Department of Plant Pathology Self Study

October 2011
The Department of Plant Pathology is one of nine academic units in the College of Food, Agricultural, and Environmental Sciences (CFAES) at The Ohio State University, and is the sole academic unit dedicated to plant-microbe interactions in Ohio's Higher Education system. The department consists of faculty, students, post-docs, and staff located on the Columbus and Wooster campuses of OSU. Funding comes from the Ohio Agricultural Research and Development Center (OARDC) and Ohio State University Extension (OSUE) line items, and from OSU Academic Programs; higher levels of financial support are obtained from external grants, contracts and gifts.

Research programs in the department encompass basic investigations of plant-microbe interactions at the molecular level to studies of epidemics at the population level, and, in parallel, mission-oriented investigations of management tactics for diseases of major crops and forest trees. Graduate education is one of the foundations of the department. Currently, there are about 2.5 graduate students per faculty advisor; 217 students have enrolled in our graduate program over the last two decades, and many of our graduates have gone on to leadership roles in academia, government and private industry. The department is fully committed to undergraduate education, with a major in Plant Health Management, a minor in Plant Pathology, a new Plant Pathology major, and courses designed for non-majors. Although our UG enrollment in our major is small, our students are very successful, and 70% ultimately enroll in graduate school. Through the use of oral, printed, and electronic media, we are at the forefront in the college in outreach and engagement efforts, primarily through our Extension education programming. Furthermore, the department is engaged globally, with leadership in international research and development projects. Planning and self-assessment are continually utilized as we develop new initiatives in research, education, and outreach. For example, we have developed a new professional master’s degree in plant health management, and are pioneering eLearning initiatives in the college in classroom and Extension education.

Our vision is to be the most credible source of unbiased, science-based information on plant diseases and plant health management in the U.S. Based on success indicators described herein, and our ongoing self-study, we strongly believe that we are one of the leading Departments of Plant Pathology in the country. We have built and maintained this prominent role despite continuing budget cuts from OARDC and OSUE, resulting most notably in the decline in the number of regular faculty members from 19 to 13 since 2000. We see many opportunities to continue our leadership role, and grow further in prominence, by making careful investments in faculty, students, staff, and in infrastructure. But we are now at a critical stage in our future. We are understaffed at the faculty level: to address new initiatives in education and outreach; to address research needs in food security, environmental quality and sustainability, and biobased products; and to take advantage of new interdisciplinary funding opportunities. Therefore, our highest and most immediate priority is to fill two faculty vacancies in basic and mission-oriented programs. We must also repair and upgrade our greenhouses on both campuses and the phytotron (growth-chamber) facility in Columbus. These targeted investments are critical to maintain and grow our leadership role in plant health science and serve our stakeholders at all levels.
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GLOSSARY OF TERMS

AA Committee – Academic Affairs Committee

APS – American Phytopathological Society, the premiere professional society for plant pathologists

APT – Appointments, Promotion and Tenure document that details criteria and procedures regarding faculty appointments

ATI – Agricultural Technical Institute, two-year technical college on the campus of the Ohio Agricultural Research and Development Center in Wooster, part of CFAES

Carmen – Ohio State’s course management system (web template for OSU courses)

CFAES – College of Food, Agricultural, and Environmental Sciences

C.O.R.N. – Crop Observation and Recommendation Network, timely recommendations provided by the OSU Extension Agronomic Crops Team (corn.osu.edu)

DPT – Departmental Promotion and Tenure Committee (also referred to as P&T)

ENLTT – Extension Nursery Landscape and Turf Team

FAHRP – Food Animal Health Research Program (OARDC program with food safety and animal health focus)

GSC – Graduate Studies Committee

HCS – OSU Department of Horticulture and Crop Science

IPM CRSP – Integrated Pest Management Collaborative Research Support Program (funded by USAID)

NRC – National Research Council

MCIC – Molecular and Cellular Imaging Center; OARDC center that provides equipment and services for microscopy, genomics and molecular biology

OARDC – Ohio Agricultural Research and Development Center

ODA – Ohio Department of Agriculture

OFFER – Organic Food and Farm Educational Research program, part of OARDC and CFAES

OSC – Ohio Soybean Council, which manages Ohio’s soybean checkoff funds research, promotion and communication initiatives

OSU – a common abbreviation for The Ohio State University (not to be confused with Oregon State University or Oklahoma State University)

OSU:pro – OSU database system in which faculty accomplishments (publications, courses, presentations, grants, etc.) are entered and catalogued for college annual reporting, promotion and tenure processes, and streamlining information sharing across campus

OSUE – OSU Extension

OSU GF – OSU General Funds, synonymous with Academic Programs

POA – Pattern Of Administration, a document describing a unit or department’s policies and procedures
for governance

**PHARM** – Plant Health and Resource Management Forum, Plant Pathology’s undergraduate student organization

**PHM** – Plant Health Management, the undergraduate major in the Department of Plant Pathology

**PMBB** – an inter-disciplinary group with faculty in Plant Pathology, Plant Cellular and Molecular Biology, and Horticulture and Crop Science

**PPDC** – C. Wayne Ellett Plant and Pest Diagnostic Clinic

**PPGSA** – Plant Pathology Graduate Students Organization

**RBB** – Responsibility Based Budgeting, formula-based budget model for the OSU General Funds allocation to university departments (pertaining to academic programs)

**SAC** – Student Advisory Committee

**Semester Transition** – OSU is changing from a quarter to a semester term calendar starting Summer 2012 (affectionately known as Q2S, for Quarters to Semesters)

**SENR** – OSU School of Environment and Natural Resources, part of CFAES

**USB** – United Soybean Board - administers soybean checkoff activities for research and market development

**USAID** – independent federal agency that provide U.S. economic and humanitarian assistance worldwide

**USDA** – U.S. Department of Agriculture

**USDA AFRI** – USDA Agriculture and Food Research Initiative (competitive grants program)

**USDA NIFA** – USDA National Institute of Food and Agriculture

**USDA ARS** – USDA Agricultural Research Service; research arm of this agency

**USDA FAS** – USDA Foreign Agricultural Service; this branch develops U.S.-global linkages to enhance export opportunities and global food security
OVERVIEW OF THE DEPARTMENT

### Background, Mission, and Vision

The Department of Plant Pathology at The Ohio State University (OSU) was established in 1967, although research and instruction on plant diseases had been conducted in Ohio since the late 1800s (see Historical Synopsis, p. 15). The department is based on two campuses 90 miles apart (Columbus and Wooster), but operates as a single academic unit within the OSU College of Food, Agricultural, and Environmental Sciences (CFAES).

The main campus of OSU is in Columbus, and the traditional home of the Ohio Agricultural Research and Development Center (OARDC, the “Experiment Station”) is in Wooster; however, OARDC funding is spread across both campuses, and at Outlying Research Stations. The majority of the academic units in CFAES have faculty, students, staff, and facilities in Columbus and Wooster.

**The primary functions of the Department of Plant Pathology include:**

- Conducting fundamental and mission-oriented research on plant pathogenic microorganisms, their interactions with plants, other microbes, and the environment, with the goal of increasing our understanding of plant disease at biological scales ranging from the molecular to the epidemiological.
- Developing and testing of new and improved disease management strategies and tactics, based on fundamental and mission-oriented research, for the purpose of ensuring plant health and productivity, as well as a secure food and fiber supply.
- Providing advanced degree programs for graduate students in fundamental and applied plant pathology and in plant-microbe interactions.
- Providing a Plant Health Management Major for undergraduate students interested in becoming plant health professionals, and providing a new Plant Pathology undergraduate major for students interested in pursuing graduate study.
- Educating undergraduate and graduate students in allied majors and in the Plant Pathology Undergraduate Minor about the principles of plant pathology, microbiology, and related subjects.
- Educating non-science majors about the role of science in their lives and the importance of plant pathology to a safe food supply and to a quality environment.
- Conducting high quality Extension-outreach and engagement programs that support the needs of key internal and external stakeholder groups – such as OSU Extension
Educators, agricultural and green industry professionals, and Ohio’s citizens – about economically and environmentally sound plant disease management practices.

- Providing expertise in the area of plant disease diagnostics with a focus on enhancing the nation’s ability to detect, respond and recover from a high consequence disease or pest outbreak.

- Making major contributions to international development in plant protection through research, teaching, and outreach with partners in numerous developing countries.

- Participation in public service activities that support the mission of the department, the College of Food, Agricultural, and Environmental Sciences, and The Ohio State University.

With these functions as a foundation, **Mission and Vision Statements** for the department are defined as follows. These statements expand on statements developed more than a decade ago, and have reconfirmed by the department in our recent self-study.

**Mission:**
We educate students, professionals, and other stakeholders in all aspects of plant disease and plant health management, and we communicate unbiased information to urban and rural citizens. The unique mission of the Department of Plant Pathology is the scientific investigation of environmental and biotic agents that cause plant diseases. The knowledge obtained in the pursuit of this mission provides the means to discover, develop, and apply innovative strategies for the environmentally sound and economically viable management of plant disease. We promote team work among ourselves and our partners to improve the quality of life in both urban and rural settings and to promote responsible management of natural and renewable resources.

**Vision:**
Plant diseases represent a significant threat to the economic stability of agricultural industries and to quality of life issues for the citizens of Ohio and for people worldwide. Plant diseases are a significant threat to human and animal life, resulting in malnutrition, famine, unsafe food and economic hardships. To deal with these realities, our vision is to be considered the most credible source of unbiased, science-based information in Ohio on plant diseases and plant health management. We strive to be recognized as a leader, both nationally and internationally, for the highest quality research and educational programs on plant-microbe interactions and plant health management.

Ohio State’s Department of Plant Pathology is one of the leading departments in the country dealing with the diseases of crops and trees. **The department is the sole academic unit dedicated to plant health and plant-microbe interactions in Ohio's Higher Education system, and is one of only 16 stand-alone plant pathology departments in the U.S.**
The faculty, staff and students of the Department of Plant Pathology, through their research, teaching, and outreach and engagement efforts directly address key facets of the three strategic signature areas of the College of Food, Agricultural, and Environmental Sciences (CFAES):

(1) **Food Security, Production, and Human Health;**
(2) **Environmental Quality and Sustainability; and**
(3) **Advanced Bioenergy and Biobased Products.**

To meet our goals in research, teaching, international development, and outreach, faculty in our department have traditionally been divided fairly evenly between Wooster and Columbus. In recent years, however, due to retirements and departures, considerably more faculty members are now based in Wooster. Details of the facilities at the two locations are provided in the INFRASTRUCTURE section.

### Department Status and Reputation

Because of difficult budget climates in the Land Grant Universities in the US over the last quarter century, there has been consolidation of departments in colleges of agriculture at many institutions. Between 1975 and 2008, ‘stand-alone’ plant pathology departments have decreased from 31 to 16, and several others may be merged, or have already merged, at institutions around the US since these statistics were compiled (2010). The total number of departments with a major plant-pathology component is now 23, with 16 of these being stand-alone plant pathology academic units. Many plant pathology departments (narrowly or broadly defined) have also chosen to specialize in a few areas rather than cover a very wide range of disciplines or sub-disciplines within the field. As stated above, the Department of Plant Pathology at Ohio State University is one of the ‘stand-alone’ departments in the country, and is the only academic unit in the state of Ohio that focuses on plant pathogens, plant diseases, plant-microbe interactions, and plant health management. Furthermore, our department has always tried to cover a very wide range of sub-disciplines in its research and teaching programs. **We thus serve a key role in educating students at the undergraduate and graduate levels, providing state-of-the-art Extension-education programs, and conducting leading research on plant diseases, plant-microbe interactions, and disease management.**
There has been no historical ranking of plant pathology departments (narrowly or broadly defined) in the US, because productivity and impact in the field can take so many different forms. The American Phytopathological Society (APS), the national professional organization of plant pathologists, has resisted efforts to become involved in rating departments or programs. There are, however, strong indications of the reputation of our department. The recent report on PhD programs from the National Research Council (NRC) is useful in this regard. NRC did not have a pure ‘plant pathology’ category for departments or programs, but it did have a ‘plant science’ category with 116 programs, including the 23 departments that have a substantial plant pathology component. We were very pleased that we ranked in the top 3-5 of the plant-pathology doctoral programs in this group using the two different scoring systems used in the NRC Study (plantpath.osu.edu/graduate-programs/about-us/). Recently revised scores (with corrected statistics) were recently received, and our rankings did not change. Using some of the measurements in the study, we had the highest rating of all plant pathology programs. However, the confidence intervals are too wide to try to give an exact ranking based on the NRC methods; rather, the results show that we are well recognized nationally for our efforts and leadership in graduate education in plant pathology. Since graduate education is partly (or heavily) evaluated based on research accomplishments, this NRC review also provides some clear documentation of our accomplishments in research. More details are given in the EDUCATIONAL PROGRAMS AND STUDENTS section of this document.

Another way to view our national impact is through our leadership roles in APS and other professional societies. **Five OSU faculty have served, or will serve, as elected APS President through 2013, including four in the past 20 years** (Rowe [1993], Madden [1997], Slack [2001], and Boehm [2013]). Moreover, Terry Niblack was the president of the Society of Nematologists (SON; 2004). Currently, three OSU plant pathologists are on the Council of APS, and several others serve, or have served, in major leadership roles. For instance, Sally Miller is the current director of the APS Office of International Programs. Larry Madden was Editor-in-Chief of the international journal *Phytopathology* and was the first chair of the APS Publications Board. Many of our faculty serve on or chair committees within APS, or have served on editorial boards of journals or on grant-review panels in Washington. Our graduate students are usually very active within APS, as well. For instance, Alissa Kriss is a member of the APS Office of Public Relations and Outreach, and Melanie Ivey is a member of the APS Public Policy Board.

Our faculty members have won numerous awards over the years. For instance, **nine (current and past) members are elected Fellows of APS**; five of our faculty have won the APS Syngenta Award, two have won the APS Ruth Allen Award, three have won the APS Excellence in Extension Award, one has won the APS Excellence in Teaching Award, one has won the APS International Service Award, and one has won the APS Hewitt & Hewitt (young investigator) Award. One faculty member won the Jakob Eriksson Prize and Gold Medal from the Swedish Academy of Sciences and also the E.C. Stakman Award from the University of Minnesota. One
faculty member received the 2010 National Teaching Award from the Association of Public and Land-Grant Universities (APLU). Another faculty member recently won the Special Meritorious Award from the American Soybean Association. Locally, faculty members have won the OSU Distinguished Scholar Award and the OSU Alumni Award for Distinguished Teaching. Moreover, several of our faculty members have been honored with awards from stakeholder organizations within the state.

Members of the Department of Plant Pathology are very proud of the department and its continuing impact in research, teaching, and Extension outreach. Subsequent sections of this document deal with major contributions in these areas. It must be pointed out, however, that the department faces some major challenges in the coming years. As discussed in the FACULTY section, the declining number of faculty members is a major concern. Graduate student enrollment remains high, but we have concerns about funding to support students in the future, given the major (and possibly unpredictable) changes at USDA-AFRI and the budgetary problems in Washington. Declining state support for counties is seriously eroding Extension in the state, making it harder for faculty state specialists to have maximum impact.

### Strategic Planning and Self-Study

The department takes self-assessment seriously, and there is continual formal and informal assessment of the status of the department in terms of research, classroom teaching, advising, Extension and outreach, and service. Through our peer-based Annual Program Review (see DEPARTMENTAL LEADERSHIP section), faculty members and senior staff have an opportunity to assess all the programs in the department on an ongoing basis, which then influences the decisions that are made in terms of new directions in the unit. Through the workings of other committees (e.g., Graduate Studies, Academic Affairs, ad hoc Faculty Priority), the current status of key components in the department is assessed, and new approaches are proposed and adopted. In CFAES, performance of every unit is evaluated every year using a range of metrics for research (OARDC), Extension (OSUE), and teaching (Academic Programs), and the evaluations affect the decision making in the department.

A formal strategic planning process was implemented with OSU a few years ago, and every college and every department had to develop a Strategic Plan. The departmental plans had to fit into the plan for the college. Several ad hoc committees and the former chair (Boehm) developed the plan for Plant Pathology, which was approved by the college (CFAES) in 2009. The major portion of the Strategic Plan — which greatly influenced the preparation of this external-review report — is attached to this document. It must be noted, however, that the 2009 Plan is already dated, based on several new developments in the department and university. For instance, the recent departure of the former chair was not anticipated when we made plans in teaching,
research, and Extension. Thus, we consider the Plan in 2009 to be a snapshot, and that plans given in this external review document should supersede those given in 2009.

In addition to the planning described above, the department had a 2-day retreat to continue with our ongoing self-assessment, and to prepare for the external review of the department. This Self-Study document reflects the deliberations at that retreat, and the writing of many individuals in the department.
**Historical Synopsis**

Research and instruction in plant pathology had already been underway at The Ohio State University for more than 75 years when the Department of Plant Pathology was established on July 1, 1967. When the university was founded in the 1870's, work in applied botany began in the Dept. of Agriculture. Classes incorporated plant disease topics in the 1880's in the Dept. of Horticulture and Botany. The first plant pathology course was taught in 1891 in the Dept. of Botany by W. A. Kellerman (left), noted mycologist and plant pathologist who chaired the department from 1891-1908. During the first half of the 1900's, research and instruction in plant pathology continued to grow on the Columbus campus.

The Ohio Agricultural Experiment Station was begun on the Columbus campus in 1882, but was moved to its present location in Wooster by 1894. Soon thereafter, A. D. Selby (right) was hired as Ohio’s first experiment station plant pathologist. He was appointed botanist and chief of the new Dept. of Plant Physiology and Pathology in 1902 and served in that capacity until 1923. Under his leadership, plant pathology research and extension fully took root in Ohio. Selby was a founder and charter member of APS and its third president. Selby Hall in Wooster is named for him. Research and Extension in plant pathology grew on the Wooster campus throughout the first half of the 1900s.

In 1948, common departments in Columbus and Wooster were joined and a Department of Botany and Plant Pathology was formed. In 1967, when the new College of Biological Sciences was formed from the agriculture and life sciences faculty, the department was split and the Dept. of Plant Pathology was formed. Dr. I. W. Deep was the first chair of plant pathology from 1968-1984. During that time, when Roy M. Kottman was Dean and Director, considerable strength was added to the discipline and the department grew in size and in national prominence. Kottman Hall in Columbus bears his name. In 1982, the Ohio Agricultural Research and Development Center at Wooster was administratively merged as an integral part of The Ohio State University, and since then the department has operated as a single academic department housed on two campuses. Before 1982, the department operated as one unit academically, but budgets were separate. The national and international visibility of the department expanded greatly in the 1980s and 1990s. After peaking with 21 faculty members in 1990, plus 3 ARS adjunct faculty, it is now composed of 13 regular OSU faculty and three USDA/ARS adjunct faculty (with two vacancies that hopefully will be approved by the college to be filled). Although traditionally there were roughly equal numbers of faculty on each campus, because of retirements and departures, the department currently has considerably more faculty in Wooster.

Dr. Deep stepped down as chair in 1984. Subsequent chairs of the department have been: Chuck Curtis (1984-96), Randy Rowe (1997-2007), Larry Madden (interim; 2007-08), Mike Boehm (2008-10), Larry Madden (interim, 2010-11). In August 2011, Terry Niblack, formerly of the University of Illinois and University of Missouri, became the new (permanent) chair of the department.
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Trends

Positions in the College of Food, Agricultural, and Environmental Sciences (CFAES) are funded by the Ohio Agricultural Research and Development Center (OARDC; the “Experiment Station”), Ohio State University Extension (OSUE), and Academic Programs (OSU General Funds, or OSU-GF). All faculty members in our department are supported by at least two of these three funding sources, and the percent appointment (FTE split) in the three areas for a faculty member broadly reflects the position description.

Changes in the FTE appointment are negotiated by the faculty member and the department chair, based on wishes of the faculty member, information supplied in the Annual Faculty Program Review (see DEPARTMENTAL LEADERSHIP section), and changing needs in the department. Although department chairs have some latitude in making FTE adjustments, as long as the total departmental dollars for the three lines do not change for a given year, the college administrative cabinet does need to approve these changes.

As with many departments in colleges of agriculture in the US, the number of full-time tenure-track faculty members in the Department of Plant Pathology has been declining for some time. The highest number of faculty (not counting USDA adjunct faculty) was 21 in 1990. In 2000, there were 19 faculty members, and there are now 13 regular faculty members in the department. Plus, there are currently two vacancies due to the retirement of Lanny Rhodes and the departure of Dennis Lewandowski, and we are hoping to replace both. Table F1 contains the list of current faculty members, and the Figure above shows the trend over the last decade. Since the 1960s, there have been USDA-ARS government scientists who are appointed adjunct faculty members in the department. These individuals are housed within Selby Hall in Wooster, perform most functions of OSU regular faculty, and are fully integrated into the unit. There are currently three USDA-ARS faculty members in the department. These individuals are promoted through the Promotion and Tenure process of the university.

Because of changing needs in research and education, and the declining number of faculty, our department has approved the position of Research Faculty, a non-tenure-track position. We have developed general procedures for the appointment of such individuals, but we have not yet hired someone in this track. As a department, we are also supportive of Clinical Faculty positions,
which are also non-tenure track. The college must first approve this type of position before we can pursue hiring someone with this title. We see such a person contributing to our education programming.

In CFAES, faculty positions revert to the college when a faculty member retires or departs. Departments can then request a new replacement position. This request requires a business plan for the position. If the department has a budget cut, which is the norm for the past decade, the department can choose to forfeit (give up) a vacant faculty position to (help) offset the cut. That is, although a vacant faculty position does not automatically return to a department, a department can apply the funds from a vacant position to deal with reductions in funding. Several times in the past decade, the department has given up faculty positions using this approach. Sometimes this happens in phases, where portions of vacant positions are given up over successive years.

It has been a long-term goal in the department to have about equal numbers of faculty in Columbus and Wooster. Although the numbers had been fairly even for a long time, due to recent retirements and faculty departures, there is now an imbalance, with eight faculty in Wooster (plus three adjuncts) and five in Columbus. It is very important that vacancy positions in Columbus are filled to restore the approximate balance between the two locations.

### Position Priorities, Recruitment and Hiring

Our department has always tried to cover, to the extent possible, the breadth of scholarship in plant pathology, while maintaining depth in multiple sub-disciplines in the field. With a generally declining total number of faculty members, it is becoming increasingly difficult to cover the breadth of the discipline, yet we still consider this a worthy goal. To guide us in our planning for faculty position replacements, our department has an ad hoc committee of faculty members (including assistant professors) to strategize about position needs in the department. This Positions Priorities Committee, which has been in the department for several years, explicitly considers short- and long-term needs in teaching, Extension, and research (anticipating retirements or faculty departures, when possible), and presents proposals to the faculty, usually during faculty meetings. The balance between basic and mission-oriented research is considered (the department likes both), as are the specific disciplinary needs (or assumed needs). As appropriate, the ad hoc committee writes draft position descriptions to help guide the discussion at faculty (departmental) meetings. Priorities are then established by the faculty as a whole. The deliberations of the ad hoc committee and the faculty as a whole lead to a general plan for faculty hires. More details are given under “Talent Plan” in the Strategic Plan that was established in 2009 (see APPENDIX C).

When a vacancy is available, the faculty decide on the highest priority, based on the long-term plan and unexpected needs. In the latter case, unexpected faculty departures can obviously
change the plan in the short term, such as when the department chair took a new position in 2010. For instance, during the search for a new chair, the Dean decided that we would need to delay a search for a fungal biologist, which was our highest priority. Given the wishes of the faculty, the chair of the department prepares a faculty-position proposal for the CFAES cabinet, consisting of a business plan for the position and a position description. If approved, the chair of the department appoints a search committee, consisting of faculty members, and usually a student and staff member. Depending on the nature of the position, a stakeholder may be also included (e.g., a representative a commodity group), or a faculty member in another department. These search committees include a combination of senior and junior faculty members.

Advertising for a faculty position depends on the nature of the position. We always advertise with the APS Placement Service, and then customize the other ads to the particular position. Molecular biology positions are often advertised in *Science*. We also use our department website to advertise positions, and send the position description to contacts in the US and other countries. **The department takes diversity issues very seriously in all recruitment efforts, and works closely with the Diversity coordinator for the college in our recruitment efforts.** Some position advertising is targeted to websites or on-line placement services heavily utilized by minorities and women in academia.

The search committee selects the candidates to interview for a faculty position. The interview involves the entire department, including staff and students on both campuses, interested outside groups (within and outside the university), and the administrative cabinet of CFAES. Always keeping diversity in mind, input is sought from all those participating in the interview, and the entire faculty then meet as a group to discuss and then rank candidates. The meeting is usually chaired by the chair of the search committee. Final selection of the candidate for the position requires at least a two-thirds affirmative vote by the faculty. The departmental choice is presented to the Dean (and the CFAES cabinet) for final approval.

The start-up package for a new faculty hire varies greatly, but consists of cash funds allocated by the college (from the different budgetary lines, depending on the position) and from the department. Departmental cash funds are usually obtained from overhead returned to the department. New hires can then choose to use the cash as needed for the early support of the program. A major challenge in recruiting top candidates for some positions is finding sufficient funds for the start-up package. It will become even more difficult to assemble sufficient funds for adequate start-up packages for some positions.

*In summary, the department is satisfied with its efforts in establishing position priorities, and in recruiting and hiring of faculty. As described above, the biggest challenge is holding onto positions as individuals retire, and in assembling competitive start-up packages.*
Diversity

Diversity is a high priority in the university and college, and the Department of Plant Pathology strongly supports this priority. As with most academic departments in the sciences, our faculty members come from many backgrounds and countries. Four of our current faculty are naturalized citizens or have permanent residence in the US. Moreover, three of our regular faculty are women, and two of our adjunct faculty are women. As is also typical in agricultural science departments, we are underrepresented in traditional minorities (US citizens who are African American, Hispanic, or Native American). We always strive to recruit from these groups when advertising for positions, but the pool of candidates is extremely small.

With our faculty, staff, and students, we always strive to honor diversity and have a congenial and cooperative working environment.

Retention of Faculty

Retention of our faculty members is always a priority for the department and college. We assume that all faculty hired will be productive and have high-impact (and long) careers at OSU. Given very limited hard-money resources, major financial incentives to retain faculty are not really feasible. However, the college is willing to consider counter offers (in terms of salary and cash support) for top performing faculty members when they are being recruited by other institutions. Overall, we feel that we have a good retention record in the department. However, there has been a case in the department where we could not really come up with a competitive counter offer for one faculty member. Other (non-retiring) faculty members who have left the department in the past decade have done so primarily to change careers (administration, for instance), and retention efforts were not relevant.

The department believes that retention of faculty may best be done by giving members flexibility in following their interests, and by making sure that members feel that they have important roles in the life of the department. In our department, position descriptions evolve over time, and it is common for faculty members to move in new directions (both in research, teaching, and Extension) as interests and needs change, and as new opportunities arise. Through the Annual Program Review (see section on DEPARTMENTAL LEADERSHIP) and Annual Promotion and Tenure evaluation (for non-full professors), faculty members can make the case for moving in new directions or taking on different duties or assignments. For instance, two of our current faculty members have long-term special assignments at universities in other countries (S. Korea and China), and one of our faculty members greatly expanded her work in international development in the last 15 years. Changes that entail a different make-up of the three funding sources supporting a position can complicate the process, but these changes can be made by the chair in the department, after the approval of the college administrative cabinet.
As discussed elsewhere in the document, all faculty members play important roles in the life of the department through their participation in many key committees. Even for the newest faculty members, it is common to serve on the Program Review committee, where key feedback is given to all faculty members on their performance. This internal peer review of individuals, a long-standing tradition in Plant Pathology at OSU, helps build camaraderie within the unit, and makes it clear that everyone has a voice in the system.

Mentoring and Incorporation of Faculty into the Workings of the Department

The department fully understands that being a faculty member is a difficult and challenging job. There are ever-increasing pressures to obtain outside funding for maintaining a fully-functioning research program, with financial support for students, technicians, and post-docs. Moreover, as the number of faculty members has decreased in our department, course loads for many faculty have increased during the last decade. In Extension, declining financial support in the counties, and declining numbers of Extension faculty in other departments (for some commodities) has made the work of our plant pathology state specialists more difficult and time consuming. The department thus realizes that mentoring of newer faculty members is extremely important.

Mentoring in Plant Pathology occurs on multiple formal and informal levels. Each assistant and associate professor is assigned a Teaching Evaluation (TE) committee consisting of two more senior faculty members. Each junior faculty member has a unique TE committee, although many of the senior faculty members serve on two of these committees. Membership on the committee usually changes when the assistant professor is promoted to associate professor. The TE committee formally works with the faculty member to: evaluate their performance in classroom teaching and/or Extension education (as relevant) during each year; develop goals and strategies for subsequent years to maximize effectiveness and impact in teaching (broadly defined); and give advice on the departmental expectations of faculty members with appointments in classroom teaching and/or Extension. Because the TE committee works one-on-one with the faculty member, the committee often provides mentoring in the broader aspects of faculty performance, productivity, and impact, not just in the narrowly-defined areas of teaching. Each TE committee writes an annual summary letter to the chair of the departmental P&T committee, and this letter becomes part of the Promotion and Tenure dossier of the faculty member.

The Departmental P&T (DPT) committee meets with each junior faculty member every year, to review their performance in all aspects of their program, and to assess their progress towards promotion. This committee gives verbal advice to the faculty members, and a summary letter is written to the faculty member by the department chair, based on the comments given by the P&T committee. Each junior (and senior) faculty member also meets yearly with the Departmental Program Review committee, which is a committee comprised of senior and junior faculty
members elected within the department, as well as the chair and associate chair of the department. **Unique to our department in the college, this DPT committee provides a peer evaluation of all faculty members on an annual basis.** Based on the written report by the faculty member and the discussion with the committee, the chair then summarizes the performance of the faculty member and provides advice for the future. More details on these committees can be found under DEPARTMENTAL LEADERSHIP.

Another aspect of the mentoring is to make sure that **all junior faculty members are fully involved in the workings of the department.** Although always cautious about putting new faculty members on too many committees while they are trying to develop a new program, our department has a culture of getting our newest hires involved early in the operations of the department. For instance, consider the annual Program Review Committee described above. The department routinely elects a new assistant professor to serve as one of the members of the committee. This gives the new person an excellent opportunity to find out what each faculty member is doing, and to learn first-hand about the expectations for research, teaching/Extension, and service for a faculty member. The new faculty members almost always have many valuable contributions to make during the committee deliberations, based in part on their prior experiences. In fact, this committee service demonstrates that our department is always looking for fresh ideas and perspectives. In some cases, a relatively new faculty member may even chair certain key departmental committees, depending on their interests and the needs in the department. For instance, the current chair of the Academic Affairs committee is an assistant professor (Thomas Mitchell).

*In conclusion, we believe that the department has a successful procedure for mentoring new faculty members and having them become fully integrated into the workings of the unit.*
<table>
<thead>
<tr>
<th>NAME</th>
<th>TITLE</th>
<th>9/12 MOS</th>
<th>OSU</th>
<th>OSUE</th>
<th>OARDC</th>
<th>OTHER (*)</th>
<th>YEARS (OSU)</th>
<th>AREA OF SPECIALTY</th>
<th>COURSES TAUGHT (***)</th>
<th>LOCATION</th>
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<td>L. V. Madden</td>
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<td>COURTESY or Tenure Unit (***))</td>
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<td>100</td>
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24
* “OTHER” funding line means that the salary comes from non-OSU sources (i.e., USDA-ARS for adjunct faculty members) or through other departments or colleges (e.g., Courtesy faculty).

** For “COURSES TAUGHT”, the Instructor of Record is listed. Several courses are team taught, but there is always a lead instructor/coordinator for the course. Course numbers will be different in the semester system (Summer 2012).

*** Courtesy or Tenure-Unit faculty members have a wide range of roles in the department. Some simply have their tenure through our unit (Slack and Nameth), where others are involved in teaching (Chatfield, Boehm) and/or research (Boehm, Meulia). In contrast, the listed adjunct faculty members are more fully or completely integrated into the full workings of the department.
RESEARCH AND SCHOLARSHIP

Research and scholarship are foundational components of the faculty programs in the Department of Plant Pathology. All regular faculty members in the department are supported by the OARDC line item budget (see Table F1, above). Most faculty have a 50% or higher OARDC appointment, reflecting the importance of research for the success and reputation of the unit. Faculty are hired to conduct research within broadly or narrowly defined areas and to provide expertise within different disciplines in the field of plant pathology. Moreover, faculty have freedom to develop, refine, expand, or revise their research programs over time in a collegial atmosphere that values cooperation and interdisciplinary dialogue. By doing so, the Department has been able to cultivate faculty that have earned national and international awards and recognition for both fundamental and mission-oriented research. Furthermore, faculty members in the department serve as major participants in a wide range of interdisciplinary and transdisciplinary research programs involving multiple departments, colleges, and universities.

Measures of research quality and impact vary, but by most measures our faculty excel in their research mission. Since 2003, members of the department have been PIs or co-PIs on over 400 grants and contracts totaling over $40 million, with about $29 million in funds allocated to our department. Another $3.8 million in gifts and “grants-in-aid” to support research have been received in the same time period. Since 2006, our faculty programs have also published over 300 peer-reviewed research articles in leading journals (see APPENDIX B), over 200 Extension Bulletins and Fact Sheets, and over 40 book chapters.

Our faculty have also generated new intellectual property, contributing to the development and release of new disease-resistant cultivars, material transfer agreements and the filing of 9 patents. The numbers compare very favorably to many other departments in the college that have significantly more faculty, indicating high levels of productivity and quality of research outputs by our department.
Research Foci and Diversity of Faculty Programs

Across the department and within individual laboratories, there is a great diversity of expertise and in the types of research projects being conducted. Our department has made a concerted effort to develop research programming that is both thorough and balanced. Through research, faculty programs provide essential support to growers, stimulate novel and innovative discoveries, and provide a vehicle for training the next generation of plant pathologists, thereby fulfilling an essential component of the Land Grant mission.

The major research foci within the department include:

- Genomics and molecular genetics of resistance and pathogenicity;
- Biochemistry of disease resistance;
- Genetics of resistance and breeding for resistance;
- Development and testing of biocontrols, biopesticides, and biobased products;
- Integrated disease management;
- Quantitative epidemiology, disease modeling and risk prediction.

Moreover, we cover the major crops of the state, especially for mission-oriented research, and most of major pathogen groups (but see the important comments below). Some of the major funded research projects in the department are given in Table S1 and S2.

Table S1. Self-reported areas of current faculty research programs.

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<tr>
<th>Name</th>
<th>Research topics</th>
<th>No. of Funded Projects</th>
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</thead>
<tbody>
<tr>
<td>Bonello, P.</td>
<td>Metabolomics and proteomics of tree/pathogen and tree/insect interactions; chemical ecology in forest systems</td>
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<tr>
<td>Dorrance, A.E.</td>
<td>Field crop pathology; management of soybean diseases; plant disease resistance</td>
<td>10</td>
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<tr>
<td>Ellis, M.A.</td>
<td>Fruit crop pathology and epidemiology; disease forecasting; integrated management of fruit crop diseases</td>
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<tr>
<td>Graham, T.L.</td>
<td>Gene silencing and metabolomics for examination of soybean pest resistance; development of a software pipeline for LC-MS based plant metabolomics</td>
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<tr>
<td>Madden, L.V.</td>
<td>Quantitative epidemiology and mathematical and statistical modeling of plant diseases; risk assessment and prediction for plant diseases based on environment and biological factors; optimization of decision tools</td>
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<tr>
<td>Name</td>
<td>Research topics</td>
<td>No. of Funded Projects</td>
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<td>Miller, S.A.</td>
<td>Sustainable disease management/IPM in vegetable crops; diagnostics; invasive disease etiology; food safety</td>
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<td>Biocontrol/biopesticide development, microbial diversity and ecology, multivariate statistics, bacterial genomics</td>
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<td>Mitchell, T.K.</td>
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<td>Nematology: soybean cyst nematode biology and management; nematodes associated with maize; nematode communities in agroecosystems</td>
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<td>Paul, P.A.</td>
<td>Epidemiology and management of corn and small grain diseases; development and testing of resistant wheat cultivars; food safety; epidemiology; meta-analysis</td>
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<td>Qu, F.</td>
<td>Plant viruses, virus-plant interactions, virus resistance, food safety, parasitic plants</td>
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<tr>
<td>Taylor, C.G.</td>
<td>Nematology, biology of root parasitism and symbiosis, plant molecular biology, molecular microbiology</td>
<td>7</td>
</tr>
<tr>
<td>Wang, G-L.</td>
<td>Plant molecular biology, plant disease resistance genes of rice, plant genomic and transcriptomic analyses</td>
<td>5</td>
</tr>
</tbody>
</table>

**Table S2. Additional expertise provided by some senior staff, adjunct, and courtesy faculty.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Research Topics</th>
<th>No. of Funded Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rimelspach, J.W.</td>
<td>Turf pathology, diagnostics, disease management, fungicide effects</td>
<td>1</td>
</tr>
<tr>
<td>Taylor, N.</td>
<td>Diagnostics</td>
<td>1</td>
</tr>
<tr>
<td>Meulia. T.</td>
<td>Microscopy, genomic/transcriptomic data analyses, mechanisms of virus resistance</td>
<td>3</td>
</tr>
<tr>
<td>Opiyo. S.</td>
<td>Bioinformatics, genomics, metabolomics, multivariate statistics, and proteomics data analyses</td>
<td>1</td>
</tr>
<tr>
<td>Redinbaugh. M.G.</td>
<td>Plant virology, virus disease resistance, plant-virus-vector interactions. Phytomlasma disease in maize.</td>
<td>4</td>
</tr>
<tr>
<td>Stewart, L.</td>
<td>Plant virology, plant-virus interactions, virus-vector interactions</td>
<td>1</td>
</tr>
</tbody>
</table>

Despite the breadth of expertise and research programs described in the tables, the department recognizes gaps in expertise that need to be filled to maintain our national prominence as a leader in the field of plant pathology and plant-microbe interactions. These gaps include insufficient coverage and depth of expertise in the areas of bacterial pathogenesis and genetics, ornamental pathology, mycology, evolutionary pathogenomics, and bioinformatics. Retirements or the departure of a faculty member are responsible for some of the present gaps in mycology and ornamental pathology. In the context of the current and predicted funding landscape, we believe that
there are sufficient funding opportunities to build and maintain world-class programs in these areas at The Ohio State University. With the current two faculty vacancies in the department, we have the immediate goal or hiring one faculty member in mycology (with a possible emphasis in evolutionary pathogenomics) and a second one in ornamental pathology. In order to maintain and further solidify our national and international reputation in plant pathology, we believe that it is essential that new tenure-track faculty with expertise in the areas mentioned above be added to the department. These faculty members will contribute to our teaching and/or Extension programs, as described in subsequent sections.

### Plant Pathology Research Programs in Relation to the College’s Signature Areas and University Directives

In order to understand the scope and nature of research activities in the Department of Plant Pathology, one needs to understand the institutional context in which the department operates. At the Department level, faculty aim to align their research programs to complement each other, effectively compete for funding at the state, national, and international levels, and do so while supporting the broader initiatives of the College and University. All of our faculty members collaborate with faculty in other departments in the college, the university, or around the world. Many of our faculty formally participate in, or provide leadership of, interdisciplinary groups, such as the Plant Molecular Biology and Biotechnology (PMBB) program and the Organic Food and Farm Educational Research (OFFER) program. Over the past few years, the College of Food, Agricultural, and Environmental Sciences (CFAES) has adopted three *Signature Areas* to define its current and future efforts in research, teaching, and outreach (including Extension). These areas are:

1. *Food Security, Production, and Human Health*;
2. *Environmental Quality and Sustainability*; and
3. *Advanced Bioenergy and Biobased Products*.

At the same time, the university has launched multiple efforts to encourage innovation and enhance the scope, impact and relevance of faculty research, in order to improve its reputation as a leading, global university. Furthermore, recognizing the essential connections between society and the scientific enterprise, the University administration has widely promoted highly innovative, trans-disciplinary, trans-institutional and global research, while maintaining the highest quality standards of rigor. Additionally, there have been recent university-wide initiatives to expand outreach and engagement, to make faculty research more relevant to and more appreciated by the general public. **The faculty in plant pathology actively design their research programs with these institutional efforts in mind.** In passing here, it must be emphasized that the department has always been a leader in outreach to the public, primarily through its Extension Education programming. Details are contained in the OUTREACH AND ENGAGEMENT section.
Here, we present a brief synopsis of our research projects in the context of the CFAES Signature Areas and University goals noted above. Table S3 highlights the salient characteristics of the research funding, focus, and scope of collaborative connections in each of the faculty laboratories. Because the number of currently active projects is extensive, only a few projects from each faculty member are listed, again highlighting the programmatic diversity managed within and across laboratories. More details on how these projects meet our institutional goals, and are consistent with the College Signature Areas, are given in the Departmental Strategic Plan, pp. 14-21 (APPENDIX C).

Table S3. Self-reported sampling of the scope and alignment of currently funded research projects in the Department of Plant Pathology.

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Project Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonello</td>
<td>PI: Identification of mechanisms and genetic markers of ash resistance to EAB</td>
</tr>
<tr>
<td>Bonello</td>
<td>PI: Natural resistance of coast live oak to <em>Phytophthora ramorum</em></td>
</tr>
<tr>
<td>Bonello</td>
<td>PI: Testing the systemic induced resistance hypothesis: implications for plant defense theory</td>
</tr>
<tr>
<td>Bonello</td>
<td>PI: Validation and development of a methyl jasmonate delivery system for insecticide-free control of the emerald ash borer</td>
</tr>
<tr>
<td>Dorrance</td>
<td>PI: R-gene cluster for <em>Phytophthora sojae</em> resistance Rps genes</td>
</tr>
<tr>
<td>Dorrance</td>
<td>PI: Screening and fine mapping resistance to Ohio’s major soybean pathogens</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Funding Agency</th>
<th>CFAES Signat. Area</th>
<th>OSU goals</th>
<th>Collaborating Departments or Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>USDA APHIS</td>
<td>2</td>
<td>I, T</td>
<td>Entomology, Wright State, US Forest Service</td>
</tr>
<tr>
<td>USFS FHP</td>
<td>2</td>
<td>T</td>
<td>Univ. of California, Berkeley</td>
</tr>
<tr>
<td>OARDC SEEDS</td>
<td>2</td>
<td>T</td>
<td>Entomology, Wright State</td>
</tr>
<tr>
<td>OARDC SEEDS</td>
<td>2</td>
<td>T, O</td>
<td>Entomology</td>
</tr>
<tr>
<td>United Soybean Board</td>
<td>1, 3</td>
<td>I, O</td>
<td>USDA-ARS, Iowa State</td>
</tr>
<tr>
<td>Ohio Soybean Council</td>
<td>1, 2</td>
<td>I, O</td>
<td>HCS, ARS/ Wooster</td>
</tr>
<tr>
<td>Faculty&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Project Topic&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Funding Agency</td>
<td>CFAES Signat. Area&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------</td>
<td>----------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Dorrance</td>
<td>PI: Expedited delivery of Phytophthora QTL and how they impact yield</td>
<td>United Soybean Board</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Dorrance</td>
<td>Co-PI: Characterization of promoters from soybean pathogen-responsive genes</td>
<td>N Central Soybean Research Program</td>
<td>1, 3</td>
</tr>
<tr>
<td>Ellis</td>
<td>Development and Implementation of grape disease management programs for Ohio</td>
<td>Ohio Grape Industry</td>
<td>1, 2</td>
</tr>
<tr>
<td>Ellis</td>
<td>An integrated decision support system for strawberry disease control</td>
<td>USDA/SCRI</td>
<td>1, 2</td>
</tr>
<tr>
<td>Ellis</td>
<td>Studies on the sporulation of <em>Phomopsis viticola</em> on grape canes</td>
<td>USDA Viticulture Consortium East</td>
<td>1, 2</td>
</tr>
<tr>
<td>Graham</td>
<td>PI: Development of Software to Generate Array-Like Data from LC-MS Based Metabolomics</td>
<td>Ohio Plant Biotech Consortium</td>
<td>1, 2</td>
</tr>
<tr>
<td>Graham</td>
<td>PI: Metabolomic Analysis of Pest Resistance in Soybean</td>
<td>Ohio Soybean Council</td>
<td>1, 2</td>
</tr>
<tr>
<td>Madden</td>
<td>Co-PI: FHB and mycotoxins epidemiology, and risk assessment modeling</td>
<td>USDA-ARS-USWBSI</td>
<td>1, 2</td>
</tr>
<tr>
<td>Madden</td>
<td>Co-PI: An integrated decision support system for strawberry disease control</td>
<td>USDA/SCRI</td>
<td>1, 2</td>
</tr>
<tr>
<td>Faculty1</td>
<td>Project Topic2</td>
<td>Funding Agency</td>
<td>CFAES Signat. Area3</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Madden</td>
<td>Co-PI: Studies on the sporulation of Phomopsis viticola on grape canes</td>
<td>USDA Viticulture Consortium East</td>
<td>1, 2</td>
</tr>
<tr>
<td>Miller</td>
<td>PI: Systems approach to managing microbial threats to greenhouse tomatoes</td>
<td>USDA SCRI</td>
<td>1, 2</td>
</tr>
<tr>
<td>Miller</td>
<td>PI: Integrated pest management regional programs in South Asia and West Africa (2 projects) Also co-PI on two others)</td>
<td>USAID IPM CRSP</td>
<td>1, 2</td>
</tr>
<tr>
<td>Miller</td>
<td>PI: Distribution, ecology and management of Xanthomonas gardneri causing bacterial spot in Midwestern tomatoes and peppers</td>
<td>USDA NC IPM Critical Issues</td>
<td>1</td>
</tr>
<tr>
<td>Miller</td>
<td>International Plant Diagnostic Network</td>
<td>USAID IPM CRSP</td>
<td>1, 2</td>
</tr>
<tr>
<td>McSpadden Gardener</td>
<td>PI: Cover crops and inoculants to suppress soilborne diseases of plants</td>
<td>NIFA OREI</td>
<td>2, 3</td>
</tr>
<tr>
<td>McSpadden Gardener</td>
<td>PI: Suppression of E. coli O157 in dairy cattle</td>
<td>NIFA Food Safety</td>
<td>1</td>
</tr>
<tr>
<td>McSpadden Gardener</td>
<td>Co-PI: Characterization of tomato fruit shape genes</td>
<td>NSF PGP</td>
<td>1</td>
</tr>
<tr>
<td>Faculty</td>
<td>Project Topic</td>
<td>Funding Agency</td>
<td>CFAES Signat. Area</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>McSpadden Gardener</td>
<td>Co-PI: Hydraulic redistribution and rhizosphere biology of degraded agroecosystems of the Sahel</td>
<td>NSF PIRE</td>
<td>1</td>
</tr>
<tr>
<td>Mitchell</td>
<td>PI: Application of the EXZACT™ Precision Technology to Fungal Systems.</td>
<td>DowAgro</td>
<td>1</td>
</tr>
<tr>
<td>Mitchell</td>
<td>Co-PI: Infection and colonization of bermudagrass by Ophiosphaerella species, the causal agents of spring dead spot of bermudagrass</td>
<td>USGA</td>
<td>2</td>
</tr>
<tr>
<td>Mitchell</td>
<td>Co-PI: AvrPiz-t-mediated suppression of PAMP- and effector-triggered immunity in rice by targeting host ubiquitin proteasome system</td>
<td>NSF SYMBIOSIS DEF &amp; SELF RECOG</td>
<td>1</td>
</tr>
<tr>
<td>Niblack</td>
<td>Co-PI: Improving management of soybean cyst nematode through Extension demonstration and outreach - Phase II</td>
<td>N Central Soybean Research Program</td>
<td>1, 3</td>
</tr>
<tr>
<td>Paul</td>
<td>Co-PI: Development of a biopesticide to control FHB</td>
<td>Industry OARDC</td>
<td>1, 3</td>
</tr>
<tr>
<td>Paul</td>
<td>Co-PI: FHB and mycotoxins epidemiology, and risk assessment modeling</td>
<td>USDA-ARS/USWBSI</td>
<td>1, 2</td>
</tr>
<tr>
<td>Paul</td>
<td>PI: Risk-based integrated management of foliar diseases of wheat</td>
<td>USDA-NC IPM</td>
<td>1, 2</td>
</tr>
<tr>
<td>Paul</td>
<td>PI: Strobilurin fungicides effect on mycotoxin accumulation in wheat</td>
<td>OSGMP</td>
<td>1, 2</td>
</tr>
<tr>
<td>Qu</td>
<td>Co-PI: Mechanism of norovirus association with fresh produce</td>
<td>USDA-NIFA AFRI</td>
<td>1</td>
</tr>
<tr>
<td>Faculty</td>
<td>Project Topic</td>
<td>Funding Agency</td>
<td>CFAES Signat. Area</td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
<td>----------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Qu</td>
<td>Co-PI: Disease resistance engineering in soybean</td>
<td>USDA-NCSRP</td>
<td>1, 2</td>
</tr>
<tr>
<td>Redinbaugh</td>
<td>Control of virus diseases in corn and soybean</td>
<td>USDA, ARS</td>
<td>1, 2</td>
</tr>
<tr>
<td>Redinbaugh</td>
<td>U.S. Serbia cooperation on management of maize redness</td>
<td>USDA, FAS</td>
<td>1, 2</td>
</tr>
<tr>
<td>Stewart</td>
<td>Molecular characterization and insect transmission of <em>Maize chlorotic dwarf virus</em></td>
<td>USDA-ARS</td>
<td>1</td>
</tr>
<tr>
<td>Taylor</td>
<td>PI: Functional Genomics of Transfer Cells</td>
<td>NSF PGP</td>
<td>1, 3</td>
</tr>
<tr>
<td>Taylor</td>
<td>PI: Characterization of the Pseudomonas genus of bacteria for plant-parasitic nematode control</td>
<td>AFRI NIFA</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Taylor</td>
<td>Co-PI: Application of biotechnology to control the soybean cyst nematode (SCN)</td>
<td>USB</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Taylor</td>
<td>PI: Evaluation of soybean cyst nematode populations in Ohio</td>
<td>OSC</td>
<td>2, 3</td>
</tr>
<tr>
<td>Wang</td>
<td>AvrPiz-t-mediated suppression of PAMP- and effector-triggered immunity in rice by targeting host ubiquitin proteasome system</td>
<td>NSF-IOS</td>
<td>1, 2</td>
</tr>
<tr>
<td>Wang</td>
<td>Understanding the rice epigenome: From genes to genomes</td>
<td>NSF-Plant Genome Research</td>
<td>1, 2</td>
</tr>
<tr>
<td>Faculty</td>
<td>Project Topic</td>
<td>Funding Agency</td>
<td>CFAES Signat. Area</td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
<td>----------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Wang</td>
<td>Identification of cell wall synthesis regulatory genes involved in regulating</td>
<td>DOE-USDA</td>
<td>2, 3</td>
</tr>
<tr>
<td>Wang</td>
<td>Mining new disease resistance genes using 1M SNP chip and 2K diversity panel</td>
<td>IRRI-USAID</td>
<td>2,3</td>
</tr>
</tbody>
</table>

1Up to four self-selected projects are highlighted for each faculty member to provide a sense of the diversity of projects and connections made throughout the Department.

2More information in the section, Funding for Research, following Table S3. Impact statements give highlights of a few of these projects.

3CFAES Signature areas: 1-Food Security, Production, and Human Health; 2-Environmental Quality and Sustainability; and 3-Advanced Bioenergy and Biobased Products.

4OSU Goals: I-innovation/IP generation; T- transdisciplinary; G-global efforts, O-outreach and engagement to stakeholders.

5Listings refer to OSU Departments and/or institutions of non-OSU research cooperators and collaborators.

### Research Impact

The faculty programs in our Department are, as a whole, well-developed, connected, and actively engaged in meeting stakeholder needs. The impact of our research can be measured in many ways, but OARDC has focused on highlighting topics in a way that is not simply grant or project-based. Rather, Impact Statements are developed over time as the result of sustained research efforts in various fields. Selected statements are included at the end of this section. The grant and gift support, the faculty recognitions given in the FACULTY section, and the publications in major journals and books all provide further evidence of the impact of the research.

### Funding for Research

Faculty members support their research programs with funds from competitive grants, gifts, and contracts. All faculty members receive soft-money support; however, the sources of funding vary greatly, based on the nature of their research and appointment. Some of the diversity of funding is exemplified in Table S3 above. It was pointed in the introduction to this RESEARCH section that the members of the department were awarded over $29 million since 2003, but some of this will only be spent over the next few years. Detailed records are available on total direct and indirect
(overhead) expenditures from grants, gifts, and contracts. These numbers do not indicate the total monies awarded in a given year for a given proposal; rather, they indicate the monies spent from external sources by members of the department. This is the most “objective” (or possibly “neutral”) way to summarize the grant activity from projects that transcend departments, colleges, and institutions. Based on these expenditure values, the total soft-money support peaked, temporarily, in 2006-07, both as an absolute total and when calculated on a faculty FTE basis (Table S4). This was partly due to the departure of a faculty member with a very large program. After a temporary decline, expenditures have again risen, and will likely be maintained at greater than $200,000 per FTE through 2012. Considering recent new grant awards, expenditures will likely rise through 2013 or 2014. However, maintaining these numbers is a serious challenge, given the decline in faculty numbers.

Table S4. Direct expenditures in Department of Plant Pathology (2003-2010) from soft money sources (grants, contracts and gifts).

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct ($)</th>
<th>Indirect ($) (Overhead)</th>
<th>Total ($)</th>
<th>Total per FTE ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>2,040,191</td>
<td>286,653</td>
<td>2,326,844</td>
<td>136,873</td>
</tr>
<tr>
<td>2004</td>
<td>2,464,331</td>
<td>355,632</td>
<td>2,819,963</td>
<td>176,248</td>
</tr>
<tr>
<td>2005</td>
<td>2,598,317</td>
<td>340,483</td>
<td>2,938,800</td>
<td>172,871</td>
</tr>
<tr>
<td>2006</td>
<td>2,825,714</td>
<td>413,133</td>
<td>3,238,847</td>
<td>231,346</td>
</tr>
<tr>
<td>2007</td>
<td>2,845,749</td>
<td>389,106</td>
<td>3,234,855</td>
<td>231,061</td>
</tr>
<tr>
<td>2008</td>
<td>2,222,658</td>
<td>264,302</td>
<td>2,486,960</td>
<td>165,797</td>
</tr>
<tr>
<td>2009</td>
<td>2,345,454</td>
<td>249,126</td>
<td>2,594,580</td>
<td>162,161</td>
</tr>
<tr>
<td>2010</td>
<td>2,525,668</td>
<td>252,913</td>
<td>2,778,581</td>
<td>213,737</td>
</tr>
</tbody>
</table>

The soft-money income and expenditures are built upon similar levels of hard money support for the Department. Specifically, total hard-money funding is now $2.3 million per year (from OARDC [~53%], OSUE [~17%], and Academic Affairs [~30%]), not including fringe benefits (which are tracked internally by the college). These funds are used to pay for faculty salaries, a small number of staff, and for partial support of the graduate program. Total (net) hard-money support from OARDC and OSUE have been declining yearly for more than a decade. The decline is due to reductions in state appropriations to the line items and to the necessity of covering salary adjustments internally (i.e., when appropriations are insufficient to cover the cost of the salary increases).
An additional source of support comes from the Indirect (Overhead; F&A [Facilities and Administration]) funding of projects. A portion of the Overhead listed above in Table S3 is returned to the Department. This return on Overhead supports various activities in the department (as “cash”), and has been essential for departmental operations. This “cash” is used for equipment repair and new major equipment purchases (usually as a cost-share). A major portion of the start-up packages for new faculty hires come from this source of income. For research programs on the Wooster campus, there is a simple formula for overhead return (25% of the total F&A), but for the Columbus campus, the formula is complex and subject to frequent adjustments from the university (making it almost impossible to predict the percentage return in any given year). For the past 5 years, income from Overhead return to the department has totaled $435,000 (across both campuses), or $87,000/year. We expect this income to continue at about the same level, or increase somewhat, over the next 3 years, based on the new grants that have been funded.

Also, it should be noted that the annual OARDC Performance Review, which can affect hard-money allocations to the Department, does not adjust for number of faculty, and also is based on a 3-year rolling average. Thus, the drop in 2008 soft-money expenditures still had a negative effect on the metrics used for 2010, even though our grant and gift support numbers are up.

As described in the Strategic Plan for the department (APPENDIX C), it is our goal to continue to increase the total amount of soft-money support for Plant Pathology. However, despite our success, our faculty numbers have declined since that plan was formulated, and, changes in the USDA-NIFA-AFRI programs have raised serious concerns about funding levels from that source. It must also be emphasized that most of the current faculty members in the department are at maximum capacity in terms of the size of their research programs. Increases in faculty funding, on an FTE basis, can only be asymptotic, i.e., any given faculty can only obtain a finite amount of funding and any expectation that funding will keep increasing forever must be considered implausible. Thus, we do not anticipate any major increases in research support for established faculty research programs. However, our newest faculty members are working hard on obtaining additional research support, and we anticipate that they too will have their programs at maximum capacity within a few years. Our main long-term growth in soft-money support, as a department, will only come from the hiring of new faculty members who can compete effectively for funding in an unpredictable future funding environment.

One final note about funding must be emphasized. Our priorities in hiring faculty members are not based exclusively on the ability to attract large research grants from competitive federal sources. Although we certainly expect that each faculty member obtain sufficient funding to support their research program, we recognize that the potential for funding varies among different research programs. Our priorities for new (replacement) faculty positions, as established by all the faculty in the department, are based on needs in research, teaching, and outreach (Extension).
A Sampling of Selected Impact Statements (OARDC Research)

Departments in CFAES annually prepare a limited number of Impact Statements, to highlight accomplishments in basic, mission-oriented, or interdisciplinary research. It would be very difficult to give Impact Statements for all the research programs in the department. Here we list a sampling of the statements from the past 2 years, just to show the breadth of the research in the department.

Elucidating Host Defense Mechanisms for Management of Fungal Diseases of Crops

Plant Pathology researchers are unraveling the molecular basis of plant host defense mechanisms against fungal plant pathogens. Using the model system of rice blast, new genes are being discovered and characterized in order to develop novel fungal disease management strategies for the world's major crops.

Situation

The majority of plant diseases are caused by fungal pathogens, many of which threaten crop production worldwide. OARDC research centers on the molecular basis of host responses to rice blast, caused by the fungal pathogen Magnaporthe oryzae. Rice blast is the most devastating disease of rice and is estimated to cause $6 billion in annual losses worldwide. M. oryzae also infects wheat and in recent years has caused significant losses in South America. Worldwide, this pathogen is a major threat to crop production and food security. Cultural management efforts have been only partially successful and environment-damaging fungicides are not affordable to farmers in the developing countries. The use of resistant cultivars is the most effective strategy to control the disease. To date it has not been fully understood how the fungus manipulates the host plant's defense and causes disease. This understanding is key to developing resistant plants as an economically and environmentally sound management strategy.

Response

Molecular tools have provided insight into disease resistance processes in the plant. Three broad-spectrum resistance genes (Pi2, Pi9 and Piz-t) were cloned using a map-based cloning strategy and gene structure and the evolution of these genes were analyzed. A novel avirulence gene, AvrPiz-t, was identified from Magnaporthe oryzae that is the cognate avirulence gene of the Piz-t gene. Further characterization of the AviPiz-t gene uncovered that its protein interacts with a host ubiquitin E3 ligase and suppresses their ligase activity.

Knocking down of the host E3 ligase gene leads to spontaneous activation of defense responses and formation of cell death lesions. The availability of the pair of avirulence and resistance proteins provides the excellent material for in-depth understanding the molecular events underlying fungal and plant interactions.

Impact

This research provides the first example on the intimate involvement of a fungal effector on a plant ubiquitination system and the active role of a host E3 ligase in response to fungal pathogen
invasion. Rice is a model plant for cereal crops and the rice blast pathosystem is an advanced model for study of plant-fungal interactions. The information generated from this project will have direct and indirect applications in controlling important fungal diseases in other cereals crops such as wheat and corn grown in Ohio. (Guo-Liang Wang, Thomas K. Mitchell, Department of Plant Pathology, Ohio State. Hei Leung and K.K. Jena, International Rice Research Institute (IRRI), Philippines).

Global Movement of a Seed-Borne Pathogen - Phytosanitation and Global Trade

Scientists at the CFAES have developed research tools to help growers manage bacterial canker disease, the leading cause of economic loss in fresh market tomatoes.

Situation
Nearly 70% of tomatoes sold in supermarkets are produced in greenhouses, mostly on grafted plants. Bacterial canker - a serious disease of tomatoes - is the leading cause of economic loss in greenhouse-grown tomatoes and a significant problem in temperate growing regions. Nationally, losses in greenhouse tomatoes range from 25-30% due to reduced crop yield and additional management costs. Disease-causing bacteria can survive in seeds and as well as in plant debris for several years. There is a great need to improve management methods for this disease over multiple crop generations (i.e., from seed to seed).

Response
Plant pathologists are conducting numerous studies to understand the biology of disease while also developing practical disease management tools. Scientists are studying seed disinfection techniques, developing sanitation protocols, and investigating the role of grafting in spread of bacterial canker. An exciting aspect of this work involves the development of bioluminescent strains of the disease-causing bacterium as a tool to study bacterial growth and movement within the plant (patent submitted). The bioluminescent strains of the canker bacterium enable scientists to visualize the process in which the pathogen moves from seed to seedling. Work is also underway to analyze the movement of the bacteria in later phases of infection, infection of flowers and seed, transmission of the pathogen during grafting and pruning, and sensitivity of the bacterium to disinfectants, antibiotics and bactericidal molecules.

Impact
These basic biological studies, combined with the practical investigation on disinfecting agents and sanitation protocols, are being used to develop science-based resources for seed disinfection techniques, sanitation protocols and management recommendations. Initial results were incorporated into a special internationally distributed bulletin on bacterial canker management produced by the American Seed Trade Association. At least one industry-leading greenhouse tomato grower is now treating seeds for bacterial canker management using our recommended protocols. (Sally A. Miller and Brian McSpadden Gardener, Department of Plant Pathology; Gireesh Rajashekara, Food Animal Health Research Program; Mark Bennett and Matt Kleinhenz, Department of Horticulture and Crop Science; Funding from OARDC SEEDS, tomato seed industry and tomato growers and organizations)
Web Based Tools for Prediction of Epidemics of Fusarium Head Blight on Wheat

Research provides the basis for web-based forecasting models for the Fusarium head blight (FHB) and toxin production. These models are widely used by the wheat industry to guide disease management and grain marketing decisions.

Situation
Fusarium head blight, or scab, caused by the fungus *Fusarium graminearum*, is the most economically important disease of wheat and barley, with yield losses of more than 45% in severe cases. Fusarium head blight was responsible for an estimated $1 billion in losses during a catastrophic 1993 Midwest epidemic. For every dollar lost due to Fusarium head blight at the farm gate, it has been estimated that there is an additional $2 lost elsewhere in the wheat industry. For instance, in addition to lowering yield, the fungi that cause this disease also produce toxin, known by its common name vomitoxin, which is harmful to humans and livestock. Vomitoxin contamination will result in price discounts or grain rejection at the time of sale. Weather conditions are major factors contributing to disease development and toxin accumulation. Fungicides can be used, but for best results should be applied during a critical time window. Early FHB risk assessment tools are highly valuable for making fungicide application decisions.

Response
Researchers at Ohio State, Penn State, and Kansas State have developed, tested, and validated a web-based model to predict the risk of Fusarium head blight for a given area. The forecasting tool, based on logistic modeling of disease risk in relation to the environment, uses weather and crop information to guide growers, both locally and nationally, in treatment decisions.

Model accuracy was about 80% in a national validation of the forecaster. Findings thus far suggest that *F. graminearum* spore abundance and cool, wet late-season conditions interact with cultivar resistance to affect toxin buildup in healthy-looking grain. Recent research has involved extensive linear, generalized linear, and nonlinear mixed modeling of FHB epidemic processes and management tactics, such as spore density over time, to better understand the disease and produce more accurate risk models for epidemic outbreaks.

Impact
This web-based tool is now being used by growers, crop consultants, and processors to make management and marketing decisions in 26 states. The forecaster correctly predicted the FHB epidemic in Ohio in 2010, giving growers and millers advance warning of the risk. Extension personnel in wheat-growing areas use the tool to deliver state customized advice to users. In Ohio, plant pathologists provide weekly web updates on the disease. With the on-line Fusarium head blight Prediction Center and similar aids, growers can now make cost-efficient and environmentally-sound disease management decisions, applying fungicides only when needed to minimize yield and quality losses. This reduces the entry of harmful toxins into the food chain and minimizes contamination of the environment with fungicides. (Pierce Paul and Larry Madden, Department of Plant Pathology; Eric De Wolf, Kansas State University; P. Knight and D. Miller, Penn State)
Discovery and Development of Biopesticides

Biopesticides, derived from microbes and natural sources, will play an ever-growing role in the integrated management of plant diseases and pests. The Department of Plant Pathology is facilitating the expansion and adoption of the use of biopesticides through discovery research, formulation development, product testing, and development of educational resources for conventional and organic growers.

Situation
Chemical pesticides have an indispensable role in plant disease management. However, concerns about the risks and safety of pesticides have led to intensive EPA review and regulatory bans on some. There is a growing interest in the use of biopesticides, which are inherently less toxic to humans and animals and more environmentally compatible than synthetic pesticides. Additionally, the growing popularity of organic produce has opened up a new market for biopesticides. These factors have led to intensive research and development to meet the growing demand for biopesticides. With fair and unbiased evaluations of these new products, growers will be able to effectively and profitably integrate biopesticides into disease management plans.

Response
OARDC researchers have been involved in the discovery, development and testing of new, environmentally friendly biopesticides: Boehm's team has developed a biopesticide for Fusarium head blight (FHB), an economically important disease of wheat and barley. Numerous yeast and bacterial biocontrol organisms have been shown to reduce disease symptoms by as much as 50%. McSpadden Gardener has developed and applied DNA-based profiling techniques to identify several new bacteria with broad-spectrum capacities to suppress fungal and oomycete plant pathogens. Formulation and testing is underway to evaluate the efficacy of these and other biopesticidal agents. Taylor is examining bacteria as biopesticides for use on nematodes. Over 10,000 bacterial isolates have been screened from water, soil and plants, and numerous strains of bacteria have been identified as potential biological control agents for nematodes.

Impact
Biopesticides have the potential to become a key component of sustainable management strategies for plant pests and diseases. The Fusarium head blight biocontrol products are moving toward market entry with three patents, one pending and two license agreements with companies. The work of McSpadden Gardner has led to the discovery of new groups of bacteria with novel and diverse biopesticidal properties. In cooperation with the Ohio State's Technology Licensing and Commercialization and the Fisher College of Business, this new intellectual property is being reviewed (patent application) and market analyses have indicated significant commercial potential for biopesticide products for plant disease control. Taylor's work is progressing towards further testing of bacterial biopesticides targeted to nematodes. The aim is to reduce the overall need for costly synthetic pesticides that may have broad spectrum toxic effects against human and animals, contaminate ground water and lead to the development of pesticide-resistant nematodes. (McSpadden Gardener, Christopher Taylor, Michael Boehm, Michael Ellis, Sally Miller, Department of Plant Pathology Joe Kovach, Department of Entomology Deborah Stinner, OFFER Program, Department of Entomology Pat Okubara, Washington State University, USDA-ARS)
Natural Products from Plants – Metabolomics Research Links CFAES, Medicine and Pharmacy

CFAES scientists have explored the use of a new approach, called metabolomics, to identify an entire suite of new compounds never before identified in soybean. These new compounds may play a critical role in plant defense against pests and may also provide novel chemicals for pharmaceutical investigation.

Situation
Plant natural products are essential components of plant defense against pathogens and insects. They also are the source of over 70% of human medicines and nutraceuticals. The discovery of key plant natural products for pest control or pharmaceutical use is severely limited by the lengthy discovery process and by their scarcity in plants.

Response
OARDC researchers have responded to these needs by using a metabolomic approach to the discovery of new plant natural products. Metabolomics is the identification of all of the metabolites made by a plant in a given tissues under a given condition. We combined this global discovery approach with the hypothesis that plants may make the majority of their novel natural products only during stress or upon mounting defenses against attacking pests. We used the herbicide, lactofen, to test disease resistance inducing responses in soybean. After treatment of soybean with lactofen we discovered that over thirty new natural products were made by soybean. Of these, at least 5 have never been reported in soybean before and 2 have never been reported in any plant.

Impact
Using soybean as a model system, we have developed and demonstrated the effectiveness of a new approach for the discovery of novel natural products in plants. The newly discovered natural products in soybean are very likely involved in pest resistance and also offer new chemicals for evaluation as pharmaceuticals. (Terrence L. Graham, Jiye Cheng, Michelle Sinden, and Madge Graham, Department of Plant Pathology, The Ohio State University; A. Douglas Kinghorn, Department of Medicinal Chemistry and Pharmacognosy, College of Pharmacy, The Ohio State University; Chunhua Yuan, Campus Chemical Instrument Center, The Ohio State University)

Strategies for Major Virus Diseases of Corn and Soybeans

Virus disease control in corn and soybeans can be improved using new and previously-discovered sources of host plant resistance.

Situation
Virus diseases seriously limit yield production in corn, soybean, and other crops in Ohio and around the world. For the past thirty years, U.S. seed companies and producers have used resistant varieties to minimize disease losses due to Maize dwarf mosaic virus (MDMV) and Sugarcane mosaic virus (SCMV). Recent emergence of resistance-breaking virus isolates threatens this approach to disease management. With soybeans, Alfalfa mosaic virus (AMV), Bean pod mottle virus (BPMV), and Soybean mosaic virus (SMV) can substantially reduce yield, but also cause seed coat mottling, which directly impacts the sales of high quality food
grade soybeans, one of Ohio’s top export crops. There is no known adequate resistance for any of these soybean viruses in commercial varieties.

**Response**

Scientists developed corn lines with highly defined combinations of three genes for corn virus resistance in a genetically desirable, but virus susceptible, background. Tests of these lines indicated they had differential resistance to three different potyviruses. We found that two corn virus isolates, MDMV-It and SCMV-OH, could break resistance to the strongest and most frequently deployed resistance gene called Wsm1. However, when another resistance gene (Wsm2) was present in addition to Wsm1, the plants did not become infected.

A third gene called Wsm3 could dramatically boost the resistance provided by Wsm1. For soybeans, plant pathologists have teamed up with scientists in University of Nebraska to generate transgenic soybean plants that confer resistance to all three viruses with a single transgene. Greenhouse experiments indicate that these transgenic plants are highly resistant to AMV, BPMV, and SMV, even when all three viruses are introduced into the plants simultaneously. The transgenic plants will be further assessed in field experiments.

**Impact**

Resistance is the primary sustainable form of disease management for viruses of field crops. Results indicate that developing corn lines with multiple virus resistance genes can provide more effective disease control. The new lines developed in this study will be used by corn breeders to develop locally-adapted, virus-resistant hybrids, leading to higher and more stable corn yields, for both food and bio-fuel production. Moreover, because of the lack of naturally occurring resistance to soybean viruses, the GMOs we are developing will be essential for sustainable management of the three soybean viruses. The new soybean resistance will also be crucial for the production of food-grade soybeans. (Feng Qu and Anne Dorrance, Plant Pathology, OARDC; Margaret Redinbaugh and Mark Jones, USDA ARS Wooster; Thomas Clemente and Jack Morris, University of Nebraska-Lincoln).

**Sudden Oak Death (SOD) – Biochemistry leads to new approaches for combating the most serious threat to North American Oak Forests**

OARDC scientists are discovering chemical compounds in oaks that are indicative of resistance to sudden oak death (SOD), an invasive and potentially lethal disease of oaks and dozens of other plant species, including common landscape ornamentals. Results can lead to new strategies for controlling the spread of diseases in forests.

**Situation**

Sudden Oak Death is an aggressive and lethal disease of oaks and dozens of other plants. First detected in California in the mid-1990s, Sudden Oak Death has moved into forests in California and southwestern Oregon. Infected nursery plants have been accidentally moved around the US, causing increased concerns about Eastern US epidemics. Because oak is a predominant species in North American forests, the loss of oak trees can dramatically alter forests and landscapes.
There are many unknown questions about Sudden Oak Death epidemiology and how to manage or stop its spread. No economically sustainable approach for disease control has yet been developed.

Response
Using state-of-the-art gas-chromatograph and mass-spectroscopy methods, scientists have identified several phenolic compounds in coast live oaks that inhibit the growth of the Sudden Oak Death pathogen and are associated with host resistance. These phenolic compounds can now serve as biochemical markers (biomarkers) for evaluating disease resistance in oaks and for developing new methods for enhancing natural resistance in oak populations. OARDC scientists are now studying how these compounds can be used to identify resistant trees ahead of the infection front so that they can be protected from urban development, logging, or fire.

Impact
Unlike the situation with annual herbaceous crops, disease resistance in woody plants is exceedingly more difficult to study and is not well understood, in general. Thus, the discovery of compounds associated with disease resistance in oaks is a highly significant result. These compounds offer a very promising and novel approach to the control of the devastating SOD disease. Understanding SOD will help scientists learn more about how woody plants resist or fight infection and guide the development of management strategies to stop the spread of a disease in forests. In many cases, the best management approach for SOD may not involve eradication of oaks or other host plants, but to allow the proportion of coast live oak population that is resistant to SOD to evolve into more stable stands. The economic impact can therefore be significant if unwarranted management approaches, such as elimination of susceptible trees and replanting with resistant trees, are avoided. (Pierluigi Bonello, Department of Plant Pathology; David L. Wood, Dept. of Environmental Science, Policy, and Management, University of California, Berkeley)

Understanding Pantoea stewartii, Cause of a Serious Corn Disease
New discoveries have led to a better understanding of bacterial pathogens and how plants defend themselves against bacterial pathogens.

Situation
Stewart's bacterial wilt and leaf blight is a serious bacterial disease of sweet and field corn in the United States. This disease is especially a problem in the eastern portions of the Corn Belt. In Ohio, damage from Stewart's wilt varies from year to year, but severe blighting of leaves can be found in some fields each year. Stewart's wilt is caused by a bacterium, Pantoea stewartii. Research on the virulence of this bacterium, or ability to cause disease, may lead to new strategies for developing disease-resistant plants.

Response
Using tools of molecular genetics, OARDC scientists have determined the virulence of \( P. \) stewartii is primarily due to a special bacterial effector protein, WtsE. The bacterium injects this effector protein into host cells, suppresses host plant defenses and induces formation of water-soaked lesions. Eventually, the plants wilt and die. In addition, the WtsE protein can control host specificity and symptom production by mimicking a common type of plant regulatory protein, called an activated G-protein. This is a significant, new virulence mechanism for plant
Another important finding is that all mutations in WtsE that eliminated its virulence activity in corn also blocked induction of defense responses in nonhosts. This suggests that these two processes may involve common cellular targets. WtsE with mutations in its putative G-protein mimicry motifs still provide a growth advantage to *P. stewartii*, indicating this protein may have additional virulence function(s) in corn.

**Impact**
This research has significantly contributed to the understanding of how this conserved and widely-distributed family of effectors functions in plant cells. These findings should lead to novel approaches for genetically engineering plants resistant to a wide range of bacterial pathogens. Strategies may include inactivating effectors or modifying their cellular receptors, thereby countering the ability of the pathogen to kill its host. (David Coplin, Department of Plant Pathology, Ohio State David Mackey, Department of Horticulture and Crop Science, Ohio State).

**Pioneering Use of Statistical Tests Paves the Way for Applications in Disease Management**
Nonparametric statistical tests have great potential value for determining the effects of treatments on diseases and pests when some response variables consist of ordinal ratings for the magnitude of symptoms. An in-depth assessment of properties of several newly developed theoretical test statistics was performed for a wide range of typical experimental conditions in plant protection. Results provide a guide for researchers for choosing the appropriate statistical tests when comparing treatments or other factors.

**Situation**
Plant pathologists often assess disease and other damages using ordinal rating scales. Examples include: 1-healthy, 2-mild symptoms, 3-stunting and wilting, and 4-dead. Analysis of ordinal data should best be done with nonparametric methods. Recent theoretical research has extended nonparametric analysis to factorials and repeated measures, situations which are common in plant pathology. Many investigations, however, involve not just one response, but several response variables (e.g., ratings for each of several diseases, yield, etc.). Multivariate methods are needed to fully explore the effects of treatments on these responses. Recently completed theoretical work by A. Bathke and S. Harrar has extended the nonparametric methodology to multivariate situations.

**Response**
Statistical protocols were developed and evaluated for the new nonparametric methods for plant disease management applications. CFAES researcher Larry Madden, together with statisticians at the University of Kentucky and University of Montana, conducted an in-depth assessment of the properties of several newly-developed test statistics for multivariate nonparametric data analyses and for univariate nonparametric analyses of ordinal data from randomized blocks. Error rates and statistical power of the tests were determined for a wide range of experimental conditions (number of replications, number of treatments, and number of correlated response variables) when treatments were the same and when they were different. The so-called nonparametric ANOVA-Type test statistic was best for response variables that were positively correlated, and the nonparametric Lawley-Hotelling test was best for negatively correlated responses. Approximations were found to be very accurate when the number of treatments was large.
**Impact**

Results of this investigation will allow applied statisticians and other data analysts to choose the most appropriate and powerful test statistic when analyzing ordinal rating data. This will be especially valuable for researchers who are attempting to determine the most effective treatment for management of plant diseases and other pests. This pioneering use of meta-analytical protocols will pave the way for further applications in plant pathology and disease management.

(Laurence V. Madden, Department of Plant Pathology; Solomon Harrar, University of Montana; Arne Bathke, University of Kentucky).

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**Safeguarding Ohio’s Soybeans from Soybean Rust**

New rapid detection method helps will help soybean growers thwart devastating invasive disease, Asian Soybean Rust.

**Situation**

Soybean is Ohio’s number one field crop, with an economic output of more than $1 billion. A disease such as Asian soybean rust can have devastating impacts on production, with yield losses ranging from 10%–80% in infected areas (USDA National Pest Alert). Asian soybean rust was recently found in the southern U.S. and is spreading northward to major soybean-growing regions. Estimated annual losses for the U.S. soybean industry range from $240 million to $2 billion. The spores of Asian soybean rust, once airborne, can rapidly spread the disease throughout a region. Surveillance and early detection are critical to limiting further spread.

**Response**

A multi-disciplinary team from government and OARDC has developed an antibody-based test to detect spores of *Phakopsora pachyrhizi*, the fungus that causes Asian soybean rust. This test can be used to screen spore traps placed throughout a region, thus improving the chances of detecting the fungus should it spread to a new area.

**Impact**

This test enhances our ability to monitor over the U.S. soybean region—an area that encompasses over 70 million acres. Spore traps are placed in strategic locations and routinely monitored and analyzed for soybean rust, enhancing our ability to detect the fungus, and respond and recover if detected. Monitoring data will also help growers make timely, cost-effective treatment and fungicide decisions. (Sally A. Miller, Anne Dorrance, and Michael J. Boehm, Department of Plant Pathology, The Ohio State University; Douglas Luster and Reid Frederick, USDA ARS Foreign Diseases and Weed Science Research Unit, Ft. Detrick, Maryland; Jill Czarnecki, Naval Medical Research Center, Biological Defense, Research Directorate, Silver Spring, Maryland)

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**Biomass Processing into Fuels and Products: Fungi's Natural Role**

Over 10 billion gallons of ethanol are produced annually from plants. However, concerns must be addressed about environmental impact, energy cost and economics if biobased technologies are to be a viable long-term solution. Fungal enzymes have great potential for improving the efficiency of biobased technologies.
Situation
There is great interest in the use of woody plants and plant waste as potential sources of ethanol. They are often called lignocellulosics, referring to the plant's primary chemical components, cellulose and lignin. With over 180 million tons available annually on a global basis, lignocellulose material is the most abundant and sustainable resource for biofuels and bioproducts. Currently, the processing of lignocellulosics into ethanol is expensive and not economically feasible. A major limitation is the cost and availability of enzymes that can chemically digest cellulose and lignin for further processing into fuel and products. Fungi are a rich and unexplored natural source of these enzymes.

Response
Using advanced technologies, researchers have analyzed over 100 species of fungi. Interestingly, certain fungi associated with plant disease have large families of candidate enzymes that digest lignocellulose. Work is underway to further characterize these enzymes and examine their potential in biomass processing systems, as well as explore other sources of candidate enzymes in soils and wetlands.

Impact
This work reveals fungi's promising potential as a source of enzymes for the breakdown of cellulose and lignin. Further work will help us exploit fungal enzymes for innovative advances in biobased technologies. (Thomas K. Mitchell, Department of Plant Pathology, Guo-Liang Wang, Department of Plant Pathology, Brian McSpadden Gardener, Department of Plant Pathology)

Conclusion
Our self-assessment is that we are fulfilling our mission in Plant Pathology to be being a national and international leader in basic and mission-oriented research. We continually challenge ourselves to define the right mix of research areas covered in our faculty programs as we move forward. We realize that our overall departmental goal of covering the full breadth of plant pathology is becoming more difficult, especially with our declining number of faculty, and with the uncertainties of the funding situation in Washington. After careful assessment of our needs in research (and in teaching and Extension), and with our desire to maintain a national leadership in plant pathology, we strongly believe that it is urgent that we are able to fill vacant positions in mycology (fungal biology) and ornamental pathology.
Plant pathology is a strong academic discipline at OSU, and one that is growing with two new degree programs. It is traditionally a graduate-level discipline, and *graduate education is a critically important part of the mission of this department*. However, our undergraduate program is very important for the education of Plant Health Management (PHM) majors, Plant Pathology minors, Horticulture and Crop Science majors, as well as non-majors. It is one of the few undergraduate plant pathology programs in the country.

The following sections describe the Undergraduate and Graduate Programs in the Department of Plant Pathology, with *additional highlights of our efforts in communications, technology, and eLearning. It must be pointed out that OSU is switching from a Quarter to a Semester term calendar in Summer 2012*. Thus, we are in the middle of a major transition, which necessitated the revamping of entire curricula from the ground up. Highlights of the semester conversion include the establishment of two new degrees: (1) an undergraduate Plant Pathology major with a stronger basic science and research focus than found with our current PHM major; and (2) a professional (non-thesis) Master in Plant Health Management (MPHM), in conjunction with the Department of Entomology. Additionally, we have redesigned the undergraduate Plant Health Management major to offer it jointly with the Department of Entomology.

In the semester system, the Department of Plant Pathology will administer seven programs:

1. **Undergraduate** Major in Plant Health Management (PHM), to become a joint program with Entomology
2. **Undergraduate** New: Major in Plant Pathology
3. **Undergraduate** Minor in Plant Pathology
4. **Graduate** Master of Science (MS) in Plant Pathology, thesis
5. **Graduate** Master of Science (MS) in Plant Pathology, non-thesis
6. **Graduate** New: Professional Master in Plant Health Management (MPHM); joint program with Entomology, non-thesis
7. **Graduate** Doctor of Philosophy (PhD) in Plant Pathology, dissertation
Undergraduate Programs

The undergraduate program is operated under the auspices of the department’s Academic Affairs (AA) committee, which consists of faculty members, lecturers, and a graduate student representative. Membership is described in the Pattern of Administration (see DEPARTMENTAL LEADERSHIP section and Pattern of Administration, APPENDIX E). The AA committee oversees and coordinates instructional programs and academic policies of the department, including academic advising, course offerings, and curricula. As we move to the semester system, the committee will also direct program and course assessment for reporting to the university.

For the past few years, the AA Committee assumed a significant leadership role in the Semester Conversion process (see Curriculum section). The AA committee also handles the evaluation and approval of all undergraduate and graduate courses.

Undergraduate Major

The PHM major has been in existence since 1994. This major was an outgrowth of a previous interdisciplinary curriculum known as the Plant Protection major. Currently, 70% of the PHM graduates enter graduate school in Plant Pathology and related fields. Others work in the public and private sectors as diagnosticians, sales and technical support in industry, inspectors for government agencies, research technicians, county Extension agents, certified pesticide applicators, growers and landscapers.

Curriculum for the PHM Major

Students majoring in PHM must complete the BS in Agriculture curriculum that includes General Education courses in English, Math, Science, Arts, Humanities, Communications, and Social Sciences, complemented by major-specific courses in Plant Pathology, Entomology, Crop/Weed Science, Plant Biology, Genetics, Microbiology, and/or Soil Science to gain a basic foundational knowledge needed for the production and maintenance of healthy crops.

Students must also complete an approved internship experience, usually between the junior and senior year, and a minor of the student’s choice (the internship and minor requirements are specific to the BS Agriculture program). Students eligible for The Ohio State University Honors Program have considerable latitude in designing a curriculum custom-tailored to their needs and interests. Honors students supplement normal course requirements with honors courses and must complete an Honors thesis, usually during their senior year. Requirements for the undergraduate degrees are
provided in APPENDIX G - Course Requirements.

Semester Changes

In the semester system, PHM will be jointly administered by Plant Pathology and Entomology. With the addition of the Entomology’s academic programs to CFAES in 2010, there was strong agreement to formally make Plant Health Management a joint major. This will allow us to leverage the resources of both departments for course offerings, recruiting, student advising and professional development opportunities for students. Further discussion on semester changes in described in the Plant Pathology Curriculum section.

The current PHM curriculum is geared towards preparing students for careers as plant health practitioners. However, we typically have two cohorts of students in the current major: those interested in working in as plant health practitioners, and those interested in pursuing research and graduate study (a larger percentage). To meet the needs of those interested in research and graduate study, we established a new Plant Pathology undergraduate major, with more rigorous chemistry, genetics, microbiology and other requirements. In comparison, the PHM curriculum has specific requirements for plant science, entomology and weed science. We recognize that there will be recruitment challenges, but we expect that our collaboration with Entomology for the PHM major and our new General Education course will attract more students (see Recruitment Strategies).

Plant Pathology Minor

The undergraduate minor in Plant Pathology is designed to give students knowledge and skills in plant diseases and plant health management. Because BS Agriculture majors must complete a minor as part of their degree requirements, the Plant Pathology minor is quite popular, with an average of 20 students. This minor requires 20-25 (quarter) credit hours, including 13-15 credit hours in Plant Pathology and the remainder in other related sciences (see APPENDIX G for Plant Pathology minor, semester curriculum). Most of the Plant Pathology minors are from Horticulture and Crop Science (HCS), with others from majors such as Agribusiness, Biology or Environmental Science.

Numbers, Trends, and Impact

Undergraduate enrollment in Plant Health Management averages 9-10 (Table T1). The number of minors is typically greater, and has been growing. The small size of our undergraduate program enables us to provide one-on-one attention to students, and it is evident that students thrive because of this support. It should be pointed out that the “RBB” Business Model for the university is based on (weighted) credit hours taught, not on the number of majors (or minors).

Since 2004, 40% of the PHM graduates enrolled in our Plant Pathology Graduate Program, and another 30% are in graduate programs around the U.S. Others are employed in university/research laboratories, and a few in the private sector. We have a near 100% placement record and the
average salary for Plant Health Management graduates is $45,500 (CFAES 2010 data).

In the past 5 years, we have had a high percentage (~50%) of Honors students. Some have received prestigious university and national awards and garnered recognition for our program. Many alumni have established distinguished careers in the discipline (Supplemental Table T-A: Selected Highlights, Plant Health Management Students and Graduates [all of these Supplemental tables are at the end of this EDUCATIONAL PROGRAMS AND STUDENTS section].

Right: Edward Luersman, PHM major and Presidential Scholar.

Attrition

Since 2005, only four PHM students have transferred to other majors at OSU, and three have left the university, for various reasons.

Table T1. Student Demographics, Plant Health Management majors, 2000-current.

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*data not available

Scholarships

As a recruitment incentive and to help provide financial assistance and recognition to students, we offer Plant Protection scholarships to eligible PHM majors, based on grade point average. We also award the A.J. Hoffmann scholarship(s) for academic excellence, and there are many scholarships available from CFAES and the university. We consider it a strong recruiting tool to say that three out of every four students in our major receive scholarships.
Table T2. Undergraduate Plant Pathology Scholarships.

<table>
<thead>
<tr>
<th>Scholarship</th>
<th>Level</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Protection Scholarship</td>
<td>Undergraduate</td>
<td>$2500 to students with 3.5-4.0 GPA; $1500 with 3.0-2.49 GPA (3-5 per year)</td>
</tr>
<tr>
<td>A.J. Hoffmann Scholarship</td>
<td>Undergraduate</td>
<td>$750-$1500 to undergraduate students based on academic merit (1-2 per year)</td>
</tr>
<tr>
<td>Janson – Stover Scholarship</td>
<td>Undergraduate and Graduate</td>
<td>Undergraduate and graduate student travel awards; up to $1000 each (2 per year)</td>
</tr>
</tbody>
</table>

Undergraduate Student Organization

The undergraduate student organization in our department is the Plant Health and Resource Management Forum, or PHARM. Members are mostly PHM majors, and the organization provides excellent leadership opportunities (e.g., club officers, event planning). It is a good way for the PHM students to become engaged in department activities, and interact socially and professionally with members of the department. Students go on field trips for apple picking, mushroom forays and to area state parks. In 2011, the club organized a fund raiser for the OARDC Secrest Arboretum’s tornado recovery fund. Monica Lewandowski and Sarah Williams are the club advisors.

PHARM plays an important role representing the department at college and university recruiting and outreach events and activities. These include:

- CFAES Scarlet and Gray Ag Day (field day for 4th-5th graders)
- Video contests (APS, CFAES, Chlorofilms)
- CFAES Banquet and Plant Science Banquet (annual student awards banquets)
- CFAES Involvement Fair and University Involvement Fair (for student organizations)

Outreach and Recruitment

We participate in several CFAES and university outreach events and provide a variety of activities designed to be engaging and expose students to plant pathology (see Table T3). In addition to the major events listed, individuals in the department also participate in numerous activities, including Extension outreach.
Table T3. Education Outreach Activities.

<table>
<thead>
<tr>
<th>Outreach activity</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field days/field trips</td>
<td>Scarlet and Gray Ag Day, Columbus. 4th-5th grade field day; CFAES’ largest elementary school event. Multiple sessions offered by Plant Pathology (160+ students)</td>
</tr>
<tr>
<td>Field days/field trips</td>
<td>Science of Agriculture Day, OARDC, Wooster. Two day event, K-6 and 7-12. Multiple sessions offered by Plant Pathology (200+ students)</td>
</tr>
<tr>
<td>Extension, Farm Science Review, London, Ohio</td>
<td>Largest Extension and trade show sponsored by CFAES (3 days). CFAES outreach; Plant Pathology recruitment; Turfgrass pathology, Extension exhibits. 1200 hundred high school student visitors to booth/exhibit</td>
</tr>
<tr>
<td>Extension event, Ohio Nursery and Landscape Assoc.</td>
<td>Trade show exhibit to publicize opportunities for high school and community college students</td>
</tr>
<tr>
<td>4-H Idea Starter</td>
<td>Viruses, Bacteria, and Fungi, Oh My! 4-H Plant Diseases Idea Starter (by. M. Boehm and S. Ellis) Nine students completed the activity, 2010</td>
</tr>
<tr>
<td>Mentoring, high school</td>
<td>Various faculty and staff mentor 1-3 students each year from Metro High School, Columbus (STEM high school with OSU affiliation) and visit area schools, FFA organizations, Girl Scouts, etc.</td>
</tr>
<tr>
<td>Mentoring, high school</td>
<td>Various faculty and staff mentor 3-5 students each summer from Wooster High School (OARDC Research Internship Program)</td>
</tr>
<tr>
<td>Mentoring, college</td>
<td>Various faculty mentor students from College of Wooster on senior projects</td>
</tr>
<tr>
<td>Mentoring, college</td>
<td>Various faculty host student interns and hire student assistantships (see following section on Interns and Student Assistants)</td>
</tr>
<tr>
<td>Outreach initiatives, APS</td>
<td>APS Office of Public Relations and Outreach, Alissa Kriss, graduate student member. Contributing to national initiatives on student recruitment</td>
</tr>
<tr>
<td>LifeSports Career Day</td>
<td>Introduction to careers in plant pathology for underserved youth (middle school) in Columbus area. Annual summer camp, 1 session, 60 students</td>
</tr>
<tr>
<td>Science camps; women in science</td>
<td>Buckeye Women in Science, Engineering, and Research Institute (B-WISER) Science Camp, College of Wooster; Women in Science, career exploration day, OSU Columbus, grades 6-8</td>
</tr>
<tr>
<td>Career fairs</td>
<td>Worthington Kilbourne High School Career Fair, Columbus</td>
</tr>
<tr>
<td>Teacher workshop</td>
<td>Anne Dorrance, Representative to Partnerships in Science Committee: College of Wooster, Wooster City Schools, The Tri-County Educational Service Center, and OARDC. Four-day workshop for area teachers</td>
</tr>
<tr>
<td>Science Fairs</td>
<td>State Science Fair - we award one scholarship and one cash award to recognize outstanding projects in plant pathology. We also mentor students and serve as judges for local science fairs.</td>
</tr>
</tbody>
</table>

Recruitment Challenges

Recruitment and enrollment is the biggest challenge for the undergraduate program. Enrollment was in the 30s in the 1970s, but has dropped to around 10 for the last two decades. While we have an excellent group of students, it has been a challenge to increase enrollment because of several factors, many of which are common to the discipline across the country:

- “Tough sell” - there is little awareness about plant pathology and career opportunities.
• Recruiting students interested in the plant sciences is made more challenging because plant-related majors are based in several units in two colleges: the PHM major is in the Department of Plant Pathology/CFAES; Crop Science, Turfgrass Science, and Landscape Horticulture are in the Department of Horticulture and Crop Science/CFAES; Forestry, Fisheries and Wildlife in the School of Environment and Natural Resources/CFAES; Plant Cellular and Molecular Biology in the Department of Molecular Genetics/College of Arts and Sciences; and Evolution and Ecology (including plant ecology) in the Department of Evolution, Ecology and Organismal Biology/Arts and Sciences.

• Students (mainly majors from Horticulture and Crop Science) typically take General Plant Pathology in their junior year. Some students have commented that they would have opted for PHM as a major had they been exposed to the discipline earlier in their career.

• Lack of access to Biology and Microbiology majors where students have little exposure to the plant sciences or mycology.

Recruitment Strategies

Many of our students are transfer students from other colleges/universities or the Agricultural Technical Institute (ATI, the 2-year technical college in Wooster; part of our college), and some transfer internally from other majors at OSU. The department is working to build on these streams of recruits in two primary ways. First, ATI offers an introductory Plant Pathology course with the same textbook and format as our General Plant Pathology (PLNTPTH 401) course. We have engaged their faculty and are working to develop a format for this course to be co-taught between the two campuses. ATI is formally a part of CFAES, so administering a joint course should be feasible. Second, we are aggressively working to gain “access” to students early in their college career and make our existing courses accessible to students. To this end, T. Mitchell has developed a General Education Course, “Molds, Mushrooms and Man” that will fulfill the general education science requirement for OSU students. Similar courses at universities around the country have attracted large numbers and we expect a similar response at OSU.

Second, we have changed the structure of some courses in the semester system by offering the lecture and laboratory portions as separate classes, to enhance flexibility in scheduling. For example, Mycology (PLNTPTH 660) is an elective for Microbiology majors; however, few have taken this course in the quarter system because of the difficulty in scheduling a fixed, 5-credit lecture/laboratory course. In the semester system, lecture and laboratory will be offered as separate courses for Mycology as well as General Plant Pathology.

We augment student recruitment in several ways. We are expanding our presence in Ohio and the region with online resources accessible to the general public. We participate in college and regional outreach activities, and we engage students with website content and social media. We are actively engaged in American Phytopathological Society (APS) initiatives - we have a graduate student representative (Alissa Kriss) with the Office of Public Relations and Outreach, and
T. Mitchell is a member of the new APS Office of Education. In 2012, the North Central Division APS meeting will be held in Wooster. **The event will include a day dedicated to undergraduate and graduate recruitment.** We will invite high school, ATI and undergraduate students (targeting Ohio and the surrounding states) to meet researchers, visit laboratories and learn more about plant pathology educational and career opportunities. Many of these efforts depend on the activities of the Academic Program Coordinator (M. Lewandowski).

Looking forward, **the department is dedicated to expanding student recruitment.** A strategic recruitment plan is under development to guide direction and utilization of personnel and resources. It is our goal to build both undergraduate majors to 15-20 students.

**Interns and Student Assistants**

*Internship programs have grown to be an important part of the department.* We host a several undergraduate and a few high school students in our department, mostly in the summer. We also host students from Metro High School (Columbus) working on capstone or senior thesis projects.

In 2003, we established an internship program, **Summer Research Internship in Plant Pathology**, funded by faculty programs ($4,000 per student) with additional support ($800 to participating faculty) from a department endowment. We also host interns through the Summer Undergraduate Research Experience (administered by the Plant Molecular Biology and Biotechnology [PMBB] Program), and the OARDC Research Internship Program, both of which provide a cost-share. For the past 4 years we have hosted from 1-2 interns from the Summer Research Opportunity Program (SROP), which targets talented underrepresented minorities for graduate study (SROP interns are fully funded by the Graduate School). We provide summer orientations in Wooster and Columbus, and students attend professional development opportunities and social events.
Since 2003, 8 interns (7 from SRIPP) have entered our Plant Pathology Graduate Program. One former intern, Katelyn Willyerd, earned her PhD in Plant Pathology from Penn State and is currently a post-doc and lecturer in our department. A tally of the enrollment in these internship programs is given in Table T4; some noteworthy intern highlights are given in Supplemental Table T-C - Selected Highlights, Student Interns.

### Table T4. Internship Programs and Participation.

<table>
<thead>
<tr>
<th>Interns</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer Research Internship in Plant Pathology (SRIPP)</td>
<td>8</td>
<td>13</td>
<td>8</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Summer Undergraduate Research Experience (SURE) and NSF-REUs</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer Research Opportunity Program (SROP)</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OARDC Research Internship Program (ORIP)</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student assistants, Visiting scholars and Volunteers</td>
<td>10</td>
<td>18</td>
<td>25</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>27</td>
<td>33</td>
<td>42</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Undergraduate Credit Hours

Credit hours have a direct impact on our teaching budget, based on the university RBB business model for General Funds (Academic Programs). There was a +19.16% increase in plant pathology undergraduate credit hours from fiscal year (FY) 2010 to FY 2011 (Table T5). The decline in credit hours from 2007 to 2009, and the subsequent increase from 2010-2011, mirrors the undergraduate enrollment in Horticulture and Crop Sciences (HCS). This is because a large percentage of our undergraduate courses are taught to HCS majors.
Graduate Program

Graduate education is a pillar of the department. Graduate students take courses and conduct research, but they also bring new approaches and ideas, and challenge us to look at the discipline in new and refreshing ways. Most importantly, graduate education allows us to pass on our knowledge of plant disease and plant-microbe interactions to the next generation of plant pathologists and plant health professionals.

Overview and Administration

Graduate degree programs at OSU are administered by the Graduate School and the Graduate Studies Committee (GSC) of the individual graduate programs. The Graduate School is made up of the Graduate Faculty (appointed separately from the regular faculty appointment), an elected Graduate Council, and the Graduate School administration (including the Dean of the Graduate School). The graduate program in Plant Pathology is operated by a GSC consisting of four graduate faculty members of our department and one graduate student. The faculty members on the committee are elected by the faculty and serve 4-year terms; the graduate student serves for a 1-year term, but this can be renewed. Faculty from both campuses are always represented on the committee. The chair of the GSC serves for a 3-year term, which could extend the total term beyond the normal 4 years (more details are in the Pattern of Administration, APPENDIX E). The GSC is responsible for the conduct and administration of the program. In particular, the GSC: evaluates applicants and makes decisions regarding admission (although the Graduate School must approve of admittances); coordinates offers of associateships (assistantships), makes offers of associateships involving departmental funds (with the approval of the department chair); approves student petitions to the Graduate School; administers annual performance reviews of students; selects student recipients of the C. C. Allison Award for excellence in graduate student research and service (our highest honor for a grad student); nominates students for university and college fellowships and special associateships; and monitors the progress of all graduate students. The chair of the GSC has

<table>
<thead>
<tr>
<th>Credit Hours for each Fiscal Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2010-11 Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,263</td>
<td>1,164</td>
<td>1,088</td>
<td>1,065</td>
<td>1,161</td>
<td>1,233</td>
<td>1,305</td>
<td>1,553</td>
<td>1,319</td>
<td>1,217</td>
<td>1,289</td>
<td>1,536</td>
<td>+19.16%</td>
<td></td>
</tr>
</tbody>
</table>
additional responsibilities, such as approving the scheduling of final examinations for students. The
GSC chair and the Academic Program Coordinator jointly spend considerable time managing the
budget for all supported students in the department, and make strategic plans for student financial
support in the coming years.

In most cases, newly admitted graduate students are assigned an advisor before they arrive. This is
partly because most students are financially supported entirely or at least partially by their advisor.
Although GSC has overall responsibility for the program, specific oversight responsibility for
each student is given to a Student Advisory Committee (SAC), which is chaired by the advisor
and includes at least two additional members. Generally, SAC members serve as the major part of
the examining committees for PhD student taking the candidacy and final examinations.

Degrees and Degree Requirements

We offer an MS and a PhD in Plant Pathology. Three types of MS degrees are currently possible:
Plan A (thesis), Plan B (non-thesis), and Plan “G.” Plan G is a special case, and can be awarded to a
PhD degree student on the basis of satisfactorily completing the doctoral candidacy examination, if
the student does not already hold an equivalent master’s degree in the same field. In addition, our
students have the option of selecting one of two tracks of course requirements: 1) the standard plant
pathology track; or 2) the Plant Molecular Biology and Biotechnology (PMBB) track (see next sub-
section).

The Graduate School establishes degree requirements in terms of credit hours and other broad areas.
However, most specific requirements, such as course requirements, originate with the individual
program (see APPENDIX F, Plant Pathology Graduate Student Handbook). With our department, it
has been general practice to have the entire faculty, not just the GSC, make decisions on degree
requirements. The course requirements are somewhat different for students in tracks 1 and 2; students in the new professional Master’s in Plant Health Management will also have different
requirements (APPENDIX G, Course Requirements). There is also a trend of giving the SAC
committee more input and authority on determining individual student degree requirements (such as
specific courses). This is part of our effort to adapt to the rapidly changing science of plant
pathology and plant-microbe interactions, and to accommodate the diverse disciplinary interests of
our students (and their advisors). However, it must be noted that every graduate student will have
coursework covering the major pathogen groups and broad-based training in the discipline of plant
pathology.

Students are encouraged to participate in teaching within our department. All PhD students are
required to have a mentored teaching experience. Students with department financial support may
be expected to provide additional assistance in teaching. Students may obtain credit for teaching
(PLNTPTH 901) or Extension outreach (PLNTPTH 902) by developing and executing a plan with
designated mentors. Students must demonstrate a substantial intellectual contribution to the course
Plant Molecular Biology and Biotechnology Program (PMBB)

Several Plant Pathology faculty members are actively involved in the PMBB program, an interdisciplinary group with faculty in Plant Pathology, Plant Cellular and Molecular Biology, and Horticulture and Crop Science. Some of our PhD students opt for the PMBB curriculum as a specialization in the Plant Pathology program. Students apply to and are admitted into their respective departments and must have an advisor that is a member of the PMBB group. The PMBB group is composed of faculty in any college or discipline studying a plant-related system using molecular tools. Individuals apply for membership and are voted in by members. The PMBB program offers lucrative graduate fellowships that have helped us recruit some excellent students to Plant Pathology. It should be noted that PMBB is in the process of changing its name.

Trends and Demographics

Our Graduate Program has enrolled a total of 217 students in the past 20 years. For many years, graduate enrollment was about 25-30 students per year, with a goal to increase numbers to 30+ graduate students (a major challenge, given the cost of graduate students and the declining number of faculty). In Autumn 2007, our graduate enrollment exceeded 30 students, and we have maintained this level to date (see Table T6). In Autumn 2011, our enrollment reached a record high of 35 graduate students, for an average of 2.5 students mentored per faculty member. Several students are projected to graduate in December 2011, which will bring the numbers down to about 30, although we anticipate admitting a couple of students in early 2012.

Our students encompass the full range of disciplines and sub-disciplines in the science, from genomics to plant disease epidemiology. We place importance on both our MS and PhD programs. In recent years, we have held a 60% PhD to 40% MS student ratio. In the past decade we have increased the number of female graduate students (particularly female PhD students). The ratio of students between Columbus and Wooster varies a great deal, but the majority are now in Wooster, partly because of the higher number of faculty in Wooster (8, plus adjunct faculty) compared with Columbus (5, but with 2 faculty vacancies).

As with most graduate programs in the sciences, international students make up half or more of our students. In the last few years, the ratio has been fairly close to 1:1, with just slightly more international students.
Table T6. Graduate Enrollment and Demographics (2000-present). Autumn enrollment.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Graduate Students (MS + PhD)</strong></td>
<td>22</td>
<td>25</td>
<td>27</td>
<td>28</td>
<td>28</td>
<td>18</td>
<td>25</td>
<td>32</td>
<td>34</td>
<td>34</td>
<td>33</td>
<td>35</td>
</tr>
<tr>
<td><strong>Domestic Minority</strong></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Applications</strong></td>
<td>48</td>
<td>49</td>
<td>32</td>
<td>52</td>
<td>37</td>
<td>31</td>
<td>38</td>
<td>34</td>
<td>28</td>
<td>29</td>
<td>38</td>
<td>43</td>
</tr>
</tbody>
</table>

**Graduate Credit Hours**

From 2000-2008, the number of graduate credit hours generated reflected the size of our graduate program (Table T7). However in Autumn 2008, a rule change at OSU mandated that post-candidacy PhD students register for only 3 credits (instead of the usual 12-18) as full-time status. This has resulted in substantial tuition/fee savings ($3,775/year for 3 credits compared to $15,100/year for a full-time 12-18 credit load). However, our graduate credit hours have declined since 2009, which affects the funding we receive in the RBB business model for the university. Although individual faculty, and the department as a whole, can save money on tuition and fees because of the 3-credit rule change, overall the department is suffering because of this credit-limit change. Because graduate credits are weighted [with research credits (PLNTPTH 999) getting the most weight], we have a large cut in Academic Programs funding for FY12 partly because of the 8.5% decline in graduate credit hours. This is ironic, and frustrating, because we have record graduate enrollment over the last few years.

Table T7. Graduate Credit Hours, Plant Pathology.

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>898</td>
<td>1,134</td>
<td>1,130</td>
<td>1,438</td>
<td>1,664</td>
<td>1,601</td>
<td>1,191</td>
<td>1,466</td>
<td>1,936</td>
<td>1,990</td>
<td>1,732</td>
<td>1,585</td>
<td>− 8.5%</td>
</tr>
</tbody>
</table>

*3-credit registration rule for post-candidacy students implemented in Autumn 2008.

**Financial Support for Graduate Students**

In most years, nearly all of our graduate students are fully funded from sources such as
OARDC, University fellowships/programs, extramural grants, foreign governments, or Fulbright scholarships. Currently, 33 students out of 35 are fully funded (two part-time MS students who were using the OSU employee tuition/fee benefit waiver are both now employed elsewhere and on self-support; one is close to completion).

The current stipend (2011-2012) for graduate research associateships is $21,000 (MS students) and $21,072 (PhD students). For students on GRA (50% FTE) appointment, the department or faculty advisor also pays 100% of the general and instructional fees. There is a university subsidy (85%) of the student health insurance. In comparison to other Plant Pathology Graduate Programs in the U.S., this stipend is competitive and in the upper third; a few programs do offer higher stipends. This is well above the median stipend ($16,010) for graduate associateships across OSU. The cost of tuition and fees is $15,100/year (4 quarters; full time). Thus, the total cost of the stipend and tuition/fees for a graduate student is ~$36,000/year.

Total support for our graduate students is ~ $320,000/year from grants, gifts, and contracts to department faculty, and ~ $330,000 from departmental funds (OARDC, Academic Programs [OSU General Funds], and endowments). Other students are supported by university fellowships, foreign government scholarships, or OSU employee tuition/fee benefit waivers.

We have recruited several excellent students who have received competitive graduate fellowships or scholarships, either locally or internationally. These awards have allowed us to leverage department funds to maintain our high graduate enrollment.

A list of current students or recent graduate fellows and scholars are included below:

University and OARDC (Recent Awards)
- **Spencer Debenport** - Distinguished University Fellowship (2010-11 and dissertation year), Excellence in Plant Molecular Biology and Biotechnology (PMBB) Fellowship (2010-11), FAES Environmental Graduate Fellowship (2011-12).
- **David Showalter** - Excellence in PMBB Graduate Fellowship and FAES Environmental Graduate Fellowship (2011-12 and 2012-13)
- **Ellie Walsh** - Excellence in PMBB Graduate Fellowship (2010-11 and 2011-12)
- **Daniel J. Anco** - OARDC Director’s Associateship (2008-09)
- **Gautam Shirsekar** - University Fellowship (2006-07)
- **Wanda Baez** - Summer Research Opportunity Fellowship (2010-11 and dissertation year)

International Scholarships
- **M. Veronica Cepeda** - Fulbright Scholarship, Ecuador
- **Godwill Chewachong** - Fulbright Scholarship, Cameroon
- **Oscar Burbano Figueroa** - Fulbright Scholarship, Columbia
- **Sawsan Elateek** - Government scholarship, Egypt
Several other aspects of the quality of our graduate program are given in later (sub-) sections, including degree completion patterns, outcomes assessment, time to degree, and placement.

Graduate Recruitment

Graduate recruitment is done at several levels. Our faculty and staff build and maintain relationships with colleagues and programs around the world to facilitate graduate student recruitment. We invest time in personal contacts - faculty and staff try to be responsive to student inquiries (weekly, sometimes daily). A lot of effort is focused on our department website, which is an important source of information for prospective students (more information in the Communication and Role of Technology section). We publicize department news through various outlets (APS, social media, college and university communications) to increase our visibility so that students interested in plant pathology will explore our department. We are actively engaged in internship and other recruitment programs. Every year, we invite selected applicants for visits to the department (expenses paid for by department and/or host PI funds), which is crucial to recruiting excellent students. These visits are organized by the Academic Program Coordinator.

Plant Pathology Graduate Students Association (PPGSA)

The PPGSA is an active part of the department. The group organizes events and fund-raisers and coordinate visits for guest speakers. Students can become involved in the department by becoming PPGSA officers and serving on department committees, including the Graduate Studies Committee, Academic Affairs Committee, faculty search committees and department social committees. The PPGSA president and vice-president often represent the department at college, university and APS functions. Another important function of PPGSA is to foster professional and social interaction between students through regular meetings and social events, including an annual weekend retreat.

PPGSA helps welcome new graduate students and organizes an annual spring symposium (where first-year students present their research proposals). One very successful activity is the student exchange with Penn State and Cornell, where graduate students from each institution have the opportunity to visit one of the other campuses and present a seminar.

Two of PPGSA’s biggest fundraisers involve raising plants (native plants in Columbus; vegetable seedlings in Wooster) for large public plant sales held on each campus every spring. These events raise a total of $2000-$4000 each year. In 2010, PPGA provided a total of $1500 in travel grants, which was matched by the department (Professorship in Plant Protection Endowment) to help 14 students attend professional meetings. A big service to the department is PPGSA’s
involvement in outreach activities such as Scarlet and Gray Ag Day (Columbus, grades 4-5) and Science of Agriculture (Wooster, K-12).

### Quality of the Graduate Program

The MS and PhD programs in Plant Pathology are continually self-assessed. Furthermore, two recent external assessments of our programs were conducted, one by the National Research Council (doctoral programs in the US) and one by the OSU Graduate School. These have bearing on our own quality assessment, and are summarized first.

#### NRC Study

The National Research Council (NRC) (2010, revised in 2011 after correction of errors) conducted a major study of doctoral programs in the U.S. In this study, plant pathology programs were grouped nationally with 116 "Plant Science" doctoral programs (broadly defined). Many of these were primarily plant molecular biology departments, with no involvement with plant pathology, plant pathogens, or microbes that infect plants. To better assess our performance in plant pathology, we identified 23 programs in the list of 116 Plant Science units that had a large plant pathology component, and we called these “Plant Pathology” programs for our current purposes.

The study included two types of assessment methods - R and S. The S (survey-based) scores are based on a survey that asked faculty to rate the importance of the 20 different program characteristics in determining the quality of a program. Based on their answers, each characteristic was assigned a weight; these weights varied by field. The weights were then applied to the data for each program in the field, resulting in a range of rankings for each program. The R (regression-based) scores are based on an indirect way of determining the importance faculty attach to various characteristics. First, groups of randomly selected faculty were asked to rate the quality of a sample of representative programs in their field. Based on the sample program ratings, weights were assigned to each of the 20 characteristics using statistical techniques; again, these weights varied by field. These weights were applied to the data about each program, resulting in a second range of scores. Each approach yielded a different set of weights, and therefore resulted in different ranges of scores (or rankings). Uncertainty in the scores was quantified with a statistical-sampling-based protocol, and the 5th and 95th percentiles for the S and R scores (rankings) were obtained.

We were very pleased that Ohio State was ranked among the top 3-5 Plant Pathology doctoral programs in the U.S., based on both the R and S methods. Unlike some programs, our ranking was about the same for the two methods. The exact numerical ranking depends on whether the 5th or 95th percentile of the S or R method was used for the sorting of programs. With some of these overall statistics we were ranked first out of the 23! (Figure T1) In terms of scores for individual components (characteristics) that make up the S or R total scores (available in the detailed statistics
from NRC), our program ranked highly in the following key areas:

- Research (publications, grants)
- Student Support and Outcomes (funding)
- Student Activities (this includes student orientation and training, access to a wide range of university programs, an active plant pathology graduate student organization, and availability of travel funds to attend professional meetings and other opportunities)

As emphasized by the NRC, there is a considerable amount of uncertainty in the scoring of departments. We agree with this assessment based on the percentile (confidence) intervals. In part this is because there is no single measure of a successful PhD program; rather, different individuals can (and do) emphasize different aspects of a program. For instance, the best place (assuming there is a best place) to get a PhD in the study of plant pathogenic bacteria would not necessarily be the best place to get a PhD in the study of plant viruses, or in the study of fungi that infect plants.

Figure T1 summarizes the rankings based on the R method (about the same results for our program were found with the S method). As evident in the figure, there is a lot overlap in the "confidence intervals." But by any measure, acknowledging a level of uncertainty, this study placed Ohio State in the top Plant Pathology doctoral programs in the U.S. Several prospective students have commented that this strong ranking has positively influenced their decision to apply to our graduate program.

**Figure T1.** NRC Ranges of Rankings, “R” method, for Plant Pathology Doctoral Programs.
OSU Doctoral Assessment – 2007

OSU’s Graduate School commissioned a university-wide doctoral program assessment that covered the time period 1996-2006. This assessment was based on data including GRE scores of admits, number of low GPA waiver requests, time to degree, enrollment, and diversity (domestic minorities; international students; gender), with input from the respective colleges.

Programs were classified into the following categories: High, Strong, Good, Must Reassess or Restructure, or New or Developing. Plant Pathology was rated as "GOOD" with the following comments, "The college report notes that Plant Pathology has a top ranking in the nation. The department appears to have a clear and publicly articulated sense of its research areas, and the college report acknowledges the successful student research that has been conducted and recognized nationally." The report also notes, as does the Graduate School, the low GRE Verbal scores and the number of petitions to the Graduate School for admissions with a low GPA from the doctoral program in Plant Pathology (www.gradsch.ohio-state.edu/Depo/PDF/Doctoral_Program_Assessment.pdf)

Each department/unit in CFAES was required (as a part of the department's strategic planning effort) to establish metrics for measures of graduate program quality including, but not limited to, undergraduate GPA, GRE, time to degree, percent completion, placement after graduation, publications, presentations of research at regional or national meetings, master’s GPA (if applicable), and quality and reputation of faculty (submitted in July 2007). CFAES monitors measures of graduate program quality annually in the department’s program review.

In December 2007, the department devoted a day-long meeting to the graduate program, including discussion on admissions criteria, definitions of “quality,” and graduate funding. There was much discussion about factors that are good predictors of success in graduate study, characteristic and qualities common to excellent applicants and students, whether GRE scores are good predictors of success in graduate study, and how an emphasis on GRE scores affects admissibility of international students and underrepresented minorities (and thus the diversity of our graduate program).

We are pleased with the rating we received by the Graduate School. However, based on the deliberations at our December 2007 meeting and other internal evaluations of our program, we strongly believe that some of the criteria used by the Graduate School are not very useful for judging our program. The department feels that, in general, GRE scores are not very meaningful for judging success in our department. First of all, there is evidence across disciplines that there is considerable variability in the relation between GRE scores and graduate-school performance. In a limited assessment of our own students, we have not seen any relationship between GRE scores and later accomplishments in our department. Furthermore, since we recruit heavily from other countries, GRE Verbal scores will be relatively low. Finally, we strongly believe that the best measures of our
graduate program should be based on accomplishments in graduate school (and after graduation), not the scores of students before they enter our program. Nevertheless, OSU feels that GRE scores have merit in judging programs, so we have set the goal of increasing the average GRE scores of incoming graduate students.

For consideration of admittance to our program, each applicant is carefully assessed in both quantitative metrics (GRE scores, GPA) as well as experience, rigor of undergraduate curriculum, recommendations, fit for a particular faculty program, career goals and potential for future success. All aspects of the graduate application - educational background, experience, transcripts, GRE scores, TOEFL scores (if applicable), letters of recommendation, statement of intent, as well as interviews - are carefully considered. Since the charge from the Graduate School has been issued, we carefully consider GRE scores (particularly low scores) in admission decisions more so than in previous years.

Since 2008 (the first academic year after release of the OSU assessment), mean GRE scores of our newly enrolled students have steadily improved towards our target of 1160 (GRE Quantitative + Verbal). Details are given in Table T8. In 2011, the mean Q+V score was 1193 (PhD) and 1107 (MS). Our target analytical writing score is 4.0; our mean writing score for PhD students is below 4.0 although in 2011 the mean for MS enrollees was 4.0. We have admitted a small number of students with low GPA waivers since 2008 (below 3.0/4.0 or equivalent) in recent years, but each decision was carefully considered on a case-by-case basis. Petitions for low GPA waivers are submitted to the Graduate School for final admission decisions.

We also implemented a requirement that all Plant Pathology graduate students submit yearly reports of accomplishments (presentations, publications, awards etc.) for their own records as well as to assist with reporting requirements. Student highlights and achievements are also reported annually to CFAES. Some of the statistics for benchmark measures of success for the graduate school are provided in the next sub-section.
Table T8. Summary of Statistics, Newly Enrolled Graduate Students

<table>
<thead>
<tr>
<th>Mean scores of new graduate program enrollees</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD. GRE (Quant + Verbal) n=number of enrollees</td>
<td>1208</td>
<td>1158</td>
<td>1260</td>
<td>1118</td>
<td>1100</td>
<td>1240</td>
<td>1190</td>
<td>1166</td>
<td>1193</td>
</tr>
<tr>
<td>MS GRE (Quant + Verbal) n=2 n=2 n=6 n=8 n=4 n=4 n=5 n=5 n=5</td>
<td>1110</td>
<td>1065</td>
<td>1070</td>
<td>1202</td>
<td>1136</td>
<td>1073</td>
<td>1178</td>
<td>1190</td>
<td>1107</td>
</tr>
<tr>
<td>GRE (Quant) PhD n=4 n=4 n=3 n=9 n=1 n=5</td>
<td>725</td>
<td>638</td>
<td>725</td>
<td>675</td>
<td>643</td>
<td>735</td>
<td>740</td>
<td>626</td>
<td>718</td>
</tr>
<tr>
<td>GRE (Quant) MS n=2 n=2 n=1 n=6 n=8 n=4</td>
<td>605</td>
<td>645</td>
<td>585</td>
<td>680</td>
<td>630</td>
<td>655</td>
<td>668</td>
<td>688</td>
<td>618</td>
</tr>
<tr>
<td>GRE (Verbal) PhD n=2 n=2 n=6 n=4 n=4 n=4</td>
<td>483</td>
<td>520</td>
<td>535</td>
<td>443</td>
<td>457</td>
<td>505</td>
<td>450</td>
<td>540</td>
<td>475</td>
</tr>
<tr>
<td>GRE (Verbal) MS n=5 n=4 n=6 n=8 n=5 n=5</td>
<td>505</td>
<td>420</td>
<td>485</td>
<td>522</td>
<td>506</td>
<td>418</td>
<td>510</td>
<td>502</td>
<td>488</td>
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<tr>
<td>Analytical Writing PhD n=3</td>
<td>*</td>
<td>*</td>
<td>3.0</td>
<td>3.6</td>
<td>4.2</td>
<td>3.6</td>
<td>3.5</td>
<td>3.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Analytical Writing MS n=4</td>
<td>*</td>
<td>*</td>
<td>4.8</td>
<td>4.3</td>
<td>4.0</td>
<td>3.3</td>
<td>3.4</td>
<td>3.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Low GPA waivers PhD n=3 n=3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Low GPA waivers MS n=2 n=2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Prior to 2005, several enrollees reported GRE scores in a different score format and/or different analytical score, thus these scores are not shown.

Some Statistics on our Graduate Students (2000-present) related to quality of program

**MS Program** (42 graduates)

Mean time to graduation: 9.9 quarters (excluding non-thesis and Plan G MS degrees)

Plan G – MS degrees are granted to PhD students after successful completion of the candidacy exam.

Of the thesis MS graduates:
12 were completed by the end of 9 quarters
20 were completed by the end of 12 quarters

**PhD Program** (36 graduates)

Mean time to graduation: 17.7 quarters (mean time since MS)

Of the thesis PhD graduates:
19 were completed by the end of 17 quarters
17 were completed by the end of 24 quarters
Attrition
We have a very good retention rate. Of 109 students in the period 2000-2011:

**MS students:** 1 transferred to another university; 2 transferred to other OSU programs; 1 left to accept an employment offer; 1 withdrew.

**PhD students:** 3 transferred to other OSU programs; 1 returned to home country; 2 withdrew; 1 was dismissed (academic misconduct).

Diversity
We have good international diversity, with 19 international students from 12 countries (2011). We also have good male:female gender balance. See above Table T8 (above) for details. However, we are working to improve our recruitment and retention of underrepresented domestic minorities. We actively collaborate with diversity programs such as the Summer Research Opportunity Program (SORP), Plant Molecular Biology and Biotechnology Summer Undergraduate Research Experience and others. We have hosted seven SROP interns in the past four years which targets talented underrepresented minorities for graduate study.

Our cadre of summer students has grown – we had over 40 summer interns and (regular) student assistants in 2010 and 35 in 2011. This group included several high school students. We continue to look for ways to improve our recruitment and expose more students to research in plant pathology.

Graduate Students – Publications and Invited Presentations
Our faculty have an excellent record working with graduate students to publish in peer-reviewed journals and produce Extension publications and resources. Just a few highlights from the past few years are given.

- **Alissa Kriss** (PhD) - 2011 OARDC William E. Krauss Director's Award for Excellence in Graduate Studies - best paper by a doctoral student in the college in 2010 (L. Madden and P. Paul, advisors). This publication was also featured as a *Phytopathology* Editor's Pick for August 2010.

- **Daniel Anco** (M. Ellis and L. Madden, advisors) and **Alissa Kriss** (L. Madden and P. Paul, advisors). 2011 Melhus Graduate Student Symposium, “Today's Students Making a Difference in the Field of Plant Disease Epidemiology and Disease Management.” American Phytopathological Society Annual Meeting, Aug. 6-10, Honolulu, Hawaii.

- 2010 *Plant Health Progress* publication by doctoral graduate **C. Andrew Wyenandt** et al. (now faculty member at Rutgers) was featured as an Editor's Pick (R. Riedel, advisor)

- Publication by doctoral graduate **Shabeg Singh** received the Environmental Bioindicators Best Paper award, Terrestrial Invertebrate category. (S. Miller and P. Grewal, advisors)

- A publication in *The Plant Cell* by doctoral graduate **Miguel Vega Sanchez** received the Krauss OARDC William E. Krauss Director's Award for Excellence in Graduate Studies for the best paper by a doctoral student in 2008 (G-L Wang, advisor).

- **Jing Song** (S. Kamoun, advisor) was first author in a 2009 *PNAS* publication (Vol 106:1654-1659).
Five doctoral graduates of S. Kamoun (G. Torto-Alalibo, J. Bos, E. Huitema, Z. Liu and J. Song) were co-authors on an internationally publicized paper in *Nature* that described the genome sequence of *Phytophthora infestans* (2009, Vol. 461: 393-398).

Doctoral graduate Kirk Broder’s publication was featured as an “Editor’s Pick” in *Phytopathology* 2009, 99: 957-967 (A. Dorrance, advisor).

Table T9. Graduate Student Publications (reported to CFAES annually)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of peer-reviewed journal articles with grad student authors (number of student authors)</td>
<td>9 (9)</td>
<td>19 (15)</td>
<td>24 (18)</td>
<td>21 (18)</td>
<td>19 (17)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of peer-reviewed journal articles (number of student authors)</td>
<td>13 (12)</td>
<td>23 (18)</td>
<td>16 (15)</td>
<td>12 (8)</td>
<td>12 (14)</td>
<td>13 (14)</td>
</tr>
</tbody>
</table>

Graduate Students – C.C. Allison Award

We annually select 1-2 doctoral students for the department's C. C. Allison Award to recognize excellence in research and service to the department. The award, established in memory of C. C. Allison, a former faculty member and outstanding student mentor, includes $800 and an engraved plaque to each recipient. This is the department's highest honor for a doctoral student.

Students Taking an Active Role in National Initiatives

Melanie Ivey, PhD candidate, serves as an APS (American Phytopathological Society) Public Policy Board intern with the Food Safety Interest Group. The board provides scientific input on pertinent issues to policy makers and also interacts with other scientific organizations/coalitions.

Alissa Kriss, PhD candidate, is a member of the APS Office of Public Relations and Outreach, where she is helping to drive national initiatives on student recruitment, education outreach and public awareness of plant pathology issues.

Table T10. Graduate student participation on APS Committees (2011).

<table>
<thead>
<tr>
<th>APS Committee</th>
<th>Graduate Students members (2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>APS Public Policy Board, Intern</td>
<td>Melanie Ivey</td>
</tr>
<tr>
<td>Office of Public Relations and Outreach</td>
<td>Alissa Kriss</td>
</tr>
<tr>
<td>Biological Control Committee</td>
<td>Chunxue Cao, Xiaoqing Rong</td>
</tr>
<tr>
<td>Crop Assessment Loss/Risk Eval. Committee</td>
<td>Alissa Kriss</td>
</tr>
<tr>
<td>Diagnostics Committee</td>
<td>Bridget Meiring</td>
</tr>
<tr>
<td>Epidemiology Committee</td>
<td>Daniel Anco</td>
</tr>
<tr>
<td>Forest Pathology Committee</td>
<td>Patrick Sherwood</td>
</tr>
<tr>
<td>Graduate Student Committee</td>
<td>Jinnan Hu, Chenxi Chen</td>
</tr>
<tr>
<td>Host Resistance Committee</td>
<td>Patrick Sherwood, Hehe Wang</td>
</tr>
<tr>
<td>Regulatory Plant Pathology Committee</td>
<td>Melanie L. Ivey</td>
</tr>
</tbody>
</table>
For additional information, see Supplemental Tables T-D to T-G at the end of this EDUCATIONAL PROGRAMS AND STUDENTS section for listings of current graduate students, selected highlights of recent graduate students, current placement of our MS and PhD graduates since 2000, and selected alumni highlights.

Postdoctoral Scientists and Visiting Scholars
Postdoctoral scientists and visiting scholars are important for all aspects of our department, and many previous post-docs and scholars now have professional positions around the world. International visiting scholars are discussed in the INTERNATIONAL section. Selected highlights are listed in Supplemental Table T-H.

Plant Pathology Curriculum

Courses
Our course offerings are structured to cover the major plant pathogen groups (mycology, bacteriology, plant virology and plant nematology), commodity groups (fruits and vegetables, field crops, ornamentals, turfgrass, forest and shade trees), and basic disciplines (molecular biology, plant-pathogen interactions, epidemiology, disease management, diagnostics, societal issues, etc.) (Lists of course offerings, Quarter and Semester, are given in Supplemental Tables T-I and T-J). In addition to instruction by regular faculty, we have also employed non-tenure track lecturers and instructors, including Extension associates, to maintain and enhance our course offerings. With the decline in number of faculty, we have had to rely more heavily on non-faculty members to teach some of our courses.

One of our strategic goals is to advance teaching and advising in the three CFAES Signature Areas (described in the SCHOLARSHIP section), and to expand our teaching in the area of bioenergy/fuels and bioproducts. We do not yet have a specific course on biobased technologies, but this and other emerging topics have been incorporated into several of our existing courses.

Quarters to Semesters Conversion
The university is switching from a quarter to a semester calendar starting in Summer 2012. To prepare for the switch, all departments conducted comprehensive evaluations of their degree
programs and courses. We sought input from the department, college and university. A day-long department retreat with faculty, staff, students and postdoctoral scientists was devoted to degree programs and course needs relevant to students in the 21st century. The AA committee spent many hours over the past two years considering the many issues involved in the change.

Program proposals were developed for each degree program (undergraduate majors and minors; graduate degrees) with the following components:

- Learning outcomes for each degree program;
- Curricula (degree requirements) for each program (APPENDIX G);
- Assessment plans to formally evaluate and document student progress in meeting each of the learning outcomes;
- Transition plans for students who will traverse the quarter and semester systems.

Additionally, proposals (learning outcomes, syllabi, assessment plan, etc.) were submitted for each of our courses in the semester system.

**Significant developments include the new Master in Plant Health Management offered jointly with Entomology (professional, non-thesis degree).** In undergraduate programs, changes include the Plant Health Management (PHM) major to be jointly administered by Plant Pathology and Entomology, and a *new major in Plant Pathology aimed at students interested in pursuing graduate study*. For specific program requirements, see APPENDIX G, Course Requirements.

**Quality of Instruction**

Our department fully supports efforts to evaluate quality of instruction, and we realize that there is no single measure of quality. **We take a multi-pronged approach to the evaluation of instruction.** The Teaching Evaluation (TE) committee, described elsewhere in this document, works with each faculty member to evaluate classroom and Extension teaching, and give recommendations for improvement. Our annual Program Review in the department, also described elsewhere, includes an assessment of performance in teaching. Through the TE committee, peer evaluation of teaching is obtained.

Our department also utilizes the university’s 10-item Student Evaluation of Instruction (SEI) survey instrument to gather student feedback on the quality of instruction (administered online). Plant Pathology faculty and instructors also collect student feedback in narrative evaluations administered at the end of the term (paper forms).

**For the past decade, the Plant Pathology average departmental SEI scores have exceeded the university averages on the 5-point Likert scale by 0.14 to 0.30**, based on the overall rating. For the individual items, our departmental averages have also typically exceeded the university averages by similar values.
Communications and Role of Technology in Support of Academic Programs

Website and Social Media

Our presence on the web is critical to our department. **We invest heavily, both in time and resources, to keep the content of our website current and engaging, with nearly daily updates.** The website is crucial to student recruitment, particularly for prospective graduate students, and we strive to meet the interests of today’s prospective students with online content.

We have also found that the website is also one of the most important ways colleagues use to “find” us. The website is an important way for us to share news and accomplishments and recognize our students, faculty and staff. Internally, we also utilize many functions of the department Intranet. Additionally, all of our Extension programs contribute to one or more websites, and many programs maintain Extension websites (Field Crop Diseases, Turfgrass Diseases, Agronomic Crops, Fruit Diseases, Vegetable Pathology, etc.)

The Academic Program Coordinator manages the department’s website content and works with the college’s communication and technology group (CommTech) on technical aspects. We use website analytics and focus groups to gauge website usage and guide improvements and future direction. These and other information will be used to improve the website and update to a new template administered by CommTech that is consistent with CFAES website and marketing standards.

*We have established a Facebook department “page”* (go.osu.edu/ppfb) which has been a good way to connect with alumni. We also post and share news on the CFAES Facebook page, which we hope allows us to connect to a larger audience of students and alumni. *We have a Twitter account* (#OSUPlantPath) which has turned out to be a good way to receive and share news with other organizations. *We also have a YouTube channel to post videos made by individuals in the department.*

News, Announcements, Publicity

We utilize CFAES CommTech to provide news and updates for news releases and Extension communications. We regularly provide news to *Phytopathology News* and *onCampus* (Ohio State’s faculty/staff news). In particular, *we have a Phytopathology News article in almost every issue of this national/international newsletter published by our professional society (APS).* We post news and photos on our website, Facebook and Twitter pages. These are ongoing efforts to gain exposure and publicize accomplishments. This work is done by the Academic Program Coordinator.
Videoconferencing

We have always been at the forefront of technology for classes and department communication. Years ago, lectures were videotaped and shown at multiple times for the convenience of the students; the lecture videotapes were made available for check-out. We utilized early satellite systems and conference phone/computer linkages to teach lectures in Wooster and Columbus.

We have used the video classrooms maintained by CFAES CommTech (Kottman Hall in Columbus and Fisher Auditorium in Wooster) for seminars and some courses for over two decades. These college classrooms are staffed by technicians who oversee the recording of presentations and update/maintain equipment. In the last decade, several departments have added video conferencing capabilities to internally managed meeting rooms and classrooms. Some of the cost of installation was shared by CFAES for the purchase and installation of the equipment. In the past year, new upgrades have been purchased for both locations. The department has invested $56,000 in new video conferencing equipment since 2006 (with additional investments in earlier years). More details of these facilities are described under INFRASTRUCTURE.

Videoconferencing facilities and upgrades have enhanced our ability to videolink courses, and we now offer 13 Columbus-Wooster linked courses (nearly all of our graduate courses) in addition to seminars and current topics courses. This is very importance because of the split of the department between two locations, with half or more of the grad students based in Wooster. The lectures of most graduate-level courses (all required core courses) are offered by videolink. Many committee meetings, including SAC (advisory) meetings for students and even some oral candidacy examinations are held over the videolink. Through these facilities, specialized distributions of courses are also possible. For instance, Larry Madden has taught his epidemiology course (PLNTPTH 702) several times to students in Columbus and Wooster, but also to students in Penn State and sometimes to Cornell and the Norwegian University of Life Sciences (UMB). B. McSpadden Gardener used webconferencing (GoToMeeting, Skype and Polycom) to teach a biostatistics course (PLNTPTH 655) to students in Columbus, Wooster, and Chonnam University in South Korea as part of his World Class University international project.

In 2008, we started to videolink sections of both the lecture and laboratory portions of our General Plant Pathology course (PLNTPTH 401), making this the first videolinked lecture/lab course. This was made possible by renovations and equipment additions to our teaching lab in Wooster, including microscopes with digital cameras, multiple screens and good quality microphones/audio equipment.
Teaching assistants are located in Wooster (in addition to Columbus) to instruct the lab section. Other lecture-lab courses also utilize the videolink (e.g., Phytobacteriology, Plant Virology). Videolinked courses have been a significant advantage for Wooster-based graduate students.

*Technical issues related to video connections over the Internet, maintenance of equipment, staffing, weak cell phone reception and wireless internet signal in Kottman Hall, and structural issues in Kottman Hall (e.g., roof leaks, room temperature control), are ongoing challenges for the distribution of our courses over video link.* We also need more videolinked course offerings in Wooster – e.g., statistics, plant cellular and molecular biology, biochemistry – offered by departments outside of our college.

**Online Course Management System - “Carmen”**

Ohio State’s online course system, Carmen, is essentially a website template created for every course. Several of our instructors utilize the Carmen system to post notes, lectures and announcements. Our online class (PNTHPTH 201D) is delivered entirely in Carmen. Students can upload assignments to the Carmen site, and grades can be maintained securely and privately online. Additional tools include discussion groups and the ability to create online tests/quizzes and surveys. Sarah Williams is a Carmen affiliate and serves as a trainer and point of contact for questions. She recently completed training on online course standards. Carmen will be a key element in the development and delivery of other online courses.

### Staffing Support for Academic Programs

All faculty teach in the department, and all advise graduate students. All are active in recruitment of students to our programs. Most undergraduate advising is done for one or two faculty members in Columbus, with considerable involvement of a Lecturer and the Academic Program Coordinator. It must be emphasized that the success of our educational programs depends greatly on the many contributions of our Academic Program Coordinator (Monica Lewandowski) and Lecturer (Sarah (Ellis) Williams). This is especially true with the general decline in number of faculty in the department over the past decade.

M. Lewandowski coordinates: undergraduate and graduate programs, graduate student admissions; undergraduate and graduate recruiting, academic program data reporting, course and room scheduling, summer internship program, teaches PLNTPTH 597, Social Issues: Pesticides, Alternatives and the Environment (one quarter per year); coordinates the summer internship program, serves as club co-advisor to the undergraduate student organization; coordinates internal and external communications, serves as website content manager.

S. Williams has the following responsibilities: teaches three sections of PLNTPTH 201 (online
coordinates three General Plant Pathology laboratory sections, including teaching a lab section and mentoring several graduate assistants; coordinates Plant Pathology 300, coordinates and assigns teaching assistants for Plant Pathology courses; supports faculty and staff teaching of classes, manages classrooms and provides technology support (PolyCom/video conferencing, etc.); manages the online Continuing Education courses and coordinates the development of online Plant Pathology curriculum; assists the department with the Quarter-to-Semester conversion and assessment process for Plant Pathology; assists with developing and implementing the new MPHM Program; assists the Academic Affairs Committee with undergraduate advising; co-advises undergraduate student organization in Plant Pathology; develops outreach engagement tools for youth and others; serves as the Carmen Affiliate department representative; and helps maintain social networking tools for department (website, Facebook, Twitter).

**eLearning in Teaching and Extension**

eLearning, which encompasses electronically supported learning and teaching, ranges from entire online courses to the use of video and multimedia teaching tools. *The department has embraced eLearning to facilitate Columbus-Wooster connections; moreover, we view eLearning as a way to reach audiences beyond campus boundaries.* As the only plant pathology department in Ohio, we have the opportunity and responsibility to provide plant health management education and information to students, clientele and the general public. eLearning will be crucial to the success of our MPHM program, and will position us to offer courses online nationwide through programs such as AgIDEA (Agricultural Interactive Distance Education Alliance). *These initiatives fully support our OUTREACH and ENGAGEMENT programming through Extension Education.*

**Online Courses**

We are a pioneer in CFAES with distance education and online courses. In 2001, we were the among the first departments in the college to offer an online undergraduate course, Social Impact of Plant Diseases (PLNTPTH 201D), which was based on a traditional lecture course developed by C. Curtis. This course continues to be offered three quarters per year by Sarah Williams, averaging 33 students per quarter.

**New Online Courses**

With several years of experience with online courses, we are well positioned to develop new courses for a growing number of target audiences. Currently, we are developing an online course on tree diseases and another course on fruit diseases, with the eventual goal of devising two forms of each course: 1) for OSU students (in addition to a traditional course taught in-person), and 2) for the Extension community.
To improve and enhance our online courses, S. Williams has participated in a number of “Quality Matters” workshops at OSU, which involves evaluating the design of an online course against a set of quality standards. The department is submitting the Social Impact of Plant Diseases course to the Quality Matters review process.

Online Extension Resources

The department actively promotes eLearning to the Extension community, and aims to expand collaborations with Extension professionals to develop additional eLearning resources. In 2009, the online courses “Sick Plants and a Hungry World” and “Plant Diseases: Their Impact and History” were offered to the general public through the Office of Continuing Education. Both courses were modeled after Social Impact of Plant Diseases (PLNTPTH 201D).

The “Sick Plants” course ($35 fee) targets Master Gardener Volunteers and has reached 327 volunteers (204 of those participants received a certificate of completion) in 24 states. It is a self-paced, non-credit course with no graded assignments. Continuing education credits may be awarded by the participant’s Master Gardener county program. Currently we are moving the online administration of the course from Continuing Education to CFAES CommTech (via eStores) to improve service and enhance marketing to attract a broader customer base.

“Plant Diseases: Their Impact and History” targets Certified Crop Advisers, teachers and others seeking continuing education credits (CEUs). The fee is $350 and participants earn 27 CCA credits in Pest Management or 3 CEUs upon completion. The course is graded pass/fail. Although this course has had only a few participants thus far, we are hoping to bolster enrollment as interest in eLearning grows.

We also offer a non-credit online course “Introduction to Diagnostics for Master Gardener Volunteers: Approaches to Plant Pest Diagnosis, developed by S. Williams and Denise Ellsworth (OSU Extension) in collaboration with the North Central Consumer Hort IPM Working Group. It is available on the eXtension website ($10). This “short-course” focuses on the basic principles of diagnostics and takes about 3 hours to complete. The course has been a great success with 341 participants since its launch in January 2011. Williams, Ellsworth and Jim Chatfield (OSU Extension and courtesy faculty appointment in Plant Pathology) are currently developing another online course, “Introduction to Diagnostics for Master Gardener Volunteers: Signs and Symptoms,” similar to the structure of the “Approaches to Plant Pest Diagnosis” course, but with more audio and visual teaching tools. The target launch date is 2012.

Other products already in use include a 4-H "Idea Starter" project on plant pathology, a Plants Get Sick Too! Plant Diseases Idea Starter on the APS Education Center (682 views from 1/1/10-8/15/10), a Phytosanitary Online Module plant disease diagnostic video posted on YouTube, and online Fact
Sheets (ohioline.osu.edu/hyg-fact/3000/index.html) used in several departmental courses. **For the Introduction to Plant Diseases Fact Sheet Series there were over 190,000 hits in 2010 alone!**

**Challenges**

A challenge in developing online courses is access to knowledgeable resources. There are few departments in CFAES offering online courses, although CFAES plans to form an eLearning (Academic Programs) committee to foster exchange of ideas, offer assistance, and provide guidance and direction in the development of eLearning initiatives. Another challenge is how to understand and assess the cost-effectiveness of the various online delivery options that are compatible with the technical needs and resources of our audiences. CFAES recently hired Assistant Dean of Academic Affairs, Jeff Hattey, who will provide leadership in eLearning and help us address these challenges.

**eLearning Committees**

The Department participates in the CFAES-OSUE committee, Extension Teaching with Technology, where new project ideas are developed. In our department, S. Williams leads the eLearning initiative and has established an advisory committee to: 1) develop a strategic plan for development, implementation, and delivery of eLearning tools; 2) guide and support the development, implementation and delivery of new eLearning tools for OSU students, Extension educators and the general public; and 3) provide education to department personnel on use of eLearning tools.

Key questions to be addressed include:

1) **Online courses** - What topics and courses are needed? What are the best delivery methods/outlets for online courses? What is the best option for cost recovery and profit? What is the best way to market our eLearning resources? Which target audiences should we aim to attract? How can we provide online courses to wider audiences, even nationally through AgIDEA (Agricultural Interactive Distance Education Alliance)

2) **How do we best select and utilize the myriad of electronic resources?** What do instructors want and need in terms of electronic tools, and how do we educate instructors on use of these resources? How do we assess the effectiveness of these tools for student learning? How can we incorporate eLearning tools into graduate education?

We are enthusiastic about the enormous opportunities ahead and strive to be at the forefront, with the goal of enhancing access to education and providing high quality plant pathology education to students, clientele and the general public.
Conclusion

Our education programs remain a high priority for the department. We have a strong commitment to excellence in teaching and advising, with a very strong reputation in our Graduate Program. In addition to the use of traditional approaches to instruction and advising, we aggressively adopt and utilize new technologies in communications to deliver course content and to recruit students. New degree programs and courses will help us adapt to workforce needs and advances in the discipline, and should result in increased enrollment in courses at the graduate and undergraduate levels. We are well aware of the major financial challenges in maintaining our graduate enrollment above 30 students, but the filling of two vacant faculty positions, if approved, should make this a reasonable goal. We also are cognizant of the obstacles to increased undergraduate enrollment, but believe our recruiting strategies—coupled with new courses and majors—will have very positive effects.
**Supplemental Table T-A. Selected Highlights, Plant Health Management Students and Graduates - 2007-present. (Reported to CFAES Annually)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Honors, Recognition, Current Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edward Luersman</td>
<td>• Presidential Scholar (most prestigious academic merit scholarship for incoming freshmen, one of ten selected in 2010)</td>
</tr>
<tr>
<td>(sophomore)</td>
<td>• University Honors Collegium</td>
</tr>
<tr>
<td>Timothy Frey</td>
<td>• AJ Hoffmann scholarship, Plant Pathology (2010-2011); Plant Protection scholarship (2009-2010)</td>
</tr>
<tr>
<td>(senior)</td>
<td></td>
</tr>
<tr>
<td>Katherine Gambone</td>
<td>• Plant Protection scholarship, Plant Pathology (2010-2012)</td>
</tr>
<tr>
<td>(junior)</td>
<td></td>
</tr>
<tr>
<td>Amber Hoffstetter</td>
<td>• CFAES 2011 Top 20 Outstanding Senior</td>
</tr>
<tr>
<td>(BS 2011)</td>
<td>• 2nd place, Plant and Environmental Sciences, Annual CFAES Undergraduate Research Forum, 2011</td>
</tr>
<tr>
<td></td>
<td>• Current: OSU Horticulture and Crop Science MS Program (multi-university wheat breeding project, Clay Sneller, advisor)</td>
</tr>
<tr>
<td>Kara Riggs</td>
<td>• Started studying with Terry Graham for her eighth grade science fair project and did research in his lab for the next 9 years</td>
</tr>
<tr>
<td>(BS 2010)</td>
<td>• The college’s first freshman to win 1st place, Agricultural/Environmental Sciences, OSU Denman Undergraduate Research Forum, 2006</td>
</tr>
<tr>
<td></td>
<td>• 1st place, Plant and Environmental Sciences, CFAES Undergraduate Research Forum, 2010</td>
</tr>
<tr>
<td></td>
<td>• Current: PhD student, Plant Sciences, University of Missouri (multi-year fellowship) (R. Sharp, advisor)</td>
</tr>
<tr>
<td>Racheal Pack</td>
<td>• Four- year Land Grant Opportunity (full undergraduate scholarship)</td>
</tr>
<tr>
<td>(BS 2010)</td>
<td>• Current: MS student in Plant Pathology (T. Graham, advisor)</td>
</tr>
<tr>
<td>Jennifer Wiester</td>
<td>• Current: Thermo Fisher Scientific, Ohio. Technical services specialist, Microbiology division</td>
</tr>
<tr>
<td>(BS 2010)</td>
<td></td>
</tr>
<tr>
<td>Laura J. (Bruner) Dotterer</td>
<td>• CFAES 2009 Top 10 Outstanding Senior</td>
</tr>
<tr>
<td>(BS 2009)</td>
<td>• Star of Agriscience Award at the National FFA Organization, Indianapolis, Nov. 2008 (Pettisville, OH FFA Chapter)</td>
</tr>
<tr>
<td></td>
<td>• 1st place, Plant and Environmental Sciences, CFAES Undergraduate Research Forum, 2009 and 3rd place, Agricultural/Environmental Sciences division, OSU Denman Undergraduate Research Forum, 2009</td>
</tr>
<tr>
<td></td>
<td>• Current: Doctor of Plant Health program, University of Nebraska-Lincoln (USDA NIFA National Needs Fellowship)</td>
</tr>
<tr>
<td>Jessica Schafer</td>
<td>• CFAES 2009 Top 20 Outstanding Senior</td>
</tr>
<tr>
<td>(BS 2009)</td>
<td>• Current: PhD student in Weed Science, Purdue, Department of Botany and Plant Pathology (S. Hallett, advisor)</td>
</tr>
<tr>
<td>Nick Weidenbenner</td>
<td>• William F. Helms Student Scholarship, USDA APHIS PPQ</td>
</tr>
<tr>
<td>(BS 2009)</td>
<td>• Current: MS student, Univ. of Minnesota, Department of Agronomy and Plant Genetics (S.L. Naeve, advisor)</td>
</tr>
<tr>
<td>Kate M. Gearhart</td>
<td>• Ohio Soybean Council Foundation undergraduate scholarship</td>
</tr>
<tr>
<td>(BS 2008)</td>
<td>• Completed MS in Plant Pathology, 2010 (A. Dorrance, advisor)</td>
</tr>
<tr>
<td></td>
<td>• Current: Pioneer Hybrid, Ohio</td>
</tr>
<tr>
<td>Name</td>
<td>Honors, Recognition, Current Placement</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Amanda Hayes (BS 2008)   | • Presidential Salute to Undergraduate Achievement – Top 150 students, 2008  
• One of five OSU students selected to present her undergraduate research at the University of Sao Paulo, Brazil (2008)  
• 1st place, Plant and Environmental Sciences, CFAES Undergraduate Research Forum, 2010  
• Current: Administrative mgr., OSU College of Dentistry                                                                                                                                 |
| Bridget Meiring (BS 2007) | • Program coordinator, C. Wayne Ellett Plant and Pest Diagnostic Laboratory, 2008-2011  
• Current: employed by Landfare Ltd. (landscape mgt.) and part-time MS student, Plant Pathology (T. Mitchell, advisor)                                                                                                        |
| Matthew Wallhead (BS 2007) | • Worked as technician for Pierce Paul and is completing his MS thesis in Plant Pathology; will pursue a PhD, University of New Hampshire                                                                                                    |
| Christine Woltjen (BS 2007) | • MS in Plant Pathology, 2010 (D. Lewandowski, advisor)  
• Current: research associate, OSU Department of Microbiology (T.M. Henkin)                                                                                                                                                         |
| Bryan Reeb (BS 2007)     | • Current: Research assistant, OSU Department of Horticulture and Crop Science (Western Branch)                                                                                                                                              |

Supplemental Table T-B. Selected Highlights, Undergraduate Alumni.

<table>
<thead>
<tr>
<th>Name</th>
<th>Achievements/Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amy Niver (BS 2005, MS 2007)</td>
<td>• Seed Enhancement Technical Services Coordinator at Chemtura (Ill.)</td>
</tr>
<tr>
<td>Gina Wirthman Zirkle (BS 2004, MS Envir Sci)</td>
<td>• Scientist, Environmental Stewardship, The Scotts Miracle-Gro Co., Maryville, OH</td>
</tr>
</tbody>
</table>
| Katherine Whitten Buxton (BS 2002, MS 2005) | • Syngenta Crop Protection  
• PhD, North Carolina State                                                                                                                                                                                                                  |
| G. Curtis Colburn (BS 1996, MS 1999) | • Molecular Plant Pathologist, Plant Industry, Clemson  
• PhD, Univ. of Florida                                                                                                                                                                                                                      |
| Denise Ellsworth (BS 1991, MS Natural Res. 1994) | • OSU Extension Educator (Agriculture and Natural Resources), Summit County, Ohio                                                                                                                                                             |
| Scott Adkins (BS 1989, MS 1991) | • Research Plant Pathologist, USDA ARS U.S. Horticultural Research Laboratory, Fort Pierce, Florida  
• PhD, Plant Pathology, University of Wisconsin-Madison                                                                                                                                                                                    |
| John Stier (BS 1988, MS 1991) | • Assistant dean, University of Tennessee College of Agricultural Science and Natural Resources (since July 2011)  
• PhD in Crop and Soil Sciences from Michigan State  
• Prior position: Chair, Dept. of Horticulture, University of Wisconsin-Madison                                                                                                                                                      |
| Scott Mills (BS 1987) | • Principal Scientist at AstraZeneca in Massachusetts  
• PhD, Plant Pathology, Univ. of California-Riverside                                                                                                                                                                                         |
| Matt Beal (BS 1983) | • Acting chief, Division of Plant Industry, Ohio Department of Agriculture                                                                                                                                                                         |
| Corinne Johnson Rutzke (BS 1983) | • Executive Director, Northeast Sun Grant Institute of Excellence, Cornell  
• PhD, Cornell University                                                                                                                                                                                                                   |
Supplemental Table T-C. Selected Highlights, Student Interns. (note: most Plant Health Management majors also serve internships in the department; their accomplishments are listed in Supplemental Table T-A.)

<table>
<thead>
<tr>
<th>Name</th>
<th>School</th>
<th>Internship period</th>
<th>Honor/Recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brittany Nauth</td>
<td>College of Wooster</td>
<td>2010-2011</td>
<td>Senior thesis, College of Wooster, received Honor distinction (highest grade possible and rarely awarded; C. Taylor advisor). Current: working in department and applying to our graduate program for 2012</td>
</tr>
</tbody>
</table>
Borlaug-Ruan summer intern at CIMMYT, Mexico; OSU freshman Autumn 2011 (agricultural and biological engineering major) |
| Robert Beaulieu| BS Ohio State Comparative Studies | 2007-2008       | OSU Comparative Studies graduate, magna cum laude with honors, 2008  
Fulbright Scholarship (with Jose Pascual, CEBAS, Spain) |
| Wanda Baez    | Univ. of Puerto Rico    | 2008-2009         | Summer Research Opportunity Program (summer internship)  
SROP Fellowship (OSU) Graduate School, PhD program, Plant Pathology, 2010-2011 (T. K. Mitchell, advisor). (Currently on leave for family illness) |
| Jefferson Amstutz| Wooster High School     | 2008              | OARDC Research and Internship Program (ORIP) intern  
2nd place, Team Research Award (B. McSpadden Gardener, advisor) |
| Seema Jain    | Wooster High School     | 2008              | OARDC Research and Internship Program (ORIP) intern  
3rd place, Team Research Award (S. Miller and F. Basel-Gurel, advisors) |
| Katelyn Willyerd| Otterbein Univ.        | 2006              | PhD, Penn State  
Current: postdoctoral scientist (P. Paul) and lecturer (General Plant Pathology), Department of Plant Pathology, OSU |
<table>
<thead>
<tr>
<th>Name</th>
<th>Source(s) of Support (Autumn Quarter)</th>
<th>Degree</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Acharya, Bhupendra</td>
<td>GRA (Grant)</td>
<td>MS</td>
<td>Dorrance</td>
</tr>
<tr>
<td>*Andersen, Kelsey F.</td>
<td>GRA (Grant)</td>
<td>MS</td>
<td>Paul</td>
</tr>
<tr>
<td>Cepeda, M. Veronica</td>
<td>Fulbright Scholarship</td>
<td>MS</td>
<td>McSpadden Gardener</td>
</tr>
<tr>
<td>*Chin, Ashlina</td>
<td>GRA (Grant)</td>
<td>MS</td>
<td>Qu</td>
</tr>
<tr>
<td>D’Angelo, Daisy L.</td>
<td>GRA (Grant)</td>
<td>MS</td>
<td>Paul</td>
</tr>
<tr>
<td>Gunadi, Andika</td>
<td>GRA (Grant)</td>
<td>MS</td>
<td>Dorrance</td>
</tr>
<tr>
<td>*Marty, DeeMarie</td>
<td>GRA (Grant)</td>
<td>MS</td>
<td>Taylor</td>
</tr>
<tr>
<td>Meiring, Bridget L.</td>
<td>Self Support</td>
<td>MS</td>
<td>Mitchell</td>
</tr>
<tr>
<td>Pack, Racheal A.</td>
<td>GRA (Dept/OSU and OARDC)</td>
<td>MS</td>
<td>Graham</td>
</tr>
<tr>
<td>Singh, Jasleen</td>
<td>GRA (Grant)</td>
<td>MS</td>
<td>Qu</td>
</tr>
<tr>
<td>Wallhead, Matthew W.</td>
<td>Part-time (University Employee)</td>
<td>MS</td>
<td>Paul</td>
</tr>
<tr>
<td>**Anco, Daniel J.</td>
<td>GRA (Dept/OARDC)</td>
<td>PhD</td>
<td>Ellis, Madden</td>
</tr>
<tr>
<td>Cao, Chunxue</td>
<td>GRA (Grant)</td>
<td>PhD</td>
<td>McSpadden Gardener</td>
</tr>
<tr>
<td>Chen, Chenxi</td>
<td>GRA (Dept/OARDC)</td>
<td>PhD</td>
<td>Mitchell</td>
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<tr>
<td>Chewachong, Godwill</td>
<td>Fulbright Scholarship</td>
<td>PhD</td>
<td>Qu</td>
</tr>
<tr>
<td>Cisneros, Fiorella</td>
<td>GRA (Dept/Endowment, OARDC)</td>
<td>PhD</td>
<td>Redinbaugh &amp; Qu</td>
</tr>
<tr>
<td>Conrad, Anna</td>
<td>GRA (Dept/OSU)</td>
<td>PhD</td>
<td>Bonello</td>
</tr>
<tr>
<td>Debenport, Spencer</td>
<td>FAES Environ. Fellow/Grant</td>
<td>PhD</td>
<td>McSpadden Gardener</td>
</tr>
<tr>
<td>**Ellis, Margaret L.</td>
<td>GRA (Grant and Dept/OSU)</td>
<td>PhD</td>
<td>Dorrance &amp; Paul</td>
</tr>
<tr>
<td>Hu, Jinnan</td>
<td>GRA (Grant)</td>
<td>PhD</td>
<td>Mitchell</td>
</tr>
<tr>
<td>**Ivey, Melanie L. L.</td>
<td>Part-time (University Employee)</td>
<td>PhD</td>
<td>Miller</td>
</tr>
<tr>
<td>**Kriss, Alissa B.</td>
<td>GRA (Dept/OSU)</td>
<td>PhD</td>
<td>Madden, Paul</td>
</tr>
<tr>
<td>***Lee, Sungwoo</td>
<td>GRA (Grant)</td>
<td>PhD</td>
<td>Dorrance &amp; Mian</td>
</tr>
<tr>
<td>Lin, Junyan</td>
<td>GRA (Dept/OARDC)</td>
<td>PhD</td>
<td>Qu</td>
</tr>
<tr>
<td>Lopez Nicora, Horacio D.</td>
<td>GRA (Grant)</td>
<td>PhD</td>
<td>Niblack</td>
</tr>
<tr>
<td>Ma, Xing</td>
<td>GRA (Grant and Dept/OARDC)</td>
<td>PhD</td>
<td>Miller</td>
</tr>
<tr>
<td>**Park, Chan Ho</td>
<td>GRA (Grant)</td>
<td>PhD</td>
<td>Wang</td>
</tr>
<tr>
<td>Rong, Xiaojing</td>
<td>GRA (Grant)</td>
<td>PhD</td>
<td>McSpadden Gardener</td>
</tr>
<tr>
<td>Salgado, Jorge David</td>
<td>GRA (Grant and Dept/OARDC)</td>
<td>PhD</td>
<td>Paul</td>
</tr>
<tr>
<td>Sherwood, Patrick W.</td>
<td>GRA (Dept/OSU and OARDC)</td>
<td>PhD</td>
<td>Bonello</td>
</tr>
<tr>
<td>**Shirsekar, Gautam</td>
<td>GRA (OARDC)</td>
<td>PhD</td>
<td>Wang</td>
</tr>
<tr>
<td>*Showalter, David N.</td>
<td>PMBB Fellowship</td>
<td>PhD</td>
<td>Bonello</td>
</tr>
<tr>
<td>**Songkumarn, Pattavipha</td>
<td>Royal Thai Scholarship &amp; Grant</td>
<td>PhD</td>
<td>Wang</td>
</tr>
<tr>
<td>*Subedi, Nagendra</td>
<td>GRA (Grant)</td>
<td>PhD</td>
<td>Miller</td>
</tr>
<tr>
<td>Walsh, Ellie</td>
<td>PMBB Fellowship</td>
<td>PhD</td>
<td>Taylor</td>
</tr>
<tr>
<td>**Wang, Hehe</td>
<td>GRA (Grant and Dept/OSU)</td>
<td>PhD</td>
<td>Dorrance</td>
</tr>
</tbody>
</table>

* New student
** Post-Candidacy
*** Student in Horticulture and Crop Science
<table>
<thead>
<tr>
<th>Name</th>
<th>Degree (Advisor)</th>
<th>Honor/Recognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daniel Anco</td>
<td>PhD candidate (M. Ellis, L. Madden)</td>
<td>• 2011 Melhus Graduate Student Symposium, APS Annual Meeting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 2011 C. C. Allison Award, Dept. of Plant Pathology</td>
</tr>
<tr>
<td>Margaret Ellis</td>
<td>PhD candidate (A. Dorrance, P. Paul)</td>
<td>• 2010 C.C. Allison Award, Department of Plant Pathology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Blair F. Janson and Wilmer G. Stover Scholarship, 2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Graduate student award, 3rd place, 2010 APS North Central Division mtg.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• OARDC SEEDS Graduate Research grant, 2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 2008 Ohio Agricultural Science and Bioproducts Research Scholarship, Ohio Soybean Council</td>
</tr>
<tr>
<td>Andika Gunadi</td>
<td>MS student (A. Dorrance)</td>
<td>• 2011 Ohio Soybean Council Foundation Graduate Scholarship</td>
</tr>
<tr>
<td>Alissa Kriss</td>
<td>PhD candidate (L. Madden, P. Paul)</td>
<td>• 2011 Melhus Graduate Student Symposium, APS Annual Meeting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 2011 OARDC William E. Krauss Director's Award for Excellence in Graduate Studies for the best paper by a doctoral student published in 2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• APS Janell Stevens Johnk Travel Award, 2009 APS Annual Meeting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Blair F. Janson and Wilmer G. Stover Scholarship, 2009</td>
</tr>
<tr>
<td>Melanie Ivey</td>
<td>PhD candidate (S. Miller)</td>
<td>• Blair F. Janson and Wilmer G. Stover Scholarship, 2011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• OARDC SEEDS Graduate Research grant, 2009</td>
</tr>
<tr>
<td>Chan Ho Park</td>
<td>PhD candidate (G-L. Wang)</td>
<td>• 2010 OARDC SEEDS Graduate Research grant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 2008 C. C. Allison Award, Department of Plant Pathology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Travel grant, 2008 Intl Rice Functional Genetics Symposium, Jeju, Korea</td>
</tr>
<tr>
<td>Gautam Shirsekar</td>
<td>PhD candidate (G-L Wang)</td>
<td>• 2011 C. C. Allison Award, Department of Plant Pathology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• OARDC SEEDS Graduate Research grant, 2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• APS Zahir Eyal Student Travel Award, 2008 APS Centennial Meeting</td>
</tr>
<tr>
<td>Fiorella Cisneros</td>
<td>PhD student (F. Qu, M. Redinbaugh)</td>
<td>• OARDC SEEDS Graduate Research grant Jun</td>
</tr>
<tr>
<td>Junyan Lin</td>
<td>PhD student (F. Qu)</td>
<td>• OARDC SEEDS Graduate Research grant</td>
</tr>
<tr>
<td>Pattavipha Songkumarn</td>
<td>PhD candidate (G-L Wang)</td>
<td>• 2009 Best Graduate Student Poster award, Plant Molecular Biology and Biotechnology (PMBB) Annual Symposium. Columbus, Ohio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• APS H. David Thurston Student Travel Award, 2008 APS Centennial Meeting</td>
</tr>
<tr>
<td>Hehe Wang</td>
<td>PhD candidate (A. Dorrance)</td>
<td>• 2010 Ohio Soybean Council Foundation Graduate Scholarship</td>
</tr>
<tr>
<td>Jiye Cheng</td>
<td>PhD 2011 (T.L. Graham)</td>
<td>• C.C. Allison Award, Department of Plant Pathology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• OARDC Professional Growth Scholarship</td>
</tr>
<tr>
<td>Name</td>
<td>Degree</td>
<td>Honor/Recognition</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
• 2009, 2nd place, Competition for the President's Prize, P-IE: Transgenics, ESA Annual Meeting  
• OARDC SEEDS Graduate Research grant |
| Xu Xiulan             | PhD 2010 (S. Miller) | • APS Elsie J. and Robert Aycock Award, 2010 APS Annual Meeting  
• APS Council Student Travel Award, 2008 APS Centennial Meeting |
| Zhifen Zhang          | MS 2010 (A. Dorrance) | • Graduate student award, 2nd place, 2009 APS North Central Division mtg |
| Carola De La Torre    | MS 2010 (D. J. Lewandowski) | • APS Robert Fulton Student Travel Award, 2009 APS Annual Meeting, Portland, Oregon  
• OARDC SEEDS Graduate Research grant |
| Kirk Broders          | PhD 2009 (A. Dorrance) | • 2008 C. C. Allison Award, Department of Plant Pathology  
• North Central Division, APS, Travel grant, 2008 APS Centennial Meeting |
| Nathan Kleczewski     | PhD 2009 (P. Bonello) | • 2008 C. C. Allison Award, Department of Plant Pathology  
• APS Kenneth Barker Student Travel Award, 2008 APS Centennial Meeting  
• 2nd place, PhD student poster competition, 2008 OARDC Annual Research Conference, Wooster |
| M. Soledad Benitez    | PhD 2008 (B. McSpadden Gardener) | • 2007 C. C. Allison Award, Department of Plant Pathology  
• Edward J. Ray Travel Award for Scholarship and Service, Ohio State Council of Graduate Students, 2008 |
| Sawsan Elateek        | PhD 2010 (S. Miller) | • North Central Division, American Phytopathological Society, Travel grant, 2008 APS Centennial Meeting, Minneapolis, Minnesota |
| Sarah (Ellis) Williams | MS 2009 (Boehm) | • Outstanding Teaching Assistant, Plant Pathology and Horticulture and Crop Science, 2009 |
| Annemarie Nagle       | MS 2009 (P. Bonello) | • 1st place, MS Graduate Student Poster Competition, 2009 OARDC Annual Research Conference, April 23, 2009, Columbus  
• OARDC SEEDS Graduate Research grant, 2009  
• 2008 North Central Division, American Phytopathological Society, Travel grant |
| Kylea Odenbach        | MS 2009 (P. Paul) | • APS Zahir Eyal Student Travel Award, 2009 APS Annual Meeting |
| John Koenig           | MS 2009 (M. Boehm) | • Edward J. Ray Travel Award for Scholarship and Service, Ohio State Council of Graduate Students, 2008 |
| Miguel Vega Sanchez   | PhD 2008 (G-L Wang) | • 2009 OARDC William E. Krauss Director's Award for Excellence in Graduate Studies for the best paper by a doctoral student published in 2008  
• 2008 C. C. Allison Award, Department of Plant Pathology  
• 2008 American Society of Plant Biologists Travel grant, Merida, Mexico |
| Rosa Raudales         | MS 2008 (B. McSpadden Gardener) | • 2nd place, MS student poster competition, 2008 OARDC Annual Research Conference, Wooster |
Supplemental Table T-F. PhD Graduates (2000-Present) – Current Placement.

<table>
<thead>
<tr>
<th>Name</th>
<th>Advisor</th>
<th>Current Placement (PhD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jaber Al-Dahmani</td>
<td>H. Hoitink</td>
<td>United Arab Emirates University</td>
</tr>
<tr>
<td>Yasar Alptekin</td>
<td>R. Riedel</td>
<td>Kahramanmaras Sutcu Imam Univ., Turkey</td>
</tr>
<tr>
<td>Jennifer Ariss</td>
<td>L. Rhodes</td>
<td>Research scientist, TileWorks, South Carolina (antifungal compounds)</td>
</tr>
<tr>
<td>Maria Benitez</td>
<td>B. McSpadden Gardener</td>
<td>Faculty, Escuela Politecnica del Ejercito, Sangolqui, Ecuador</td>
</tr>
<tr>
<td>Jorunn Bos</td>
<td>S. Kamoun</td>
<td>Researcher, Scottish Crop Research Institute</td>
</tr>
<tr>
<td>Shabeg Singh Briar</td>
<td>S. Miller/P. Grewal</td>
<td>Research associate, Univ. of Mannitoba</td>
</tr>
<tr>
<td>Kirk Broders</td>
<td>A. Dorrance</td>
<td>Asst. Professor, University of New Hampshire, Dept. of Biological Sciences</td>
</tr>
<tr>
<td>Jiye Cheng</td>
<td>T.L. Graham</td>
<td>Washington University School of Medicine, St. Louis (J. Gordon lab)</td>
</tr>
<tr>
<td>Xiaoyun Dong</td>
<td>D.P.S. Verma</td>
<td>Last known: postdoctoral researcher, NIH, Maryland</td>
</tr>
<tr>
<td>Richard Edema</td>
<td>D. Gordon</td>
<td>Lecturer, Makerere University</td>
</tr>
<tr>
<td>Sawsan Elateek</td>
<td>S. Miller</td>
<td>Lecturer, Ain Shams University, Cairo, Egypt</td>
</tr>
<tr>
<td>Jessica Engle</td>
<td>P. Lipps</td>
<td>USDA APHIS, Raleigh, NC</td>
</tr>
<tr>
<td>Omer Erincik</td>
<td>M.A. Ellis</td>
<td>Faculty, Adnan Merderes University</td>
</tr>
<tr>
<td>Edgar Huitema</td>
<td>S. Kamoun</td>
<td>Univ. of Dundee, Scottish Crop Research Institute</td>
</tr>
<tr>
<td>Chatchawan Jantasuriyarat</td>
<td>G-L Wang</td>
<td>Lecturer, Kasetsart University, Thailand</td>
</tr>
<tr>
<td>Young Ki Jo</td>
<td>M. Boehm</td>
<td>Assistant Professor, Texas A&amp;M</td>
</tr>
<tr>
<td>Nathan Kleczewski</td>
<td>P. Bonello</td>
<td>Postdoc, Purdue Dept. of Botany &amp; Plant Pathology</td>
</tr>
<tr>
<td>Matthew Krause</td>
<td>H. Hoitink</td>
<td>Product Development, BioWorks, Victor NY</td>
</tr>
<tr>
<td>Massimo Merighi</td>
<td>D. Coplin</td>
<td>Staff Scientist, Glycosyn, Inc., Medford MA</td>
</tr>
<tr>
<td>Christian Nava Diaz</td>
<td>S. Miller</td>
<td>Faculty, Colegio de Postgraduados, Mexico</td>
</tr>
<tr>
<td>Mizuho Nita</td>
<td>L. Madden</td>
<td>Research/Extension Pathologist, Virginia Tech, Dept. of Plant Pathology, Physiology and Weed Science</td>
</tr>
<tr>
<td>Rose Palumbo</td>
<td>G-L Wang</td>
<td>Botanist, Army Corps of Engineers, Louisiana</td>
</tr>
<tr>
<td>Angel Rebollar-Alviter</td>
<td>M.A. Ellis</td>
<td>Faculty, Universidad Autonoma Chapingo, Mexico</td>
</tr>
<tr>
<td>Amr Tag El-Din</td>
<td>P. Grewal</td>
<td>Last known: returned to Egypt</td>
</tr>
<tr>
<td>Jing Song</td>
<td>S. Kamoun</td>
<td>Postdoctoral scientist, Case Western Reserve Univ</td>
</tr>
<tr>
<td>Samantha Thomas</td>
<td>M. Boehm</td>
<td>Global Seed Health Lead, Monsanto Vegetables, Woodland CA</td>
</tr>
<tr>
<td>Miaoying Tian</td>
<td>S. Kamoun</td>
<td>Postdoc, Boyce Thompson Institute for Plant Research</td>
</tr>
<tr>
<td>Gertrude Torto-Alalibo</td>
<td>S. Kamoun</td>
<td>Virginia Tech Bioinformatics</td>
</tr>
<tr>
<td>Felicita Varela-Ramirez</td>
<td>S. Nameth</td>
<td>Associate Researcher, University of Puerto Rico, Mayaguez</td>
</tr>
<tr>
<td>Name</td>
<td>Advisor</td>
<td>Current Placement (PhD)</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Miguel Vega Sanchez</td>
<td>G-L Wang</td>
<td>Assistant Project Scientist, UC Davis; Deputy Director, Grass Genetics at Joint BioEnergy Institute (JBEI)</td>
</tr>
<tr>
<td>Christopher Wallis</td>
<td>P. Bonello</td>
<td>Research plant pathologist, USDA ARS, Parlier, Calif.</td>
</tr>
<tr>
<td>Justin Whitehill</td>
<td>P. Bonello</td>
<td>Post-doc, University of British Columbia</td>
</tr>
<tr>
<td>C. Andrew Wyenandt</td>
<td>R. Riedel</td>
<td>Assistant Extension Specialist, Rutgers Univ., Dept of Plant Biology and Pathology</td>
</tr>
<tr>
<td>Xiulan Xu</td>
<td>S. Miller</td>
<td>Postdoctoral researcher, Ohio State, Plant Pathology</td>
</tr>
<tr>
<td>Lirong Zeng</td>
<td>G-L Wang</td>
<td>Molecular Plant Pathologist, Univ. of Arkansas Little Rock, Arkansas Ctr for Plant Powered Protection</td>
</tr>
<tr>
<td>Jianhua Zhang</td>
<td>S. Miller</td>
<td>Potato Research Centre, Agriculture and Agri-Food Canada</td>
</tr>
</tbody>
</table>

Supplemental Table T-G. MS Graduates (2000-Present) – Current Placement.

<table>
<thead>
<tr>
<th>Name</th>
<th>Advisor</th>
<th>Current Placement (MS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emilia Briceno-Montero</td>
<td>S. Miller</td>
<td>Returned to Costa Rica</td>
</tr>
<tr>
<td>Oscar Burbano Figueroa</td>
<td>T.K. Mitchell</td>
<td>Returned to Colombia</td>
</tr>
<tr>
<td>Amanda Core</td>
<td>M. Boehm</td>
<td>Last known: research technician, Columbus Children’s Hospital</td>
</tr>
<tr>
<td>Jennifer Cox Ariss</td>
<td>L. Rhodes</td>
<td>Completed PhD in Plant Pathology at Ohio State (see PhD table)</td>
</tr>
<tr>
<td>Christian Cruz</td>
<td>A. Dorrance</td>
<td>PhD plant pathology program, Kansas State</td>
</tr>
<tr>
<td>Carola De La Torre Cuba</td>
<td>D. Lewandowski</td>
<td>Staff, Horticulture and Crop Science, Ohio State</td>
</tr>
<tr>
<td>Sarah (Ellis) Williams</td>
<td>M. Boehm</td>
<td>Lecturer, Plant Pathology, Ohio State</td>
</tr>
<tr>
<td>Aaron Fown</td>
<td>D. Coplin</td>
<td>Chaos Butterfly Productions, Columbus Ohio</td>
</tr>
<tr>
<td>Daniel Garling</td>
<td>M. Boehm</td>
<td>Advanced Turf Solutions, Lewis Center, Ohio</td>
</tr>
<tr>
<td>Kate Gearhart</td>
<td>A. Dorrance</td>
<td>Pioneer Hybrid, Ohio</td>
</tr>
<tr>
<td>Laura Gutierrez Chapin</td>
<td>B. McSpadden Gardener</td>
<td>Staff, Horticulture and Crop Science, Ohio State</td>
</tr>
<tr>
<td>Hongtao Jia</td>
<td>A. Dorrance</td>
<td>Completed PhD in OSU Molec. Cellular Developmental Bio program; currently postdoc, OSU Comprehensive Cancer Ctr.</td>
</tr>
<tr>
<td>Raghavendra Joshi</td>
<td>B. McSpadden Gardener</td>
<td>Software developer, Minnesota</td>
</tr>
<tr>
<td>John Koenig</td>
<td>M. Boehm</td>
<td>Research specialist, The Scotts Miracle Gro Company</td>
</tr>
<tr>
<td>Joseph LaForest</td>
<td>P. Bonello/D. Herms</td>
<td>Univ. of Georgia, Bugwood network</td>
</tr>
<tr>
<td>Clayton Larue</td>
<td>T.L. Graham</td>
<td>Monsanto</td>
</tr>
<tr>
<td>Cunyu Li</td>
<td>P. Pierce</td>
<td>Patent Examiner (Agriculture); Patent Examination Cooperation Center of SIPO, Beijing, China</td>
</tr>
<tr>
<td>Zhenyu Liu</td>
<td>S. Kamoun</td>
<td>PhD Univ. of Wisc. Madison; currently postdoc, Dept. of Entomology, Penn State.</td>
</tr>
<tr>
<td>Name</td>
<td>Advisor</td>
<td>Current Placement (MS)</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cerinda Loschinkohl</td>
<td>M. Boehm</td>
<td>Last known: USDA APHIS, Maryland</td>
</tr>
<tr>
<td>Santiago Mideros Mora</td>
<td>A. Dorrance</td>
<td>PhD plant pathology program, Cornell Univ.</td>
</tr>
<tr>
<td>Annemarie Nagle</td>
<td>P. Bonello</td>
<td>Exotic Pest Forest Educator, Entomology, Purdue Univ.</td>
</tr>
<tr>
<td>Mizuho Nita</td>
<td>L. Madden</td>
<td>Completed PhD plant pathology, Ohio State; now faculty Virginia Tech</td>
</tr>
<tr>
<td>Amy Niver</td>
<td>M. Boehm</td>
<td>Seed Enhancement Technical Services Coordinator, Chemtura, Ill.</td>
</tr>
<tr>
<td>Kylea Odenbach</td>
<td>P. Pierce</td>
<td>Technical Staff, Sandia National Laboratories, Albuquerque, NM</td>
</tr>
<tr>
<td>Maria Andrea Ortega</td>
<td>A. Dorrance</td>
<td>PhD program, Plant Breeding, Genetics &amp; Genomics, Univ. of Georgia</td>
</tr>
<tr>
<td>Rosa Raudales</td>
<td>B. McSpadden Gardener</td>
<td>PhD program, Plant Pathology, Univ. of Florida</td>
</tr>
<tr>
<td>Nagendra Subedi</td>
<td>S. Miller</td>
<td>Returned from Nepal, now in PhD Plant Pathology program, Ohio State</td>
</tr>
<tr>
<td>Nathan Tuttle</td>
<td>A. Dorrance</td>
<td>Evans Adhesive LTD, Columbus, Ohio</td>
</tr>
<tr>
<td>Miguel Vega-Sanchez</td>
<td>A. Dorrance</td>
<td>Completed PhD with G-L Wang (see PhD)</td>
</tr>
<tr>
<td>Barry Weber</td>
<td>L. Rhodes</td>
<td>Weber is retired from the Forest Service; completed a graduate degree initiated earlier in his career</td>
</tr>
<tr>
<td>Katherine Whitten Buxton</td>
<td>L. Rhodes</td>
<td>Completed PhD, NC State Plant Pathology; Syngenta Crop Protection</td>
</tr>
<tr>
<td>Christine Woltjen</td>
<td>D. Lewandowski</td>
<td>Research Associate, Department of Microbiology, Ohio State</td>
</tr>
<tr>
<td>Simeon Wright</td>
<td>S. Miller</td>
<td>Forest pathologist, Missouri Dept. of Conservation</td>
</tr>
<tr>
<td>Laura Wutz Bierce</td>
<td>R. Riedel</td>
<td>Western Reserve Suzuki School (piano and theory instructor)</td>
</tr>
<tr>
<td>Zhifen Zhang</td>
<td>A. Dorrance</td>
<td>PhD program, Horticulture and Crop Science, Ohio State</td>
</tr>
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Supplemental Table T-H. Some Selected Highlights, Graduate Alumni.

<table>
<thead>
<tr>
<th>Name</th>
<th>Achievements/Position</th>
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<tbody>
<tr>
<td>Scott Adkins</td>
<td>• Research Scientist, USDA-ARS (Florida)</td>
</tr>
<tr>
<td></td>
<td>• Director of the Annual Meeting Board of the American Phytopathological Society (APS)</td>
</tr>
<tr>
<td>Mike Boehm</td>
<td>• Vice Provost for Academic Planning, The Ohio State University</td>
</tr>
<tr>
<td></td>
<td>• 2010 National Teaching Award, Association of Public and Land-grant Universities</td>
</tr>
<tr>
<td></td>
<td>• 2008 APS Excellence in Teaching Award</td>
</tr>
<tr>
<td></td>
<td>• 2000 Alumni Award for Distinguished Teaching, The Ohio State University</td>
</tr>
<tr>
<td>Charles Changa</td>
<td>• National Banana Research Program, Uganda</td>
</tr>
<tr>
<td>Adipala Ekwamu</td>
<td>• Regional Coordinator of the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM); Faculty, Makerere University, Uganda</td>
</tr>
<tr>
<td></td>
<td>• CFAES International Alumni Award</td>
</tr>
<tr>
<td></td>
<td>• 100 Buckeyes You Should Know (2011) OSU Alumni Association</td>
</tr>
<tr>
<td>Gary Grove</td>
<td>• Professor of Plant Pathology, Washington State</td>
</tr>
<tr>
<td></td>
<td>• 2010 APS Excellence in Extension</td>
</tr>
<tr>
<td></td>
<td>• Director, Ag Weather Network, Washington State</td>
</tr>
<tr>
<td>R. Kenneth Horst</td>
<td>• President and CEO, H &amp; I Agritech, Inc., Ithaca, NY</td>
</tr>
<tr>
<td></td>
<td>• Professor Emeritus, Plant Pathology, Cornell Univ., Ithaca, N.Y.</td>
</tr>
<tr>
<td>Charles Krause</td>
<td>• USDA ARS Research Leader, MidWest Area, Application Technology Research Unit, Wooster and Toledo, OH</td>
</tr>
<tr>
<td></td>
<td>• 2007, Outstanding Research Award, Ohio Nursery and Landscape Association</td>
</tr>
<tr>
<td>James Leonard</td>
<td>• 2011 OSU CFAES Alumni Society, president</td>
</tr>
<tr>
<td>Sergio Lenardon</td>
<td>• Research scientist, INTA-Inst. Fitopatologia y Fisiologia Vegetal in Cordoba Argentina</td>
</tr>
<tr>
<td>Eric Nelson</td>
<td>• Professor, Dept. of Plant Pathology and Plant-Microbe Biology, Cornell Univ.</td>
</tr>
<tr>
<td></td>
<td>• 2008, First prize, Public Engagement and Science Communication, Center for Life Science Enterprise, Cornell Univ.</td>
</tr>
<tr>
<td>Balakrishna Rao</td>
<td>• Manager of Research and Tech Development, The Davey Tree Co., Kent OH</td>
</tr>
<tr>
<td>Fikrettin Sahin</td>
<td>• Chair, Department of Genetics and Bioengineering and Director of the Institute of Biotechnology, Yeditepe University, Turkey</td>
</tr>
<tr>
<td></td>
<td>• CFAES International Alumni Award</td>
</tr>
<tr>
<td>Christine Taylor Waddill</td>
<td>• Center Director and Professor, University of Florida/IFAS Tropical Research and Education Center, Homestead, FL</td>
</tr>
<tr>
<td></td>
<td>• CFAES Distinguished Alumni Award</td>
</tr>
<tr>
<td>William Turechek</td>
<td>• USDA ARS Food Quality Laboratory, Acting Research Leader, Beltsville, MD</td>
</tr>
<tr>
<td></td>
<td>• Senior Editor of the journal Phytopathology</td>
</tr>
</tbody>
</table>
Supplemental Table T-I. Some Selected Highlights, Postdoctoral Scientists and Visiting Scholars.

<table>
<thead>
<tr>
<th>Name</th>
<th>Achievements/Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Il-Pyung Ahn</td>
<td>Professor, RDA, South Korea</td>
</tr>
<tr>
<td>James T. Blodgett</td>
<td>USDA Forest Service, Forest Health Protection</td>
</tr>
<tr>
<td>Mark Boudreau</td>
<td>Consultant, Univ. of Georgia, Driftmier Engineering Center</td>
</tr>
<tr>
<td>Kara D. Burnham</td>
<td>Assistant Professor, University of Western States, Portland</td>
</tr>
<tr>
<td>Venu Reddyvari Channarayappa</td>
<td>Research Associate, USDA-National Rice Research Center, AK</td>
</tr>
<tr>
<td>Songbiao Chen</td>
<td>Professor, Fujian Academy of Agricultural Sciences, China</td>
</tr>
<tr>
<td>Zhenbang Chen</td>
<td>Assistant Professor, Dept. Cancer Biology, Meharry Medical College, Nashville, TN</td>
</tr>
<tr>
<td>Stefano Constanzo</td>
<td>Research Plant Pathologist, USDA-ARS, Pine Bluff, Arkansas</td>
</tr>
<tr>
<td>Amal deSilva</td>
<td>Research Assistant, North Dakota State University</td>
</tr>
<tr>
<td>Elizabeth De Nardo</td>
<td>Research scientist, GOJO Industries, Akron, OH</td>
</tr>
<tr>
<td>Erick de Wolf</td>
<td>Associate Professor, Dept. of Plant Pathology, Kansas State University</td>
</tr>
<tr>
<td>Jong Hyun Ham</td>
<td>Assistant Professor, Dept. of Plant Pathology and Crop Physiology, Lousiana State University</td>
</tr>
<tr>
<td>Wai Foong Hong</td>
<td>Associate Professor, Sterling College, KS</td>
</tr>
<tr>
<td>Carla Garzon</td>
<td>Assistant Professor, Dept. of Entomology and Plant Pathology, Oklahoma State</td>
</tr>
<tr>
<td>Stuart G. Gordon</td>
<td>Assistant Professor, Dept. of Biology, Presbyterian College, South Carolina</td>
</tr>
<tr>
<td>Malali Gowda</td>
<td>Director, Next-Generation Genomics Laboratory Bangalore BioCluster</td>
</tr>
<tr>
<td>Norman Lalancette</td>
<td>Associate Professor, Rutgers University</td>
</tr>
<tr>
<td>Ruiming Lin</td>
<td>Associate Professor, Chinese Academy of Agricultural University, China</td>
</tr>
<tr>
<td>Guo-Long Lu</td>
<td>Professor, Fujian Agricultural and Forestry University, China</td>
</tr>
<tr>
<td>Jing Luo</td>
<td>Director, Natural Science Foundation of China, China</td>
</tr>
<tr>
<td>Nicola Luchi</td>
<td>Research Scientist, Institute for Plant Protection, Italian National Research Council, Florence, Italy</td>
</tr>
<tr>
<td>Sheshu Madhav Maganti</td>
<td>Senior Scientist, Directorate of Rice Research (DRR-ICAR), India</td>
</tr>
<tr>
<td>Baek Hie Nahm</td>
<td>Professor, Division of Bioscience and Bioinformatics, Myongji University, South Korea</td>
</tr>
<tr>
<td>Yueese Ning</td>
<td>Assistant Professor, Chinese Academy of Agricultural University, China</td>
</tr>
<tr>
<td>Pierce Paul</td>
<td>Assistant Professor, Dept. of Plant Pathology, Ohio State Univ.</td>
</tr>
<tr>
<td>Shaohong Qu</td>
<td>Professor, Zhejiang Academy of Agricultural Sciences, China</td>
</tr>
<tr>
<td>Keith Reynolds</td>
<td>Research Scientist, USDA-Forest Service, Corvallis, OR</td>
</tr>
<tr>
<td>Antonino Testa</td>
<td>Research Scientist in the Dept. of Ar.Bo.Pa.Ve., Plant Pathology Section, University of Naples, Italy</td>
</tr>
<tr>
<td>Name</td>
<td>Achievements/Position</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Terry Wheeler</td>
<td>Associate Professor, Texas Agricultural Experiment Station, Lubbock, TX</td>
</tr>
<tr>
<td>Yinghui Xiao</td>
<td>Professor, Hunan Agricultural University, Hunan</td>
</tr>
<tr>
<td>Xiusheng Yang</td>
<td>Professor, Univ. of Connecticut, and Director, Connecticut State Climate Center, and President, Association of Chinese American Agricultural Scientists (ACAAS)</td>
</tr>
<tr>
<td>Carolyn Young</td>
<td>Assistant Professor, The Samuel Roberts Noble Foundation</td>
</tr>
<tr>
<td>Bo Zhou</td>
<td>Professor, Zhejiang Academy of Agricultural Sciences, China</td>
</tr>
</tbody>
</table>
### Supplemental Table T-J. Plant Pathology Courses, Quarter System.
All courses offered one quarter per year unless otherwise indicated.

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Credit hours</th>
<th>Level</th>
<th>Enrollmt. Range 2000-2011</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>Soc Impact Plant Dis in Shaping Human Soc (online) 3Q/yr</td>
<td>3</td>
<td>U</td>
<td>8-48</td>
<td>S. Williams</td>
</tr>
<tr>
<td>300</td>
<td>Field and Woodland Fungi</td>
<td>3</td>
<td>U</td>
<td>5-13</td>
<td>T. Mitchell; J. Chatfield, S. Williams</td>
</tr>
<tr>
<td>395</td>
<td>Plant Health Science Forum</td>
<td>3</td>
<td>U</td>
<td>1-7</td>
<td>M. Lewandowski</td>
</tr>
<tr>
<td>401</td>
<td>General Plant Pathology</td>
<td>5</td>
<td>U</td>
<td>38-60</td>
<td>K. Willyerd, S. Williams</td>
</tr>
<tr>
<td>455</td>
<td>Bioterrorism: An Overview</td>
<td>5</td>
<td>U</td>
<td>13-38</td>
<td>M. Boehm</td>
</tr>
<tr>
<td>489</td>
<td>Internship Experiences</td>
<td>1-5</td>
<td>U</td>
<td>1-3</td>
<td>M. Lewandowski (coord)</td>
</tr>
<tr>
<td>501</td>
<td>Diseases of Ornamentals</td>
<td>3</td>
<td>U</td>
<td>4-16</td>
<td>J. Chatfield, S. Williams</td>
</tr>
<tr>
<td>597</td>
<td>Societal Issues: Pesticides, Alternatives and Environ 3Q/yr</td>
<td>5</td>
<td>U</td>
<td>15-43</td>
<td>T. Markham, M. Anderson, Lewandowski</td>
</tr>
<tr>
<td>600.01</td>
<td>Phytobacteriology</td>
<td>3</td>
<td>U, G</td>
<td>11-19</td>
<td>B. McSpadden Gardener</td>
</tr>
<tr>
<td>600.02</td>
<td>Plant Virology</td>
<td>3</td>
<td>U, G</td>
<td>15-24</td>
<td>F. Qu</td>
</tr>
<tr>
<td>602</td>
<td>Plant-Microbe Interactions</td>
<td>3</td>
<td>U, G</td>
<td>9-17</td>
<td>B. McSpadden Gardener (team taught)</td>
</tr>
<tr>
<td>603</td>
<td>Plant Disease Management</td>
<td>5</td>
<td>U, G</td>
<td>7-22</td>
<td>M. Ellis, L. Madden</td>
</tr>
<tr>
<td>610</td>
<td>Dis of Forest and Shade Trees</td>
<td>4</td>
<td>U</td>
<td>17</td>
<td>P. Bonello</td>
</tr>
<tr>
<td>612</td>
<td>Turfgrass Diseases</td>
<td>3</td>
<td>U, G</td>
<td>9-31</td>
<td>J. Rimelspach</td>
</tr>
<tr>
<td>613</td>
<td>Integr Turf Health and Pest Mgt</td>
<td>4</td>
<td>U, G</td>
<td>5-16</td>
<td>J. Rimelspach</td>
</tr>
<tr>
<td>614</td>
<td>Diseases of Field Crops</td>
<td>3</td>
<td>U, G</td>
<td>14</td>
<td>A. Dorrance, P. Paul</td>
</tr>
<tr>
<td>615</td>
<td>Fruit &amp; Veg Diseases (altern yrs)</td>
<td>3</td>
<td>U, G</td>
<td>14-15</td>
<td>M. Ellis, S. Miller</td>
</tr>
<tr>
<td>636</td>
<td>Plant Nematology</td>
<td>3</td>
<td>U, G</td>
<td>7-11</td>
<td>C. Taylor</td>
</tr>
<tr>
<td>655</td>
<td>Quant Methods in Applied Biol</td>
<td>3</td>
<td>U, G</td>
<td>6-19</td>
<td>B. McSpadden Gardener</td>
</tr>
<tr>
<td>660</td>
<td>Mycology</td>
<td>5</td>
<td>U, G</td>
<td>10-20</td>
<td>T. Mitchell</td>
</tr>
<tr>
<td>683H</td>
<td>Honors Projects</td>
<td>1-10</td>
<td>U</td>
<td>variable</td>
<td>Faculty</td>
</tr>
<tr>
<td>685</td>
<td>Diagnostic Field Plant Path (alternate yrs)</td>
<td>3</td>
<td>U, G</td>
<td>6-14</td>
<td>S. Miller</td>
</tr>
<tr>
<td>693</td>
<td>Individual Studies</td>
<td>1-5</td>
<td>U, G</td>
<td>variable</td>
<td>Faculty</td>
</tr>
<tr>
<td>702</td>
<td>Plant Disease Epidemiology (alternate yrs)</td>
<td>4</td>
<td>G</td>
<td>3-13</td>
<td>L. Madden</td>
</tr>
<tr>
<td>703</td>
<td>Agricultural Genomics: Principles and Applications</td>
<td>3</td>
<td>G</td>
<td>8-27</td>
<td>G. Wang, E. Stockinger (HCS)</td>
</tr>
<tr>
<td>830</td>
<td>Current Topics in Plant Pathology</td>
<td>1-2</td>
<td>G</td>
<td>variable</td>
<td>Various faculty</td>
</tr>
<tr>
<td>842</td>
<td>Biochem of Plant Responses to Infection (alternate yrs)</td>
<td>3</td>
<td>G</td>
<td>6-14</td>
<td>T. Graham</td>
</tr>
<tr>
<td>843</td>
<td>Ecology of Plant-Associated Microbes</td>
<td>5</td>
<td>G</td>
<td>9</td>
<td>B. McSpadden Gardener, P. Bonello</td>
</tr>
<tr>
<td>901</td>
<td>Mentored Teaching in Plant Pathology</td>
<td>1-5</td>
<td>G</td>
<td>variable</td>
<td>T. Mitchell</td>
</tr>
<tr>
<td>902</td>
<td>Mentored Extension/Outreach Teaching in Plant Pathology</td>
<td>1-3</td>
<td>G</td>
<td>variable</td>
<td>M. Ellis</td>
</tr>
<tr>
<td>995</td>
<td>Seminar 3Q/yr</td>
<td>1</td>
<td>G</td>
<td>(all grad students enroll)</td>
<td>Faculty</td>
</tr>
<tr>
<td>999</td>
<td>Research</td>
<td>1-18</td>
<td>G</td>
<td>variable</td>
<td>Faculty</td>
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### Supplemental Table T-K. Plant Pathology Courses, Semester System.

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Credits</th>
<th>Level U=Undergrad G=grad</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Molds, Mushrooms, and Man</td>
<td>3</td>
<td>U</td>
<td>T. Mitchell</td>
</tr>
<tr>
<td>2001</td>
<td>Sick Plants and a Hungry World – online course</td>
<td>2</td>
<td>U</td>
<td>S. Williams</td>
</tr>
<tr>
<td>3001</td>
<td>General Plant Pathology Lecture</td>
<td>2</td>
<td>U</td>
<td>T. Niblack</td>
</tr>
<tr>
<td>3002</td>
<td>General Plant Pathology Lab</td>
<td>2</td>
<td>U</td>
<td>S. Williams</td>
</tr>
<tr>
<td>3195</td>
<td>Plant Health Science Forum</td>
<td>1</td>
<td>U</td>
<td>M. Lewandowski</td>
</tr>
<tr>
<td>3597</td>
<td>Societal Issues: Pesticides, Alternatives, and the Environ</td>
<td>3</td>
<td>U</td>
<td>T. Markham, M. Anderson, M. Lewandowski</td>
</tr>
<tr>
<td>4191</td>
<td>Internship Experiences in Plant Health Management</td>
<td>1-6</td>
<td>U</td>
<td>M. Lewandowski (coordinator)</td>
</tr>
<tr>
<td>4550</td>
<td>Bioterrorism: An Overview</td>
<td>2</td>
<td>U</td>
<td>M. Boehm</td>
</tr>
<tr>
<td>4998</td>
<td>Undergraduate Research</td>
<td>1-6</td>
<td>U</td>
<td>Faculty</td>
</tr>
<tr>
<td>4999H</td>
<td>Honors Research with Distinction</td>
<td>1-3</td>
<td>U</td>
<td>Faculty</td>
</tr>
<tr>
<td>4999</td>
<td>Research with Distinction</td>
<td>1-3</td>
<td>U</td>
<td>Faculty</td>
</tr>
<tr>
<td>5010</td>
<td>Phytophacteryology</td>
<td>2</td>
<td>U, G</td>
<td>McSpadden Gardener</td>
</tr>
<tr>
<td>5020</td>
<td>Introductory Plant Virology</td>
<td>2</td>
<td>U, G</td>
<td>F. Qu</td>
</tr>
<tr>
<td>5030</td>
<td>Plant Nematology</td>
<td>2</td>
<td>U, G</td>
<td>C. Taylor</td>
</tr>
<tr>
<td>5040</td>
<td>Science of Fungi: Mycology Lecture</td>
<td>3</td>
<td>U, G</td>
<td>T. Mitchell</td>
</tr>
<tr>
<td>5041</td>
<td>Science of Fungi: Mycology Lab</td>
<td>1</td>
<td>U, G</td>
<td>T. Mitchell</td>
</tr>
<tr>
<td>5110</td>
<td>Ecology and Management of Pathogens and Insects Affecting Trees in Forest and Urban Environments</td>
<td>3</td>
<td>U, G</td>
<td>P. Bonello, D. Herms</td>
</tr>
<tr>
<td>5120</td>
<td>Diseases of Ornamentals</td>
<td>2</td>
<td>U, G</td>
<td>J. Chatfield, S. Williams</td>
</tr>
<tr>
<td>5130</td>
<td>Turf Diseases and Integrated Turf Health Management</td>
<td>3</td>
<td>U, G</td>
<td>J. Rimelspach</td>
</tr>
<tr>
<td>5140</td>
<td>Diseases of Field Crops</td>
<td>2</td>
<td>U, G</td>
<td>A. Dorrance, P. Paul</td>
</tr>
<tr>
<td>5150</td>
<td>Fruit and Vegetable Diseases</td>
<td>2</td>
<td>U, G</td>
<td>M. Ellis, S. Miller</td>
</tr>
<tr>
<td>5550</td>
<td>Quantitative Methods for Agricultural Scientists</td>
<td>3</td>
<td>U, G</td>
<td>B. McSpadden Gardener</td>
</tr>
<tr>
<td>5603</td>
<td>Plant Disease Management</td>
<td>3</td>
<td>U, G</td>
<td>M. Ellis, L. Madden</td>
</tr>
<tr>
<td>5604</td>
<td>Capstone Course: Problem-Based Studies in Plant Health</td>
<td>2</td>
<td>U, G</td>
<td>Faculty, Plant Pathology and Entomology</td>
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<tr>
<td>5685</td>
<td>Plant Disease Diagnosis</td>
<td>2</td>
<td>U, G</td>
<td>S. Miller</td>
</tr>
<tr>
<td>6001</td>
<td>Advanced Plant Pathology</td>
<td>3</td>
<td>U, G</td>
<td></td>
</tr>
<tr>
<td>6193</td>
<td>Individual Studies</td>
<td>1-6</td>
<td>U, G</td>
<td>Faculty</td>
</tr>
<tr>
<td>7002</td>
<td>Plant Disease Epidemiology</td>
<td>3</td>
<td>G</td>
<td>L. Madden</td>
</tr>
<tr>
<td>7003</td>
<td>Agricultural Genomics: Principles and Applications</td>
<td>3</td>
<td>G</td>
<td>G-L Wang, E. Stockinger</td>
</tr>
<tr>
<td>8300</td>
<td>Current Topics in Plant Pathology</td>
<td>2</td>
<td>G</td>
<td>Faculty</td>
</tr>
<tr>
<td>8400</td>
<td>Molecular Bases of Plant Host-Microbe Interactions</td>
<td>3</td>
<td>G</td>
<td>Team-taught</td>
</tr>
<tr>
<td>8899</td>
<td>Mentored Teaching in Plant Pathology</td>
<td>1-3</td>
<td>G</td>
<td>T. Mitchell</td>
</tr>
<tr>
<td>8902</td>
<td>Mentored Extension/Outreach Teaching in Plant Pathology</td>
<td>1</td>
<td>G</td>
<td>M. Ellis</td>
</tr>
<tr>
<td>8999</td>
<td>Plant Pathology Research</td>
<td>1-18</td>
<td>G</td>
<td>Faculty</td>
</tr>
</tbody>
</table>
Overview

All faculty members within the Department of Plant Pathology are continually involved in outreach and engagement activities. Most of our activity in outreach is within our Ohio State University Extension (OSUE) educational programming, although we are also involved in multiple forms of outreach.

Although our resources have been greatly reduced over the past several years, we continue to provide innovative programming to keep commercial producers and the public well apprised of current and new methods to identify and manage plant disease problems. Our specialists interact with colleagues in public and private sectors statewide, nationally, and internationally to keep abreast of the latest disease-management tools and practices available. In addition to longstanding disease problems that are always present, new emerging and re-emerging diseases and invasive pathogens present a continual challenge. We further promote ways to minimize the use of pesticides and to use pesticides in the most sustainable, cost-effective, and environmentally safe manner. Moreover, we always strive to be at the forefront of important developments in agriculture. In this regard we are developing and delivering education programs on crop protection for biofuels (e.g. corn, soybean) and on food safety and security (e.g. vegetables, wheat and corn). In summary, our outreach programs are fully in line with the college’s Signature Areas.

At present, we have five faculty members with various percentage appointments within OSUE. Although the majority of our faculty members do not have formal Extension appointments, everyone is involved in outreach and engagement activity. In fact, we have traditionally maintained an unwritten rule that all faculty members have at least a “10% Extension appointment” regardless of their actual appointment. Our faculty members are very active in outreach and engagement at the Community, Department, College, University and National level. The level of outreach and engagement for each faculty member is well documented in their Dossier (for promotion) and Annual Program Review documentation.

Below we summarize our efforts in outreach and engagement, either through distance education or through OSUE programming.

Outreach and Engagement through Extension Educational Programming (OSUE)

The Department of Plant Pathology at The Ohio State University serves as the primary source of information about plant disease management and diagnosis for all citizens of Ohio, including Ohio's Agricultural Industry. Our primary approach for outreach and engagement is through our Extension education programming, funded by the Ohio State University Extension (OSUE) line item. The goal
of the department’s program in this area is to achieve and maintain a position of recognized excellence in Extension educational programs in plant pathology and plant health management.

The department considers Extension an integral part of our teaching programs, albeit for non-OSU students such as the citizens of the state. In Plant Pathology, our outreach efforts are primarily centered in the OSU Extension Focus Areas of Enhancing Ag and the Environment (especially in terms of controlling plant diseases and reducing their spread with a minimal environmental impact) and Advancing Employment and Income Opportunities (in terms of maximizing profits through use of the most effective and cost-efficient control measures). Our outreach programming also addresses Food Safety themes (in terms of the production of healthy, toxin- and human-pathogen-free produce).

Because of the diversity of crops, commodities, agricultural practices and environmental conditions in Ohio, it is our practice to utilize all available technical expertise and qualified faculty, rather than limiting official Extension programming to only a few individuals. Traditionally, more than half of the Plant Pathology faculty members, and up to three full-time program specialists, have been directly involved through paid appointments in OSUE. This has been accomplished primarily through the use of joint appointments that combine responsibilities in Extension, research (OARDC), and, in some cases, resident instruction (Academic Programs). With just a few exceptions in the past, we have not had faculty members with more than a 50% (0.50 FTE) Extension appointment, and often the Extension appointment has been around 25-35% (0.25-0.35 FTE). This integrated approach to structuring faculty appointments allows us to more seamlessly transition our mission-oriented research into our outreach and engagement efforts. Plus, as described above (and below), faculty members with no formal OSUE appointment typically make important contributions to Extension education, through invited presentations in the state, through the preparation of grower-education articles and educational fact sheets, disease diagnostics and many other activities.

Because of some recent faculty retirements and departures, coupled with cuts in OSUE funding for most years during the past decade (directly, or indirectly through the self-funding of salary adjustments), our Extension program has been downsized considerably. At the time of our last review (October, 2000), we had 12 faculty members with formal OSUE appointments, with a total of 3.56 FTE, and three Extension associates (now called program specialists) with a total of 2.55 FTE
in Extension. At present (September, 2011), five of our 13 current faculty members have formal OSUE appointments, with a total of 1.85 FTE. This figure does not include the FTE (0.40) for the recently vacated ornamentals position (which we hope to recover). Of the three program specialists (formerly called Extension Associates) with 100% OSUE appointments, one position was lost due to budget cuts (field crop pathology), and one was reduced to 55% Extension, with the remainder of the position supported by soft money or Academic Programs (OSU General Funds) for teaching (turf pathology). This change in funding has also meant a change and shift in programming. In addition, the Director of the Plant and Pest Diagnostic Clinic is still 100% funded by OSUE (but other Clinic funding has been cut). The following table lists our current OSUE faculty and program specialist, their program area and FTE.

### PLANT PATHOLOGY EXTENSION FACULTY AND PROGRAM SPECIALISTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Program Area</th>
<th>OSUE FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terry Niblack</td>
<td>Field Crops, Department Chair</td>
<td>0.15</td>
</tr>
<tr>
<td>Anne Dorrance</td>
<td>Field Crops</td>
<td>0.40</td>
</tr>
<tr>
<td>Pierce Paul</td>
<td>Field Crops</td>
<td>0.40</td>
</tr>
<tr>
<td>Mike Ellis</td>
<td>Fruit Crops, Dept. Extension Coordinator</td>
<td>0.50</td>
</tr>
<tr>
<td>Sally Miller</td>
<td>Vegetable Crops</td>
<td>0.40</td>
</tr>
<tr>
<td><strong>Total Faculty FTE</strong></td>
<td></td>
<td><strong>1.85</strong></td>
</tr>
</tbody>
</table>

(Note: this does not include the recently vacated Ornamentals position which has 0.40 FTE)

<table>
<thead>
<tr>
<th>Name</th>
<th>Program Area</th>
<th>OSUE FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe Rimelspach, Program Specialist</td>
<td>Turfgrass pathology</td>
<td>0.55</td>
</tr>
<tr>
<td>Nancy Taylor, Clinic Director</td>
<td>Disease diagnostics</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Total Program Specialist FTE</strong></td>
<td></td>
<td><strong>1.55</strong></td>
</tr>
</tbody>
</table>

This table does not capture the Extension contributions by other faculty in the department. For example, with expertise in biologically-based pest management, Brian McSpadden Gardener is frequently called upon to answer questions and make presentations to growers (particularly organic growers) on numerous subjects related to biological control. Each year, he responds to inquiries related to biopesticide development and/or application from growers, dealers, and companies. He regularly participates in various field days and workshops and has made 16 formal Extension presentations in the past 5 years. McSpadden Gardener serves on the Ohio Ecological Food and Farming Association’s Organic Standards Advisory panel.

Similarly, Thomas Mitchell is called on periodically to respond to needs in the public and private sector in Ohio. Recently he provided recommendations to a large steel rolling plant in Marion, Ohio, with a foul odor in its cooling/lubricating liquid that could be detected a mile beyond the plant’s site. Mitchell determined that a dimorphic yeast was the culprit; he tested new coolants with anti-fungal
additives and provided consultation on the replacement of the 45,000 gallons of coolant. Other examples of his Extension work include advising homeowners on remediation of mold outbreaks and working with an Ohio museum to address mold contamination of important artifacts. All of our faculty members are engaged in similar outreach activities within their areas of expertise.

Extension Program Emphasis Areas

Formal Extension education programs continue to be centered on commodity groups. At present, we have active programs in the areas described below.

Field Crops Disease Management

With Anne Dorrance, Pierce Paul, and the recent addition of Terry Niblack, we have outstanding expertise in field crop disease and nematode management. Our Extension team provides programming to county educators, independent and company-based crop advisors, Ohio-based seed companies, agricultural business associations, and large producers in Ohio. Paul primarily focuses on corn and small grains, while Dorrance and Niblack cover soybeans. Lanny Rhodes (emeritus) did cover alfalfa, but that responsibility will now shift to Dorrance. Paul and Dorrance provide educational content for numerous pesticide applicator training and field crop disease management training sessions at state, county and regional meetings throughout the year. In addition, Paul, Dorrance and others are actively involved with the OSUE Agronomic Crops Team. This team has a weekly newsletter (with over 2,500 subscribers) that provides timely information on agronomic crops in Ohio (corn.osu.edu). The team, which meets weekly by conference call, also coordinates on-farm research. Paul and Dorrance, along with colleagues from Entomology, provide in-depth workshops on a biannual basis to Extension educators and crop advisors. These workshops are hands-on, classroom style sessions that are usually standing-room only.

Soybean Pathology Extension Program. Dorrance collaborates with soybean specialists on a number of national and regional initiatives. She was part of the first team that helped to coordinate, develop, and distribute Extension materials for the invasive plant pathogen, Phakopsora pachyrhizi, which causes soybean rust. Through this effort, infected leaves preserved in acrylic, identification cards, and a manual on fungicide management were developed in less than five months and distributed to soybean producing states and Canada. The ID card was also translated into Spanish and French and distributed in Mexico and Quebec, Canada, respectively. Over 200,000 copies of the fungicide manual were distributed. Dr. Dorrance also coordinated the Phytophthora sojae research efforts for the North Central Soybean Research Program and is involved in several of the “pathogen teams.” Niblack’s Extension expertise includes management of the soybean cyst nematode; diagnostics of parasitic nematodes affecting all crops; yearly assessment of soybean cultivars labeled “resistant” for levels of resistance, and applied field nematology research. In addition, Chris Taylor, Feng Qu, Terry Graham and Nancy Taylor also contribute to soybean research and Extension.

Corn and Small Grain Management. Paul’s Extension programming serves the nation’s 9th largest
producer of corn, with an average of close to 3.5 million acres planted annually, and the nation’s largest producer of soft red winter wheat, with close to a million acres planted annually. Niblack also brings new expertise to our department in parasitic nematodes of corn, which has become an increasing problem in recent years. Paul provides leadership for corn and wheat pathology Extension activities through the development of Extension education programs, authorship of Extension publications and electronic newsletters, webinars, processing of diseased samples, visits to producers’ fields, and assistance of county Extension educators, crop consultants, and producers with problem situations. The main emphasis of his Extension program is the development and implementation of effective and economically sound integrated disease management strategies. His mission-oriented applied research program feeds directly into his Extension program, providing stakeholders with up-to-date, research-based disease and plant health management recommendations. As a member of the OSUE Agronomic Crops team, he makes significant contributions to team’s electronic newsletter (Crop Observation and Recommendation Network [CORN]) with timely articles (more than 150 in the last 5 years) addressing stakeholder-derived questions on corn and wheat disease management. He is one of the national leaders in the coordinated management efforts for the US Wheat and Barley Scab Initiative. Larry Madden contributes to the development of disease models, assessment of fungicide and management strategies, and the national web-based Fusarium head blight of wheat forecasting system.

Vegetable Crops Disease Management

Sally Miller is responsible for vegetable pathology in the state. While she deals with a diverse array of vegetable crops, her main emphasis is on fresh market and processing tomatoes and peppers and vine crops, as well as salad (lettuce, radish, onion) and brassica vegetables produced on muck soil. Ohio’s vegetable production is extremely diverse, from large to small farms, conventional and organic production systems, and open field and protected culture. Her Vegetable Pathology Lab diagnoses from about 100 to more than 300 samples per year from Ohio and other states and countries and provides accompanying management advice. Miller is committed to providing the latest information on sustainable disease management practices to growers arising from her mission-oriented research and that of other vegetable pathology specialists. She also provides disease management instruction for Master Gardeners and the Amish community. With the severe reduction in the number of county educators over the past few years, Miller has expanded her immediate clientele base considerably to include consultants, farm crop protection specialists and farmer-leaders to help provide timely information to vegetable producers.

Fruit Crops Disease Management

Fruit crops Extension programming is conducted by Mike Ellis. The overall program objective is to provide the most reliable and current information available on diagnosis and control of fruit crops diseases to Ohio fruit growers and other interested clientele. There are two major groups of clientele: commercial fruit producers and backyard fruit growers and gardeners. Programs have been implemented to address the specific needs of each group. A major emphasis has been placed on the development and implementation of integrated disease management programs (in print, online, video, and oral form) for the various fruit crops grown in Ohio and the preparation of regional Extension publications (such as Bulletins) within the Midwestern states. Ellis diagnoses more than
200 fruit disease samples per year from fruit growers mainly in Ohio, but also from across the Midwest. Larry Madden also contributes to this area, particularly in assessment of disease management strategies and the development of risk prediction models fruit crop diseases.

Turfgrass Disease Management

The Extension turfgrass pathology program delivers current, science-based information on the control of turfgrass diseases and the implementation of turfgrass health management systems. Since 1996, this program was led by a faculty member, Mike Boehm, but after he assumed the vice provost position the turfgrass pathology program is now led by Joseph Rimelspach (Extension program specialist) and Todd Hicks (program coordinator). This program supports a large Ohio turfgrass industry, with acreage exceeding 4 million acres covering over 2.5 million home lawns and 350,000 commercial, governmental and sport turf areas.

Annual expenditures related to Ohio turfgrass exceed $4.6 billion annually; the industry employs over 41,000 people. Rimelspach also works with county Extension educators and the general public.

The program encompasses diseases and disorders of home lawns, commercial lawns, municipal and park turfgrass areas, athletic fields, sod farms and golf courses. An extensive applied field research program utilizes the Ohio Turfgrass Foundation Research and Education Center (OSU Columbus campus) and offsite locations, aimed understanding turfgrass ecosystems and developing integrated plant health management programs. Diagnostic services are provided primarily by Rimelspach through the C. Wayne Ellett Plant and Pest Diagnostic Clinic (PPDC). Timely presentations, popular articles, electronic/web-based postings, videos, fact sheets and applied research information are provided annually. The turf pathology team works closely with a large group of turfgrass personnel in Horticulture & Crop Science (HCS), Entomology, the School of Environment and Natural Resources, and with industry professionals. The turf pathology team is also heavily involved in teaching, primarily to the 60+ Turfgrass Science majors in HCS.

To maintain the program and be a world class turfgrass pathology program, a faculty member with expertise in turfgrass diseases is crucial.

Disease Management in Ornamentals

Ohio’s ornamental or “green” industry is a strong and vital part of the state’s economy. Extension programming is targeted at three main areas: 1) disease management in woody ornamentals (nursery or field grown trees, shrubs and perennials); 2) disease management in greenhouse ornamentals (annual and perennial bedding plants and floricultural crops); and 3) disease management in
established landscapes (trees, shrubs, flowers and interior plantings). A fourth “green” area, disease management for turfgrass, is described above. In past years, Pierluigi Bonello had some Extension responsibilities with trees, woody perennials and established landscapes, but with his change in appointment these areas are now not formally covered. **Because of a recent departure, we do not have current coverage of ornamental disease management (floriculture and nursery) by a faculty member in our department.** A faculty member in OSUE with a courtesy appointment in Plant Pathology, Jim Chatfield, does have major responsibility with ornamentals (but diseases are only a small part of his education programming). Nancy Taylor (program specialist, Clinic) also provides some important educational programs for Master Gardeners and other groups. However, the industry is large and diverse, and a faculty member in the department is needed who can focus completely on diseases and disease management, and integrate mission-oriented research into an Extension education program. This new faculty member could also have responsibilities for turfgrass diseases. Ohio’s ornamentals industry is one of the largest in the country, and diseases are major constraints to production. Stakeholders confirm the need for a faculty member in this area. **This area remains a very high priority for the department.**

### Diagnostics

Considerable effort is made in plant disease diagnostics in the department. This is done through formal mechanisms (Ellett Clinic) and several individual programs that are linked (to varying degrees) through a statewide network. Both approaches are described below.

**The C. Wayne Ellett Plant and Pest Diagnostic Clinic**

The C. Wayne Ellett Plant and Pest Diagnostic Clinic (ppdc.osu.edu) celebrated its 25th year in 2010 as a multidisciplinary unit. The Clinic’s focus is the identification and diagnosis of plant disease and insect problems, but it also includes plant and weed identification and environmental/cultural problems (agronomic and horticultural). From 2006-2010, the average number of samples processed was 1,315 (high of 1,722 in 2006, low of 919 in 2010). In 2006-2007, the Clinic cooperated in the soybean rust sentinel plot program and processed 608 samples for that program.

Also in 2006-2007, the Clinic partnered with the Ohio Department of Agriculture (ODA) to process 804 samples for sudden oak death. The Clinic charges a fee for its diagnostic services, which varies depending on the procedures required ($20-$150).

In the past decade, concurrent with declining Extension budgets, the Clinic has experienced a decline
in personnel support from the various participating departments. From a high of three clinic
diagnosticians (plant pathology, entomology and agronomy) and an office associate, all supported by
hard (OSUE) money, the Clinic is now staffed by one full-time (hard-money supported) staff
member, Nancy Taylor, who is the Clinic Director and member of the Department of Plant
Pathology. Turfgrass diagnostics are handled by J. Rimelspach under the umbrella of the Clinic,
with some support from Taylor.

The Clinic is part of the National Plant Diagnostic Network (NPDN) and has used NPDN funding to
improve its infrastructure and to support diagnostic staff. With (partial) funding from the NPDN in
recent years (until 2011), the Clinic supported a staff member to assist the director in diagnostics and
education programs. The Clinic’s entomology program is now being coordinated by faculty in the
Department of Entomology; NPDN funding has traditionally supported an entomology intern during
the summer. The Clinic is also a partner in the Ohio Plant Diagnostic Network (see below), and is
now co-located with the Ohio Department of Agriculture’s Plant Health Laboratory in
Reynoldsburg, Ohio.

Taylor supports Ohio’s Master Gardener program, and teaching in the area of basic plant pathology,
the OSU Nursery Short Course, and in recent years, the Pesticide Applicator Training program.

Ohio Plant Diagnostic Network (OPDN)
The Ohio Plant Diagnostic Network (OPDN) concept first emerged after the C. Wayne Ellett Plant
and Pest Diagnostic Clinic adopted the Plant Diagnostic Information System (PDIS) as its data
management system, which enabled coordination of sample data among multiple locations. It
expanded after S. Miller and A. Dorrance obtained funding to support remote diagnostics to some of
the Outlying Research Stations of the OARDC (see INFRASTRUCTURE). Further motivation for
the creation of the OPDN was the realization that several programs are involved in diagnostics on a
regular basis.

In 2009 a major programmatic change was undertaken with the formal implementation of the Ohio
Plant Diagnostic Network. The mission of the OPDN is to facilitate the protection of Ohio’s plant-
based agricultural and natural plant systems through a multi-institutional consortium engaged in the
detection and diagnosis of, and surveillance for, plant-related problems and threats, in support of
coordinated response and recovery efforts, and in the development of education and outreach
programs in support of this mission. The Network now includes diagnostic laboratories with OSU
and the Ohio Department of Agriculture (ODA). The C. Wayne Ellett Plant and Pest Diagnostic
Clinic (OSU) is now co-located in the ODA Plant Health Diagnostic Laboratory’s new facility
(3,000 sq. ft.). The new laboratory provides the Clinic with ample space to adopt and implement
new diagnostic protocols and programs. By co-locating these diagnostic programs, the ODPN’s co-
directors (N. Taylor, OSU, and Rob Fisher, ODA) may potentially access additional revenue streams
unavailable to each laboratory individually. While the two diagnostic programs are co-located,
program missions remain unique and each program maintains separate data and reporting systems. OSU’s Clinic maintains diagnostic space on the Columbus campus with an emphasis on turfgrass diagnostics (see previous sections).

Table E1. OPDN samples processed (2006-2010).

<table>
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<tr>
<th>OPDN (OSU component)</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>5-yr mean</th>
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<td>698</td>
<td>106</td>
<td></td>
<td></td>
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<td>161</td>
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<tr>
<td>PPDC - Soybean Rust Survey</td>
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<td>553</td>
<td></td>
<td></td>
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<td>38</td>
<td>39</td>
<td>45</td>
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<tr>
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<td>1405</td>
<td>1794</td>
<td>1156</td>
<td>1932</td>
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* - Counts not available at the time of printing of this report.

Participation on Commodity Teams and Contributions to Newsletters

Plant Pathology personnel work closely with county and regional Extension educators in Ohio through partnerships on Commodity Teams and interdisciplinary programs such as the Agronomics Crop Team, Vegetable Crops Team, Fruit Crops Team, Grape Team, Extension Nursery Landscape and Turf Team (ENLTT), and Organic Food & Farming Education & Research Program (OFFER). These collaborations keep us appraised of issues and enable us to integrate plant pathology into broader Extension programming.

An important example is the Agronomics Crop Team, which holds weekly Monday conference calls during the growing season. These calls help generate field crop recommendations via the Crop Observation and Recommendation Network (C.O.R.N.) Newsletter (distributed by e-mail, fax, and on agcrops.osu.edu to over 2,500 subscribers). Widely used by growers, the agcrops.osu.edu website had 1,322,554 visits between 2004 and 2010. The C.O.R.N. newsletter has a documented impact of $11.3 million to Ohio growers (Battelle, 2005). Dorrance has provided 106 contributions and Paul 186 contributions to the C.O.R.N. Newsletter over the past 5 years.

Paul also is a regular contributor to a national web-based Fusarium head blight of wheat forecasting system (www.wheatscab.psu.edu), with Ohio-based commentaries that are distributed by e-mail and text messages to subscribers across the country. Dorrance contributes to the national web-based soybean rust IPM PIPE program, as well as to several pathogen teams through the North Central Soybean Research Program’s Plant Health Initiative. She is also the lead coordinator of the Soybean
Disease White Paper, “Focus on Research Priorities for the NCERA 212.”

Miller contributes to VegNet (vegnet.osu.edu), an online resource for vegetable growers, and to the Ohio Produce Growers and Marketers Association newsletter on timely topics. She is also the section editor for disease management for the “Ohio Vegetable Production Guide” (Extension Bulletin 672).

Ellis is a member of the Ohio Fruit Team and the Ohio Grape Team. He makes regular contributions to the Ohio Fruit Team’s ICM Newsletter and the Ohio Grape Team’s OGEN Newsletter. He also coordinates the pathology sections for the annual revision of “The Midwest Tree Fruit Spray Guide” and “The Midwest Small Fruit and Grape Spray Guide”. The tree and small fruit guide is shared by nine Midwestern states, and the grape guide is shared by 11 Midwestern states.

N. Taylor participates in the Extension Nursery, Landscape and Turf Team’s weekly teleconference during the growing season. Timely information is disseminated through the Buckeye Yard and Garden onLine (bygl.osu.edu). Team members also provide workshops and presentations through the state. A 2010 reader’s survey indicated plant-problem diagnostics topped everything in value to readers. Taylor also participates in the Floriculture Industry Roundtable of Ohio teleconferences to provide information pertaining to floriculture based on Clinic observations. However, until we have a faculty member in ornamental pathology, we are not in a position to take any leadership within the ornamental groups.

Regionalization in Extension Programming

In view of reduced resources for Extension programming across the country, we are continually exploring avenues to increase our productivity through the regionalization of Extension programs and products. The following are some examples of our participation and leadership in regional Extension efforts.

*Fruit crops.* Several Midwest states do not have Extension specialists working directly with fruit crops, especially fruit crop diseases, and therefore do not have the resources to meet the needs of fruit producers within their state. In the past, states that did have the resources and personnel produced their own Extension publications. This resulted in a duplication of information and greatly increased costs for individual states. To maximize resources and take advantage of regional expertise, M. Ellis has led efforts in the Midwest to produce state-of-the-art Bulletins, Guides, and Handbooks related to pest and disease management for fruit crops. He has cooperated with other experts in producing fruit crop production guides for the entire region. In particular, he has worked with colleagues within the Midwest Fruit Workers Group to coordinate the production of a regional publication series for the Midwest. Publications within this series bear the name of each
cooperating state and the state specialists working with fruit within each state. At present, “The Midwest Tree Fruit Spray Guide” is used in eight states and “The Midwest Small Fruit and Grape Spray Guide” is used in 11 states.

In addition the following regional publications have been developed and are currently being shared by 11 states:

- Midwest Small Fruit Pest Management Handbook
- Midwest Tree Fruit Pest Management Handbook
- Midwest Grape Production Guide
- Midwest Strawberry Production Guide
- Midwest Home Fruit Production Guide

Additional Production Guides are currently being developed.

*Soybeans.* Dorrance collaborates with soybean pathologists across the Midwest and Southern region on key diseases affecting soybean. *She coordinated the development and deployment of the Soybean Rust Fungicide Manual (over 200,000 manuals have been distributed in the US).* Dorrance also collaborates with several groups that are focused on root and foliar diseases of soybean.

*Corn and small grains.* Paul collaborates with wheat and corn pathology specialists across the region and the country to develop handouts, factsheets, and pocket guides on the identification and management of diseases. Through his role in the quantitative synthesis of data – through meta-analyses – from nationally coordinated fungicide and integrated management trials, Dr. Paul has contributed to the development of PowerPoint slides and other materials that are being used in Extension programs.

*Vegetables.* Miller collaborates with specialists from other states in the Eastern half of the US and California on the Cucurbit Downy Mildew ipmPIPE (cdm.ipmpipe.org/), a program designed to provide breaking news to growers on the movement of *Pseudoperonospora cubensis.* She works with growers, Extension educators and consultants to identify the disease as it appears on Ohio farms, and maintains 2-4 sentinel plots at OARDC Outlying Stations. Miller and Brian McSpadden Gardener also participate in the eOrganic Community of Practice in the Vegetable Disease Management section. In addition to contributing Fact Sheets, Miller has conducted several eOrganic webinars; a video on late blight has 818 views since July 2010 (www.youtube.com/watch?v=ECCqpSo5tzY).
Outreach through eLearning

The department has been engaged in distance education and the development of online resources for several years, and our efforts are extensive and intensive. We believe we are at the forefront of efforts in the college in this type of education and outreach programming. To save space and minimize redundancy in this document, we give the details in the eLearning portion of the EDUCATIONAL PROGRAMS section (above).

Evaluation and Current Status of Plant Pathology Extension

Based on our own experience and feedback from clientele, OSUE County-based faculty and educators, and College Administration, it is our self-assessment that, overall, the department is presently meeting its major objectives, and that our Extension programs are highly functional and well respected. As described in several places, we do have a current gap in our coverage of ornamental diseases, but the other major commodities are covered with state-of-the-art education programming. Our evaluation is based on several pieces of evidence, including the following.

Surveys of Internal and External Stakeholders

OSUE Administration routinely surveys Plant Pathology’s internal and external stakeholders, with very positive results in terms of numerical scores and narrative feedback. Written comments from both external and internal stakeholders have been extremely favorable regarding the current Extension faculty and senior staff in the Department. Furthermore, annual reviews of the department’s Extension program by OSUE Administration are routinely very strong. However, the lack of a faculty member in ornamental pathology is now severely limiting our ability to serve this agricultural sector worth several billion dollars per year.

Input from the Department’s Extension Advisory Committee

Our Department has traditionally had an Extension Advisory Committee, consisting of 10 to 12 County Extension Educators. We schedule regular meetings (annually) to gather feedback regarding the functioning of the department’s Extension programs. The committee has been very helpful in guiding direction. Committee members consistently state that we are doing a very good job in conducting our Extension programming. They have expressed appreciation that Plant Pathology personnel are very accessible and responsive to needs, and have provided leadership in developing state-of-the-art programs in integrated disease management. Committee members have clearly indicated that the most valuable resources we provide include plant disease Fact Sheets and our Extension Bulletins.
Recognition of Faculty with Awards

Our Extension personnel are well recognized locally, regionally, and nationally for their outstanding achievements in outreach and engagement. **Three of the department’s Extension specialists – Anne Dorrance, Mike Ellis and emeritus professor Pat Lipps – have been honored nationally with the APS Excellence in Extension Award.** Ellis received the Gamma Sigma Delta Extension Award of Merit, the State Personnel Service Award from the Ohio Extension Agents Association, and named to the Ohio Grape Hall of Fame. **Dorrance received a Special Meritorious Award from the American Soybean Association (2008),** the USDA Group Honor Award for Excellence for the Asian Rust Team (2006), the Personnel Service Award from the OSU Extension Agents (2006), and the Team Award for Soybean Rust Sentinel Plots, Ohio Chapter of Epsilon Sigma Phi (2006). Terry Niblack received the Excellence in Soybean Research, Illinois Soybean Association (2007 and 2011) and the United Soybean Board Outstanding Achievement Award (2004). Pierluigi Bonello received the President’s Award for Service and Excellence from the Ohio Chapter of the International Society of Arboriculture (2005). Several of our current or retired Extension specialists have been elected Fellows of APS (Ellis, Miller, Rowe, Hoitink).

Recognition of Published Materials with National Awards

In 2010-2011, **Pierce Paul was the editor and co-author on two OSU Extension publications that received national recognition by the American Society of Agronomy.** One is a Fact Sheet entitled “Gibberella Ear Rot and Mycotoxins in Corn: Sampling, Testing, and Storage.” The publication was awarded the 2010 Extension Educational Materials Program Certificate of Excellence from the American Society of Agronomy (for publications of 16 pages or under). The second is a Bulletin entitled “The Corn, Soybean, Wheat and Alfalfa Field Guide.” This publication was also awarded the 2010 Extension Educational Materials Program Certificate of Excellence from the American Society of Agronomy (for publications greater than 16 pages). Dorrance was a co-author on this Bulletin 827 and contributed to several sections related to soybean pathology. Other authors included members of OSUE Agronomic Crop Specialists.

**Mike Ellis has been an author of several publications that have received national awards.** He received the first place award from the Extension Division of The American Society of Horticultural Science for development of the “Midwest Small Fruit Pest Management Handbook.” He also received the American Society for Horticultural Science Extension Division, Educational Materials Award, for outstanding Extension materials for “Bramble Production, Management and Marketing” (OSUE Extension Bulletin 782), and The American Society for Horticultural Science Extension Division, Educational Materials Award, for outstanding Extension materials for “Midwest Grape Production Guide” (OSUE Extension Bulletin 919).
Frequent Invitations for our Extension Specialists to Speak Locally, Regionally, and Nationally

Departmental Extension personnel, as well as other faculty members, are frequently invited to give educational presentations within Ohio and across the country on diagnostics and disease management. For instance, Mike Ellis has made 22 out-of-state invited presentations since 2006, and has a career total of 123 out-of-state invited presentations. Anne Dorrance has made 16 out-of-state invited presentations since 2006, and has a career total of 21. Sally Miller has made 23 out-of-state invited presentations since 2006, and has a career total of 25. Pierce Paul has made 5 out of state invited presentations since 2006.

A Sampling of Selected Impact Statements (Extension)

Departments in CFAES annually submit Impact Statements to highlight accomplishments in Extension (OSUE) outreach and education. It would be very difficult to give Impact Statements for all the programs in the department. Here we list a sampling of statements, to demonstrate the breadth of the programming.

Timely Diagnoses of Plant Diseases Save Lives in Developing Countries

Situation
Plant pests and diseases can cause devastating crop losses in developing countries where farming is a major source of food and income, and resources for treatment are scarce. Early identification of pests and diseases is key to preventing outbreaks, and critical for international agricultural trade, where products must be certified as pest- and disease-free. Diagnostic capacities for plant pests and diseases in developing countries must be improved.

Response
Ohio State has a lead role in providing education to scientists from Africa, Central America, and other regions. Programs – developed in collaboration with international and U.S. institutions – include intensive training in modern and traditional diagnostic methods.

Impact
Surveys on diagnostic capacities and needs in Africa and Central America provide the foundation for capacity-building in these regions. More than 50 scientists from 20 countries have participated in Ohio State’s international training programs in the past two years. (Sally Miller, Department of Plant Pathology. Collaborator: Luis A. Cañas, Department of Entomology).

Food Security: From Field to Fork

Situation
Food safety, particularly for fruit and vegetables, has become a serious public health issue with several outbreaks of food-borne illness associated with lettuce, spinach, tomatoes and more recently, chili peppers.
Response
OSU Extension’s Vegetable Team has been mobilized to study the interaction of plant and zoonotic (animal) pathogens on fresh produce, as well as the effect of pest management practices on the incidence and survival of food-borne human pathogens. The USDA CSREES National Food Safety Initiative (NFSI) grant obtained in 2006 takes a farmer-directed approach to Extension programming, in which Extension materials are being developed based on surveys of farmers to determine their knowledge gaps.

Impact
This work will lead to improved, more focused and relevant educational resources for fruit and vegetable growers. Further, this strengthened collaboration better enables growers to address food safety and other issues in supplying safe, quality produce to consumers. (Sally Miller, Department of Plant Pathology; Collaborators: Jeffrey T. LeJeune, Food Animal Health Research Program; Brian B. McSpadden Gardener, Department of Plant Pathology).

Fusarium Head Blight Risk Assessment Model: A Widely Used Management Tool

Situation
Fusarium head blight (FHB), or scab, is an economically important disease of wheat and barley, with yield losses of more than 45% in severe cases. FHB was responsible for an estimated $1 billion in losses during a catastrophic 1993 epidemic in parts of the Midwest – one of the greatest economic losses attributed to a plant disease on record. For every dollar lost by growers due to FHB, it has been estimated that there is an additional $2 lost elsewhere in the wheat industry. FHB is caused by the fungus *Fusarium graminearum*. In addition to lowering yield, the fungus can also produce a toxin harmful to livestock and humans. Weather conditions such as rain and humidity are major factors contributing to the disease.

Response
Researchers at Ohio State, Penn State, and Kansas State have developed a web-based model to predict the risk of Fusarium head blight for a given area. The tool uses weather and crop information to guide growers in treatment decisions.

Impact
This web-based tool is now used by growers, crop consultants, and processors to make management decisions in 30 states, including Ohio. Extension personnel in wheat-growing areas use the tool to deliver state customized advice to users. In Ohio, plant pathologists provide weekly web updates on the disease. The Fusarium Head Blight Prediction Center for Wheat (wheatscab.psu.edu) and similar aids help guide growers in cost-efficient and environmentally-sound disease management decisions. (Pierce Paul and Larry Madden, Department of Plant Pathology).
**Foliar fungicide applications are critical for disease management but not for “plant health” of soybean**

**Situation**
Soybean is Ohio’s number one field crop, with an annual economic output of more than $1 billion. Foliar fungicides were rarely applied to Ohio’s soybean crop prior to 2004. Early work at Ohio State during the 1960’s demonstrated a 2-4 bushel/acre advantage of fungicide when Phomopsis seed decay was a high risk problem.

**Response**
From 2004 to 2008, a total of 37 farm-scale studies evaluated the impact of strobilurin and triazole fungicides on the foliar disease and yield of soybean. Damaging levels of soybean aphid occurred in 9 field locations. In the remaining 28, a single application of fungicide increased yield in only 6 locations, of which only 3 had yield increases greater than 4.2 bu/A. Fungicides did decrease the disease severity of both brown spot and frog eye leaf spot, but action thresholds could not be determined in this study.

**Impact**
Producers can save production costs by not applying fungicides unless disease is present in the field. Application costs alone range from $8 to 12/acre. Savings of more than $45 million dollars on application costs alone can be accrued by spraying only when needed for disease control. (Anne Dorrance, Dennis Mills, Christian Cruz – Soybean Pathology, Department of Plant Pathology; R. Hammond, Department of Entomology. County Extension Educators: Bender, R., Koenig, M., LaBarge, G., Leeds, R., Mangione, D., McCluer, G., Ruhl, S., Siegrist, H., Sunderlander, A., Sonnenberg, D., Yost, J., Watters, H., Wilson, G.)

**Seed treatments can protect soybeans from Phytophthora sojae and prevent crop replanting**

**Situation**
Soybean is an important field crop in the North Central Region, and the crop is produced on over 4.5 million acres each year in Ohio alone. In Ohio, much of this production occurs on soils comprised of clay or which are poorly drained. *Phytophthora sojae* is yield-limiting on approximately one-third of these acres. Early infection leads to plant death, and can result in the need to replant entire fields. Due to changes in seed production and the incorporation of specialty traits into cultivars, soybean seed is now costly, but also in short supply for some desirable cultivars.

**Response**
From 2003 to 2006, 11 trials were conducted to evaluate the effect of metalaxyl or mefenoxam seed treatment on the stand and yield of soybean cultivars with different resistance gene
combinations to *P. sojae* (*Rps* major genes, and also partial resistance). Results clearly showed that fields that are poorly drained and have a high risk of stand loss due to Phytophthora would benefit from a seed treatment across all resistance combinations.

**Impact**
In years with greater than average rainfall following planting, replanting has occurred on over one-third of Ohio’s soybean acres, primarily due to infection by *Phytophthora sojae*. As more producers have employed the recommended seed treatment as part of their production practices, we have observed a decline in the number of acres that require replanting, thus saving a production cost estimated at $80/acre for cost of seed, planting costs, and lost yield due to later planting date. (Anne Dorrance and colleagues from 4 North Central States and Ontario, CA: A. Robertson (IA), L. Giesler (NE), C.R. Grau (WI), M.A. Draper (SD), A. Tenuta (Ontario Ministry of Agriculture).

**OSU Extension Thwarts State-wide Disease Epidemic and Saves Apple Growers Millions**

**Situation**
Apples are Ohio's #1 fruit crop, with a production value of over $60 million annually. Apple scab is a major fungus disease that must be controlled for successful commercial production. In 2004, the incidence of apple scab in Ohio began to rise, and by the following year, Ohio apple growers were facing crop losses of 25-40%. It was unclear why apple scab was escalating into such a widespread epidemic.

**Response**
In 2005, scientists initiated research and grower surveys to study factors behind this epidemic. It was determined that the apple scab fungus had developed resistance to commonly used Sterol-Inhibiting, or DMI fungicides. Once the basis of the problem was identified, Extension programs were launched to educate growers on new management recommendations, which included using protectant fungicides instead of DMI fungicides.

**Impact**
In 2006, Ohio's apple scab epidemic was successfully brought under control. By 2006, apple prices reached an all-time high, and if the epidemic had not been halted, growers would have faced losses of $15-20 million in 2006. The Ohio Fruit Growers Marketing Association estimates that this program has saved the state's apple industry $75-$100 million dollars over the past five years (2006-2010). (Mike Ellis, Department of Plant Pathology; Ohio Fruit Growers Marketing Association)
Less is More: Change in Dollar Spot Management Reduces Disease

**Situation**
Ohio's turfgrass industry has an economic impact of $4.6 billion and employs over 41,000 people. An important component of the industry is the management of turfgrass on the 800+ golf courses in the state. Dollar spot is a widespread disease that leaves unsightly brown and dead spots in lawns, golf courses and sports fields. More fungicides are used to manage this disease than any other in Ohio and much of the U.S.

To manage the disease, turfgrass managers typically apply fungicides when symptoms start to appear in the spring, and continue through the summer and fall. This approach often leads to frequent chemical applications and, although effective, there is a need for less costly and more environmentally sustainable methods.

**Response**
Turfgrass scientists are testing the effectiveness of spring fungicide treatments made well before dollar spot is observed. By reducing or killing the fungus at the outset, before the infection is widespread, disease can be effectively minimized by up to 50%.

**Impact**
OARDC researchers and OSU Extension specialists have developed new dollar spot management protocols that are being adopted by hundreds of golf courses in the Eastern U.S. In addition to being more effective, this program will reduce the amount of fungicides in the environment and management costs. (Joe Rimelspach and Mike Boehm, Department of Plant Pathology).

New Engagement Efforts in Ohio 4-H and Youth Development

**Situation**
Plant pathology is not typically viewed as an entrance discipline for agriculture and the environmental sciences, and K-12 curriculum materials on plant disease are lacking. Declining enrollments in plant-related majors at the university level will find us with a critical shortage of plant pathologists to address crises such as disease epidemics, invasive diseases and emerging disease threats to our crops.

**Response**
Educational resources have been developed for various target audiences ranging from K-12 to professionals in the field. An "Introduction to Plant Diseases" fact sheets series was developed and is available online through ohioline.osu.edu. Designed for a broad range of audiences, these resources provide excellent background information on key concepts in plant pathology and serve to augment fact sheets on specific plant diseases. A productive partnership between Ohio 4-H and the Department of Plant Pathology has led to the development of a 4-H Idea Starter, "Viruses, Bacteria and Fungi, Oh My!" The idea starter includes projects to help students explore plants and nature (available online through Ohio 4-H). An online course, "Sick Plants and a Hungry World," provides general and historical information on plant pathology. Target audiences include Master Gardeners and students.
Impact
On-line fact sheets have been accessed over 190,000 times. In addition, the fact sheets have been
distributed to high school and elementary school teachers at education outreach events. Over 200
people from across the U.S. have registered for the Sick Plants and a Hungry World online
course. Twelve students have completed 4-H Idea Starter activities through local 4-H clubs. We
have been able to provide plant pathology resources to audiences we would not otherwise have
been able to reach. We are currently expanding our online resources to cover additional topics.
(Sarah Ellis Williams, Monica Lewandowski, Mike Boehm, Department of Plant Pathology; Jane
Wright, Ohio-4-H; Pamela Bennett, OSU Extension)

Future Planning and Objectives

Through our Strategic Planning (see APPENDIX C), we have developed a list of major objectives
for our Extension programming in the department. These are, for the most part, continuations and
expansions of our current activities. The list includes, after some shortening and updating:

• Provide the most current and reliable information available on the causes, diagnosis and
control of plant diseases in Ohio through the use of printed materials such as bulletins, fact
sheets, video presentations, newsletters with real-time response capabilities, live
presentations at grower meetings and workshops, computer-based retrieval systems, and
personal contacts with Ohio citizens. Increased emphasis will be placed on the use of
eLearning and distance technologies for interacting with clientele.

• Develop new approaches for plant disease prevention and control in rural and urban
communities.

• Conduct educational programs for Ohio commercial growers and home owners that
effectively implement new technology for plant disease diagnosis and control.

• Provide educational information, training and support to Ohio State University Extension
educators and specialists in the area of plant health management.

• Strive to maintain active participation of Plant Pathology Extension personnel in
Extension/research teams within the college.

• Operate a modern, state-of-the-art Plant and Pest Diagnostic Clinic and associated
laboratories within the Ohio Plant Diagnostic Network (OPDN) to aid all citizens in Ohio in
the diagnosis of plant health problems. We will also maintain a strong presence and
participation within the National Plant Disease Network (NPDN) and continue to be involved
in first detection and alert programs to help secure our nation’s food supply.

• Continue to maintain problem solving applied research programs to obtain new and timely
information for use in Extension programming.
Conclusion

Through our self-study we have concluded that the Department is fulfilling its mission in Outreach and Engagement, and that we are a national leader in several Extension programs. However, because of downsizing in number of faculty, we are now not adequately serving the needs of the agricultural industry or the public in ornamental pathology. The department clearly needs new faculty member in this area. The downsizing in program specialists (county educators) around the state (due to chronic problems in statewide and county funding) has further challenged us as we move forward with our objectives.

Despite our successes, we recognize the need for continued evaluation, innovation, and constructive change in Extension and general outreach and engagement, especially in light of new technologies in information transfer and new developments in eLearning/distance education. With the general declining number of personnel in Extension, innovation in outreach and education is clearly needed. We envision a continual need to evaluate and incorporate electronic and distance technologies into Extension education programming, and to broaden the reach of our Extension education programs through new initiatives and greater collaboration with our county- and regional OSUE colleagues.
Overview

Globalization of agriculture has mandated that research and outreach efforts in Land Grant Universities place some emphasis on work outside the United States. Globalization of our programs and curriculum has long been a goal in CFAES, and the Department of Plant Pathology fully embraces this commitment to international research, development, teaching and outreach.

All faculty in Plant Pathology have directed some of their program into the international arena, either by advising international graduate students, collaborating with international scientists, speaking at international symposia or in foreign countries, or by leading or participating in organized international development programs.

Our faculty have given presentations at 125 international conferences and workshops since 2001. Furthermore, two have long-term appointments at universities in other countries (China, South Korea). The involvement of our faculty at international venues has greatly enhanced our visibility. These opportunities also help us strengthen international collaborations and open new avenues for research and development, especially of the interdisciplinary and trans-disciplinary types. We continually strive to develop and enhance our global reputation as a leader in plant pathology to leverage resources and expand our international network.

As described in our Strategic Plan, we have two broad international programming objectives.

- Train and collaborate with international students, postdoctoral scientists and scholars through our undergraduate and graduate programs, international exchange programs, training workshops, and joint research projects. Utilize technology to bring educational opportunities to new audiences.

- Continue to develop linkages and partnerships between programs and individuals in developed and developing countries, for the purpose of development and human-capital capacity building in less developed countries.
Participation in Organized International Programs

World Class University Program—South Korea

Since 2009, Brian McSpadden Gardener (right) has collaborated with South Korean scientists at Chonnam National University (CNU) in the development of technologies related to biological control of plant diseases as part of a World Class University (WCU)-funded program. His research involves developing new sampling strategies to improve the efficiency of bioprospecting, assisting with the testing of new agents, and genomic sequence analyses.

He has worked in residence as a Visiting Professor and WCU Scholar in Gwangju, South Korea, for a total of 8 months in the past 2 years. He also supervised graduate students and training visits of three other Korean research scholars from CNU and Korea University. In addition to the research, McSpadden Gardener taught a graduate-level courses on biocontrol of plant diseases and biostatistics at CNU. These courses were conducted both in person and via web videolink between OSU and CNU. The WCU grant is funded by the Korean National Research Foundation (wcu-becc.chonnam.ac.kr).

Integrated Pest Management Collaborative Research Support Program (IPM CRSP)

The IPM CRSP was initiated in 1993 with funding (approx. $1.5 million/yr) from USAID, and is managed by Virginia Tech (Virginia Polytechnic Institute and State University). The mission of the IPM CRSP is to foster IPM through collaborative research between U.S. and Less Developed Country (LDC) institutions for their mutual benefit by improving their abilities to develop and implement economically and environmentally sound crop production methods. The IPM CRSP focuses on horticultural crop production systems. Research is conducted in South, Southeast and Central Asia, Sub-Saharan Africa and Central America. The IPM CRSP is now in its 18th year; Ohio State is one of the original cooperating institutions, and others currently include the University of California-Davis, Penn State, University of Florida, Clemson, Michigan State and Purdue. OSU Plant Pathology faculty members have been actively involved in the IPM CRSP since the last review. Sally Miller is a co-PI in the South Asia, West Africa and East Africa regional programs, and is the PI of the International Plant Diagnostic Network (IPDN), a “Global Theme” program active in four regions. Miller’s major emphasis in the regional programs is on management of diseases of tomato, eggplant, pepper, potato, onion, cabbage and squash. Principal research objectives include management of bacterial wilt and root knot nematode in tomato and eggplant using resistant cultivars and grafting, understanding the biology of the bacterial wilt pathogen, Ralstonia solanacearum, and biological control of soil-borne diseases. In the last 10 years she has trained one
OSU MS student (OSU degree), and one MS and two PhD students in “sandwich” programs (research conducted at OSU but courses and degree from home institution). She has also hosted three short-term trainees in her lab through the IPM CRSP. The IPDN project is modeled after the National Plant Diagnostic Network (NPDN) hub- and spoke system, with programs in 12 countries. Hub labs in Guatemala, Kenya, Nigeria and India coordinate regional research and training efforts.

Mike Ellis participated in the IPM CRSP regional program in Ecuador until 2005. He worked as an IPM team with Roger Williams, Department of Entomology, and with in-country collaborators (Jose Ochoa and Carmen Perez, faculty members at INIAP, Quito, Ecuador). This collaboration resulted in the development of integrated disease management programs for several Andean fruit crops, including babaco, naranjilla, tree tomato and platano.

Margaret Redinbaugh and Feng Qu advised two sandwich PhD students (Kenya, Uganda) on the characterization of viruses responsible for passion fruit woodiness disease, part of a major effort on passion fruit IPM in the IPM CRSP East Africa regional program. Qu also advised a sandwich MS student (Uganda) on tomato virus identification and characterization.

**International Diagnostic Training**

*IPM CRSP International Plant Diagnostic Network.* Through the IPDN, S. Miller has organized and/or conducted ten intensive 3-5 day long plant disease and insect pest diagnostics workshops in Benin, Mali, Ghana, Uganda, Kenya, Indonesia, Kyrgyzstan and Guatemala since 2004. These workshops have trained more than 200 international plant protection professionals and students in classical and modern diagnostic technologies.

*OSU International Diagnostics Short Course: Pest and Disease Diagnostics for International Trade and Food Security.* This 2-week, fee-based course offered by Plant Pathology and Entomology in Wooster has trained more than 50 plant pathologists and entomologists, primarily from developing countries.

The course provides intensive training in classical and modern plant disease and insect pest diagnostics, data management, networking, and Sanitary/Phytosanitary (SPS) issues that affect international trade. The short course is organized by Miller in cooperation with Luis Cañas (Entomology). Additional members of Plant Pathology (Redinbaugh, Bonello, Meulia, C. Taylor, Paul and N. Taylor) and Entomology (A. Michel and H. Klompen) contribute lecture and lab material to support this training. USAID, USDA FAS, IPM CRSP and various foundations and
other private sources of funding support the trainees.

**Department of Energy - EARTH University**

Between 2004 and 2008, M. Ellis and R. Williams (Department of Entomology) participated in an EARTH/DOE pest management project, funded by the U.S. Department of Energy to develop research capabilities with the faculty of EARTH University in Costa Rica. Ellis and Williams worked as an IPM team to develop IPM programs for important insect pests and diseases on banana and pineapple.

**Horticulture CRSP**

The Horticulture CRSP is a relatively new program, managed by the University of California-Davis. Miller directed an “Immediate Impact Project” under this CRSP entitled “Enhancing Trade in Horticultural Crops through Food Safety and Phytosanitary Measures” in Nigeria in cooperation with Ken Shenge, Ahmadu Bello University. This 18-month project assessed plant disease and food safety issues pre- and post-harvest in Nigerian fresh market tomatoes. Co-PIs on this project are Jeff Lejeune, OSU Food Animal Health Research Program (FAHRP), and Mark Erbaugh, OSU Office of International Programs in Agriculture. Miller is currently a co-PI, with Erbaugh, on an “Exploratory” Hort CRSP project led by Matt Kleinhenz, Department of Horticulture and Crop Science, entitled “Toward Increasing Smallholder-Vegetable Farmer Utilization of Grafting and Low and High Tunnel Microclimate Management Tools in Kirinyaga District, Kenya.”

**Africa Food Security Initiative**

Miller and Erbaugh cooperate on two USAID projects in Senegal and Uganda focusing on disease and pest management in tomatoes and rice, and enhancing plant diagnostic capacity in these two countries. One student from Makerere University (Uganda) was trained in a sandwich MS program under the supervision of Qu and Miller; another student from the University of Dakar (Senegal) was trained at the University of California Davis in a similar program, advised by Bob Gilbertson and Miller. Redinbaugh cooperates on rice virus identification and management in this project.

**NSF PIRE Project on Rhizosphere Biology in the Sahel Region – Senegal**

In 2011, McSpadden Gardener began working with Richard Dick (School of Environment and Natural Resources at OSU) on an NSF-funded project examining the contributions of rhizosphere microorganisms to productivity enhancements provided to millet by a co-cultivated perennial shrub in the Sahel region of Senegal. As part of that project, McSpadden Gardener is supervising a graduate student who will conduct research for two years in Senegal. He will also co-teach a short-course in tropical microbial ecology focusing on methods and data analysis during the summer of 2012 (extension.osu.edu/news-releases/archives/2011/march/ohio-state-receives-2.6m-nsf-grant-for-unique-research-in-africas-threatened-sahel-region).
USDA Foreign Agricultural Service (FAS) Faculty Exchange Program

The Department of Plant Pathology worked with OSU’s Office of International Programs in Agriculture to conduct faculty exchange program funded by USDA FAS in 2007 and 2008. The purpose was to develop graduate and undergraduate curricula related to sanitary/phytosanitary (SPS) issues in trade of agricultural and horticultural crops, including specialized courses in plant disease diagnosis and management. Five faculty members of crop protection departments in Ghana (two), Senegal, Swaziland and Nigeria collaborated with members of our department (S. Miller, M. Ellis, M. Boehm, S. Williams) during their stays at OSU; new collaborations were generated after the exchange programs were completed with Nigeria (Hort CRSP), Senegal (AFSI) and Ghana (IPM CRSP).

Plant Disease Epidemiology: US-UK

Larry Madden collaborates with leading epidemiologists in a number of cutting-edge areas of research, including: 1) Quantification of the spatial component of plant disease epidemics, development of new indices of spatial patterns, and effects of spatial aggregation on disease development, sampling, and prediction, with Gareth Hughes of University of Edinburgh (Scotland) and Xiangming Xu of Malling Research (East Malling, UK); 2) Development of risk assessment models for the decision making in plant disease epidemiology and management, with Neil McRoberts of Scottish Agricultural College (Edinburgh, Scotland; now with University of California, Davis), and Gareth Hughes of University of Edinburgh; 3) Theoretical assessment of pathogen transmission characteristics and virus-vector and virus-plant interactions on the epidemics of plant diseases, with Mike Jeger of Imperial College (London, UK) and Frank van den Bosch of Rothamsted Research (Harpenden, UK); and 4) Determination of the basic reproduction number for heterogeneous and complex plant disease epidemics, with Frank van den Bosch and Mike Jeger.

Interdisciplinary OSU/ARS Research on Maize Viruses and Phytoplasmas

Since 2004, OSU faculty in Plant Pathology, Horticulture and Crop Science, Entomology, and USDA-ARS researchers have collaborated with scientists in Serbia on maize redness (MR) disease. The U.S. part of the project was funded by USDA-FAS and the Serbian part by the Serbian Ministries of Science and Agriculture. The disease caused 40-90% losses in the South Banat Region in 2002-2003, and continues to cause substantial losses for producers in Serbia. Together with scientists at the Institute for Plant Protection and Environment (Serbia) and CABI, the pathogen causing MR was identified as stolbur phytoplasma, and the cixiid planthopper *Reptalus panzeri* was identified as the vector. The disease cycle was determined and plant reservoirs of the disease were identified. The team determined that hybrids commonly used by producers in the region are all highly susceptible to losses from MR. Results indicated that the common maize – wheat rotation used in the region exacerbates the disease problem, and the team suggested potential management strategies including alternative rotations and seed treatments for wheat and maize crops. Continued
work will focus on testing management strategies.

Lucy Stewart is collaborating with Filomena Sta. Cruz (University of the Philippines, Los Banos Philippines) on molecular characterization, leafhopper transmission determinant identification, and sequences comparisons of the waikaviruses *Rice tungro spherical virus* (RTSV) and *Maize chlorotic dwarf virus* (MCDV).

### Students, Post-Docs, and Visiting Scholars

Our undergraduate and graduate students have been involved in many international activities and programs. A large percentage of our PHM majors have done Study Abroad experiences; 8 students have participated in CFAES programs in Brazil, Tanzania and Uganda, Czech Republic, Costa Rica and Iceland (2008-2011). A few additional highlights are given in Table I-1.

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<th>Year</th>
<th>International Activity</th>
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| 2011 | **Elizabeth Roche**, Metro High School (Columbus) graduate who worked as a student assistant in the Department of Plant Pathology, spent this summer as a Borlaug-Ruan intern at CIMMYT in Mexico.  
Alumni of Zamorano University in Honduras, or "Zamoranos," gathered for the 1st Annual Symposium of Zamoranos in the U.S. at OARDC in Wooster, May 21, 2011. The event included over 50 students and scholars from nine Latin American countries and around the U.S. Zamorano plant pathologists included **Jorge David Salgado**, PhD student in plant pathology at Ohio State, and **Christian D. Cruz**, Ohio State alumnus (MS 2008) and currently a PhD student in plant pathology at Kansas State.  
**Spencer Debenport** traveled to Senegal and conducted demonstrations of diagnostic tests for mycotoxins and plant pathogens for students and faculty of the Université Dakar and the Université Gaston-Bergier. |
<p>| 2009 | <strong>Margaret Ellis and Alissa Kriss</strong> were the first recipients of the department's Blair F. Janson and Wilmer G. Stover Scholarship. The travel awards to Ellis and Kriss helped fund their participation in Atatürk University's international summer school program in July 2009. During their three-week visit, Ellis and Kriss also met with plant pathologist Dr. Recep Kotan (OSU Plant Pathology visiting scholar, 1998) and other faculty and students in the Department of Plant Protection. They also visited Yeditepe University in Istanbul as guests of Dr. Fikrettin Sahin (PhD OSU Plant Pathology 1997), professor and chair of the Department of Genetic and Bioengineering. |</p>
<table>
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<tr>
<th>Year</th>
<th>International Activity</th>
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<tr>
<td>2003</td>
<td><strong>Melanie Lewis Ivey</strong> (Research Associate and current Ph.D. student) traveled to the 8th International Congress of Plant Pathology in Christchurch, NZ to present her work on characterization of anthracnose (Colletotrichum acutatum) on bell peppers and pepper cultivar response to the pathogen.</td>
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<td>2002</td>
<td><strong>Melanie Lewis Ivey</strong> presented her work on the coffee wilt pathogen, <em>Fusarium xylarioides</em> at the Integrated Pest Management Conference for Sub-Saharan Africa in Kampala, Uganda.</td>
</tr>
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</table>

The Department is also committed to providing a positive learning experience for international visitors. Since 2001, we have trained 43 international postdoctoral fellows and associates, as well as more than 50 short and long-term visiting scholars, professors and scientists. Three of our visiting scholars conducted most or all of their MS or PhD thesis research in the department under “sandwich” programs with degree-granting universities abroad under the IPM CRSP.

### International Awards, Honors, and Recognition

Evidence of our accomplishments in the international arena can be seen in the many accomplishments of our faculty and alumni. A sampling of the awards, honors, and other recognitions are listed here.

**Faculty**

- Sally Miller, IPM Excellence Award, 2009 (co-awardee as member of IPM Collaborative Research Support Program)
- Larry Madden, Fisher Lecturer, Rothamsted Research, England (March 31, 2008)
- Larry Madden, Jakob Eriksson Prize and Gold Medal from the Swedish Academy of Science, 2008
- Sally Miller, Director, APS Office of International Programs Board, 2007-present
- Sally Miller, Gamma Sigma Delta International Award of Merit, 2007
- Guo-Liang Wang, FuRong Scholar, Hunan Agricultural University, China, 2004-09
- Guo-Liang Wang, Adjunct Professor, Hunan Agricultural University, China, 2002-present
- Sally Miller, The American Phytopathological Society International Service Award, 2002
- Sally Miller, Philippines Department of Agriculture Bureau of Agricultural Research Director’s Award 2001

**International Alumni**

- Adipala Ekwamu (PhD 1992, advisor Pat Lipps, emeritus professor), founder and regional coordinator of the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) based in Uganda, was selected as one of "100 BUCKEYES You Should Know" by The Ohio State University Alumni Association in 2011. Ekwamu was honored for his leadership in establishing innovative agricultural research and education programs in sub-
Saharan Africa.
Adipala Ekwamu, OSU College of Food, Agricultural, and Environmental Sciences International Alumni Award, 2010.
Fikrettin Sahin, Chair of the Department of Genetics and Bioengineering, Yeditepe University, Istanbul, Turkey (Ph.D. 1997, advisor Sally Miller), OSU College of Food, Agricultural, and Environmental Sciences International Alumni Award, 2007. Sahin is also the recipient of the Distinguished Scientist Award, Department of Plant Pathology, Ataturk University (2003); Distinguished Young Scientist Award, The Turkish Academy of Sciences (2004); and the Junior Science Award, The Scientific and Technological Research Council of Turkey (2005).

Placement of several of our international postdoctoral scientists and international scholars is provided in Supplemental Table T-I, Selected Highlights, Postdoctoral Scientists and Visiting Scholars.

### Selected Publications from International Projects

A listing of all the journal articles from our department since 2006 are given in APPENDIX B. However, it is instructive here to list papers over the last decade or so that are the outcome of international projects. These papers show the breadth and depth of our international work.


## Conclusion

Our department greatly values research and development in the global arena. Our self-study indicates that we are very successful in our international efforts.
The Department of Plant Pathology at The Ohio State University is divided between two very different locations about 90 miles apart, each with differing facilities, equipment and needs. In Columbus, the department is located on the main campus of a major research university situated within a metropolitan area of over 1 million people. Research and teaching space is located in Kottman Hall (below left), a building that dates to the early 1980s. Space there is shared with three larger units, the Department of Horticulture & Crop Sciences (HCS), the School of Environment and Natural Resources (SENR), and the Section of Communications and Technology (a service department for the college). Field research space at Columbus is located on nearby Waterman Agriculture and Natural Resources Laboratory.

In Wooster, the department is located on a modern research campus of about 2,000 acres in a rural setting. The Wooster campus is the administrative home of the Ohio Agricultural Research and Development Center (OARDC). Plant Pathology occupies Selby Hall, a building designed by plant pathology faculty in the late 1960s and built in 1971 (above right). The only other unit formally based in Selby Hall is the Molecular and Cellular Imaging Center (MCIC), a college-wide service facility that is heavily used in support of Plant Pathology (and many other) research programs. Three USDA-ARS scientists with adjunct faculty appointments in Plant Pathology have office and lab space in the building (Redinbaugh, Stewart, Krause). Field research facilities at Wooster are extensive and close to Selby Hall. The department traditionally has shared the nearby Snyder Research Farm with the Department of Entomology. Major changes have been recently initiated regarding the research-farm operations in Wooster, which are described below.

An extensive set of Outlying Agricultural Research Stations, operated under the auspices of OARDC, are located around the state. Facilities, equipment and research land at each of these branches vary widely. Each is staffed by a branch manager and (full and/or part-time) assistants. Research at outlying stations is arranged by the faculty in consultation with each manager. All
faculty have open access to use of facilities at any location, pending availability. There is not necessarily a standard charge for specific operations, but faculty usually contribute soft money to help maintain operations or purchase equipment at the stations they use most frequently.

Vehicles for conduct of research programs are provided by the OARDC. The motor pool is based in Wooster, although a small number of pool vehicles are available in Columbus. In Columbus, the university also operates a motor pool. Moreover, individual faculty often purchase vehicles with soft monies, and these are considered part of the inventory of the OARDC motor pool. Mileage charges are imposed for use of the vehicles (and also daily rental fees for longer term use). While in the past, travel between Wooster and Columbus was exempt from mileage or rental charges for OARDC motor-pool vehicles, more recently, a uniform mileage-charge system was invoked that applies to all travel with OARDC vehicles regardless of destination. There are no hard-money funds in the department to cover travel within the state or across state lines. Travel between Wooster and Columbus, in terms of time and cost, has a major influence on all programs in the department.

Columbus Campus

Laboratory Space

All Columbus-based faculty have office and laboratory space in Kottman Hall, primarily on the third or fourth floor. Four faculty laboratories on the fourth floor are standard size (approximately 700 sq ft). There is also a somewhat smaller faculty lab with an adjoining prep room and another even smaller lab being used by a research scientist. There are two labs on the third floor, of 437 and 560 sq ft. The third-floor labs are part of a wing of molecular biology laboratories, which allows ready sharing of molecular biology related resources. There is also a lab on the second floor that has been used for the turf pathology program for several years; this is part of a suite of rooms, including offices and a student-oriented social-gathering space. M. Boehm continues to maintain research in this second floor lab, and the facility is also being used by T. Niblack’s program.

There are three common equipment labs, including two on the fourth floor and one on the third floor. The third floor common lab is shared by the Department of Horticulture and Crop Science (HCS) as part of the molecular biology suite. The common labs on the fourth floor include a walk-in cold room, common equipment and spill-over space for programmatic incubators, freezers, etc. On the fourth floor, there is also a small “eat and meet” room used for lab meetings, socializing, and as a space for all personnel to have meals. Finally, there is a standard sized laboratory on the fourth floor that is being used by “MCIC South,” a unit of OARDC MCIC recently established in Columbus. This houses additional common molecular biology, chromatography and imaging equipment.

Overall, laboratory space is adequate in Columbus. We foresee no immediate problems in having adequate laboratory space as current vacant positions are replaced. If we reach the full contingent of
faculty members we have had in the past, however, we would lack space if some larger programs
needed additional room. However, Kottman Hall has major problems with heating and cooling, and
there is a need for an overall renovation.

Faculty in Columbus also have access to BSL-3 laboratory facilities on campus, on a fee basis (not
part of our college). One of our faculty members uses the containment facilities for research projects.

Diagnostic Clinic and Ohio Department of Agriculture Facilities
The C. Wayne Ellett Plant Pest and Diagnostic Clinic (PPDC) traditionally has operated in lab and
office space on the 1st floor of Kottman Hall in Columbus. However, to increase cooperation with
the plant diagnostic efforts at the Ohio Department of Agriculture (ODA), the PPDC moved to new
lab and office facilities at the ODA Headquarters at Reynoldsburg (30 miles east of the Columbus
campus). The PPDC occupies part of a 3000-sq ft lab/office complex at the Division of Plant Health;
the new facilities are state of the art for diagnostic (and other) laboratory work. The former clinic in
Kottman Hall is still used for diagnostic work (primarily turfgrasses) and some classes, but the
department is currently trying to decide how to utilize this “Clinic” space. More details on the
Clinic are given in the OUTREACH AND ENGAGEMENT section.

Through a collaboration with ODA, members of our department have opportunities to utilize
other laboratory space, office, and growth-chamber facilities at the ODA Reynoldsburg
facility. Currently, Thomas Mitchell is using space at Reynoldsburg for bioenergy research.

Teaching Space
Most Plant Pathology courses are taught in the two laboratory classrooms on the 4th floor of Kottman
Hall. These rooms are used for classes during the normal (8-5) time slots, and also sometimes in the
evenings. The department has complete schedule control of these two teaching rooms. For
larger undergraduate courses or lecture courses for non-majors (General Plant Pathology,
Bioterrorism, Societal Issues), we utilize lecture rooms under the scheduling control of the college or
university, and compete for space. For some courses, including seminar, we utilize the CFAES
supported and staffed videolinked classrooms (244 Kottman/Columbus and 121 Fisher/Wooster),
although we must compete with other departments for the space. The teaching facilities are generally
sufficient for all of our courses at this time. However, we could not afford to lose any of these rooms
if our curriculum and course content continues to grow.

Most graduate-level courses in Plant Pathology are taught through the videolink facilities on
the Columbus and Wooster campuses. At a minimum, the lecture-recitation-discussion parts of the
courses are completely taught this way; and for courses without labs, the entire course is usually
taught in this manner. One of the fourth-floor teaching labs and the second-floor conference room
have complete videolink facilities, purchased by the department, or with a cost-sharing program
between the department and the college. As described above, we also use the college video classroom for courses (Teaching space in Wooster is described below). Additional information on the videolinked teaching facilities is given in the EDUCATIONAL PROGRAMS AND STUDENTS section.

Although teaching labs are sufficient, we have inadequate storage for equipment and supplies, and a shortage of greenhouse and phytotron space to support the teaching program. Maintenance of teaching equipment, including videoconferencing equipment, is a continuing challenge.

Office and Meeting Space

Individual office space is available for all faculty, research scientists, and senior staff members. Other members of the department (students, post-docs and technicians) usually share office space. We have strived to have one programmatic desk (in a shared office) per faculty that can be used for a technician, post-doc or visiting scientist. Graduate students have priority on the remaining office space. In the long run, however, we have had a shortage of regular office space for graduate students and post-docs. To make ends meet, we have accommodated student office needs to some extent using kiosks in a large office on the fourth floor of Kottman, but additional space would be of great benefit, especially as new faculty are hired.

The suite in 201 Kottman has office space for the department chair, two office associates, and a reception desk (staffed by a temporary student worker, as needed). This suite also has a conference room that is heavily used for committee meetings, teaching, and other events. It has new video conferencing capabilities. The second floor of Kottman also has a suite of offices (associated with the one second floor lab) that is used for turf pathology staff, the academic coordinator, and lecturers. This area also has casual meeting space for students and student activities.

Equipment

Common equipment in Columbus has been a constant challenge. We have relied very heavily on the annual OARDC Equipment Competition for the acquisition of new equipment and repair of existing equipment. The use of this fund is always highly matched by faculty contributions. The OARDC Equipment Competition has been highly beneficial and its maintenance is essential to our operations. However, several major needs still remain, including the replacement of a very old HPLC and additional -80 freezer space.

In addition, there are several important equipment concerns common to Kottman Hall. While Kottman Hall had a central source of distilled/deionized water, this resource became non-functional many years ago. Installation of some type of system is badly needed to support research in all three departments housed there.
Plant Growth Facilities

All plant growth facilities (growth chambers and greenhouse space) and the headhouse area have recently come under the management of the Department of Plant Pathology and a newly hired facilities manager. This has immensely improved operations of the growth facilities and minor repairs and maintenance are handled by user fees. While the quality of day-to-day operations has thus greatly improved, we are still in need of additional plant-growth facility resources, and renovation of the current facilities. The total space is inadequate, especially for our expanding programs, and control of the environment in chambers or rooms is poor. For instance, many of the growth chambers located in the Kottman Hall headhouse need to be repaired or replaced. While greenhouse space in Kottman Hall was expanded somewhat by an NSF facilities grant in the early 1990’s, it is barely adequate for existing programs and will not be adequate for our department with the addition of Dr. Niblack and the anticipated filling of other faculty positions.

Field Research Facilities (Waterman Farm)

The Waterman Agriculture and Natural Resources Laboratory is a 288-acre multidisciplinary research and education facility under the college auspices located only several blocks from the OSU main campus. About 80% of the area is devoted to crop and pasture land supporting research in horticulture, agronomy and dairy science and a woodlot used by Natural Resources. The remainder is a very modern turf research and education center with a new field laboratory and excellent equipment. The field-based faculty in Columbus have traditionally been heavy users of this facility. The current faculty have less-extensive field programs, although we heavily use the turf center and we anticipate that Dr. Niblack and future hires will have considerable needs for this facility in the future. There is always a concern that the university could see some of this property because of high land value in this area, and we are grateful that the university has resisted this in order to help meet our research needs.

Staffing and Office Support for Kottman Hall (Columbus)

Two office associates are housed in the front office of the department in Columbus. The academic coordinator and a lecturer who supports many parts of the teaching program are also housed in Columbus. These individuals are described in the section, General Office Staffing.

Until 2010, departmental personnel support for general operations in the greenhouse, headhouse, and phytotron in Columbus were generally lacking. The loss of a full-time employee several years ago and budget cuts prevented us from providing full-time support, and the limited part-time support used in the interim was found to be totally inadequate. In 2010, the Department of Plant Pathology picked up the university overhead charges for the entire plant-growth facility area. We also obtained a one-time renovation fund for repair of the electrical and cooling systems, which were in abysmal condition. In addition, the department hired a full-time staff member (Justin Morse) to manage the operations in the greenhouse, headhouse, and phytotron in Columbus. As manager of this
space, this individual imposed a building-wide cost-recovery system for greenhouse and phytotron operations, which allows for day-to-day operations and minor maintenance. The general consensus is that this additional staff member has had a great positive influence on the work done in these facilities. Morse also serves as the go-to person for common equipment maintenance and is the lab safety coordinator for the department.

The only other general staff member in Columbus is for IT support. This staff member is paid 25% by our department (including the Clinic), and 75% by the Department of Horticulture and Crop Sciences (HCS). This individual (Brian Mowery) does an excellent job of providing a wide range of hardware and software support for personal computers, including lab computers, and manages the network connections in the department. The individual liaisons directly with the CFAES IT staff (CommTech). This arrangement has been very positive for the department.

**Wooster Campus**

**Laboratory Space**

Selby Hall and attached greenhouses were constructed in 1971. Laboratories (675 sq. ft. each) are available to all faculty members, with some additional general laboratories or rooms dedicated to PCR, radioisotope, and microbe-culturing or transfer work. Some of these rooms are the size of offices (114 sq. ft.). There is also general lab-support space for autoclaves, dishwashing, and related activities. Because of the size of their research programs, four faculty members currently use two labs each. Three USDA-ARS scientists with adjunct faculty appointments in Plant Pathology also use labs in Selby, as does one OSU Entomology faculty member. The Molecular and Cellular Imaging Center (MCIC) service facility for the college is located in the basement of Selby Hall. Lab space for plant pathology research is currently very tight in Selby Hall.

Selby Hall is clearly showing its age, as the wear and tear becomes more and more apparent. We are scheduled for a new roof in the next year, which will help with the current leaks. *There is a general objective with the Master Plan for the campus to renovate all the older buildings on a rotating basis; we totally support this objective. It is uncertain when such renovation would occur for Selby (given the pressing needs in recovering from a tornado in 2010). Selby Hall is also showing the effects of a change in custodial care. With previous budget cuts, the total number of custodians was cut, and a new roving building-cleaning program was initiated, where crews move through several buildings without ever spending much time in any single one. Some of the custodians are excellent, but others are more problematical, and the general appearance of the inside of the building is less than desired.*

A new BSL-3 building (“PAAR” facility) was recently completed on the Wooster campus; inspections will be occurring over the next year before it is operational. We have access to the facility, on a fee basis. This will be very useful to those who wish to work on pathogens which require this level of containment, and will allow us to compete for new biosecurity-type grants.
Teaching Space

At the time of the last external review of the department, the concept of teaching facilities in Selby Hall did not really exist. One conference room (203 Selby) has always been used for seminars and meetings, and we have used the OARDC campus classroom (121 Fisher) for videolinked seminars and a few courses with Columbus. However, to facilitate the involvement of all faculty with classroom instruction, and to benefit the graduate students based both campuses, we have invested heavily in videoconferencing equipment for several rooms, and have converted one research lab to a teaching laboratory (213 Selby). Currently, we have videolink facilities in three rooms in Selby — 104 (library), 203 (conference room), and 213 (teaching lab). In the teaching lab, we also have video equipment to digitally link microscopes between sites.

Office and Meeting Space

All Wooster faculty members have offices in Selby Hall. Standard size of an office is 114 sq. ft. Senior staff members with broad responsibilities have or share offices. Grad students and post-docs share offices. Some original offices have been converted to specialized lab facilities, such as for BSL-2 containment and for culturing plants or microbes. As programs have grown in Wooster, office space for grad students and post-docs has become very tight. We have finished renovation of several offices so that they can hold three graduate students or post-docs. The biggest challenge is to provide office space to students and post-doc on the floors where their labs are located.

Seminar and meeting rooms are available in the building, as described under Teaching space (e.g., conference room, teaching lab, library). In addition, the “Buckeye Room” on the second floor is available for meetings and social gatherings.

The front office suite (102 Selby) has space for the associate chair, an office associate, and one other office associate or departmental support person. The library is also housed in this office complex (with videolink equipment).

Equipment

As in Columbus, maintaining common equipment is challenging for the operations of the department in Wooster. Faculty members purchase required equipment for their programs, or sometimes a few faculty members pool resources to purchase shared equipment. The department may contribute to purchases (on both campuses) on a cost-share basis. Moreover, the OARDC has a new-equipment competition (across campuses) during most years, where proposals are considered for the purchasing of large “items” (such as a GC Mass Spectrometer, or a computer-controlled combine for field studies). Usually, proposals require a substantial cost share from the faculty and department. Even with a cost share, however, the department is always challenged by the high cost of major equipment, either for laboratory studies or field studies.
Greenhouses and Plant Growth Facilities

The greenhouses that are attached to Selby Hall generally provide adequate space for the research of the OSU and ARS faculty in Plant Pathology. There are four wings, with a total of 12,700 sq. ft. However, they are now 40 years old and in generally poor condition. The climate control system for the entire greenhouse complex (pad cooling) is obsolete and insensitive, and cannot be automated to meet the needs of several programs. Many experiments cannot be done in the summer months because of the high temperatures. Lighting is also inadequate. The headhouse and soil mixing room for the greenhouses are very heavily used by many programs. Soil mixing is not mechanized and requires heavy hand labor to prepare appropriate potting mixes. Storage for blended soils is inadequate.

Of the four greenhouse wings, one is newer and has been renovated to meet BSL-2 containment specifications. This wing is primarily used by the virus group (USDA-ARS and OSU). The lack of containment in the other wings has been limiting our ability to do other research with APHIS-permitted pathogens. Fortunately, rooms in an additional wing are scheduled for some renovation (concrete floors, drainage collection, etc.) to allow research on nematodes (or other soilborne pathogens) which require some level of containment. This should occur in the next 6 months. With a longer-term time horizon, we are scheduled for the construction of a new greenhouse complex in the next few years. This is part of the Master Capital Plan for the Wooster Campus, and depends on Capital Budget from the state. This construction has been delayed by other large campus-wide projects (e.g., PAAR facility) and financial difficulties with the state, but we hope to have a new and modern greenhouse facility within the next 6+ years. This is urgently needed. There is a possibility that the new facilities could be part of a wider (multi-department) state-of-the-art greenhouse operation for the campus. In particular, the new facility could be combined with those in HCS and maybe Entomology (after they have a new building).

The phytotron (growth chamber) facility is Selby Hall has been in very bad shape for several years. Many of the chambers were purchased when the building was built, and many no longer work. Several faculty purchased chambers over the years with soft monies, and even some of these are no longer functioning. Fortunately, we are now in the process of having a complete upgrade of the entire phytotron facility ($2 million), with all new chambers and central chilling system. This is funded by the state Capital Budget. We have waited several years for this, and are very excited about the new facilities. This upgrade will also include the building of an insect-vector transfer room, which will satisfy APHIS requirements for containment (BSL-2). This should be completed within a few months, and will allow us to be more competitive for grants.

Field Research Facilities (Snyder Farm)

The Department of Plant Pathology shares the 85-acre Snyder Farm field research facility on
the Wooster campus with the Department of Entomology, and Plant Pathology has taken nearly all responsibility for managing this unit for over a decade. The field, vegetable and fruit pathology research programs at Wooster make extensive use of plot land on the Snyder Farm, as do several USDA-ARS research programs. Some of our faculty in Columbus also use plots at this facility. There are no fees for the use of the field facilities at this time. Additional research with organic agricultural practices is carried out in plots at the nearby Organic Farm maintained by the OFFER (Organic Food and Farm Educational Research) program of OARDC.

There is a shortage of land at Snyder Farm for our increasing needs in research. With restrictions on crop rotations and with the need to set-aside additional land for organic production studies (long term), we are more frequently going elsewhere in the area to conduct studies. For instance, we often use land at the nearby Agricultural Technical Institute (ATI) for field-crop plots. We are hoping that the consolidation of the campus farm crews (described below) will open up new opportunities for the use OARDC land in the area. Several faculty members also conduct field studies in commercial farms in different parts of the state. On-farm research is conducted because of the study objectives (e.g., carrying out the experiment where the disease normally occurs or where the environmental or soil conditions are appropriate for the study) or because of lack of appropriate space at Snyder.

Research programs in both Plant Pathology and Entomology have been limited for many years by inadequate field laboratory facilities and machinery storage at Snyder Farm. We currently have very valuable field research equipment that is stored outside or in an insecure machinery shed. Renovation of this shed is not cost effective. The primary facility needs at Snyder Farm involve the replacement of old wood-frame machinery shed and the obsolete storage shed with a modern, all-steel building designed for machinery storage with sections designated for a heated field laboratory and an equipment maintenance workshop.

Staffing and Office Support for Selby Hall (Wooster)

There is one full-time office associate in Wooster (see description below). Traditionally, there were two office associates, but we lost one position due to budget cuts. There is a building facilities manager for Selby Hall (80% time), who handles space and equipment inventory and audits for both campuses in plant pathology (Laurel Leedy). This person also handles dishwashing and general support for many building operations in Wooster. Other staff members, primarily on soft-money funding, provide very limited general support, such as service as the building safety officer or oversight of biocontainment protocols. The Department of Plant Pathology has supported three full-time staff members on hard funding and one full-time staff member on soft money to maintain the field and greenhouse facilities and equipment, and to support field-based research at Wooster. A new Wooster-campus consolidation of all farm personnel has just been implemented (this summer) that will have a long-term effect on the operations. The department has supported this consolidation in order to facilitate better research-land utilization for the entire campus and to more efficiently manage the entire operation. Procedures are being developed at this time for the operation
of this group.

One of the challenges in operating on the Wooster campus concerns some of the purchasing policies that must be followed on both campuses. For instance, in an effort to save money, the university has designated one retail company to be the sole vendor for office supplies. However, this company does not have any retail outlets in the Wooster area, and the on-line ordering is not efficient (and is slow). This simply makes doing business more difficult than necessary.

### OARDC Outlying Research Stations

The OARDC maintains several Stations across the state. These stations provide facilities to conduct field experiments under the state's many agro-climatic conditions. Soil type, terrain, and climate characteristics of most major crop production areas in Ohio are represented by the conditions existing on the various stations.

Each station has a resident manager and full- or part-time support staff to run the operation. Space for research plots on is assigned by the manager. The manager and technical staff are available to assist in land preparation and applications of fertilizer and standard pest control procedures. Faculty members conducting research at the stations generally are responsible for plot establishment, treatment applications and data collection. Depending on the project, time available and prior arrangements, the station staff may assist in planting, harvesting, application of treatments, and monitoring of plots. There are no direct land-use charges at the stations, in general, although faculty provide considerable support to the stations in terms of supplies and (sometimes) cash to support local operations.

Faculty in Plant Pathology primarily use the following stations:

**Northwest Station (Hoytville):** The station is located in Wood County in northwest Ohio, south of Bowling Green. This area of Ohio is a major production area for wheat, corn and soybeans. The branch consists of 247 acres of Hoytville clay loam having very high clay content (60%).

**Muck Crops Station (Willard):** The 15-acre station is near Celeryville in the heart of fresh market vegetable country in north-central Ohio. The soil at this branch is almost 80% organic
matter, resulting from the drainage of swamp land in the early 20th century. The rich, black soils of Huron County, Ohio, are perfect for green, leafy vegetables and other fresh-market vegetable crops. Research is conducted on lettuce, radishes, parsley and other leaf and root crops.

North Central Vegetable Crops Station (Fremont): The rich, fertile soils of Sandusky County, in north-central Ohio, are ideal for vegetable production. This station has 105 acres of sandy loam and clay loam soils used to produce tomatoes, pickling cucumbers, cabbage, sweet corn, pumpkins and peppers. Soybeans, wheat and alfalfa are grown in rotation with the vegetable crops.

Ashtabula Grape Station (Kingsville): The station is a 30-acre research facility dedicated to improving production efficiency of grapes. The station is located in Ashtabula County (far northeast Ohio) in the grape production belt that extends along Lake Erie from Ohio through Pennsylvania and into New York. Research is conducted on juice, wine and table grape cultivars, pest management, rootstock-scion interactions, chemical growth regulators, nutrition and viticulture.

Western Station (South Charleston): The station is located in Clark County in southwest Ohio. The predominant soil types in this part of the state are Brookston silty clay loam, Crosby silt loam, Miami silt loam, and Celina silt loam. Corn and soybean are the two major crops grown in this region. The station has 428 acres that are used mostly for research on agronomic crops, with projects including variety evaluations, soil fertility, crop rotation and tillage, and insect and disease management.

The cost of travel between locations is probably the biggest challenge in using these facilities.

General Office Staffing to Support Departmental Operations (across campuses)

For many years, the department operated with a total of four office associates, but due to budget cuts, we have restructured our front-office to operate with three individuals (currently two in Columbus and one in Wooster). Ramona Powell (Administrative Associate 2) is located in Columbus and oversees the office operations and work flow for the entire department. She supervises Veronique (Niqui) Beckrum (Administrative Associate 1), also located in Columbus, and Lynn West (Office Associate) in Wooster. Powell and Beckrum work closely together on budget issues. Beckrum maintains budget information for all funding sources on a department server. She serves as the department grants manager by interacting with Office of Sponsored Programs (OSP), provides customized reports and tracks release time and cost share on OSP projects for faculty. Beckrum and West both enter purchase orders (POs and OSU eRequests), travel requests and reimbursements, procurement card reconciliations and journal entries into the university system which flow to Powell for approval.
Powell and West handle the paperwork, letters of offer, and visas for new hires and visitors. Beckrum and West enter human resources (HR) information into the university system, including position descriptions and job postings, which flow to Powell for approval. The Columbus campus is piloting a new timekeeping system, which Powell monitors. West currently enters biweekly and monthly timekeeping, which is approved by the OARDC central HR office. OARDC will adopt the new timekeeping system in December, which will change the flow. West oversees the daily operations of the Wooster front office and assists the associate chair as needed. Powell handles various department-wide issues and reports directly to, and assists, the chair and associate chair. She handles/assists with the Annual Program Review, the Promotion & Tenure Review process, the annual salary process and monitors graduate research associateship appointments and funding.

In general, we feel that three is the bare minimum number of office associates required to run the business and HR aspects of the department. The addition of new programs will severely test our ability to provide all the necessary tasks for the department. Moreover, the responsibilities for these individuals continue to increase (without additional resources) as new policies and procedures are imposed from central administration regarding HR, purchasing, reporting, and other duties.

**Conclusion**

*We have been very successful in research, education, and outreach using the available facilities and support staff. For the most part, however, we are making maximum usage of the current facilities, and the support staff are working at maximum capacity. On a routine basis, the department makes targeted investments, sometimes as a cost share, to improve facilities or to purchase major equipment. As would be expected, however, improvements in infrastructure are clearly needed for both campuses. Greenhouses on both campuses and the phytotron facility in Columbus require upgrades; general renovation of both buildings is also needed. These are the types of upgrades that require Capital Funding. Such improvements will increase our ability to obtain future funding and to be productive with ongoing projects. We are developing fund-raising plans by working with college Development officers.*
DEPARTMENTAL LEADERSHIP AND GENERAL OPERATING PROCEDURES

The department functions primarily through the work of standing and \textit{ad hoc} committees composed of faculty, staff, and students, as appropriate. Representation from both campuses on major committees is assured on most committees, by departmental policy. Standing committees include: Graduate Studies, Faculty Promotion and Tenure Review, Faculty (annual) Program Review, Academic Affairs (which now includes Undergraduate Studies), Recognitions, and Seminar. Select operational committees function separately on each campus, including those dealing with laboratory and greenhouse space, phytotron utilization, field operations, equipment maintenance, teaching supplies and equipment, and IT.

\section*{Departmental Administration}

The Chair is the administrative leader of the department and reports to the Vice President and Dean of the College of Food, Agricultural, and Environmental Sciences (CFAES). Selection of the Chair is done by the Dean, based on recommendations from the departmental faculty and the members of the administrative cabinet of CFAES.

The Chair has general administrative responsibility for all aspects of departmental programs, and represents the faculty of the department in dealing with the Dean or others in the university administration. The Chair is appointed for a term of 4 years and is eligible for reappointment after faculty evaluation and vote, and approval by the CFAES Vice President and Dean. The primary duties of the Chair are: 1) to develop and prepare, in consultation with the faculty and according to university policies, a departmental Pattern of Administration (POA, APPENDIX E), and an Appointments, Promotion and Tenure (APT, APPENDIX D) document setting forth the criteria and procedures according to which recommendations are made concerning appointments and/or dismissals, salary adjustments, promotions in rank, and matters affecting the tenure of the faculty; 2) to consult with the faculty on major policy matters; 3) to plan with the faculty and encourage a progressive and high quality program of research, teaching and Extension in conjunction with the CFAES Vice President and Dean and the CFAES Administrative Cabinet; 4) to provide appropriate supervision to faculty and staff and to evaluate faculty members and staff periodically for annual performance and to evaluate faculty members for promotion and/or tenure consideration in accordance with procedures specified in the departmental APT document; 5) to recommend to the CFAES Vice President and Dean, after consultation with department faculty, appointments, promotions, dismissals and matters affecting the tenure of the members of the department in
accordance with procedures specified in the departmental APT document; 6) to promote continuous improvement of instruction within the department; 7) to prepare, in consultation with the faculty, annual and special budget recommendations and performance reports of departmental activities for consideration by the CFAES Vice President and Dean and the CFAES Administrative Cabinet; 8) to oversee the business and HR functions of the department; and 9) to appoint, with appropriate input from the faculty, members of committees and designate chairs of standing and ad hoc committees.

The Associate Chair is located on the campus where the chair is not located (presently the Chair is located on the Columbus campus and the Associate Chair is located on the Wooster campus). This position is not a full-time administrative position, but rather an administrative appointment to a member of the faculty, in addition to other research, teaching, and/or Extension responsibilities, as defined in consultation with the Chair. The Associate Chair is appointed by the Chair after consultation with the faculty and approval by the CFAES Vice President and Dean. The term of office is 4 years, concurrent with the Chair, with option for renewal on satisfactory evaluation. The primary duties of the Associate Chair are to handle local operations on the campus on which he/she is located. Specific duties include: 1) to act as oversight administrator and facilitator for faculty, staff and students located on that campus, with regard to research, teaching and Extension functions; 2) to oversee management of departmental business and HR operations, including the operational budget for that campus, personnel issues, and facilities management on that campus; 3) when located on the Columbus campus, to oversee the academic programs of the department including classroom and curricular logistics, teaching equipment and budgets, student issues, and other activities as appropriate; and 4) to represent the chair at events when the chair is not available. The Associate Chair and Chair work as a team to facilitate efficient administration of the department at both the Wooster and Columbus locations.

### General Operating Procedures and Committees

Departmental policy and program decisions are made by the department faculty as a whole, by standing or ad hoc committees, or by the Chair and/or Associate Chair. The nature of each issue and importance of the decision to be made usually determines how it is addressed. Usually, the Department operates on the faculty-governance or consensus principle, although certain issues related to HR and personnel may require more confidential decision making involving a small number of individuals. Department governance proceeds on the rule-of-thumb that the more important the matter to be decided, the more widespread the agreement on a decision needs to be. Matters of general importance are usually dealt with first through one of the standing or ad hoc committees and then discussed in a full departmental meeting and eventually resolved by faculty consensus or vote. Matters of lesser importance or of a more specific or more immediate nature may be decided by appropriate departmental committees themselves or by the Chair and/or Associate Chair. Any item or matter of concern can be placed on the agenda of a faculty meeting.
Traditionally, the department holds a full faculty (and senior staff) meeting every two-three months during the academic year, and at other times when necessary. Periods of transition between the terms of permanent chairs have resulted (temporarily) in less frequent full faculty meetings. The regular faculty meeting locations alternate between the Columbus and Wooster campuses, or may occur at an intermediate location (e.g., Mt. Vernon). Retreats and specialized meetings are also held to address specific needs. For instance, conversion to semesters has required several special meetings during the past year. Matters brought to the faculty for a vote will be decided by a majority vote of the voting faculty present, provided a quorum is in attendance (but note that promotion and tenure votes and selection of new faculty require a super-majority (2/3) for a positive recommendation). Senior staff members with leadership roles in the department (such as program specialists in Extension and the Academic Coordinator) are expected to participate in these departmental meetings. Additional representatives of the staff and graduate students are selected by each of these groups and invited to participate in the faculty meetings. Staff and student representatives can submit agenda items, fully participate in the meeting, and present staff and student issues for faculty consideration, but do not have voting privileges. Minutes of faculty meetings are taken, prepared and distributed to all members of the faculty following the meeting.

The Department of Plant Pathology has a longstanding tradition of conducting two types of annual peer reviews of faculty performance, each with a unique and specific purpose. The Annual Promotion and Tenure Review is held each June by the Departmental Promotion and Tenure (DPT) Committee, which consists of three tenured full Professors elected by the faculty and the department Chair (ex officio, nonvoting). (Traditionally, there were four full Professors, but because of downsizing, we are currently working with three). In June, the DPT committee meets individually with each member of the department faculty to obtain his/her views on the progress towards promotion and tenure of each promotion-and-tenure-eligible member of the department faculty. A draft dossier prepared by each assistant and associate professor, prepared through OSU:pro (online database operated by Ohio State University) provides relevant data during these meetings. Following the meetings which take place over 2 days, the DPT committee makes recommendations to the Chair on faculty progress towards promotion and tenure. The APT document describes the many additional steps in the promotion and tenure process within the department; more information is given in the Mentoring sub-section of the FACULTY section. The entire process is heavily faculty driven.

The Annual Faculty Program Review is conducted during winter quarter (or very early spring quarter) by the Faculty Program Review (FPR) Committee. The FPR committee consists of five persons: the Chair and Associate Chair, and other faculty members elected by the entire faculty. The exact membership structure for the FPR committee is somewhat complicated because it involves, by definition, some members of the DPT committee. However, other members are usually assistant or associate professors; in fact, it is common for the newest member of the faculty to be elected to serve on the FPR committee. New faculty members bring valuable insight to the review process, and the work on this committee quickly educates a new faculty member on the many activities in the
department. The purpose of the Faculty Program Review is: 1) to evaluate the extent and quality of
the teaching, Extension, student advising, research, and service activities of each member of the
department faculty during the previous calendar year, 2) to engage each faculty member in a
constructive, evaluative discussion of his/her performance, and 3) to make recommendations to the
Chair regarding the content of the Chair’s annual performance report on each faculty member. The
FPR is a cornerstone for the department because it reflects the full participation of the faculty
(including new hires) in the evaluation of all programs in the department.

Many other committees are of utmost importance in the workings of the department. Two are
mentioned here, and others are described elsewhere in this document. The Graduate Studies
Committee (GSC) has oversight of all matters dealing with the graduate program, including
admissions, setting of academic standards and requirements, and assessment of student performance.
The Academic Affairs Committee has oversight of curriculum development and the assessment of
learning outcomes for courses and the entire curriculum. Recently, the AA committee has subsumed
the Undergraduate Studies Committee since there was a lot of overlap in responsibilities. The AA
committee has been especially challenged in the past year with the OSU conversion for Quarters to
Semesters (Q2S), and the recent development of learning outcomes and the assessment of outcomes.
Membership on these committees is by election; graduate students are also elected to serve on these
committees.

Conclusion

The consensus of the department is that the committees work well, and that we have an effective
governance structure. There is strong participation by faculty and, as appropriate, students and
staff. New faculty members are especially encouraged to participate in the full workings of the
department. The recent retreat confirmed that operating procedures are generally appropriate for
the functioning of our department.
The preceding pages provide a description of the Department of Plant Pathology at The Ohio State University, as of October 2011. Major issues were highlighted throughout this self-study document (usually in **bold** or in *italics*). We tried to describe: our performance or status in research, education, outreach, and international development; some of the major issues we are addressing; some of the challenges or obstacles we are facing; and several of the strategies we have for dealing with these challenges.

As stated several times, we believe that we are a leading department of plant pathology in the US. But we realize that it will take considerable effort to maintain this prominence. Perhaps our biggest challenge is maintaining a critical mass of faculty members across our two campuses in order to excel in research, teaching, outreach, and international development. We urgently need to fill two vacant faculty positions as soon as possible.

We ask that the review team consider our self-study documentation and provide feedback on our status and the direction we are going. We are not asking for evaluations of individual faculty programs. Rather, we are looking for appraisals of: 1) the department as a whole; 2) our goal of broadly covering the major disciplines or sub-disciplines in plant pathology; 3) our integration of research, teaching, outreach, and international development; 4) the extent to which we are in alignment with college and university priorities; 5) our efforts in increasing undergraduate enrollment; and 6) our efforts in developing and maintaining high-quality education programs at the graduate and undergraduate level. Suggestions for fulfilling our mission and for overall improvement are most welcome.
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A  Short CVs of Faculty and Senior staff in Plant Pathology
B  Peer-Reviewed Journal Articles Since 2006
C  Strategic Plan (2009)
D  Appointments, Promotion, and Tenure document
E  Pattern of Administration document
F  Graduate Student Handbook
G  Course Requirements
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APPENDIX A

Short CVs of Faculty and Senior Staff in Plant Pathology
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PIERLUIGI (ENRICO) BONELLO, Professor

EDUCATION
Laurea (= M.S.) 1987 The University of Padova, Italy (Forestry)
Ph.D. 1991 The University of Oxford, United Kingdom (Forest Pathology)

PROFESSIONAL EXPERIENCE
2010 - present  Professor, Department of Plant Pathology, OSU
2005-2010  Associate Professor, Dept. of Plant Pathology, OSU
2000-2005  Assistant Professor, Dept. of Plant Pathology, OSU

AREAS OF RESPONSIBILITY
My current appointment is 70% research (OARDC) and 30% teaching (OSU). My current primary research interest is in the ecological role of tree diseases. Specific aspects being investigated are the chemical ecology of tree/fungal pathogen/insect interactions, with particular attention to effects of disease on systemic changes in host chemistry that affect insect pest behavior, such as location and selection of suitable feeding and breeding substrate. Connected to this primary interest is a focus on systemic disease resistance induced in trees by fungal pathogens. Chemical, biochemical, molecular, and anatomical approaches are used to dissect these phenomena in trees. A third significant research area centers on emerging pathogens and insect pests of trees, with particular reference to the nature of tree host-invasive pest interactions that drive their ecological consequences. My current teaching responsibilities include one full course, Diseases of Forest and Shade Trees (PP610), and I co-teach (50%) Molecular Ecology of Fungi in Natural Ecosystems (PP830). I participate or have participated as a guest lecturer in several courses, e.g. Plant Disease Management (PP603), Diagnostic Field Plant Pathology (PP685), Soil Ecology (NR682), and Arboriculture (NR631). I occasionally teach independent studies (PP693). I advise graduate students both as thesis advisor and as a member of Student Advisory Committees. I also advise post-doctoral associates and undergraduate students (both OSU and non-OSU students) involved in independent study projects. Extension activities have included production of extension publications and technical reports, presenting technical sessions, and responding to practical concerns from industry, extension colleagues and the public. Service includes participation in departmental, college, and university committees, involvement in professional society activities, national and international review panels, and providing ad hoc reviews of manuscripts and grant proposals for funding agencies.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
Research
- Sudden oak death (SOD) is a serious disease of oaks caused by Phytophthora ramorum. We have identified biochemical markers of resistance in coast live oak that will help devise rational management tools.
- The emerald ash borer (EAB) is a wood-boring beetle native to Asia that was accidentally imported into the U.S. and discovered in Michigan in 2002. Since then, EAB has killed over 30 million ash trees. We have identified potential biochemical and molecular genetic markers of resistance in EAB-resistant Manchurian ash. Characterizing the mechanisms of EAB resistance is a major step toward identifying genes involved in resistance, and ultimately breeding or selecting for EAB resistance in North American ash species. This is critical for reforestation and could restore ash use as a landscape tree and in industry.
Extension

- With SOD there is a real concern that the disease might spread to the eastern hardwood forests and decimate eastern oak species that dominate those ecosystems, causing irreparable ecological harm. For several years we were the leading Midwestern lab in a US Forest Service-sponsored national survey of woodland and forest areas for the detection of *P. ramorum* in Ohio, Indiana, Illinois, Iowa, Missouri, and Wisconsin.

Interdisciplinary R&D

- Putative fungal pathogens and wood decay fungi associated with bark and ambrosia beetles involved in the SOD syndrome were identified. This will help understand the syndrome and devise better management tools. COLLABORATING AGENCY/INDIVIDUALS: Prof. David L. Wood, Division of Insect Biology, UC Berkeley.
- Putative biochemical and genetic markers of resistance and susceptibility to EAB were characterized in Manchurian, black, green, and white ash. Identification of specific traits in resistant ash might lead to the use of resistant genes in native ash species. COLLABORATING AGENCY/INDIVIDUALS: Dr. Daniel Herms, Dept. of Entomology, OARD; Dr. Don F. Cipollini, Dept. of Biological Sciences, Wright State University; Dr. Jennifer Koch, US Forest Service, Northern Research Station.

AWARDS, HONORS, SELECTED RECOGNITIONS

- 2006 Price Advising Award, for outstanding performance and lasting contribution, College of Food, Agricultural, and Environmental Sciences
- 2008 - invited to be a member of a Scientific Advisory Board for “The Mountain Pine Beetle Epidemic Project: Using Genomics of the Interacting Bark Beetles, Fungal Pathogens and Host Pine Trees to Improve Forest Ecological Risk Models” between the provinces of British Columbia and Alberta in Canada.
- 2007-8 - invited to join the Editorial Boards of *Tree Physiology* and *Physiological and Molecular Plant Pathology* and to be a senior editor for *Phytopathologia Mediterranea*.
- 2006 - invited to be part of a National Task force on invasive species to make recommendations to the central office of the research branch of the US Forest Service.

SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006

Refereed journal articles, books, and book chapters (career total = 55; since 2006 = 35)
Selected publications since 2006:


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**Extension, technical, popular articles (career total = 21; since 2006 = 11)**

### Selected recent invited presentations


- **2011.** The chemical ecology of tree / fungal pathogen / insect interactions: Mechanisms and ecological roles. Presented at Tree resistance to natural enemies - physiology, ecology and management, to International PhD course, The Southern Swedish Forest Research Centre, SLU. Alnarp, Sweden. (May 18)

- **2011.** Natural Products Workshop. Presented at VI Congreso De Ciencia Y Tecnología – ESPE 2011. ESPE Campus Politecnico. Salgonquil, Ecuador. (June 8 - 10)

- **2011.** Impacts and management of sudden oak death: The case of coast live oak in Northern California. Presented at XXI Annual Meeting of the American Phytopathological Society – Caribbean Division joint with the Southeastern Branch of the Entomological Society of America, to Invasive forest insects and diseases symposium. San Juan, Puerto Rico. (March 22)

- **2010.** Understanding mechanisms and genetic resistance to emerald ash borer and development of resistant ash. Presented at XXI USDA Interagency Research Forum on Invasive Species. Annapolis, MD. (January 14)

- **2009.** Chemical and proteomic approaches to dissecting ash resistance to EAB. Presented at XX USDA Interagency Research Forum on Invasive Species. Annapolis, MD. (January 15)

ANNE E. DORRANCE, Professor

EDUCATION
A.S. 1978 Herkimer County Community College (Biology)
B.S. 1980 College of Environmental Science and Forestry (Forest Pathology)
M.S. 1985 University of Massachusetts (Plant Pathology)
Ph.D 1995 Virginia Polytechnic Institute and State University (Plant Pathology)

PROFESSIONAL EXPERIENCE
2009 to present   Professor, OSU-OARDC
2003-09     Associate Professor, OSU-OARDC
1997-2003     Assistant Professor, OSU-OARDC
1996-97     Post Doctoral Research Associate, WSU-Mt Vernon REU
1991-95     Graduate Research Assistant, Virginia Polytechnic Institute and State Univ.
1990-91     Adjunct Instructor, Concord College, Dept. of Biology, Athens, WV
1985-89     Plant Pathologist, Vermont Dept. of Agriculture, Montpelier, VT

AREAS OF RESPONSIBILITY
Major research focus on the identification, biology, epidemiology and management of both soilborne and foliar diseases of soybeans. Current research is aimed at development of disease resistance in soybeans to *Phytophthora sojae*, *Pythium spp.* and *Fusarium graminearum*; characterization of the soilborne plant pathogen populations throughout Ohio’s diverse production systems, population assessment of *P. sojae*, mapping of both single *Rps* genes and quantitative trait loci associated with resistance to *P. sojae*; characterization of the mechanisms of partial resistance, evaluation of fungicide seed treatments for *P. sojae*, *Pythium spp.*, *F. graminearum*, *F. virguliforme*, and *Rhizoctonia* on soybean, detection and identification of *Phakopsora pachyrhizi* (soybean rust), fungicide efficacy and timing studies for *Cercospora sojina* and *Septoria glycines* and development of integrated disease management strategies for management of all soybean diseases. Extension responsibilities include development and implementation of disease management programs for field crops in Ohio with emphasis on soybeans, wheat and corn. Educational activities involve state-wide extension programming for production agriculture, intensive soybean disease short courses, development of extension literature, and extensive participation in county and state-wide educational sessions. Teaching assignments include co-responsibility for Diseases of Field Crops (PP 614); guest lectures in Management (PP603), advising graduate student, visiting scholars, summer interns and independent research projects. Service responsibilities currently include: College Crop Variety Release and Distribution Committee; Extension Field Crop Agronomy Team, NCERA-212 Soybean Diseases, NCERA-208 Soybean Rust, Chair of the Committee for APS National Soybean Rust (2009); invited participant for Soy2020; American Phytopathological Society including Senior Councilor at Large.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
1. Primarily and foremost everything from my lab has been through collaborations the first of which is with Drs. Steve St.Martin (emeritus) and Rouf Mian via development of new soybean cultivars/germplasm with high levels of disease resistance to *Phytophthora sojae*. These efforts are now continuing with the Dr. Leah McHale.
2. Developed a series of molecular markers across the region where \( Rps8 \) and \( Rps3 \) putatively maps, these are now based on sequence from BACs derived from the sources of these two resistance genes. We have defined this region to a 2.2 Mb as well as defined key rearrangements within the genome of the PI 399073, the source of \( Rps8 \) as well as the source of \( Rps3 \). Collaborators for this endeavor are Maroof (VA Tech), Graham, Shoemaker (USDA-ARS, Iowa State University) and Cregan (USDA-ARS Beltsville).

3. Through collaborations with Maroof (VA-Tech), Tyler (VBI, VA-Tech), St.Martin (OSU-HCS), Nguyen & Shannon (Univ. of MO), Mian (USDA-ARS, OSU), we have identified and confirmed a number of QTL associated with partial resistance to \( Phytophthora sojae \). In addition, several key genes, which contribute to the resistance response following infection. Our data suggest that this is a complex coordinated response involving several key defense pathways.

4. Characterized the \( Pythium \) populations and pathogens causing seedling blight/decline in Ohio corn and soybean. This is the primary work of graduate student Kirk Broders and Margaret Ellis and started as a collaboration with P. Lipps. Different \( Pythium \) spp, that are pathogenic on both corn and soybeans were insensitive to some of the more common fungicides used as seed treatments. Implications are that some of the more common seed treatments were not providing control of some \( Pythium \) populations in some fields. We have also identified and mapped resistance to the most common \( Pythium \) species.

5. Identified that \( Fusarium graminearum \) is also pathogen of soybean – also documented the spontaneous mutation of isolates to fludioxonil the most commonly used seed treatment for corn, soybean and wheat. In addition, we have identified and mapped resistance to \( F. graminearum \) in soybean.

6. Identified through a series of “on-farm” and small plot research that the use of soybean foliar fungicides are rarely economical – except when Frogeye leaf spot is present. Collaborators included Christian Cruz (graduate student) Dennis Mills, Bruce Eisley, numerous county agents and producers. As part of this research we demonstrated that \( Cercospora sojina \) can overwinter in Ohio, which as implications for primary inoculum as well as Brown spot does contribute to overall yield loss (2 to 5 bu/A).

7. Determined that soybean rust never reached detectable levels in the state via sentinel plot system – discovered frogeye leaf spot, soybean aphid, bean leaf beetles, downy mildew through this soybean check-off-USDA funded program.

**AWARDS, HONORS, RECOGNITIONS**

- American Phytopathological Society – Excellence in Extension, 2009
- American Soybean Association, Special Meritorious Award, 2008
- Team Award Soybean Rust Sentinel plots – Ohio Chapter of Epsilon Sigma Phi, 2006
- USDA, Group Honor Award for Excellence for Asian Rust Team, 2006
- Ohio Extension Agents Association Personnel Service Award, 2006
- Alumni Hall of Honor-2002, Herkimer County Community College, Herkimer, NY
- Outstanding Achievement Award – 2002, Ohio Soybean Council, Columbus, OH
- Graduate Teaching Assistant Award-1995, College of Agriculture
  Virginia Polytechnic Institute and State University, Blacksburg, VA

**SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006**

- **Refereed journal articles, book chapters (career total: 52)**


MICHAEL A. ELLIS,  Professor

EDUCATION
B.S.  1971  Eastern Illinois University (Education)
M.S.  1973  Eastern Illinois University (Botany)
Ph.D.  1976  University of Illinois (Plant Pathology)

PROFESSIONAL EXPERIENCE
1992 - present  Extension Coordinator, Dept. of Plant Pathology, The Ohio State University/OARDC, Wooster, OH.
1988 - present  Professor, Dept. of Plant Pathology, The Ohio State University/OARDC, Wooster, OH.
1983 - 1988  Associate Professor, Dept. of Plant Pathology, The Ohio State University/OARDC, Wooster, OH.
1979 - 1983  Assistant Professor, Dept. of Plant Pathology, The Ohio State University/OARDC, Wooster, OH.
1976 - 1979  Assistant Professor of Plant Pathology, Univ. of Puerto Rico, Mayaguez Campus.

AREAS OF RESPONSIBILITY
I have a 40% research, 50% extension and 10% teaching appointment. Responsibilities include the development and implementation of integrated disease management programs for all fruit crops in Ohio. Much of my research and extension activity is directed toward the development of disease control methodology using an integrated program of cultural practices, biological control and chemical control. Research is also being conducted on the epidemiology, etiology and ecology of fungal pathogens. Much of the research in epidemiology and ecology is directed toward the development of disease forecasting or advisory systems for the major fungal pathogens of fruit crops. The majority of my research is being conducted on apple, grape, strawberry and brambles. I have been extension coordinator for the department since 1992. I and Larry Madden co-coordinate the Department’s team taught course Plant Disease Management (PP603) each year; and I teach half of Diseases of Fruits and Vegetables (PP615), along with Sally Miller every other year.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
1. Development of a disease warning system for Phomopsis cane and leaf spot on grapes
The wine grape industry has become an important part of Ohio’s economy, with more than 2,200 acres of vineyards and 150 licensed wineries in the state. Phomopsis cane and leaf spot is a growing threat to wine grape production in the Midwest. Crop losses up to 30% have been reported in Ohio vineyards when weather is favorable to the disease. Myself and Larry madden have developed a web-based disease warning system that uses weather and other data to predict when conditions are favorable for the disease. Growers use the warning system to time fungicide applications, thereby improving the chance of treatment success and eliminating unnecessary sprays.
2. Detection of fungicide resistance in the apple scab fungus apple scab fungus and educating Ohio grower on how to overcome the problem

Apples are Ohio's #1 fruit crop, with a production value of over $60 million. Apple scab is a major fungus disease that must be controlled for successful commercial production. In 2004, the incidence of apple scab in Ohio began to rise, and by the following year, Ohio apple growers were facing crop losses of 25–40%. It was unclear why apple scab was escalating into an epidemic. In 2005, we conducted surveys and initiated research to study factors behind this epidemic. We determined that the apple scab fungus had developed resistance to commonly used Sterol-Inhibiting, or DMI fungicides. Once the source of the problem was identified, we initiated state wide extension programs to educate growers on new management recommendations, which primarily included using protectant fungicides instead of DMI fungicides. In 2006, the scab epidemic was successfully brought under control. Also in 2006, apple prices reached an all-time high, and if the epidemic had not been halted, growers would have faced losses of $15-20 million. The Ohio Fruit Growers Marketing Association estimates that this extension program has saved the state's apple industry $75 to $100 million dollars over the past five years (2006-2010).

3. Applied research and extension programs have made a major impact on strawberry production in Ohio

Ohio strawberry growers currently produce about 1000 acres of strawberries. Research conducted by Dr. Mike Ellis and Dr. Larry Madden on the epidemiology and control of strawberry fruit rots is internationally recognized. Research on the use of ground cover (straw mulch) for control of strawberry leather rot caused by Phytophthora cactorum showed that the mulch was as effective as currently used fungicides for control of leather. Most Ohio growers have adapted this cultural practice that has resulted in increased disease control and reduced fungicide use. Additional research conducted on Botrytis fruit rot of strawberry showed that the majority of fruit infection occurs during bloom. The results of this research resulted in growers apply fungicides for Botrytis control only during the bloom period instead of during the entire pre-harvest period, which was the standard practice. By spraying only during bloom growers were able to reduce the number of fungicide application for Botrytis control from five to two. This eliminated three unnecessary applications resulting in reduced fungicide use and increased profits for Ohio growers. The reduction of one fungicide application costing approximately $40 per acre for the fungicide alone (not counting application costs) would result in a savings to Ohio growers of $40,000. The elimination of three applications per season would result in savings (increased profits) of $120,000 in fungicide costs alone for Ohio Strawberry producers annually.

AWARDS, HONORS, RECOGNITIONS

2009 Inducted into the Ohio Grape and Wine Hall of Fame
2004 Designated Fellow of the American Phytopathological Society
2004 State Personnel Service Award for Distinguished Service from the Ohio Extension Agents Association
2000 American Phytopathological Society Award for Excellence in Extension
2000 OSU, Gamma Sigma Delta Award of Merit in Extension
1987 CIBA-Geigy Award from the American Phytopathological Society for outstanding contributions to agriculture.
SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006
Refereed journal articles, books and book chapters (career total =140) (since 2006 = 24)
Extension, technical, popular articles (career total = 462) (since 2006 = 47)


INTERNATIONAL PROGRAMS
I have worked in international programs in Columbia, Panama, Mexico, Puerto Rico, Peru, Dominican Republic, Guatemala, Brazil and the Azore Islands.

INVITED OUT-OF-STATE AND/OR INTERNATIONAL PRESENTATIONS (career total = 129) (since 2006 = 17)

FOREIGN LANGUAGE - Spanish, good speaking ability.
TERRENCE L. GRAHAM, Professor

EDUCATION
B.S.  Biochemistry, Suma cum laude, Pennsylvania State University
M.S.  Biochemistry, Purdue University
Ph.D. Biochemistry, Purdue University
Post-Doctoral  Plant Pathology, University of Wisconsin (with Luis Sequeira)

PROFESSIONAL EXPERIENCE
1977-1979  Project Leader, Host-Pathogen Project, Monsanto Company
1979-1982  Senior Research Group Leader, Stress Biochemistry Group, Monsanto Company
1982-1984  Science Fellow, Biological Control, Monsanto Company
1984-1986  Research Manager, Cellular and Molecular Biology, Monsanto Company
1986-1992  Assistant Professor, Department of Plant Pathology, Ohio State University.
1992-2002  Associate Professor, Department of Plant Pathology, Ohio State University.
1996-2000  Associate Chair, Department of Plant Pathology, Ohio State University
2000-2002  Chairman, The Ohio Plant Biotechnology Consortium
2010-2011  Interim Associate Chair, Department of Plant Pathology, Ohio State University

AREAS OF RESPONSIBILITY
Primary areas of research include the biochemical and molecular genetic mechanisms involved
in induced disease resistance in plants, with particular focus on the signaling processes which
trigger and coordinate plant cell responses. Recent research projects concern the relative roles of
pathogenesis-related (PR) protein and secondary product (phenylpropanoid) defense responses in
providing host resistance in the soybean - Phytophthora sojae interaction. In the last few years,
focus has been on the use of gene silencing strategies and the development of metabolomics
software for the integration of metabolomics, genomics and transcriptomics data. Teaching
responsibilities include Biochemistry of Plant Responses to Infection (PP 842) and team teaching
a series of lectures in Plant-Microbe Interactions (PP 602). Dr. Graham is involved in advising
graduate, undergraduate and high school students. Departmental service for 2011 included
serving as Interim Department Associate Chair, Graduate Studies Chair and membership on the
Promotion and Tenure Review Committee and Space Utilization Committee (Columbus).
College and University service included membership on the CFAES Honors Committee, Plant
Molecular Biology and Biotechnology (PMBB) Council and service as Ohio State’s
representative to the Ohio Plant Biotechnology Consortium.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
In the past 5 years, Dr. Graham has continued to refine biochemical, molecular genetic and
cellular approaches to soybean disease resistance, including new strategies for RNAi based gene
silencing and LC-MS based metabolomics.

1) Using Agrobacterium rhizogenes mediated RNAi based gene silencing, we undertook the
silencing of eight major metabolic, pathogenesis related protein (PR) and signaling genes in a
matrix of over 20 different soybean lines carrying various Rps genes for race specific resistance
to Phytophthora sojae (and various genes for partial resistance to P. sojae) against five different
races of *P. sojae*. We examined the effects of silencing each individual gene on infection, HR-mediated programmed cell death and responses to the *P. sojae* glucan elicitor at various developmental zones along the root. This very comprehensive study led to two major discoveries: (a) that the soybean isoflavone, daidzein, is required and participates in HR cell death conditioned by all alleles at the Rps1 and Rps2 loci, but not by the Rps3 or Rps7 loci, for which an isoflavone-independent HR exists, and (b) that the glucan elicitor from *P. sojae* is sufficient to elicit the isoflavone mediated HR for Rps1 and Rps2 lines. This effect of the glucan elicitor and be blocked by silencing the glucan elicitor-releasing PR-2. These findings demonstrate: a) that secondary products can be sufficient for mediating HR cell death, b) that multiple mechanisms for HR cell death exist within race-specific resistance to a single pathogen and c) that a classical PAMP, normally associated with basal resistance, can trigger race-specific HR and resistance.

2) The use of LC-MS has dramatically changed our understanding of soybean secondary product defenses. In soybean tissues treated with various defense elicitors or infected by Phytophthora or soybean rust, we were able to identify about 30 induced metabolites, many of which have never before been reported in soybean and two of which have never been reported before in any plant. Importantly, these are very abundant induced metabolites that were not detected by conventional HPLC and UV detection. Among the highlights are isoflavones (e.g., retusin and afrormosin) never before reported in soybeans and the presence of a series of prenylated forms of the known and newly discovered isoflavones. We were able to demonstrate that 3-prenyl-daidzein is approximately 10 times more toxic to *P. sojae* than the established phytoalexin, glyceollin. The dynamics of its accumulation in relation to glyceollin suggests that the newly discovered 3-prenyl daidzein may play a more important role than glyceollin as a soybean phytoalexin.

3) We are developing a pipeline of software for the generation of array-like data from liquid chromatography-mass spectrometry (LC-MS) based metabolomics that can be used to directly complement genomic, proteomic and transcriptomic analyses. This is being applied to our own and collaborative research projects in soybean, rice and Arabidopsis. So far we have developed two pipelines which both show excellent promise and are making final refinements for a user friendly version.

**AWARDS, HONORS, RECOGNITIONS**

1) Honorary Fraternities: Phi Eta Sigma, Phi Kappa Phi, Phi Lambda Upsilon (Chemistry Honorary)
2) Charles Gerth Scholarships (Biochemical Scholastic), Pennsylvania State University.
3) Evan Pugh Silver Medal (Upper 0.5% of Junior Class), Pennsylvania State University.
4) Evan Pugh Gold Medal (Upper 0.5% of Senior Class), Pennsylvania State University.
5) Summa Cum Laude Graduate of Pennsylvania State University. Class rank, 2nd in the School of Science.
6) John White Graduate Fellowship, Pennsylvania State University.
7) University Graduate Fellowship, Purdue University.
8) Public Health Service National Research Service Awards for Post-Doctoral Training in Pathology (University of Wisconsin).
9) Monsanto Achievement and Incentive Awards (3 years).
10) Monsanto Science Fellow (equivalent of Assoc. Professor in the Science Track)
11) Monsanto Senior Science Fellow (equivalent of Full Professor in the Science Track)
12) College of Food, Agricultural and Environmental Sciences, Award for Excellence in Teaching
13) The Ohio State University, Dept of Plant Pathology Research Award.

SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006


SYNERGISTIC ACTIVITIES
Graduate Students Advising: Dr. Graham was major professor for 7 Ph.D. and 3 M.S. students. He has been on the Student Advisory Committees of over 70 Ph.D. and 15 M.S. students. He has served twice as the Plant Pathology Graduate Studies Chair.
LAURENCE V. MADDEN, Distinguished Professor of Plant Protection

EDUCATION
B.S. 1975 The Pennsylvania State University (Biology)
M.S. 1977 The Pennsylvania State University (Plant Pathology)
Ph.D. 1980 The Pennsylvania State University (Plant Pathology; Stat. minor)

PROFESSIONAL EXPERIENCE
2006-07, 10-11 Interim Chair of Dept. of Plant Pathology, OSU
2007 - present Associate Chair of Dept. of Plant Pathology, OSU
1991 - present Professor, Department of Plant Pathology, OSU
  (Appointed Distinguished Professor of Plant Protection in 2008)
1986-91 Associate Professor, Dept. of Plant Pathology, OSU
1983-86 Assistant Professor, Dept. of Plant Pathology, OSU
1980-82 Senior Researcher, Dept, of Plant Pathology, Ohio State Univ. (OSU)

AREAS OF RESPONSIBILITY
Major research focuses on plant disease epidemiology, modeling, statistical analysis, and crop loss and risk assessment. Research is primarily aimed at diseases of fruit crops and wheat, with the goals of determining the influence of climate and environment on disease dynamics, and developing disease management strategies based on epidemiological theory and experimentation. Research projects include: the use of mathematical and statistical modeling to describe and understand the temporal and spatial dynamics of disease epidemics, and to forecast the risk of disease outbreaks; quantification and prediction of crop losses and toxin contamination in relation to disease intensity, pathogen density, and environment; sampling for disease incidence; and predicting the risk of invasion and persistence of introduced non-indigenous pathogens. Teaching assignments include responsibility for Epidemiology (PP 702), co-responsibility for Management (PP 603), and advising graduate students. Administrative responsibilities include serving as Associate Chair of the department.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
- Pioneered the use of many statistical and bio-mathematical approaches to: analyze, compare, and predict plant disease epidemics; characterize the spatial pattern of disease incidence, and relate spatial heterogeneity to crop, pathogen, and environmental factors. Led efforts in developing a wide range of linear and nonlinear mixed models, including meta-analytical models, for characterizing the risk of disease, yield loss, and mycotoxin contamination in relation to environment and management practices.
- In an international collaborative effort, developed coupled differential-equation models for plant viruses with insect vectors, and derived the theoretical basic reproduction number ($R_0$) for predicting invasion (establishment) and persistence of viruses and other pathogens in systems of increasing complexity.
- Through a combination of experimental and theoretical work over two decades, developed a fundamental understanding of the bio-physical mechanisms of rain-splash dispersal of plant pathogens. Demonstrated the pronounced effect of surface topography and plant canopy structure on splash dispersal, and developed models for the physical movement of propagules through a crop.
• In international collaborations, developed risk models and decision-analytical tools (based on Bayesian principles) for the prediction of plant disease outbreaks or for choosing optimum control strategies (based on predictor accuracy and the costs of incorrect decisions).

• Provide instruction in plant disease epidemiology and statistical data analysis, locally, nationally, and internationally. Written material is in the form of books, book chapters, and analytical programs distributed electronically. Oral instruction is in the form of formal classroom instruction (that is distributed to select non-OSU universities), teaching seminars, or statistics workshops delivered at APS meetings.

AWARDS, HONORS, RECOGNITIONS
• Ciba-Geigy Agricultural Achievement Award, 1989, given by American Phytopathological Society [APS])
• Distinguished Senior Research Award of Ohio Agricultural Research & Devel. Ctr. (OARDC), College of Agriculture, 1990
• Distinguished Scholar Award of The Ohio State University, 1991
• Elected Fellow of the American Association for the Advancement of Science (AAAS), 1992
• Elected Fellow of the American Phytopathological Society (APS), 1999
• Outstanding Alumnus Award, Pennsylvania State University, College of Agric. Sci., 1997
• Editor-in-Chief of international journal Phytopathology, 1991-93
• President, American Phytopathological Society (APS), 1996-97
• Ruth Allen Award for Innovative Research, American Phytopathological Society, 2003
• E.C. Stakman Award, Univ. of Minnesota, 2005
• Fisher Lecturer, Rothamsted Research, England (March 31, 2008)
• Jakob Eriksson Prize and Gold Medal from the Swedish Academy of Science, 2008

SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006
Refereed journal articles, books, and book chapters (career total = 248; since 2006 = 42)


assessing genotype-by-environment (G × E) interactions with disease severity data. *Plant Disease* 91: 891-900.


BRIAN McSPADDEN GARDENER, Associate Professor

EDUCATION
B.S. 1992 University of Illinois (Honors Biology)
Ph.D. 1998 Michigan State University (Botany)

PROFESSIONAL EXPERIENCE
2009 - present Visiting Professor and World Class University Scholar, Chonnam Nat. Univ.
2006 - present Associate Professor, Dept. of Plant Pathology, OSU
2000-2006 Assistant Professor, Dept. of Plant Pathology, OSU

AREAS OF RESPONSIBILITY
Research in the areas of microbial ecology related to pathogen suppression and biopesticide/biofertilizer development. Expertise in microbial community profiling, diversity characterization, and bacterial genomics. Applied research aimed at enhancing production efficiency of organic agricultural systems.
Teaching in the areas of phytobacteriology (PLNT PTH 600.01, 100%), plant-microbe interactions (PLNT PTH 602, 40%), biological control (PLNT PTH 830, 100%) and biopesticides (PLNT PTH 603, 10%), as well as quantitative methods (PLNT PTH 655, 100%). Laboratory training of graduate students, undergraduate interns, and other personnel. Outreach activities focus on organic farming practices, particularly those related to biological control and microbial inoculants.
Service responsibilities for the Department of Plant Pathology, the OARDC, and the University. Service outside of this institution is focused on participation within the American Phytopathological Society, USDA multistate committee W-2147, The Ohio Ecological Food and Farming Association, the BioPesticide Industry Alliance, and the American Society of Microbiology, as well as reviewing of manuscripts and grants.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
Successfully used community profiling to linked sequence to function in the soils, and identified two novel bacterial species associated with soilborne disease suppressiveness, Discovered and patented a novel, plant growth promoting symbiosis with potential for development as an algae-based biofertilizer. Developed and used marker-assisted selection to recover novel biocontrol bacteria belonging to various genera Characterized the diversity, biogeography and activities of DAPG-producing Pseudomonas spp.

AWARDS, HONORS, RECOGNITIONS
- Appointed Interim Director of the OARDC Organic Food, Farming, Education and Research program, 2011;
- World Class University Scholar and Visiting Professor, Chonnam National University, 2009;
- Invited reviewer for USDA, NSF, Agriculture Agri-food Canada, and Swiss National Research Foundation, 2006-present
SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006

Refereed journal articles, books, and book chapters (career total = 40; since 2006 = 26)


Extension, technical, popular articles, and patents (career total = 15; since 2006 = 11)


Cao, C., Vallad, G., McGrath, M., and McSpadden Gardener, B. 2010. Efficacy of Biochemical Biopesticides that may be used in Organic Farming. eXtension. Published Aug 23 online at: http://www.extension.org/article/29381

Raudales, R., Cao, C., Vallad, G., McGrath, M., and McSpadden Gardener, B. 2010. Efficacy of Microbial Biopesticides that may be used in Organic Farming. eXtension. Published Aug 25 online at: http://www.extension.org/article/29382


Invited presentations (career total = 48; since 2006 = 31)

"Changing views of biological control and plant health promotions: Implications for biopesticide development” –Kyung Hee University, Suwon, Korea, November 5, 2010

"Redefining the paradigm of biocontrol” – Annual meeting of The American Phytopathological Society, Charlotte, NC. Aug 7-11, 2010


"Discovery of new mechanisms and functionally important populations of plant associated microbes” – BK21 Project, Dong-A University, Pusan, South Korea, December 11, 2009

"Discovery of new mechanisms and functionally important populations of plant associated microbes” – Rural Development Authority, Suwon, South Korea, December 10, 2009.

"Biopesticides: Global market demands and research trends” – Korean Crop Science Society Annual meeting, Gwangju, South Korea, October 22, 2009


"Using community and species diversity data to discover novel biocontrol bacteria"- Molecular Tools for Understanding and Improving Biocontrol sponsored by the International Organization for the Biological and Integrated Control of Noxious Animals and Plants (IOBC), Interlaken Switzerland, Sept 23-25, 2008

"Biocontrol of Plant Pathogens and Plant Growth Promotion by Bacillus"- 9th International Congress of Plant Pathology (ICPP2008), Torino, Italy, August 24-29, 2008

"Defining roles and building bridges between the public and private sectors.” – BioPesticide Industry Alliance, Ottawa, ON Canada, October, 18, 2007
SALLY A. MILLER, Professor

EDUCATION
B.S.  1976  The Ohio State University  Biology
M.S.  1979  University of Wisconsin, Madison  Plant Pathology
Ph.D.  1982  University of Wisconsin, Madison  Plant Pathology

PROFESSIONAL EXPERIENCE
2003 – present  Professor, Department of Plant Pathology, The Ohio State University, Ohio Agricultural Research and Dev. Center, Wooster, OH
1997 - 2003  Assoc. Professor, Dept. of Plant Pathology, OSU-OARDC, Wooster
1991 - 1997  Asst. Professor, Dept. of Plant Pathology, OSU-OARDC, Wooster
1990 - 1991  Senior Manager, Plant Pathology, Agri-Diagnostics Associates
1986 - 1990  Manager, Plant Pathology, Agri-Diagnostics Assoc., Cinnaminson, NJ
1984 - 1986  Research Scientist II, DNA Plant Technology Corp., Cinnaminson, NJ
1982 - 1984  Research Scientist I, DNA Plant Technology Corp., Cinnaminson, NJ

AREAS OF RESPONSIBILITY
Develop sustainable strategies for disease management in organic and conventional field and greenhouse vegetable crops, detect and quantify pathogen and biocontrol agent populations through soil and plant ecosystems, determine taxonomic relationships among plant pathogens and understand the relationships of plant and human pathogens on vegetables. Develop programming for Ohio and national clientele including Extension educators and other state personnel, growers and private sector crop protection professionals on disease management for vegetable crops. Teach upper level courses on plant disease diagnostics and vegetable disease management. Coordinate cooperative international research and training programs in vegetable disease management and diagnostics.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
• Developed a novel bioluminescent strain of *Clavibacter michiganensis* subsp. *michiganensis* and elucidated the patterns of colonization of tomato plants under different environmental conditions. This knowledge has led directly to the development of recommendations for management of bacterial canker in greenhouse and field tomatoes.
• Identified the cause of a severe bacterial spot variant of tomato as *Xanthomonas gardneri* and developed management recommendations for processing tomato growers.
• Identified the cause of anthracnose of green peppers as *Colletotrichum acutatum* and developed management programs that are widely adopted throughout Ohio and the eastern half of the US.
• Organized and lead the International Plant Diagnostic Network that has significantly improved plant diagnostic capacity in 12 developing countries.
• Developed and teach plant disease diagnostics intensive laboratory courses and workshops, training hundreds of domestic and international students and professionals worldwide.

AWARDS, HONORS, RECOGNITIONS
• Elected Fellow of the American Phytopathological Society (APS), 2010
• International IPM Excellence Award, IPM CRSP team member, 2009
• Director, APS Office of International Programs, 2007 - present
• Gamma Sigma Delta International Award of Merit, 2007
• The American Phytopathological Society International Service Award, 2002
• Philippines Department of Agriculture Bureau of Agricultural Research Director’s Award 2001
• The Ohio State University Plant Pathology Department Research Award, 1999
• Named Honorary Professor, D’nepropetrovsk State Agricultural University, D’nepropetrovsk, Ukraine, 1997

SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006

Refereed journal articles, books and chapters (career total=137; since 2006=36)


Extension, Technical and Popular Articles (career total = 128; since 2006 = 53)


THOMAS K. MITCHELL, Assistant Professor

EDUCATION
B.S. 1992 The Pennsylvania State University (Plant Sciences)
M.S. 1995 Clemson University (Plant Pathology)
Ph.D. 2000 North Carolina State University (Plant Pathology)

PROFESSIONAL EXPERIENCE
2007-present  Assistant Professor
The Ohio State University, Department of Plant Pathology
2001-2007  Research Assistant Professor
North Carolina State University, Center for Integrated Fungal Research,
Department of Plant Pathology
2005-present  Adjunct Faculty
Oklahoma State University Department of Entomology and Plant Pathology
2005-2007  Adjunct Faculty
Fayetteville State University Department of Biology
1999–2001  Senior Research Scientist
North Carolina State University, Fungal Genomics Laboratory, Department of Plant Pathology

AREAS OF RESPONSIBILITY
(9-month, 70% research and 30% teaching) The goal of my program is to perform interdisciplinary basic research in fungal molecular biology in the context of molecular plant/fungal interactions. Research topics include, but not limited to, molecular mechanisms of fungal interactions with plants, functional genomics, bioinformatics, proteomics, metabolomics of fungal pathogens, and comparative and evolutionary analysis of fungal genomes. This position is to teach a graduate course in fungal biology as well as plant-fungal interactions. The position is part of the Translational Plant Sciences initiative within the Plant Molecular Biology and Biotechnology program funded by the Ohio State University’s Targeted Investment in Excellence initiative.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
1. Spent the past 1.5 years leading the conversion from quarters to semesters for the department and serving on the college conversion committee. This entailed re-constructing our 7 programs from scratch, leading the merger of 1 major with Entomology, creating a new major, developing transition plans, creating assessment metrics and reporting protocols, leading college effort for assessment reporting, and reviewing each course offered.
2. Established a high throughput genome sequencing, assembly, and annotation platform from the ground up where we have sequenced and processed 14 fungal genomes in the past 13 months with two manuscripts submitted for publication on our findings from 2 genomes.
3. Published the first ChIP-chip study of any fungus in a high impact journal and developed novel protocols. Hosted scientist from the U.S. and abroad wishing to learn our ChIP technology.
4. Since 2008, given 52 invited presentations with 21 of those being international.
5. Taught or co-taught with major responsibility, an average of 4 courses a year since 2008 and developed 4 new courses, one of which is in the final stages of approval for the General Education Curriculum. This will be the first GEC offered in Plant Pathology’s history for students outside the college.
Awards, Honors, Recognitions
2008 Faces of the Future in Mycology, American Phytopathological Society Annual Meeting

Selected scholarly contributions since 2006

Refereed journal articles, books, and book chapters (career total = 45; since 2006 =33)


Donofrio, N, M; Oh, Y; Lundy, R; Pan, H; Brown, D, E; Jeong, J, S; Coughlan, S; Mitchell, T, K; and R.A. Dean. 2006. Global gene expression during nitrogen starvation in the rice blast fungus, *Magnaporthe grisea*. *Fungal genetics and biology*. Vol. 43. : 605-614. (IF: 2.96)


Extension, technical, popular articles (career total = 1; since 2006 = 1)

Terry L. Niblack, Professor and Chair

Education
B.S. 1976 The University of Tennessee (Horticulture/Agricultural Education)
M.S. 1982 The University of Tennessee (Entomology and Plant Pathology)
Ph.D. 1985 The University of Georgia (Plant Pathology)

Professional Experience
2011-present Professor and Chair, Dept. of Plant Pathology, OSU
2001-2011 Professor, Department of Crop Sciences, University of Illinois
1995-2000 Associate Professor, Dept. of Plant Pathology, University of Missouri
1988-1994 Assistant Professor, Dept. of Plant Pathology, University of Missouri
1986-1987 Postdoctoral Research Assistant, Dept. of Plant Pathology, Iowa State Univ.

Areas of Responsibility
- Current responsibility (since August 16, 2011): chair of the Department of Plant Pathology.
- Previous research emphasis: biology, ecology, genetics, and phenotypic variability of the soybean cyst nematode; disease interactions involving plant-pathogenic nematodes; nematode parasites of biofuel crops; nematode parasites of maize.
- Previous teaching emphasis: lab and lecture courses in Plant Pathology and Nematology; mentoring undergraduates, graduate students, and postdoctoral researchers.
- Previous extension emphasis: state/regional/national programs on management of the soybean cyst nematode; diagnostic laboratory for parasitic nematodes affecting all crops; yearly assessment of soybean cultivars labeled “resistant” for levels of resistance for state/regional programs; applied field nematology research.

Highlights of Contributions in Research, Teaching or Extension
- Taught Introductory Plant Pathology 12 years at the University of Missouri and 5 years at the University of Illinois; increased enrollment by 67% and 100%, respectively, over the given time period.
- Focused extension programming at the University of Illinois on the soybean cyst nematode from 2001 to 2008 and increased awareness of the nematode and management options from 65% to over 90% among those who attended extension programs. From 2008 to 2011, the nematology extension focus has been on nematodes that parasitize corn. Funding for this focus increased 15-fold in three years.
- Led a team of nematologists, soybean geneticists, and extension specialists to create a new framework for assessment of genetic variability in the soybean cyst nematode, and continued fundamental and applied research to understand and manage such variability.

Awards, Honors, Recognitions
- Senior Editor (Features), Plant Disease, 2007-2010
- Wyffels Award for Faculty Excellence, Department of Crop Sciences, 2009
- Team Award for Excellence, College of ACES, University of Illinois, 2008
- Vice-President, President-elect, President, Society of Nematologists, 2002-2004
• United Soybean Board Outstanding Achievement Award, 2004
• Fellow of University of Missouri Institute of Instructional Technology, 1997
• Senior Editor, *Journal of Nematology*, 1996-2002
• Senior Editor, *Plant Disease*, 1995-1997
• Special Recognition Award, Southern Soybean Disease Workers, 1993.
• Distinguished Service Award (Junior), Southern Soybean Disease Workers, 1991.

**SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006**

**Refereed journal articles, books, and book chapters (career total = 78; since 2006 = 20)**


Extension, technical, popular articles (career total = 59; since 2006 = 37)

Invited presentations (career total = 46; since 2006 = 13)

“The nightmare of plant diseases associated with soybean cyst nematodes,” Symposium on Disease Complexes between Nematodes and Other Plant Pathology, American Phytopathological Society Annual Meeting, Honolulu, HI, 2011.

“Races, HG Types, biotypes, pathotypes … confused yet?” Soybean Breeders/Pathologists Workshop, St. Louis, Missouri, 2010.


“Corn nematodes in the Midwest.” Corn Belt Seed Conference, Indianapolis, Indiana, 2010.

“Unraveling the interactions among soybean cultivars, the cyst nematode *Heterodera glycines*, and the fungal pathogen *Fusarium virguliforme*, cause of sudden death syndrome of soybean”. *2nd* International Congress of Tropical Nematology, Maceio, Brazil, 2009.


“SCN Genetics and Genomics and the Real World.” University of Kentucky Department of Plant Pathology, 2008.

PIERCE A. PAUL, Assistant Professor

EDUCATION
B.S.  1997  Universidade Federal de Viçosa, Brazil (Agronomy)
M.S.  1999  Universidade Federal de Viçosa, Brazil (Plant Pathology)
Ph.D.  2003  Iowa State University (Plant Pathology; Stat. minor)

PROFESSIONAL EXPERIENCE
2006-present  Assistant Professor and Extension Specialist - The Ohio State University, College of Food, Agricultural and Environmental Sciences, Department of Plant Pathology, Wooster, OH (60% Research and 40% Extension-Outreach).
2005-2006  Research Scientist and Extension Specialist - The Ohio State University, College of Food, Agricultural and Environmental Sciences, Department of Plant Pathology, Wooster, OH.
2003-2005  Postdoctoral Researcher - The Ohio State University, College of Food, Agricultural and Environmental Sciences, Department of Plant Pathology, Wooster, OH.

AREAS OF RESPONSIBILITY
Research in the Cereal Pathology laboratory focuses mainly on the biology, resistance, epidemiology, and integrated management of diseases of wheat and corn. Current projects include: i) evaluation and development of integrated management strategies for corn and wheat diseases; ii) evaluation of factors influencing infection and mycotoxin accumulation in wheat and the relationship between disease intensity and mycotoxin contamination; iii) evaluation of the effects of fungicides on grain yield and quality in wheat and corn; iv) development, validation, and refinement of disease risk assessment models; and v) the use of statistical models to conduct quantitative synthesis of research data. Collaborative projects include: i) evaluation of fungicide application technology for wheat disease management; ii) determination of sources of variation in, and mechanisms of resistance to, mycotoxin contamination in wheat; iii) evaluation of pathogens associated with corn and soybean seedling diseases; and iv) evaluation of biological control strategies for wheat diseases. In extension, I provide leadership for corn and wheat pathology outreach activities through the development of extension education programs, authorship of extension publications, webinars processing of diseased corn and wheat samples, and assist county extension educators, crop consultants, and producers with problem situations. I do not have a formal teaching appointment, but I co-coordinate and co-teach a graduate-level course (Diseases of Field Crops, PP 614) and provide guest lectures in Plant Disease Management (PP 603) and Diagnostic Field Plant Pathology (PP 685).

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
• Coordinated multi-state research projects to evaluate the efficacy and economics of integrated management strategies for wheat diseases.
• Through a collaborative effort, conducted experiments as part of a multi-state research project to develop effective and economically sound foliar fungicide application guidelines for field corn.
• As part of a multi-state effort, contributed to the development and evaluation of risk assessment models for Fusarium head blight and deoxynivalenol in wheat.
• Through experiments, developed a better understanding of the role of rainfall in the dissemination of spores of Fusarium graminearum in wheat canopy and factors influencing late, asymptomatic F. graminearum infection and mycotoxin accumulation in wheat.
• Successfully conducted a quantitative synthesis of corn and wheat data from multi-state trials to evaluate the effects of fungicides on corn and wheat diseases and grain yield.

AWARDS, HONORS, RECOGNITIONS
• Recipient of the 2008 APS William Boright Hewitt and Maybelle Ellen Ball Hewitt Award.
SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006

Refereed Journal Articles


**SELECTED EXTENSION CONTRIBUTIONS SINCE 2006**

- A coauthor on an award-winning fact sheet: “*Gibberella Ear Rot and Mycotoxins in Corn: Sampling, Testing, and Storage*. The Ohio State University/OSUE. Factsheet AC-52-10”
- Coordinated the revisions of an award winning pocket guide: “*Corn, Soybean, Wheat, and Alfalfa Field Guide*. The Ohio State University/OSUE. Bulletin 827”.
- Coordinated the revisions of “*Improving Wheat Profits in Ohio*”, an important reference publication for wheat production in the state.
- Contributed to more than 180 electronic newsletters published in Crop Observation and Recommendation Network (C.O.R.N).
- Prepared and presented more than 80 extension talks, a few of which were given in Indiana, Michigan, and Pennsylvania.
- Contributed, as part of a national effort, to the development of extension publications on identification and management of corn and wheat diseases.

**SELECTED SERVICE CONTRIBUTIONS SINCE 2006**

- U.S. Wheat and Barley Scab Initiative, Steering Committee Member and Integrated Management Coordinated Project Chair.
- American Phytopathological Society, Member of Visionary Forum, Plant Disease Epidemiology Committee (Chair, 2007-2008), and Crop loss Assessment and Risk Evaluation Committee.
- Member of an Ad-hoc committee for the development of a wheat stem rust recovery plan.
- NCERA 184 “Management of Small Grain Diseases” Committee Member (Chair, 2007-2008).
- Editorial Survive: Associate Editor, *Plant Disease* and Ad-hoc Reviewer for 7 other journals
- Service on several department and college committees.
FENG QU, Assistant Professor

EDUCATION
B.S. 1985 Nantong Medical College, China (General Medicine)
M.S. 1988 Institute of Epidemiology and Microbiology, Chinese Academy of Preventive Medicine (Medical Microbiology)
Ph.D. 1992 Institute of Microbiology, Chinese Academy of Sciences (Plant Virology)

PROFESSIONAL EXPERIENCE
09, 2008 – present: Assistant Professor. OSU/OARDC
07, 2004 – 08, 2008: Research Associate Professor. University of Nebraska-Lincoln
07, 1999 – 06, 2004: Research Assistant Professor. Same as above
09, 1994 – 06, 1999: Postdoctoral Research Associate. Same as above
11, 1992 – 07, 1994: Associate Investigator. Institute of Genetics, Chinese Academy of Sciences

AREAS OF RESPONSIBILITY
Research: Conduct basic, applied, as well as integrated investigations of plant anti-viral defense mechanisms; and search for simple, cost-effective strategies to manage virus-related crop losses.
Teaching: Introductory Plant Virology (PP600.02); Current Topics on Molecular Virus-Plant Interactions (PP830). Participating in teaching Molecular Plant-Microbe Interactions (PP602) and Plant Disease Management (PP603).

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
1. Our research focusing on the mechanism of antiviral RNA silencing revealed antagonistic interactions between the endogenous microRNA pathway and the antiviral defense. Our findings have been published on a number of prominent journals, among them PNAS, and have been cited several hundred times.
2. We have successfully developed transgenic soybean plants that confer resistance to three different viruses with one transgene construct.
3. I have been actively engaged in training international scholars and students, especially those from Africa, helping them acquire the skills needed to solve the recurrent virus problems associated with crops in their countries. Recruited one Fulbright Scholar from Cameroon.

AWARDS, HONORS, RECOGNITIONS
- Awarded a competitive graduate fellowship from Max-Planck Society, Germany, 1989 - 1992.
- Ad hoc reviewer of about 20 journals, including Cell, PNAS, and Nature Reviews Microbiology.
SELECTED SCHOLARLY PUBLICATIONS SINCE 2006
CHRISTOPHER G. TAYLOR, Assistant Professor

EDUCATION
B.S. 1989 The Pennsylvania State University (Biochemistry)
Ph.D. 1996 North Carolina State University (Genetics; Plant Molecular Biology)

PROFESSIONAL EXPERIENCE
2009-present Assistant Professor, The Ohio State University (OH)
2001-present Principal Investigator, Donald Danforth Plant Science Center (MO)
2006-2009 Adjunct Assistant Professor, University of Missouri-St. Louis (MO)
2002-2009 Adjunct Assistant Professor, University of Missouri-Columbia (MO)
1999-2001 Program Leader, Akkadix Inc. (CA)
1996-1999 Senior Scientist, Monsanto Company (MO)
1995-1996 Postdoctoral Researcher, Monsanto Company (MO)
1989-1996 Graduate Student, North Carolina State University (NC)

AREAS OF RESPONSIBILITY
Major area of research is on root-biotic interactions primarily focused on how gene expression in roots is influenced by bacteria and plant-parasitic nematodes. Ongoing areas of research and interest include:
Gene expression analysis of root-knot nematode infested roots and nematode feeding sites using laser-capture microdissection; Examination of the role of plant amino acid transporters during nematode parasitism; Examination of the role of jasmonic acid during early nematode infestation; Identification of novel nematicidal proteins and phytochemicals for use in nematode control; Gene expression analysis of Agrobacterium rhizogenes-induced root formation and the use of disarmed A. rhizogenes for plant transformations; Functional analysis of soybean genes during the interaction between soybean roots and the nitrogen-fixing bacteria, Bradyrhizobium japonicum; And, a bridge project between the bacteria and nematode research groups, examining the colonization of plant roots by Pseudomonas spp. and their ability to defend plants from plant-parasitic nematodes. Teaching assignments include responsibility for Nematology (PP 636) and guest lectures in Plant Microbe interactions (PP 602), Plant Disease Diagnostics (PP 685) and the International Short Course in Plant Pathology. Currently advising three graduate students and several postdocs and sit on numerous Student Advisory Committees. Departmental committee assignments include Seminar, Graduate Studies Committee and Faculty Positions Priorities.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
1. Improving the insight into how nematodes influence gene expression in plant host. Using laser-capture microdissection and microarray techniques to identify genes that are regulated during nematode parasitism. Current funding is through NSF-Plant Genome Program (PI Taylor) – “Functional genomics of transfer cells” to identify genes that are involved in the mass flow of nutrients in transfer cells of seeds and of nematode-induced giant cells. Collaborative effort between OSU and UF.
2. Identify and characterize bacterial agents with potential biocontrol activity against plant-parasitic nematodes. Emphasis is on understanding the mechanism of activity. Currently have 100+ different isolates that can kill free-living and plant parasitic nematodes. Currently funded through NIFA (PI Taylor) focusing on the biocontrol activities of Pseudomonas isolates. Collaborative effort between OSU and WSU.
3. Developed a robust transgenic system that allows for the production of transgenic roots on wild-type shoots (composite plants) using *Agrobacterium rhizogenes*. Further developments of composite plant technology include the development of composite plants in wood species and creating transgenic sweet potatoes from transgenic storage roots that form on wild-type shoots. Collaborative project with NCSU. Current emphasis of this project has moved to understanding how *A. rhizogenes* induces root formation.

4. Improving the insight into how nitrogen-fixing bacteria (*Bradyrhizobium japonicum*) influence gene expression in legume host (soybean) to form nodules. Collaborative effort between DDPSC, OSU, UMC and UIUC funded by NSF-Plant Genome Program (co-PI Taylor). The composite plant system was used to produce transgenic roots on wild-type soybean plants. RNA interference and over expression constructs were used to examine the function of numerous genes induced during the nodulation process.

5. Written numerous manuscripts on how nematodes and bacteria influence gene expression in plant host. Edited a book on and written several chapters on the cell biology of nematode parasitism.

**AWARDS, HONORS, RECOGNITIONS**

**SELECTED SCHOLARLY CONTRIBUTIONS (from 2005)**


GUO-LIANG WANG, Professor

EDUCATION
B.S. 1982 Hunan Agricultural University, China (Plant Genetics)
M.S. 1985 Fujian Agricultural University, China (Plant Genetics and Breeding)
Ph.D. 1992 University of the Philippines and International Rice Research Institute (IRRI),
        Philippines (Plant Genetics and Breeding)

PROFESSIONAL EXPERIENCE
10/2008-present. Professor, Department of Plant Pathology, Ohio State University, Columbus, Ohio
8/2004-9/2008. Associate Professor, Dept of Plant Pathology, Ohio State University, Ohio
2002-present Adjunct Professor, Hunan Agricultural University, China
10/1999-8/2004. Assistant Professor, Dept of Plant Pathology, Ohio State University, Ohio
8/1996-9/99. Senior Scientist, IMA, The National University of Singapore,
8/1993-8/96 Postdoctoral Research Associate, University of California at Davis,
6/1992-8/1993 Postdoctoral Research Associate, Texas A&M University,

AREAS OF RESPONSIBILITY
My appointment is 70% Research and 30% Teaching. The main focus of my research program is to
understand the mechanism of plant-pathogen interactions and defense signal transduction leading to
the induction of disease resistance responses. Both genetic and genomic approaches are being used in
the program. We are currently using rice as a model plant to study the function of disease resistance
genes and genes involved in resistance responses to rice fungal and bacterial pathogens. In addition,
we are involved in developing functional genomics resources and tools for the plant community. I
teach two graduate-level courses: Plant Pathology 703 (Agricultural Genomics: Principles and
Applications) and Plant Pathology 830 (Current topics on disease resistance). I currently advise three
PhD students, two postdoctoral fellows, one research assistant, two visiting PhD students and two
undergraduate students. I am a SAC member for four PhD students. I participate in the activities of
the Plant Molecular Biology and Biotechnology (PMBB) Program. I am the main organizer of the
Kowlett Seminar. I am a member in several committees in PMBB, CFAES’s Agricultural Faculty
Council, Ohio State University Gateway faculty advisory board, the American Phytophathological
Society (APS) and ad hoc reviewer or panel member of national and international funding agencies
such as OADRC, OPBC, USDA and NSF and Natural Science Foundation of China. I am on the
editorial board of Rice, Journal of Plant Biology and Plant Physiology and ad hoc reviewer for
several international journals such as Nature, Plant Cell, PNAS, Plant Physiology and MPMI.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
1) Established an internationally-known research program on molecular analysis of rice and
   *Magnaporthe oryzae* interactions and plant functional genomics.
2) Obtained substantial funding from diverse sources including NSF, USDA, Rockefeller
   Foundation, DOE, USAID-IRRI, and industry. Since 2000, I have obtained $5.5 million to
   support the lab
3) Published 85 peer-reviewed journal articles and 15 book chapters since 1993. Several of them are
   published in high impact journals such as Science, Nature, PNAS, Plant Cell.
4) Trained over 20 graduate students and postdoctoral fellows since 2000. Most of them have
obtained a job in Academic or research institutions.

5) Established close and active collaborations with rice scientists in the International Agricultural Centers (IRRI and AfricaRice) and developing countries to apply research discovery to rice production

AWARDS, HONORS, RECOGNITIONS
- Editorial Board of Rice, July 2011-present
- Editorial Board of Plant Physiology, Sept. 2009-present
- W.E. Krause Director’s Award for Best Graduate Research Mentorship, 4/2009
- Co-Organizer, Rice Functional Genomics workshop, PAG, 5/2008-present
- Research Award of Merit, GammaSigma Delta, Honor Society of Agriculture/OSU, 4/2007
- Editorial Board of Plant Science, 2/2007-2/2010
- The Syngenta Award of the American Phytopathology Society, 8/2006
- OARDC Distinguished Junior Faculty Research Award, 5/2005
- Outstanding Overseas Young Scientist Award, NSF of China (6/2001)
- DuPont Young Professor Award (8/2000)

SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006

Refereed journal articles, books, and book chapters (career total = 101; since 2006 = 55)

Refereed journal articles list since 2008


mapping of the new blast resistance genes Pi47 and Pi48 in the durably resistant local rice cultivar Xiangzi 3150. *Phytopathology* 2011.


CHARLES R. KRAUSE,  Adjunct Associate Professor

EDUCATION
B.S. 1964 Ohio State University (Zoology)
M.S. 1970 Ohio State University (Entomology)
Ph.D. 1976 Ohio State University (Plant Pathology)

PROFESSIONAL EXPERIENCE
2001-Present  Research Leader, United States Department of Agriculture, Agricultural Research Service, Mid West Area, Application Technology Research Unit (USDA, ARS, MWA, ATRU), and Wooster, OH/Toledo, OH.
1990-2001       Lead Scientist, USDA, ARS, ATRU Wooster, OH.
1976-1990       Research Plant Pathologist, Nursery Crops Research Laboratory, Delaware, OH

AREAS OF RESPONSIBILITY
Research Leader of the only USDA, ARS multidisciplinary team of the United States Department of Agriculture, Agricultural Research Service that investigates improved spray application technology. The Unit also emphasizes USDA, ARS partnerships with greenhouse and nursery producers. ATRU consists of 8 scientists and engineers with a technical staff of twenty two at the University of Toledo and Ohio State University/OARDC, Wooster.

Personal research focuses on: investigating fungicide coverage using a cold field emission scanning electron microscope and energy dispersive x-ray microanalyzer to directly quantify and relate fungicide distribution to efficacy; studying phylloplane interactions between pathogens, host surface structures and fungicide coverage and nutritional studies using EBA; leading the Wooster USDA-ARS minor pesticide registration project (IR-4) for both minor food use and environmental crops.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION

AWARDS, HONORS, RECOGNITIONS
1988 - USDA, ARS National Take Pride in America Award (USDA)
1990 - IR-4 Meritorious Service Award (Rutgers University)
2005 – Norman Jay Coleman Award (American Nursery and Landscape Association)
2007-Outstanding Research Award from the Ohio Nursery and Landscape Association

SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006
Selected Journal Articles (Career Total 200)

Heping, Z., Altland, J.E., Derksen, R.C., Krause, C. R. Optimal spray application rates for ornamental nursery liner production. *HortTechnology*. Accepted for publication April 8, 2011.


MARGARET G. REDINBAUGH, Adjunct Professor

EDUCATION
M.S. 1980. Biochemistry, SUNY College of Environmental Science and Forestry.

PROFESSIONAL EXPERIENCE
2007-present Supervisory Research Plant Molecular Biologist Corn and Soybean Research & Adjunct Professor, Dept. Plant Pathology, Ohio State University.
1998-2006 Research Plant Molecular Biologist, Corn and Soybean Research & Adjunct Associate Professor, Dept. Plant Pathology, Ohio State University.
1995-1998 Research Plant Physiologist, Forage and Range Research Laboratory, Logan, UT & Adjunct Associate Professor, Utah State University.

AREAS OF RESPONSIBILITY
Major research focus is on virus diseases in maize and soybean. Research goals for the next five years include 1) identifying and characterizing emerging insect-transmitted diseases in maize and soybean; 2) determining the basis of multiple virus resistance in maize inbred lines; 3) developing genetic and genomic information on insect vectors of maize and soybean viruses; and, 4) understanding virus factors required for disease, transmission, and interactions with crops, and developing new virus-based research tools for studying gene function in cereals. Teaching activities include lectures in Plant Microbe Interactions (PP602), a lecture and laboratory in Plant Disease Diagnostics (PP685) and serving as Research Advisor for graduate students in Plant Pathology and Horticulture and Crop Sciences. Dr. Redinbaugh serves as the Research Leader for the USDA, ARS Corn and Soybean Research Unit, and as the Acting Research Leader for the USDA, ARS, Soft Wheat Quality Laboratory.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
1. Maize redness, caused by stolbur phytoplasma, produces yield losses of up to 90% yield loss in the Banat region of Serbia. In collaboration with researchers from Serbia and OSU, we established that the cixiid planthopper R. panzeri is the major vector of stolbur phytoplasma to maize in Serbia, and identified two new plant hosts of stolbur phytoplasma, johnsongrass and wheat. We demonstrated that large populations of R. panzeri carrying the MR pathogen overwinter on autumn-planted wheat and emerge to infect maize the following summer.
2. Increased disease losses caused by BPMV in soybean in the North Central U.S. are associated with higher populations of its bean leaf beetle vector. With collaborators, demonstrated differential responses of soybean germplasm to infection with Bean pod mottle virus (BPMV). We determined that resistance to insect vectors may not be useful for control of BPMV, suggesting that efforts to identify and characterize quantitative resistance to BPMV are warranted.
3. Quantitative trait loci for Maize chlorotic dwarf virus (MCDV) resistance were identified and mapped to loci on chromosomes 3 and 10 in the tropical inbred line, Oh1VI. Oh1VI is resistant to six other maize viruses, so we developed populations to investigate multiple virus resistance in
this line. A locus for resistance to viruses in the Potyviridae on maize chromosome six was associated Maize dwarf mosaic virus in 43 of 44 maize inbred lines. Virus species, virus isolate, environment and resistance gene complement were demonstrated to affect resistance to the Potyviridae. A virus resistant synthetic maize population was developed and released.

4. Characterized Maize necrotic streak virus (MNeSV), an emerging maize-infecting virus. Physical, biochemical and molecular analyses demonstrated MNeSV is a virus in the family Tombusviridae. Complete genome sequence analysis, development of infectious virus clones and analysis of viral RNAs indicated MNeSV is the first cereal-infecting tombusvirus identified. Developed serological reagents for virus diagnosis, and identified resistant maize germplasm.

5. Characterized maize-infecting rhabdoviruses and their transmission. Characterized Maize fine streak virus (MFSV), sequenced the genomes of MFSV and Maize mosaic virus, and showed that the MFSV N and P proteins localize to plant nuclei. Demonstrated MFSV infects several cereals and cool-season and grassy weeds. Established that MFSV infects and is persistently transmitted by the leafhopper Graminella nigrifrons, and determined that G. nigrifrons is not a very good vector of MFSV, with <10% of insects becoming vectors.

AWARDS HONORS AND RECOGNITIONS

- Senior Editor, Plant Disease, 2006-2010. Associate Editor, 2003-2006.
- Senior Editor, Phytopathology, 2012-2013.
- Sigma Xi, 1989-present.

SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006

Refereed journal articles, review articles and book chapters (career total = 82; since 2006 = 30)


Correa, V.R., Majerczak, D.R., Ammar E.-D., Merighi, M., Pratt, R.C., Redinbaugh, M.G., Coplin, D.L. and Hogenhout, S.A. A bacterial pathogen uses distinct type III secretion systems to alternate between host kingdoms. Bacteriology, submitted.


Stewart, L.R., Bouchard, R., Redinbaugh, M.G. and Meulia, T. Complete sequence and development of a full-length infectious clone of an Ohio isolate of Maize dwarf mosaic virus. J. Virology, submitted.
LUCY R. STEWART,  Adjunct Assistant Professor

EDUCATION
B.S.  2002  Brigham Young University (Plant Genetics and Breeding)
Ph.D.  2009  University of California, Davis (Plant Biology)

PROFESSIONAL EXPERIENCE
2010 - present  Adjunct Assistant Professor, Department of Plant Pathology, OSU
2009 - present  USDA-ARS Research Molecular Biologist, Wooster, OH

AREAS OF RESPONSIBILITY
The USDA-ARS virus group in the Corn and Soybean Research Unit has a mission to develop knowledge and tools to manage virus disease threats to corn and soybeans in the US and worldwide. Within this framework, my current research focuses on insect transmission and molecular biology of corn viruses. Understanding the interactions between viruses, vectors, and plants enhances basic understanding of plant viruses as well as specific management strategies. Current projects in the lab include completion of a minisurvey for the two major corn viruses in Ohio (MCDV and *Maize dwarf mosaic virus*, MDMV), development of data on the genetic diversity of major corn viruses, mapping the protease cleavage sites of MCDV, and mapping protein interaction domains in MCDV-encoded R78. Experiments to assess potyvirus *Wsm*1, *Wsm*2 and *Wsm*3 resistance genes for responses to the potyviruses *Sorghum mosaic virus* (SrMV) and *Johnsongrass mosaic virus* (JGMV) are also in progress. As an Adjunct Assistant Professor in the Plant Pathology department, my teaching responsibilities are minimal. I currently advise one M.S. student in the department in addition to information student advising, present seminars in the department and university settings, organize a plant virus group weekly lab meeting, and participate in department committees as requested.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
1. Graduate and post-doctoral research significantly advanced research in the *Crinivirus* model, *Lettuce infectious yellows virus* (LIYV). Viruses in the genus *Crinivirus* and family *Closteroviridae* have always been challenging for research because of their relatively large viral genomes and phloem limitation. Graduate research showed self-interaction of two unique crinivirus proteins, identified the LIYV protein responsible for an unusual plasmodesmata-associated virus cytopathology, localized crinivirus proteins including an LIYV replication enhancer, and determined the role of the C-terminus of the LIYV-encoded minor coat protein in whitefly transmission but not long-distance movement. Graduate research was also instrumental in developing and testing an agroinoculation method for LIVY that enabled *in planta* mutant testing and transmission experiments that were previously impossible or extremely difficult.

2. Current research has begun molecular characterization of *Maize chlorotic dwarf virus* (MCDV), a phloem-limited virus of corn at is broadly distributed in United States corn-growing regions. Research so far has identified virus protein interactions and revised virus distribution for the first time in several decades.

3. Trained multiple undergraduate students in laboratory research, mentoring and supervising two College of Wooster senior thesis (integrated studies) projects, one ongoing. A total of four College of Wooster undergraduate researchers have been mentored since 2009, and an additional five undergraduate, postgraduate, and high school students were mentored in research projects during graduate and postdoctoral work.
AWARDS, HONORS, RECOGNITIONS

- USDA-ARS Midwest Area Summer Intern Mentor award, 2011
- Virology committee president, American Phytopathological Society (APS), 2011
- Schroth Faces of the Future in Virology, APS, 2010
- Invited speaker for Closterovirus session, APS annual meeting, 2011 (declined; lack of funds)
- I. R. Schneider UC Davis Virology student travel award, 2008
- Student travel award, American Society for Virology (ASV), 2008
- I.E. Melhus award, APS, 2007
- Co-wrote funded USDA-NRI research grant application with Prof. Bryce W. Falk, on Crinivirus-encoded determinants of cytopathology, virus trafficking, and phloem-related biology, funded for $397500, 2007

SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006
Journal articles, reviews, and book chapters


TEA MEULIA, Research Associate Professor

EDUCATION
BS/MS, 1985 Biochemistry/Biology Un iversity of Lausanne, Switzerland

Ph.D, 1990 Virology/Cancer Genetics Swiss Institute for Experimental Cancer Research, CH

1990-94 Cancer genetics Fred Hutchinson Cancer Research Center, Seattle, WA

1995-98 Plant pathology/virology The Ohio State University, OARDC, Wooster, OH

PROFESSIONAL EXPERIENCE
2000-date Research Associate Professor in Plant Pathology and Director of the Molecular and Cellular Imaging Center (http://www.oardc.ohio-state.edu/mcic), a shared technology facility at OARDC, The Ohio State University, Wooster, Ohio.

1998-1999 Research Scientist split position in Horticulture with Dr. David Francis and Crop Sciences, and the Electron Microscopy Laboratory, OARDC, The Ohio State University, Wooster, OH.

1995-1998 Research Associate in Plant Pathology with Dr. Donald Gordon, OARDC, Ohio State University, Wooster, OH.

1990-1994 Post-doctoral associate at the Fred Hutchinson Cancer Research Center with Dr. Mark Groudine, in Seattle, WA

Other Experience and Professional Appointments:
1985-1990 Full time High School Teacher at the Liceo Pareto, Lausanne, Switzerland.
1983-1986 Teaching Assistant for genetics courses and laboratory with Prof. Walter Wahli, University of Lausanne, College of Biology, Lausanne, Switzerland.

AREAS OF RESPONSIBILITY
I oversee the operation of the MCIC core facility and I work tightly with faculty to provide core resources and develop new technologies necessary for their research. I assist faculty, students and postdocs with experimental design, execution and data analysis of new microscopy and genomics projects. I am part of several collaborative grant proposals and publications. I also train students in microscopy, help teach laboratory classes that involve technologies at the center and I am on graduate student thesis committees. The MCIC facility is also accessible to the local community and schools. We developed several training modules and provide science hands on demonstrations for local elementary, middle and high school students, and for students of the nearby Agricultural Technical Institute. Often I represent the Wooster campus molecular and genomic researchers during visits to the OARDC Wooster of Federal, State, University or Industry. Some recent visitors included The Ohio State University officials, community and industry representative and politicians: Gordon Gee (OSU president), Joseph Alutto (OSU Provost), Dave Baldwin (Ohio BioScience Consortium Coordinator), Christine Hazel (Dupont/Pioneer), Bob Brenneman (Wooster Mayor), Ron Amstutz (Ohio State Senator), James Carmicheal (County Commissioner), Ann Obrecht (County Commissioner), Scott Wiggam (County Commissioner), Jim Renacci (US congress).
HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION

I am the director of the core laboratory Molecular and Cellular Imaging Center, which was established in 2000 by expanding the old electron microscopy laboratory. Since then, I have led the efforts to secure funding for the development of the facility and collaborated with faculty on their research. All of the current equipment and technologies housed at the facility have been acquired and implemented under my tenure. We provide services in microscopy, genomics and bioinformatics (http://www.oardc.ohio-state.edu/meic). Major accomplishments include funding from NSF and then the Ohio State Thirds Frontier for the acquisition of major high throughput equipment for sequencing and genotyping. Access to these technologies increased funding opportunities for our faculty.

AWARDS, HONORS, RECOGNITIONS

SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006 (career total = 22; since 2006 = 10)


LIAN-MEI Y. GRAHAM, Research Scientist

EDUCATION
B.S. Agriculture Chemistry, National Taiwan University
Ph.D. Biochemistry, Purdue University
Post-Doctoral Pharmacology, University of Wisconsin
NIH Trainee Microbiology and Immunology, Washington University

PROFESSIONAL EXPERIENCE
1981-1985 Research Associate, Genetics and Pharmacology, Washington University
1986-1990 Research Associate, Biotechnology Center and Plant Pathology, Ohio State University
1991-1996 Senior Research Associate, Plant Pathology/OARDC, Ohio State University
1997-2005 Research Scientist, Plant Pathology, Ohio State University
2005- Senior Staff Research Scientist, Plant Pathology, Ohio State University

AREAS OF RESPONSIBILITY
Dr. Madge Graham’s major role has been to carry out research in plant host-pathogen interactions through extramural support. Since being a research scientist, she writes single PI as well as collaborative grant proposals to secure funding for various projects within that topic. She carries out the experiments in her own laboratory as an independent investigator or as part of the collaborative efforts for these projects. She presents results in various meetings and writes or co-authors papers for publication. In the process, she trains technicians and undergraduate students for hands on molecular biology techniques, and occasionally she co-advises other graduate students, techs and undergrads for the interacting labs. Dr. Madge Graham was a charter member of the campus PMBB (Plant Molecular Biology and Biotechnology) program since 1997. She also has been a member of the statewide OBPC (Ohio Plant Biotechnology Consortium) since its beginning in 2000. She has actively participated in seminars, annual symposiums and other activities (e.g. PMBB quarterly and special meetings) of these two programs, interacting with other members, students, postdocs and other scientists during and outside these events. Dr. Graham is an active member of APS, IS-MPMI and ASPB. She is frequently asked to review manuscripts and grant proposals in the molecular plant pathology area.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
- Dr. Madge Graham has been working on aspects of soybean-Phytophthora interactions since 1986. Earlier work involved defining soybean responses to pathogen wall glucan elicitor and its associated signaling events. Since being a research scientist, she initiated global defense gene expression studies in soybean using publicly available soybean and other data bases. In last five years or so, these efforts have become more focused on activation and regulation (Defense Regulons) as they relate to: 1) pathogen derived elicitors (now termed PAMP- Pathogen Associated Molecular Patterns); and 2) chemically induced cell death (as hypersensitive reaction mimicry).

- **Glucan PAMP induced defense genes.** Using Affymetrix Soybean chips, it was revealed that many soybean genes were induced upon P. sojae glucan exposure. In addition to conventional secondary metabolic and pathogenesis-related protein genes, many other novel genes were induced as well. Noteworthy, a late glyceollin (phytoalexin) biosynthetic gene was most dramatically up-regulated.
• **Cell death inducing chemicals up-regulate certain defense related genes.** We have observed that the defense activating herbicide lactofen causes localized cell death and defense gene induction in soybean. A search for natural chemicals having similar properties gave rise to several promising leads. Through collaborations, fumonisin and juglone were chosen to examine the metabolites induced with LC-MS metabolomics, and the genes up and down regulated with Next Generation RNA sequencing. Shared metabolite and gene inductions by these two chemicals were revealed. By choosing the timing of cell commitment to cell death, a couple of genes uncovered this way are particularly interesting.

• **Functional studies and validations with gene silencing.** In collaborations, RNAi gene silencing was first used to knock down conventional defense genes to access the changes in biochemical, cytological defense responses and disease phenotypes. It has been performed for a number of genes; the most interesting results are described below. A key finding was that silencing isoflavone synthase (IFS) abolished race-specific resistance in soybean for resistance conditioned by the Rps1 and Rps2 loci. Moreover, the glucan elicitor induced a similar cell death response that was abolished by silencing IFS. This was surprising because PAMPs and secondary metabolite responses were both traditionally considered to be associated with general resistance responses. With other Rps loci (Rps3 and Rps7) isoflavone mediated cell death did not occur. It is hypothesized that this PAMP triggered response has been recruited for some particular race-cultivar interactions in soybean during host-pathogen co-evolution. In the future, this approach will be used to test some newly uncovered genes from microarray and Next Gen Seq efforts.

**AWARDS, HONORS, RECOGNITIONS**

**SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006**


Subramanian S, Graham MY, Yu O, Graham TL. 2005 RNA Interference of soybean isoflavone synthase genes leads to silencing in tissue distal to the transformation site and to enhanced susceptibility to *Phytophthora sojae*. Plant Physiol. 137:1345-1353

STEPHEN O. OPIYO, Research Scientist Molecular and Cellular Imaging Center/OARDC

EDUCATION
B.S. 2000 University of Nebraska Lincoln (Agronomy)
M.S. 2003 University of Nebraska Lincoln (Agronomy; Plant Breeding and Genetics)
Ph.D. 2007 University of Nebraska Lincoln (Agronomy; Bioinformatics)

PROFESSIONAL EXPERIENCE
2010 - present Research Scientists and Manager, MCIC/OARDC, OSU
2007 - 2010 Post-doc Research Associate, University of Nebraska Lincoln, NE.

AREAS OF RESPONSIBILITY
Main research interests are pathogen effector bioinformatics and biomarker discovery of secondary compounds: Effector bioinformatics include identification of plant pathogen effectors from pathogen genomes (bacteria, fungi, oomycetes, and nematodes), and their effector targets from host genomes (Arabidopsis, soybean, rice, maize, etc.) using multivariate statistics and machine learning approaches. Biomarkers of secondary compounds (metabolites) from the hosts due to pathogens infections are also identified using multivariate statistics and machine learning approaches. Other areas of my responsibilities include managing Kottman Hall-Translational Plant Science core facility, conductive bioinformatics collaborative research, and providing bioinformatics, genomics, proteomics, metabolomics, and statistical support.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
1. Conducted collaborative research in bioinformatics and metabolomics with faculty from the departments of Plant Pathology and Horticulture and Crop Science.
2. Participated in writing grant proposals and manuscripts with faculty from the two departments.
3. Provided bioinformatics, metabolomics, genomics, proteomics, and statistical support to faculty, staff, and students from the two departments.
4. Managed and provided services for Kottman Hall-Translational Plant Science core facility.

AWARDS, HONORS, RECOGNITIONS
• International Society for Computational Biology Best Poster Winner, Detroit Michigan, 2005.
• Editorial Board Member Journal of Health and Medical Informatics, Omics Publishing Group.
• Associate Member of Food Innovation Center, The Ohio State University.
• Program Committee member of Biotechnology and Bioinformatics Symposium.
• International Society for Computational Biology member.
• Kottman Hall - Translational Plant Sciences Committee (non-voting) member.
• Reviewer of African Journal of Agricultural Research.
• Reviewer Biotechnology and Bioinformatics Symposium Proceedings.
• Reviewer of International Journal of Bioinformatics Research and Applications.
SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006


JOSEPH W. RIMELSPACH, Program Specialist

EDUCATION
B.S. 1973 The Ohio State University (Landscape Horticulture / Turfgrass)
M.S. 1980 The Ohio State University (Plant Pathology)

PROFESSIONAL EXPERIENCE
1992 - present Program Specialist - Turfgrass Pathologist, Dept. of Plant Pathology, OSU

AREAS OF RESPONSIBILITY
The position conceives, develops, and executes a comprehensive, state-wide Extension Turfgrass Pathology Program aimed at the delivery of current, science-based information on the control of turfgrass diseases and the implementation of turfgrass health management systems. Programs are designed to support the Ohio turfgrass industry, county Extension personnel, and all Ohio citizens. Decisions regarding the development, delivery, and management of the programs are made in conjunction with faculty and staff in the Departments of Plant Pathology and turfgrasses personnel in Horticulture & Crop Sciences, Entomology, and the School of Natural Resources, and with industry professionals in Ohio and elsewhere. The position is an integral part of The Ohio State University Turfgrass Plant Pathology Program and closely functions in collaboration with postdoc Dr. Orshinsky and program manager Mr. Hicks. Currently there is no faculty member in the position of turfgrass pathologist.

Major focuses are the biology, epidemiology, and management of turfgrass diseases and disorders of home lawns, commercial lawns, municipal and park turfgrass areas, athletic fields, sod farms, and golf courses. Along with the dissemination of science-based information on the control of turfgrass diseases and the implementation of turfgrass health management systems to the citizens and turfgrass industry of Ohio the following are crucial components of the position.

- Applied research is aimed to develop improved understanding of turfgrass ecosystems and the development of integrated turfgrass plant health management strategies for managing turfgrass diseases in Ohio.
- Diagnostic services are provided to the C. Wayne Ellett Plant and Pest Diagnostic Clinic (CWEPPDC) for turfgrass samples.
- Teaching includes courses: Turfgrass Disease Management and Integrated Turfgrass Pest Management.

HIGHLIGHTS OF CONTRIBUTIONS IN RESEARCH, TEACHING OR EXTENSION
1. Directly responsibilities for two pathology classes PP612 Turfgrass Disease Management and PP613 Integrated Turfgrass Health Management. There are also advising students in PP693 Individual Independent Studies.

2. Annually process 150 – 200 turfgrass and related samples. The primary focus is on turfgrass samples from commercial turf areas and homeowner samples as a secondary focus. (Sample numbers fluctuate from year to year primarily due to environmental conditions experienced during the growing season. This leads to challenges managing time and resources.)
3. Field evaluations comprised of dollar spot, brown patch, and pythium. The majority of the studies were field fungicide evaluation trials conducted at the OSU / Ohio Turfgrass Foundation (OTF) Research and Education Facility. Several tests were done off site or in growth chambers. I have assisted in research design and layout, applications, data collection and interpretation, and final reports to the collaborators. Communications with collaborators is maintained throughout the year. Support fund for applied field work in 2010 exceeded $140,000.

4. Develop and communicate information on the integration of turfgrass health management systems, diagnosing turfgrass disorders & diseases, solve problems, and the management of turfgrass by the turfgrass industry, lawn owner and user in Ohio and beyond. The key area of emphasis is the contributing to OSU turf grass web sites. Traditional vehicles to deliver extension services and products are: short courses, workshops, seminars, industry presentations, Extension publications, newsletters, trade articles, and radio/TV. Site and field diagnostic visits provided to the industry and Extension system to strategically serve the clientele and maximize input to the program in the most cost efficient manner.

5. Provide service to Internal & External Customers to professional, industry, departmental and Extension organizations, committees and public service groups to enhance the working rapport between the university and industry. Time and effort is especially focused on state Extension green industry initiatives and professional industry organizations.

AWARDS, HONORS, RECOGNITIONS

SELECTED SCHOLARLY CONTRIBUTIONS SINCE 2006
EXTENSION CONTRIBUTIONS

Bulletins:

Fact Sheets:
NEW Fact Sheet April 2010: Collecting and Submitting a Turfgrass Sample, HYG-3087-10
UPDATED April 2010  Slime Mold on Turfgrass, HYG-3074-10
UPDATED April 2010  Dollar Spot on Turfgrass, HYG-3075-10
UPDATED April 2010  Powdery Mildew on Turfgrass, HYG-3081-10
UPDATED April 2010  Summer Patch on Turfgrass, HYG-3082-10
UPDATED April 2010  Gray Leaf Spot on Turfgrass, HYG-3083-10
UPDATED April 2010  Brown Patch on Turfgrass, HYG-3084-10

Proceedings, Newsletters, Handouts, Handbooks: Internet Postings:
Proceeding


Newsletters


Handbook

Internet – Development and Postings
Spring 2010: Launched Ohio State Turfgrass Web Site

http://turfdisease.osu.edu/

Contributed posting to the following websites: (approximately 20/year)
http://buckeyeturf.osu.edu/
http://bygl.osu.edu/
http://www.ohioturfgrass.org/
http://www.ohiolawn-care.org/
Nancy J. Taylor, Program Director

Education
1973 B.S., West Virginia University, Plant Science
1974 M.S., Virginia Polytechnic Institute and State University, Plant Pathology/Plant Protection

Professional Experience
2001 - present  Program Director, Department of Plant Pathology. OSU.
1993 - 2001  Program Coordinator, Department of Plant Pathology. OSU.
1986 - 1993  Research Assistant 1/BH, Department of Plant Pathology. OSU.
1978 - 1986  Pesticide Impact Assessment Coordinator, University of Tennessee,
1974 - 1978  Plant Pathologist, State of West Virginia, Department of Agriculture.

Areas of Responsibility
Responsible for operation of OSU’s interdisciplinary C. Wayne Ellett Plant and Pest Diagnostic Clinic (CWEPPDC); provides program leadership, develops and maintains budget; supervises research assistant; coordinates diagnostic activities with faculty and staff in other departments to ensure diagnoses are accurate, scientifically sound and timely; diagnoses plant diseases and disorders and communicates results to clientele; serves as co-director of the Ohio Plant Diagnostic Network (OPDN); coordinates activities with OPDN affiliate laboratories and university collaborators and stakeholders; serves as a member of OPDN strategic planning board and oversees OPDN working groups; develops and implements OPDN training programs; manages OSU’s commitments to the mission and goals of the National Plant Diagnostic Network (NP DN) including implementation of its policies and procedures; pursues external funding opportunities; prepares reports.

Highlights of Contributions in Research, Teaching or Extension

Awards, Honors, Recognitions
N/A

Selected Scholarly Contributions Since 2006

Prepared 3,766 sample reports.

Contributed plant disease information to the Buckeye Yard and Garden Line weekly newsletter.

C. Wayne Ellett Plant and Pest Diagnostic Clinic website: http://ppdc.osu.edu
APPENDIX B

Peer-Reviewed Journal Articles Since 2006
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Peer Reviewed Journal Articles

2011


Muilenburg V.L., Phelan P.L., Bonello P. and Herms D.A. 2011. Inter- and intra-specific variation in stem phloem phenolics of paper birch (Betula papyrifera) and European white birch (Betula pendula). Journal of Chemical Ecology. (Accepted)


2010


Wu, S., Xiao, H., Cabrera A., Meulia, T., Van der Knaap, E. 2011. Expression of the tomato fruit shape gene SUN results in elongated lateral organs and fruit by changing cell division patterns. Plant Physiology. (Accepted)


2009


2008


van den Bosch, F., McRoberts, N., van den Berg, F., and Madden, L. V. 2008. The basic reproduction number of plant pathogens: Matrix approaches to complex dynamics. Phytopathology 98:239-249.


2007


APPENDIX C

Strategic Plan (2009)
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Department of Plant Pathology

STRATEGIC PLAN

2009 - 2013

plantpath.osu.edu

Submitted June 9, 2009
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DEPARTMENT OF PLANT PATHOLOGY

STRATEGIC PLAN

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Mission and Vision: Healthy Plants, Healthy Planet ......................... 2

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Business Plan ................................................................................. 28
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CFAES Signature Areas

**Food Security, Production, and Human Health** - Focused on improving agricultural production; enhancing the quality of food and feed; ensuring an adequate, affordable, and safe food supply; and maintaining agrosecurity to ensure food security and the basics of nutritional health for a growing global population.

**Environmental Quality and Sustainability** - Working to understand, protect, and remediate the environment and ecosystems to ensure long-term sustainability.

**Advanced Bioenergy and Biobased Products** - Developing biomass-based advanced energy technologies and value-added biobased products such as fuels, specialty chemicals, and fiber products.

Mission and Vision: *Healthy Plants, Healthy Planet*

Plant Pathology within the context of the global land grant university

Throughout history, plant diseases have had a major impact on society. Plant pathologists play a vital role in improving the quality and productivity of America’s food, fiber and feed because plants and plant products figure prominently in the diets and economic base of the country and the world. Not only do plant diseases cause yield losses, they also often render plants unusable and in some cases outright dangerous to human and animal health when pathogenic infection results in accumulation of toxins in plants destined for human or animal consumption. Furthermore, to keep food and feed production secure and environmentally sustainable, it is necessary to have the ability to detect, diagnose, and forecast the development and subsequent spread of diseases, and deploy appropriate counter measures, before they turn into uncontrollable epidemics. This ability provides the only conduit to establishing environmentally and economically sustainable plant disease management programs. Plant pathologists also play a vital role in protecting ornamental, landscape, and timber crops from diseases that, at the very least, cause economic damage and at worst cause environmental catastrophes, such as the virtual extinction of American chestnut. Plant pathologists serve two key areas related to the new economy: (a) protection; and (b) development of crops that will be used increasingly in the production of biofuels and advanced biomaterials. Thus, OSU’s Department of Plant Pathology is a critical component of the three signature areas of the college and university: (1) Food Security, Production, and Human Health; (2) Environmental Quality and Sustainability; and (3) Advanced Bioenergy and Biobased Products.
Mission and Vision
The mission of the Department of Plant Pathology at The Ohio State University is critical to and supports the strategic missions of the University and the College of Food, Agricultural, and Environmental Sciences. The faculty, staff and students of the Department of Plant Pathology, through their research, teaching and outreach engagement efforts directly address key facets of the three CFAES’ strategic signature areas of: (1) Food Security, Production, and Human Health; (2) Environmental Quality and Sustainability; and (3) Advanced Bioenergy and Biobased Products. Faculty within the department communicate unbiased information to citizens around the globe.

Ohio State’s Department of Plant Pathology is one of the leading departments in the country dealing with the diseases of crops, trees, ornamentals, and turfgrass and landscape plants. The department is the sole academic unit dedicated to plant health and agricultural microbiology in Ohio's Higher Education system and is one of only 16 stand-alone plant pathology departments in the U.S. Our vision is to be considered the most credible source of unbiased, science-based information in the U.S. on plant diseases and plant health management. We strive to be recognized as a leader, both nationally and internationally, for the highest quality research, educational and outreach and engagement programs on plant-microbe interactions and plant health management.

Departmental Functions
The primary functions of the Department of Plant Pathology in accomplishing our mission are:

* Conducting fundamental and mission-oriented research on plant pathogenic microorganisms, their interactions with plants and the environment in causing plant disease, and the development of new and improved methods of for ensuring plant health and productivity.

* Providing professional advanced degree programs for graduate students in plant-microbe interactions and in fundamental and applied plant pathology.

* Providing a Plant Health Management Major for undergraduate students interested in becoming plant health professionals.

* Teaching undergraduate and graduate students in allied majors and the Plant Pathology Minor about the principles of plant pathology, microbiology, and related subjects.

* Teaching non-science majors about the role of science in their lives and the importance of plant pathology to a safe food supply and a quality environment.

* Conducting high quality extension-outreach and engagement programs that support the needs of key internal and external stakeholder groups such as OSU Extension Educators, agricultural and green industry professionals, and Ohio’s citizens about economically and environmentally sound plant disease management practices.
* Providing expertise in the area of plant disease diagnostics with a focus on enhancing the nation’s ability to detect, respond and recover from a high consequence disease or pest outbreak.

* Providing expertise by participation in public service activities that support the mission of the department, the College of Food, Agricultural and Environmental Sciences and The Ohio State University.
Strategies, Actions, and Metrics

The four areas within the Department of Plant Pathology will play a key role in fulfilling our strategic plan. This section details how teaching, research, outreach, and international engagement and development will implement the strategic plan.

**ACADEMIC PROGRAMS: Enrich and Enhance Graduate and Undergraduate Education**

High Quality Training of Plant Pathologists

In this time of increasing international commerce and exploding world population, there is a growing demand for a diverse cadre of well-trained plant pathologists. The field of plant pathology provides the scientific foundation for securing a safe supply of high quality food throughout the world and managing the continuous threat of introductions of exotic, invasive plant pathogens that have the potential to destroy entire crops (e.g. soybean rust) or ecosystems (e.g. sudden oak death). However, this demand is not being met. In a white paper published in March 2006, entitled “A National Need for Broadly-Trained Plant Pathologists”, the American Phytopathological Society (APS), the world’s preeminent professional society of plant pathologists, stated that

“The practice of plant pathology has been and will continue to be crucial to our nation’s food production and safety” and made the case that “The future of plant pathology, and the health of our nation’s food, fiber and forest resources, depends upon our ability to attract outstanding graduate students to the field” (www.apsnet.org/members/ppb/PDFs/Education.pdf).

The APS position was a response to a long, steady decline in plant pathology programs across the nation, due in part to the gradual weakening of public funding for land grant universities where such programs are traditionally housed.

This document was spurred, in part, by the demands of industry, government agencies, and extension services, which find themselves facing a shortage of professionals capable of dealing with practical, day-to-day plant disease problems. While this need for broadly trained plant pathologists is keenly felt at present, in the last 10-20 years we have witnessed a strong push, in this country and around the world, to train students with very narrow research focus in part driven by a desire and necessity to understand plant pathosystems at a more fundamental level. According to a recent survey that compared the demographics of plant pathology departments at the U.S.’ 50 land grant university’s between 1975 and 2008, the number of ‘stand-alone’ plant pathology departments decreased from 31 to 16. The number of departments including the name ‘plant pathology’ went from 47 to 33 during this same time as did the number of institutions offering graduate degrees (MS or PhD) in plant pathology.

This change in emphasis has affected all departments of plant pathology. However, Ohio State’s Department of Plant Pathology rightly prides itself in having preserved an equal mix of faculty
and research programs that translates into viable and well balanced student training in areas spanning from very basic to very broad plant pathology. Indeed, our department is highly ranked nationally and internationally in terms of its capacity to meld fundamental and applied research with a strong outreach-engagement component. We are one of only a few departments in the U.S. that still offers a viable undergraduate degree program in plant pathology/plant health management. As such, we are well and strategically positioned to tackle the challenges of training the plant pathologists of the future. This is reflected in our curriculum and overall approach to teaching and advising.

Undergraduate and Graduate Classroom Teaching - With personalized attention, every student can thrive.

Our teaching, advising and training on the nature, prevention, consequences, and the management of plant diseases is of paramount importance in the building of future cadres of scientists and professionals in plant protection. These are the people that will help enhance crop yield and quality, and thus food/fiber production, human and animal health, and environmental sustainability in the future. These are also the individuals that will support new and emerging industries related to biobased products and fuels. All faculty within the department are engaged in either formal classroom teaching and/or graduate and/or undergraduate student advising in these signature areas. Many are also engaged in advising visiting scholars, many of whom are from abroad, which provides an international connection. We are also involved in training EREA- and county-based Extension Educators, certified crop consultants (CCAs), Master Gardner volunteers, 4-H participants, and industry reps, and this has a direct, positive impact on the productivity and economic viability of food and feed businesses in Ohio and the rest of the country.

Our overall approach to education has been to structure our curriculum to cover major plant pathogen groups (fungi, bacteria, nematodes, viruses), commodity groups (field crops, fruits and vegetables, turfgrass and ornamentals, and forest and shade trees), and basic disciplines (molecular biology, plant-pathogen interactions, breeding, ecology, epidemiology, disease control, social impact of plant disease, etc.). We have also begun employing non tenure track Lecturers and Instructors to help maintain and enhance our curriculum.

We have an active undergraduate program consisting of the Plant Health Management (PHM) Major and Plant Pathology Minor that incorporates this curriculum philosophy, with the goal of preparing students for careers in plant pathology and allied professions, or for entering graduate programs in plant pathology. While modest in size, our undergraduate program is known for having a high proportion of Honors students who conduct high-quality research. Currently our faculty and instructors are engaged in teaching the courses listed in Addendum A.

Graduate Program

Our current courses are well defined and represent a balance among applied and basic plant pathology. In addition, we cover specialty areas with regards to ecological aspects of plant production from the field to the greenhouse, to the forest. Thus, by and large, our graduate teaching and advising programs already address all of the areas of expertise and the three
CFAES signature areas, by virtue of being driven by the wide-ranging research that is taking part in all of our laboratories. However, we constantly strive to have a curriculum that will respond to changing dynamics in agricultural production such as bioenergy and bioproducts that have been embraced by Ohio producers. The plant pathologists of the future will be the key to producing “healthy biomass” for bioenergy and advanced bioproducts, but will also actively participate in the development of the organisms that will be used in the bio-based economy. Our department is specifically addressing the strategic area of environmental quality and sustainability in our curriculum, with courses ranging from 200- to 800-level covering: the social impacts of plant diseases and the means (particularly pesticides) to control them; the multifaceted benefits of deploying integrated pest management (IPM) and organic farming approaches; plant disease diagnosis and pathogen detection including the specter of plant disease-centered bioterrorism; the ecology and epidemiology of plant diseases; the impact of plant diseases in natural and man-made forest ecosystems.

In the Graduate School's "Doctoral Program Assessment and Plan", the Plant Pathology graduate program received a rating of "GOOD." As stated in this document, "The college report notes that Plant Pathology has a top ranking in the nation. The department appears to have a clear and publicly articulated sense of its research areas, and the college report acknowledges the successful student research that has been conducted and recognized nationally". The report also notes, as does the Graduate School, the low GRE verbal scores and number of petitions to the Graduate School for admissions with a low GPA from the doctoral program in Plant Pathology. In response to these limitations, we have implemented a plan, which was approved by the College, to enhance the quality of our Ph.D. program from good to "HIGH QUALITY" (Addendum B). This plan is reviewed annually to ensure that it remains on target.

Of particular note for the graduate program, several faculty in the department were instrumental in the preparation of the Translational Plant Sciences (TPS) proposal that was funded by the University and the Board of Regents as a Targeted Investment in Excellence (TIE) initiative. The TPS program, now in its third year, is key in applying some of the plant pathological knowledge generated in our program to the bio-based economy of the future. Funding obtained through this program was used to hire the first TPS faculty position, which is located in our department. This person is active in teaching and advising in areas pertaining to TPS. Furthermore, some of our faculty were also centrally involved in the planning and implementation of the new Excellence in Plant Molecular Biology and Biotechnology (PMBB) Graduate Fellowships program (http://pmbb.osu.edu/pmbb_gradstudy_(excellence_in_PMBB).php). This program is a natural offshoot of the TPS TIE initiative and is already resulting in the recruitment of high caliber graduate students to our department.

**Undergraduate Advising/Internship Programs**

Keeping in mind the national need to attract and train new professionals in the field of Plant Pathology, our Department has developed several opportunities to engage talented undergraduates in research scholarship.

In 2003, our department instituted a 10-wk long Summer Research Internship in Plant Pathology (SRIPP) program (http://plantpath.osu.edu/internship/). The SRIPP program was designed to
provide undergraduate students with an opportunity to learn fundamental concepts and develop skills for conducting independent research through in-depth investigations in the field of plant pathology. Interns work closely with our faculty, post-docs and graduate students to identify and develop an independent research experience. In this way, interns develop an appreciation of plant pathology and the societal impacts of plant disease, and often end up applying to graduate school. Internships have been excellent recruiting and training tools for our own graduate program, but have also been a resounding success in general. In the five years since its inception, SRIPP has attracted and trained 49 students – 7 of which were African American. Addendum C shows that 24 of those students have gone on to graduate school, with 15 interns going directly into plant science graduate programs. Significantly, our interns have produced, or contributed to, 15 peer-reviewed publications.

Our department is also an active participant in other internship programs, through which undergraduates from around the country (and in some cases from abroad) have been exposed to our discipline: the OARDC Summer Research Internships (ORIP) (http://www.oardc.ohio-state.edu/orip/secondary.asp?id=221) (which targets high school students); the Summer Research Opportunities Program (SROP) (http://gradsch.osu.edu/Content.aspx?Content=72), which specifically helps underrepresented students explore opportunities for graduate study and academic careers; and the Summer Undergraduate Research Experience (SURE) program in the Plant Molecular Biology and Biotechnology (PMBB) program (http://pmbb.osu.edu/pmbb_undergrad_sure.htm). The SURE is an integral part of the TPS TIE. Lastly, many students also become interns in our department as part of NSF’s Research Experience for Undergraduates (REU) program that is often attached to regular NSF research grants.

**Strategic Goals Related to Academic Programs**

The planned development of our teaching and advising program over the next five years (2009-2013) can be summarized by the following objectives:

**Strategy 1:** Drive to the next level of excellence in teaching and advising by obtaining more extramural funding and attracting high quality students;

**Strategy 2:** Adapt to changing societal demands for broadly trained cadres of plant pathologists; and

**Strategy 3:** Advance teaching and advising in the three CFAES signature areas, especially in the areas of bioenergy and bioproducts.

**Strategy 1:** Drive to the next level of excellence in teaching and advising by obtaining more extramural funding and attracting high quality students
**Action Steps**

Although there is no formal ranking structure for departments of plant pathology, Ohio State’s Department is generally considered to be among the top five plant pathology programs in the country (with similar programs at Cornell University, University of Wisconsin, U.C. Davis, North Carolina State University, and the Pennsylvania State University). We will strive to maintain our current level of excellence and advance the quality of instruction over the next five years by:

a. Continually evaluating our core curriculum designed to produce broadly trained plant pathologists to include offering new courses in the areas of advanced fungal genetics and biology, nematology, and advanced virology;

b. Replacing anticipated retirements with faculty that fit in our strategic plan set forth by the ongoing activities of the departmental Positions Priority Committee;

c. Openly considering new ways of organizing the curriculum that may include decentralizing undergraduate courses so that they are not strictly housed in a specific department or college. For example, we are generally supportive of the Ag*IDEA initiative being advanced by Linda Martin;

d. Venturing into the concept of adopting teaching or co-teaching of large enrollment courses in other units. For example, with the absorption of PCMB into Molecular Genetics, there is an opportunity for us to teach courses such as PCMB 101, 102 (Introductory Plant Biology) and 623, (Plant Genetics and Genomics), or co-teach it with colleagues in HCS; and

e. Evaluating expansion of distance teaching/learning efforts. To this end, the department will engage in discussions with College and University administration to alleviate and/or solve some of the logistical impediments now in place (e.g. assignment of credits, establishing web-based payment options, etc.).

Our plan is to maintain our current department size of 15 faculty training 25-35 graduate students (plus post-docs and undergraduate advisees). Our three most recent hires were made with an eye towards the kinds of courses they will be able to teach as well as the areas of research in which they will actively engage. In this we were very successful, as these individuals will be able to offer courses in fungal biology, virology, and nematology that are key to complementing our core pathogen expertise, and will provide training of our students in the most modern tools available in the area of molecular plant pathology.

We anticipate two to three additional faculty retirements over the next 5 years as well as the transition from quarters to semesters. Our plan will be to respond to these changes with an open mind and with student learning outcomes driving our decision-making. We envision hiring a full-time Instructor and at least one tenure-track faculty with a strong inclination for teaching, learning and advising of undergraduate students – likely in the area of turfgrass and biomass conversion plant (switch grass and other grasses) pathology. We envision the continued use of
part-time lecturers and support the exploration and development – if deemed appropriate by the majority of units within CFAES - of non-tenure track Clinical faculty positions.

**Metrics**

a. To ensure improvements in student quality, we will adhere tightly to our CFAES and Graduate School approved Ph.D. Program Quality Improvement Plan (Addendum B). We will benchmark progress as outlined in Addendum B. A detailed list of metrics that will be used to assess the size, scope and success of our graduate program is provided in Addendum E.

b. We will continue to emphasize undergraduate student quality by attracting high-achieving Honors and Scholars students. CFAES- and university-supplied student enrollment and demographic data will be used as metrics. Addendum E outlines a comprehensive set of metrics that will be used to assess the size, scope and success of our undergraduate programs.

c. The department is committed to support high-quality undergraduate student research and as such will continue to support and enhance our undergraduate research programs (SRIPP, SURE, etc). We will continue to monitor participation, placement and productivity of those participating in these programs and benchmark against our 3-year rolling averages in each metric area (number of participants; placement of participants; number of peer-reviewed scientific publications; number of participants pursuing advanced degrees; number of minority students participating, etc). Addendum E outlines a comprehensive set of metrics that will be used to assess the size, scope and success of our undergraduate student research programs.

**Strategy 2: Adapt to changing societal demands for broadly trained cadres of plant pathologists**

**Action Steps**

a. To develop and launch a pilot professional degree program: The Master of Science in Plant Protection. Students graduating from this program will be trained to work as county educators and in industry and governmental and non-governmental agencies/organizations. Graduates will have hands-on experience with a variety of pathogens and commodities, will have experienced communication and outreach with various stakeholders, and will be expertly prepared for jobs with regulatory agencies working on the prompt detection and eradication of plant pathogens and pests of high consequence. The curriculum for this program will be made available via a combination of both traditional and e-Learning/distance efforts taking advantage of existing course offerings (both traditional and eLearning/distance-based). A proposed curriculum for the MSPP program is provided in Addendum D.

As envisioned, this program would be modeled after the ‘Executive MBA’ program offered by the Fisher College of Business and would target individuals already working
in areas related to crop/plant production and protection. Companies interested in the agbioscience (bio-fuels, biomass conversion and bioproducts) and plant breeding have expressed interest in the concept. Several government and non-governmental agencies have also expressed interest in this type of a program. Once the program becomes fully established, we plan to seek accreditation from professional societies, such as APS or the American Society of Agronomy’s Certified Crop Consultant (CCA) program. We believe that this accreditation will be instrumental in the establishment of the MSPP program as one of the best available anywhere.

b. Our Graduate Program is a major priority for the Department of Plant Pathology, with 185 students in the past 20 years. We currently allocate approximately $1 million or about 20% of all funds brought into the department (including the line items, fellowships and grants) in support of our graduate program. At the start of AU07, we had an all-time high enrollment of 32 graduate students in the program and in AU08 our enrollment grew to 34 students. Based on the size of our faculty, we believe the size of the Plant Pathology Graduate Program has reached institutionally sustainable numbers with an average of approximately two graduate students per faculty member. Our strategy will one of placing a premium on quality rather than quantity. We have implanted a plan (Addendum B) to increase the quality of the incoming doctoral student population that we believe will allow us to move from “GOOD” to “HIGH QUALITY”.

c. Ohio State’s Department of Plant Pathology is one of the leading departments in the country dealing with the diseases of crops, trees, ornamentals, and turfgrass and landscape plants. The department is the sole academic unit dedicated to plant health and agricultural microbiology in Ohio's Higher Education system and is one of only 16 stand-alone plant pathology departments in the U.S. We understand our responsibilities and are excited by the opportunities of being in this position. Our vision is to be considered the most credible source of unbiased, science-based information in the U.S. on plant diseases and plant health management. We aim to grow enrollment of the PHM Major and Plant Pathology Minor and develop new ways for ‘exporting’ our unique curriculum to those in Ohio, the Midwest, U.S. and world interested in plant diseases and crop protection. At the local level, we intend to develop new ways for reaching new and diverse pools of students and life-long learners. To reach more students and get them interested in the PHM major, our department is establishing relationships with Extension, ATI, and 4-H youth outreach programs that should help us reach more students. We are also interested in establishing linkages with OSU’s four branch campuses as well as students enrolled in community colleges and 2-year technical schools. Integral to this strategy will be increased emphasis on eLearning/distance education – to include participation in the new Ag*IDEA initiative being developed within CFAES. We also plan on hiring an Instructor with experience with transitioning traditional classroom-based curriculum into an eLearning platform using Moodle and other distance teaching technologies and through partnerships with OSU’s Office of Continuing Education.

d. When it comes to recruitment of high caliber graduate students, we see the further development of the internship programs we already have in place as key to achieving our goals. The SRIPP, ORIP, SROP, SURE, and REU programs described above will
ensure access to high quality students that will be vetted by our own faculty as they work
with them in their internship experiences. Furthermore, some of these programs, such as
SROP and REU, are specifically designed to increase participation by underrepresented
groups and minorities, including African American, Native American, and
Latinos/Hispanics.

Metrics

a. **Master of Science in Plant Protection** – We intend to seek funding to support the
   establishment of an ad hoc committee consisting of faculty, OSU Extension Specialists,
   Certified Crop Advisors, industry stakeholders and Ohio Department of Agriculture staff
to conduct a ‘needs/market assessment’ and brainstorming sessions regarding the
   establishment of the MSPP program. The goal of this ad hoc committee will be to
close a market and needs analysis for such a program and to develop an
implementation plan for rolling out this program in 2011. The implementation plan will
contain additional metrics used to gage the success of this program but as envisioned,
when the program is operational, we will monitor graduation rates, job finding rates, and
response from industry and use the data to inform further refinements/developments of
the program. Our preliminary goal is to graduate 20 students within five years from
inception and thereafter maintain 30 students in the program.

b. We have implanted a plan (Addendum B) to **increase the quality of the incoming
   doctoral student population** that we believe will allow us to move from “GOOD” to
   “HIGH QUALITY”. The metrics contained within Addendum B will be used to measure
   success in this area. The quality of graduate education in our department will be
   measured, not simply by the increasing scores and grades of students entering the
   program, but also by their achievement while in the program and following graduation.
   Student achievement will be assessed by the awards and distinctions bestowed the
   number and quality of research presentations at national and international meetings, the
   leadership positions held by our students in college and national societies, and the
   number and quality of peer-reviewed articles that result from their projects. Following
   graduation, the career path for each student will be tracked. The positions that our
   students matriculate into within the 4-8 years following graduation will be the barometer
   that we will use to gauge if we are fulfilling our mission to educate the cadre of
   individuals that will become the leaders of plant pathology in government, industry, and
   academia.

c. **We aim to grow enrollment of the PHM Major and Plant Pathology Minor** by
developing new ways for ‘exporting’ our unique curriculum to those in Ohio, the
Midwest, U.S. and world interested in plant diseases and crop protection. By 2013, we
expect to generate enough funding from our eLearning initiatives to cover the salary and
benefits of our eLearning Instructor.

d. The department is **committed to support high-quality undergraduate student
   research** and as such will continue to support and enhance our undergraduate research
   programs (SRIPP, SURE, etc). Addendum E outlines a comprehensive set of metrics that
will be used to assess the size, scope and success of our undergraduate student research programs.

**Strategy 3: Advance teaching and advising in the three CFAES signature areas, especially in the areas of bioenergy and bioproducts**

**Action Steps**

- While we have been traditionally and successfully addressing the first two strategic areas in our teaching and research programs, the third area, Advanced Bioenergy and Biobased Products (ABBP), has started to come into focus only recently. However, as explained above, we are well positioned to take full advantage of our know-how to address future needs in this general area. Our department has strong programs in molecular genetics of plants and microorganisms, which will be key to the development of bio-based technologies that enable scientists to target and manipulate traits for improved functionality. Ongoing research addressing ABBP in our department (e.g. discovery of nutraceuticals and biopesticides, development of plant feedstock with unique cell wall composition, or fungal enzymes to be used in biomass conversion) will spur and inform the offering of revised or new courses specifically addressing ABBP. We currently offer an 800-level special topics course in Biological Control of Plant Diseases. That course spans a full range of topics including the theory, practice, regulation, and use of biopesticides in the marketplace. That course can be readily expanded to provide a more practical course in a lecture/lab format should there be a demand to do so. Alongside a traditional 600-level course on Diseases of Field Crops, we can envision offering a new 600-level course on Diseases of Feedstock Plants (including, for example, switch grass, willows, sugar cane, etc.). Alternatively, the latter content could be included into the Diseases of Field Crops course. Furthermore, we foresee our faculty being able to contribute significantly to one or more 600-level courses that includes harnessing microbial physiology for developing new bioproducts, such as industrial enzymes, biopesticides, biological substrates, nutraceuticals, pharmaceuticals, and/or phytopharmaceuticals. Because the disciplines involved in ABBP span multiple departments, it is not clear just how such an offering or set of offerings should be structured. Nonetheless, expertise in our department should be considered essential for developing curriculum in that area.

**Metrics**

- ABBP disciplines are still in their infancy with much of their creation being drive by the needs of the stakeholders in the state, nation, and the world. As such, the success with which we train our students to address the needs of this emerging economy will be conveyed by the stakeholders themselves. Our ability to train students to help drive this economy, by working to develop new products and processes, and combating emerging diseases on new production crops, can best be assessed by the strength and development of the industry and the feedback we obtain from its leadership. In any case, our department will respond proactively to College- and/or University-wide efforts to develop courses applicable to ABBP. We will do so by providing the expertise to
develop and/or contribute to graduate level courses related to biopesticide development and production of bioenergy feedstocks. The specialized nature of our department precludes us from taking leadership in the design of a broad-based curriculum related to ABBP. However, we still plan on using metrics such as numbers of students specializing in some aspects of ABBP or the number of new courses offered as a yardstick to evaluate our success in the ABBP strategic area. Finally, we may attempt to establish a graduate assistantship in diseases of bio-feedstock. The development of a new ABBP program through partnership with other CFAES units and/or with other institutions through the Ag*IDEA initiative would be a key metric of success in this area.
RESEARCH: Accelerate Discovery, Innovation, and Commercialization through Targeted Research Investment in Our Signature Areas

Food Systems and Human Health

The discipline of Plant Pathology is a central one as it relates to food systems and human health. Research on plant diseases and disease resistance is central to maintaining crop yield and quality and thus food production, food security and food safety. All of our faculty are engaged in research on the major food and forage crops, including, but not limited to soybean, corn, wheat, rice, tomatoes, potatoes, peppers, strawberries, apples, and forages. This includes basic and applied research on the diversity and activities of plant pathogens, the mechanisms of disease development and resistance, and the epidemiology of disease and disease diagnosis. Plant Pathology is among the most interdisciplinary of all sciences and our research thus encompasses plant and microbial genomics, genetics, proteomics, metabolomics, biochemistry, chemistry, crop physiology, statistics and ecology. These various aspects of research form a critical network of information for the prevention of diseases that affect food quality and quantity.

With increased globalization and vertical integration of food production, there has been a concomitant rise in food safety and quality issues. Notably, bacterial pathogen contamination of fresh vegetables, e.g. with *E. coli* O157 and *Salmonella* spp. has become a major issue. In order to address concerns about food safety in fresh produce, OSU plant pathologists are collaborating with faculty in the Food Animal Health Research Program (FAHRP) to investigate the nature of pathogen distribution, survival, and suppression in agricultural systems. Such interdisciplinary work is shedding light on the various pathways of infection and is revealing which management strategies will most reduce risk.

In addition to research affecting food production, research on microbial and plant natural products has always been an integral part of Plant Pathology. Thus the expertise of several of our faculty is often sought in collaborative work aimed at improving the nutraceutical value of plants or the development of novel pharmaceuticals, 70% of which are plant derived. Indeed, in cooperation with several other departments, we have developed resources in Kottman Hall (including several HPLCs and the recent acquisition of an LC-MS) that put our natural product research in a lead position nationally.

Risk-based management of plant diseases through knowledge and application of principles of plant disease epidemiology has been a critical part of management programs developed to effectively and economically minimize losses due to plant diseases. OSU Plant Pathologists are at the forefront of national research efforts to better understand the
biology, ecology and epidemiology of key plant diseases such as Fusarium Head Blight (FHB) of wheat and its associated toxins. Through this effort, done in collaboration with researchers from all major wheat-producing states, a web-based FHB risk assessment system is now available for use in 24 states to assist in FHB management and marketing decision making.

**Strategic Research Foci - Food Systems and Human Health**

The pathogens that cause plant disease are highly adaptive. Due to this, major plant epidemics (such as the Irish Potato Famine and Southern Corn Leaf Blight) are always a threat. As the world population grows, the impact of such epidemics increases with each year. We thus need to maintain a broad coverage of research on crop diseases. As plant pathologists, we also need to be poised to detect, respond and recover from bioterrorist threats on food security.

Building upon our strengths, specific areas of focus will thus include:

**Natural Product Discovery, Characterization and Manipulation in Plants: Metabolomics**

The treasure trove of natural products made by plants and microbes has only begun to be characterized. The acquisition of the new LC-MS allows us to very rapidly identify new metabolites and thus opens up completely new opportunities for our faculty. As an example, some projects planned or just initiated in the Graham lab include the first characterization of the entire soybean metabolome and the characterization of toxins produced by Fusarium species (in collaboration with the Paul lab) and by *Streptomyces* species (in collaboration with Leslie Wanner at USDA, Beltsville). In all of these projects it is anticipated that completely new pathways and novel metabolites will be identified, which in turn may have novel agricultural and/or human pharmaceutical uses.

**Molecular genetics and genomics of host resistance**

Elucidation of the genetic and molecular mechanisms of host resistance to pathogens is critical for the development of highly resistant cultivars. Several faculty members in the department have made significant progress on mapping and cloning disease resistance genes in important crop plants. The DNA markers linked to Phytophthora resistance genes are being widely used in soybean breeding programs. Cloning and characterization of resistance genes to rice blast disease has provided new insights into the molecular mechanism of plant and fungal interactions. An RNAi based gene silencing protocol for soybean has allowed clear molecular genetic strides in soybean disease resistance for the first time. This technology, developed at Ohio State, has been adopted by soybean researchers internationally. In addition, molecular analysis of the interaction between turf and *Sclerotinia homoeocarpa*, has revealed new information on the pathogenicity of the important pathogen causing the dollar spot disease in turf in Ohio and other mid-west states. We also made important contributions in developing large-scale genomics approaches to analyze defense transcriptome during pathogen infection in cereals. Continuation of these projects and expansion to new crop plants will provide new
strategies to effectively control plant diseases and reduce the use of environmentally harmful chemicals.

**Microbial Genomics**
Understanding the molecular underpinnings of virulence and host-pathogen interactions is essential as we work to expertly design control measures of microbial pest of crops plants that incite disease or produce dangerous toxins. As such, faculty in this department are leading studies to elucidate the identity, regulation, and function of the entire compliment of genes in the genomes of important plant pathogens. Significantly, these researchers are developing the most cutting edge technologies for microbial genomics and functional proteomics that are leading the way for unprecedented discoveries. For example, Mitchell, in collaboration with Johns Hopkins School of medicine, has generate the first protein microarray for a plant pathogen and is using it to model the signaling pathways that the rice blast pathogen uses to initiate infection related development. In other work, the McSpadden Gardener lab’s interest in biological control has recently led to the discovery of novel microbial species with potential for producing new and different antibiotics. Recent work has led to the isolation and patenting of two novel groups of microbes involved in pathogen suppression; further analyses of the genomes and metabolomes of these bacteria are expected to reveal novel genes, pathways, and metabolites of use in agriculture. Continuation of work underway and expansion to new crop plants will reveal new insights on the molecular basis and modulation of host defense induction and pathogen invasion and lead to the development of more effective disease control methods.

**Bioinformatics**
The exercise to apply meaning to genomic, proteomic, and metabolomic data within the context of an organism’s biology is not facile. In many cases, our ability to generate these data has outstripped our capability to make sense of it. Faculty in this department have recognized the need for bioinformatics support and are following multiple avenues to bring it into the department. Most notable, they have decided to use a TIE TPS professional PhD level position to create the Columbus branch of the MCIC and fill it with a scientist that will be able to support the bioinformatic research activities of the faculty. This is significant as we see this position as the nucleus for the development of bioinformatic core working on plant pathogens and host resistance. Additionally, faculty have looked farther afield to identify existing bioinformatic resources on campus. Specifically, collaborations are being forged with faculty in the Department of Biomedical Informatics and staff in the MCIC. Our goal is to use the expertise of these collaborators to strengthen and build the capabilities of the future bioinformatics core in this department.

**Food Safety**
Interdisciplinary collaborations can best evaluate the many sources and mitigation strategies that will reduce risk of food contamination and poisoning. Because plant pathogens create microenvironments on plants that may be more readily colonized by human and animal pathogens, ecological studies need to involve plant pathologists. Studies of the associations and interactions of manure-borne human pathogens, plants,
and other plant-associated microbes will be needed in order to accurately quantify the
risks associated with different manure-handling strategies. Additionally, food and feed
can be readily contaminated with mycotoxins produced by plant pathogens. Studies on
the ecology, physiology, and biochemistry of mycotoxin production will be essential for
ensuring a safe and healthy food supply in the future.

**Mitigation of Potential Negative Impacts of Ethanol Production**

Plant pathology research will play a major role in mitigating some of the negative
impacts the rapidly-expanding ethanol industry may have on agriculture. For example,
co-products of corn-based ethanol production, in the forms of dried distillers’ grain and
solubles (DDGS) and wet distillers’ grains (WDG), are relatively cheap sources of animal
feed (at least relative to the actual corn grain which is now more expensive partly because
of ethanol production). However, several plant pathogen-produced mycotoxins
(fumonisins, deoxynivalenol, and aflatoxin) that are not degraded during the fermentation
process may reach relatively high concentrations in DDGS and WDG (three times higher
concentration in the co-products than in the original grain), leading to health problems in
animals. Over the past two years there has been increased interest in the development of
grain production and handling methods to reduce mycotoxin contamination in corn
destined for ethanol production.

**Disease Diagnosis and Epidemiology**

Novel tools for molecular plant disease diagnosis, sophisticated statistical modeling
systems, and efficient information delivery systems will allow for further development
and expansion of risk-based disease management tools to help guide economically and
environmentally sound disease management decisions in all major disease-crop systems.
For instance, the cereal pathology and epidemiology programs have initiated studies to
use molecular techniques to detect and quantify pathogen colonization prior to, or in the
absence of, visual symptom manifestation in an effort to develop models to assess the
risk of toxin accumulation in wheat. Future effects to develop prediction models for other
diseases, especially those caused by viruses, will also benefit from the use of molecular
techniques in plant disease epidemiology.
Environmental Quality and Sustainability

Plant Pathologists work very closely with farmers, foresters, extension workers and environmental agencies to control indigenous plant diseases with the minimum impact on the environment. This is accomplished through enhancements in all of the components of integrated pest management, including cultural procedures, disease prediction tools, development of environmentally safe pesticides and natural plant disease resistance. Management of plant diseases is even more important to the success of organic agriculture, because the convenience of chemical controls is voluntarily restricted. Over the past eight years, Drs. Miller and McSpadden Gardener have worked successfully with the OARDC’s Organic Food Farming Education and Research (OFFER) to fund several large interdisciplinary projects as well as a number of smaller ones. Such projects effectively combine efforts to answer fundamental questions regarding the nature of human impacts on the environment and applied questions regarding what are the most effective ways to improve production efficiency, quality, and sustainability in agriculture.

Our faculty is also engaged in research pertaining to protection and sustainability of agricultural, natural and urban forest resources from diseases of consequence (including those caused by exotic, invasive pathogens) such as soybean rust and sudden oak death. Our expertise in interactions between plant hosts and their assailants has led to key roles in research even in domains that were historically the purview of other disciplines. For example, Bonello’s expertise in tree resistance mechanisms has led to a leadership position of his program in research on ash resistance to the emerald ash borer.

Plant disease resistance is the most environmentally sound means of controlling plant diseases. Collaborative research projects between the departments of Plant Pathology and Hort. and Crop Science have led to several wheat and soybean varieties with improved levels of resistance to major diseases being develop. The use of these varieties will reduce producer’s reliance on environmentally harmful chemicals to control plant diseases.

Strategic Research Foci - Environmental Quality and Sustainability

Development of Disease Resistant Cultivars

1) Research Extension faculty are collaborating with breeders in HCS to ensure that Ohio’s grower’s have ready access to value-added public varieties with enhanced capacities for disease resistance. Particular emphasis will be placed on high-impact diseases that are endemic to Ohio and are major limitations to yield throughout the United States (e.g. Fusarium Head Blight of wheat, Phytophthora Root Rot of soybean).

2) New insights are being made by merging basic and applied research to develop new rapid screening programs for resistant cultivars. Using advanced molecular techniques, researchers in this department are working to create microbes that can be tracked as they
penetrated and parasitize host plants. This work has already led to major paradigm
changing discoveries on how some microbes cause disease. One direct application of this
research that we plan on developing is a protocol were these traceable microbes are used
to rapidly screen breeding material in a high throughput fashion to identify lines able to
restrict microbial growth and proliferation. Mitchell and colleagues have plans to work
toward such a program for the turf industry to ultimately develop advanced resistant
cultivars and reduce the extreme dependence on fungicides for recreational and landscape
turf.

Reducing chemical inputs through refined integrated pest
management recommendations
Extension-based research often focuses on efficacy evaluation of available chemical
pesticides. In the future we should focus more in integrating selection and
recommendation of chemical pesticides with reference to epidemiologically-based risk
assessment and cost-benefit models applicable to our changing environment. Future work
will include evaluation of reduced-risk chemicals and biopesticides, as well as enhanced
disease forecasting models that can better inform growers of when to use such inputs
most effectively. We will also work to better integrate biologically based control
procedures into production recommendations in order to more effectively mitigate
(natural or induced) epidemics of plant diseases.

Providing effective disease management tools and
recommendations for organic farmers
Fundamental research into soilborne disease suppressiveness, the ecology of plant-
associated microbes, and biological control will more thoroughly reveal the ways which
humans and the environment impact the growth and health of plants. Applied studies on
the efficacy, persistence, and risks of biologically-based disease controls and
biopesticides will provide near-term value to organic growers looking for cost-effective
disease management options.

Forest Pathology
Research on tree diseases and insects will continue to be a cornerstone of the country’s
approach to management and sustainability of forest ecosystems. We will continue to
have a sustained program in this area, particularly as it pertains to the threat of invasive
pathogens and insects.

Continue breeding for resistance, not only to diseases, but also
to toxins produced by disease-causing organisms
Recent collaborative efforts between the Paul lab. and the Sneller lab. (Hort and Crop
Science) have focused on determining the molecular basis for differential toxin
accumulation in soft red winter wheat breeding lines. Finding from these investigations
will contribute to the development of wheat varieties with resistance to toxins that are
harmful to humans and livestock.
Advanced Energy and Biobased Products

Research in several labs in the Department of Plant Pathology relates directly to the development of bioenergy or biobased products. Already mentioned is the work in several labs (Bonello and Graham Labs) on natural products in plants, which could lead to the development of biobased nutraceuticals or pharmaceuticals. In addition, work is underway in the Mitchell Lab on hydrolytic enzymes from plant pathogenic fungi that are excellent candidates for digestion and utilization of cellulose and other plant polymers. Work underway in the Wang Lab, funded by DOE and USDA’s Plant Feedstock Genomics for Bioenergy Program, is aimed at genetically manipulating plant cell wall synthesis related genes to change the cell wall composition for cost effective treatment of rice straw and other crop residues for use in the production of biofuels and biochemicals. Finally, work in the McSpadden-Gardner Lab focuses on discovery research related to biologically-based suppression of plant diseases. This includes identification of novel biopesticidal agents and their mechanisms of action. The origins of these agents include microbes as well as materials derived from organic waste streams (e.g. composts and by products of biofuel processing).

Strategic Research Foci - Advanced Bioenergy and Biobased Products

Novel Natural Products from Plants and Microbes

Plant and microbial natural products represent a nearly endless source of chemistry for the development of novel bioproducts. Activities of interest include pharmaceuticals, nutraceuticals or agricultural chemicals. As noted earlier, nearly 70% of pharmaceuticals are either directly or indirectly derived from plants. Examples of nutraceutical products include increased vitamin levels in plants or the production of edible vaccines. Agricultural chemicals from plants could include the discovery and production of novel disease, insect or weed control products. Plant or microbial natural products can be isolated and used directly or they can be used as models or templates for the synthesis of novel chemicals. Moreover, their production can be genetically manipulated within plants, which are then used as novel food sources for humans or animals. The acquisition of the new LC-MS housed in the Department of Plant Pathology enhances the discovery and characterization of such bioproducts immensely and puts OSU in a lead position for such efforts.

Manipulation/breeding for altered cell wall structure to improve efficiency of conversion of biomass to biofuels

Cost efficient conversion of lignocellulosic biomass into bioethanol requires improvements in cell wall characteristics and yield to fit biorefinery and agricultural requirements. We have found several regulatory genes that play important roles in cell wall synthesis, and knockout and overexpression mutants of these genes are being generated. Characterization of these mutants will provide new information about the function of these genes in cell wall biosynthesis pathways. At the same time, disease
resistance of these mutants to pathogens will be evaluated. Genes important for efficient lignocellulosic biomass conversion, but having minimum negative impact on disease resistance, will be further characterized and used in molecular breeding of bioenergy crop plants.

**Discovery research aimed at identifying novel agents for plant disease control**
These would include biological and biochemical active ingredients whose novelty, efficacy, and safety would make them good candidates for commercial development.

**Evaluation of biobased products for use as amendments to improve agricultural production**
In addition to manures and biosolids, waste materials for biodiesel, ethanol, food processing, and other bio-based production systems will need to be recycled to increase value of any process. To profitably manage such waste streams, materials will have to be composted or otherwise be processed to generate value-added products for use in land and/or energy-based applications.

**Biomass conversion**
The conversion of complex biomass polymers to sugars for bioenergy production is primarily the work of fungi. As such, the need to discover new enzymes capable of degrading plant cell wall material is great. Bioinformatics analysis shows that the genomes plant pathogens have a larger arsenal of cell wall degrading enzymes than non-pathogens. Faculty in this department are working to characterize these enzymes with the intent of using them in the pre-treatment phase of biomass conversion prior to fermentation. The goal over the next 5 years is to develop a pipeline for the cloning, expression, and characterization of cell wall enzymes in a high throughput manner.

**Strategic Goals Related to Research**
The planned development of our research program over the next five years (2009-2013) can be summarized by the following objectives:

**Strategy 1:** Advance research in the three CFAES signature areas, especially in the areas of bioenergy and bioproducts; and

**Strategy 2:** Enhance infrastructure to support research in support in the three CFAES signature areas.

**Strategy 1:** Advance research in the three CFAES signature areas, especially in the areas of advanced bioenergy and bioproducts

**Action Steps**
• Redirect resources strategically when making new faculty hires – both tenure and non-tenure Research track – such that the department is ideally positioned to create significant impacts in the CFAES signature areas. Maintain tenure-track faculty FTE at 15 while augmenting with new non-tenure track research faculty and courtesy and adjunct faculty.

**Metrics**

• Develop guidelines and ‘experiment’ with the hiring of non-tenure track research faculty to augment the research agenda of the department. Key metric will be the hiring of at least one non-tenure track research professor by 2013.
• Double the number of courtesy and adjunct faculty by 2013.
• Increase total extramural fund expenditures (both direct and indirect) to over $3 million or 36% at a rate of ~6% per year. Current: $2.2 million; Goal: $3.0 million. Specific to indirect funding, double the amount of indirect funds expended from $264,000 in 2008 to over $528,000 annually in 2013.
• Show positive annual increases in all metrics used by CFAES in measuring unit productivity in research. Addendum E outlines a comprehensive set of these metrics and includes but is not limited to: Direct expenditures; F&A expenditures; Peer reviewed journal publications; Number of patents and licenses; and M.S and Ph.D. degrees conferred.
• Develop 30 (6 per year) additional ‘Research’ highlight pieces showcasing the impact of research conducted by OSU Plant Pathologists by 2013.

**Strategy 2: Enhance infrastructure to support research in support in the three CFAES signature areas**

**Action Steps**

• Increase research productivity by significantly investing in the research infrastructure in both Selby Hall (Wooster) and Kottman Hall (Columbus) with a particular focus on greenhouse and phytotron facilities.

**Metrics**

• Completion of Selby Hall greenhouse and phytotron renovations – $5 million.
• Completion of capital improvement upgrades in Kottman Hall to include new windows, air handling and heating/cooling system - $20 million.
• Enhancement of research lab space and plant growth facilities in Kottman Hall through infusion of new funds.
Accelerate Engagement with Targeted OSU Extension Programming

The Department of Plant Pathology considers our extension-outreach and engagement programs an integral part of our teaching program. Because of the diversity of crops, commodities, policies and environmental conditions in Ohio, it is our practice to utilize all available technical expertise and qualified faculty rather than limiting official extension programming to only a few individuals. Most Plant Pathology faculty are directly or indirectly involved in extension programming. This is accomplished primarily through the use of joint appointments that combine responsibilities in extension, research and, in some cases, resident instruction. This integrated approach to structuring faculty and staff appointments allows us to more seamlessly transition our research into our outreach and engagement efforts. Currently the department has a total of 2.61 faculty FTEs in extension distributed over eight faculty (8 out of 16) with appointments ranging from 10-57% extension. In addition, there are three full-time Extension Associates in Plant Pathology (2.15 FTEs supported by OSU Extension).

Our mission is to serve as the primary source of information about plant disease diagnosis and control for all citizens of Ohio and beyond. Our goal is to achieve and maintain a position of recognized excellence in extension plant pathology. We provide innovative programming to keep commercial producers and the public well apprised of current and new techniques to identify and manage plant disease problems. Our specialists interact with colleagues in public and private sectors statewide, nationally, and internationally to keep abreast of the latest disease-management tools and practices available. In addition to longstanding disease problems that are always present, new emerging and re-emerging diseases and invasive pathogens present a continual challenge. Right now several new diseases in the U.S. are confronting Ohio, including Soybean Rust and Sudden Oak Death, the latter problem threatening many important woody ornamentals and forest trees. Just as in the field of human health, issues in plant health are constantly changing and Extension state specialists and program specialists are continually at work bringing new information to Ohio citizens on effective management technologies. Another important focus of our Extension programming is to promote ways to minimize the use of pesticides. We are doing that by implementing advanced, computerized disease forecasting systems, working to develop and promote improved disease-resistant cultivars, providing information on organic production of fruits and vegetables, and exploring new ways to deploy fungicides on turfgrass and other crops. Finally, we always strive to be at the forefront of important developments in agriculture. In this regard we are developing and delivering education programs on crop protection for bio-fuels (e.g., corn) and on food safety and security (e.g., vegetables).

In Plant Pathology, Outreach and Engagement efforts are primarily focused in the OSU Extension Focus Areas of **Enhancing Ag and the Environment** (especially in terms of controlling plant diseases and reducing their spread with a minimal environmental impact) and **Advancing Employment and Income Opportunities** (in terms of maximizing...
profits through use of the most effective and cost-efficient control measures). Our Outreach and Engagement programming also addresses Food Safety themes (in terms of the production of healthy, toxin- and human-pathogen-free produce).

Based on our own experience and feedback from clientele, OSUE County-based faculty and Educators and college administration, it is our assessment that the department is presently meeting its major objectives and our extension programs are highly functional and well respected. Despite this success, we recognize the need for continued evaluation, innovation, and constructive change, especially in light of new technologies in information transfer and eLearning/distance education. We envision the continual need to evaluate and incorporate electronic and distance technologies into extension education delivery and to broaden the reach of our extension education programs through new initiatives and greater collaboration with our county- and EERA-based OSUE colleagues.

**Strategic Goals Related to Outreach, Engagement and Development (Extension)**

The main goal of the department's Outreach, Engagement and Development (Extension) program is to achieve and maintain and position of recognized excellence in Extension Plant Pathology.

To achieve this goal and to best serve the citizenry of Ohio the Midwest and nation, we have set the following objectives for our Extension Program:

**Strategy 1:** Provide the most current and reliable information available on the causes, diagnosis and control of plant diseases in Ohio through the use of printed materials such as bulletins, fact sheets, video presentations, newsletters with real time response capabilities, live presentations at grower meetings and workshops, computer-based retrieval systems, and personal contacts with Ohio citizens. Increased emphasis will be placed on the use of eLearning and distance technologies for interacting with clientele;

**Strategy 2:** Develop new techniques and programs for plant disease prevention and control in rural and urban communities. These new techniques are based on research results from around the world in addition to Ohio-based research programs;

**Strategy 3:** Conduct educational programs for Ohio commercial growers and home owners that effectively implement new technology for plant disease diagnosis and control;

**Strategy 4:** Provide educational information, training and support to Ohio State University Extension educators and specialists in the area of plant health management;

**Strategy 5:** Strive to maintain active participation of Plant Pathology extension
personnel in extension/research teams within the college. Plant Pathology Extension Specialists and Associates work closely and network with County Educators through partnerships on commodity teams such as the Agronomics Crop Team, Extension Nursery Landscape and Turf Team, Floriculture Industry Roundtable of Ohio, Fruit Crops Team; Integrated Forage Management Team; Organic Food & Farming Education & Research Program and Vegetable Crops Team;

**Strategy 6:** Operate a modern, state-of-the-art Plant and Pest Diagnostic Clinic to aid all citizens in Ohio in the diagnosis of plant health problems. We will also maintain a strong presence and participation within the National Plant Disease Network (NPDN) and continue to be involved in first detection and alert programs to help secure our nation’s food supply; and

**Strategy 7:** We will continue to maintain problem solving applied research programs to obtain new and timely information for use in extension programming.

**Action Steps**

a. Explore/develop opportunities (including the designation of Courtesy appointments) for enhancing linkages with county- and EERA-based OSU Extension faculty, Educators and Program Assistants that either have or wish to develop a specialty in plant health management and/or plant protection.

b. Work with OSU’s Office of Continuing Education to launch eLearning courses related to turfgrass disease management, organic/backyard gardening and field crop diseases (and others as appropriate). These courses will target Master Gardener volunteers and Certified Crop Advisors.

c. Pursue partnerships with Plant Management Network to publicize and expand eLearning offerings to those interested in CEU credit-bearing courses.

d. Given the importance of Ohio’s plant industries, it is essential that Ohio’s diagnostic capabilities related to plant health are not only maintained but enhanced. To accomplish this, we will actively pursue the establishment of a new state-wide detection system called the Ohio Plant Diagnostic Network (OPDN).

**Metrics**

a. The development of “X” new win-win opportunities and the awarding of courtesy status to county-based and EERA-based faculty.

b. Launch 5 new eLearning courses that generate enough revenue to sustain the salary and benefits of an Instructor dedicated to eLearning and the transition of course content into an eLearning platform.

c. Show positive annual increases in all metrics used by CFAES in measuring unit productivity in extension-outreach. Addendum E outlines a comprehensive set of these metrics.

d. Establishment of the Ohio Plant Diagnostic Network and Ohio as the North Central hub for the National Plant Diagnostic Network by 2013.
International Programs

Strategic Goals Related to International Programs

The Department of Plant Pathology is committed to global cooperation and visibility, and has a long history of collaboration in teaching, research and service with partners in both developed and developing nations. We continually strive to develop and enhance our global reputation as a leader in plant pathology to leverage resources and expand our international network.

The involvement of our scientists at international venues has greatly enhanced our visibility. These opportunities also help us strengthen international collaborations and open new avenues. Many of our faculty are involved in international working groups and other organizations relevant to their areas of expertise. Some recent examples of programs are provided in the Addendum F.

The planned development of our international engagement and development program over the next five years (2009-2013) can be summarized by the following objectives:

Strategy 1: Train and collaborate with international students, postdoctoral scientists and scholars through our undergraduate and graduate programs, international exchange programs and training workshops. Utilize technology to bring educational opportunities to new audiences; and

Strategy 2: Continue to develop linkages and partnerships between programs and individuals in developed countries equally with development, capacity building and other efforts with less developed countries.

It is well known that graduate degrees from U.S. universities are highly sought after worldwide. The Department of Plant Pathology has a valuable product to offer in our graduate training program, and plans to continue to recruit the best and brightest students. We value our international students and post-doctoral associates for their contributions to research, teaching and outreach programs, and the intellectual and social diversity they bring to the Department of Plant Pathology. We will continue to recruit and train visiting scholars who will become part of a pool from which talented potential graduate students can be selected.
**Action Steps**

a. Many of the areas of expertise in the Department of Plant Pathology can be shared internationally through course development. We developed an international laboratory short course in plant diagnostics in collaboration with the Department of Entomology that is self-sustaining through fees (see Addendum F). We envision a series of demand-driven courses in other topics led by this department or others in the college (in which we will participate). We encourage the development of eLearning/distance education products (e.g. short and full-length courses) on specific topics that can be offered internationally as well as nationally via the internet.

**Metrics**

a. Maintain current graduate student program levels of 40% international students (out of total 30 graduate students/year).

b. Have at least 20% of our domestic graduate students involved in exchange, internship and study abroad opportunities by 2013.

**Strategy 2: Continue to develop linkages and partnerships between programs and individuals in developed countries equally with development, capacity building and other efforts with less developed countries.**

We recognize that international visibility is necessary for individual faculty advancement as well as the reputation of our department as a global leader in the discipline of plant pathology. Further, we recognize that we possess unique skills in basic and applied research and teaching that are in demand globally. Our international efforts benefit our individual programs and careers, the university, the State of Ohio and our cooperating partners.

**Action Steps**

a. Encourage international activities that enhance our ability to address the Mission of our department and The Ohio State University.

**Metrics**

a. 50% of all faculty are involved in international engagement and development work by 2013.
Business Plan

A business plan is presented below to support our goals and objectives described in the PLANT PATHOLOGY Strategic Plan. It includes our Talent Plan, Facility Plan, Technology Plan, Development Plan, and Resource Plan for our department to include our three funding lines; General Funds, OARDC, and OSUE.

Talent Plan
Managing our faculty and staff with existing resources

Over the next five years, PLANT PATHOLOGY will make decisions to fill or release vacant faculty and staff positions based on projected and existing resources. Our decisions will be based on a prioritized system where we will emphasize our signature areas and strategic opportunities which will fall within those established by CFAES. In the Department of Plant Pathology at Ohio State University, we have done very well at maintaining the talent needed to meet the needs of Ohio. This effort has and will continue to be facilitated by a permanent committee in the department, the Faculty Positions Priority Committee. As faculty positions are vacated over the next five years, we will first carefully discuss and review our current and future needs in extension, teaching and research and replace these scientists with new faculty members that have the most appropriate state-of-the-art expertise. Considered among our positions to be filled during the next five years will be that of non-tenure research track faculty or research scientist titles where programs or funding will determine and benefit from such hiring. We will also consider hiring Lecturers and Instructors when appropriate to fulfill our teaching mission.

We have estimated faculty and staff vacancies based on years of service within PLANT PATHOLOGY. Over the next five years we anticipate and predict three faculty vacancies and four staff vacancies to occur. When considering staff vacancies we restricted our estimates to only include those staff directly financed by departmental funds. In other words, we did not include technical staff supported by programmatic funds (grants, contracts, and gifts). In line with CFAES projects for refilling positions, we anticipate being able to refill approximately 66% of our faculty vacancies through FY2013. Specifically, we anticipate refilling two faculty positions (1 in FY11 and another in FY12). As described in our strategic plan, we anticipate experimenting with hiring non-tenure research track faculty to augment our research needs in the department – especially in the area of advanced bioenergy and bioproducts.

In the area of basic research, we currently foresee possible replacements needed in the next five years in the areas of mycology/mycotoxicology (with a possible focus on biomass conversion) and bacteriology that will help us meet the many objectives in the various strategic areas noted above. Because of past leadership in the area of Turf Pathology and the high demand for high quality turf protection in urban areas (especially for recreation), it will also be essential to hire a Turf Pathologist. This position is
expected to also aid in advancing our Department’s Strategic Plan for Teaching. We see a strong need for ongoing linkages between our Extension Research faculty and plant breeders employed in HC&S. In past years, cooperation on the Agronomy Crops and Vegetable Crops Teams have provided the basis for award-winning activities, the development of novel IP, and laid the basis obtaining large interdisciplinary grants. Extension Associates provide essential support for our outreach programs in the areas of field crops and turf pathology. With the impending retirement of our fruit pathologist (FY13), the Department sees a real need for an Extension Associate to assist the remaining Specialty Crops Pathologists (specializing in Vegetable and Ornamentals Pathology).

In the case of staff, CFAES anticipates a 50% refill rate over the next five years. We anticipate replacing staff at this same rate between now and 2013. We anticipate hiring one new Instructor using grant and gift funds in FY10. As envisioned, this person will play a key role in helping implement the strategic implantation of new eLearning/distance courses and products.

**Facility Plan**

PLANT PATHOLOGY is housed in Selby Hall on the Wooster campus and Kottman Hall on the Columbus campus. Both of these buildings show signs of deferred maintenance and have infrastructural issues. Both OARDC and OSU have been very proactive in planning for infrastructural upgrades in Selby Hall and Kottman Hall, respectively. We anticipate conducting a $1 million upgrade and renovation of the Selby Hall phytotron (plant growth chamber facilities) during FY10 followed by a $5 million capital renovation to the Selby Hall greenhouse complex in FY13. In Columbus, we anticipate a $20 million capital improvement investment in Kottman Hall to replace all windows and upgrade the heating/cooling and air handling systems. Upgrades in Kottman Hall are expected to take place in FY10 to FY13.

Additional upgrades to the Kottman Hall phytotron and greenhouse complex are sorely needed. Preliminary planning efforts are underway and funding for high-priority upgrades to the heating and cooling system in the Kottman Hall greenhouses (~$100K) are anticipated for FY10/FY11. Major upgrades to the chilled water system are needed. We need to maintain and support core facilities and equipment in the Department and the College (e.g., the MCIC). This is a complex area that cannot be evenly supported over time by grants to individual faculty. Rather, sustained base funding for equipment maintenance and repair as well as technical personnel with the expertise to train others in the use of such equipment is required. Without such continuity, large equipment purchases will not be efficiently utilized.

To maintain excellence in research, high quality greenhouse, growth chamber, and field space will have to be provided. At present the quality of the greenhouse space, particularly in Columbus, is very poor. And, while there is ample field space in Wooster to conduct meaningful research; field planting, tillage, and harvesting equipment is woefully out of date and does not provide adequate models of the diversity of production
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practices used by stakeholders. Connected to these physical needs, hard funding will be necessary for the staffing of positions devoted to the upkeep and overall organization of these facilities.

In FY09, the department invested ~$54K to establish two eLearning teaching laboratories – one each in Selby Hall and Kottman Hall. Additional upgrades to these spaces are anticipated to maximize their use in distance teaching. An additional $30K is being sought to upgrade an additional teaching laboratory in Kottman Hall.

Additional facilities needs center on the quality of our student space and on equipment. Regarding student space, the space currently devoted to student residency is woefully inadequate from both quantitative and qualitative perspectives, especially in Kottman Hall. High quality of student offices (including furniture) is paramount if we want to be competitive in attracting the best students in the world to be educated at The Ohio State University as the next generation of plant pathologists. Furnishings and space currently in use project a degree of crowding, age, and wear that is not particularly inspiring to domestic students who have grown up in an age of material wealth and unprecedented freedom. Further renovation would help to project a sense of quality and ambition commensurate with our Department’s past and future achievements.

In regards to equipment, as a department that is integral to the TPS TIE, we have been striving to create a pool of high quality common equipment to be used in the state-of-the-art research that our department is conducting now and into the future. Easy access to such equipment, as can only be obtained by having the equipment directly available to us in our buildings, is critical to the training of world-class plant pathologists knowledgeable and experienced in advanced technologies. However, we currently lack the institutional resources to be able to maintain such expensive common equipment, both in terms of service agreements/contracts and staff charged with their maintenance. Financial support for maintaining and managing common use facilities within Kottman Hall and Selby Hall will be essential to our continued success.

**Technology Plan**

Plant Pathology is very supportive of CFAES’ efforts toward developing a college-wide technology plan. At the local level, the department currently cost-shares (25%) of an IT specialist housed in the Department of Horticulture and Crop Science. This arrangement has worked well for us and we anticipate continuing with this arrangement in the future. The model of having a local IT person that is considered part of the CFAES IT team is an appealing model and something we support.

**Development Plan**

Similar to CFAES, private support will play a key role in meeting the goals of the department and it strategic initiatives. The department is actively engaged in dialogue with members of the CFAES Development team and is working on a comprehensive and strategic alumni relations and development plan. Our goal in this area is to aggressively
increase the amount of annual giving made in support of the Plant Pathology Annual Fund. Specifically, our goal is to double the amount of contributions made to this account each year between now and 2013. In FY09, the department was fortunate to receive a $50,000 gift that was used to establish the *Blair F. Janson and Wilmer G. Stover Scholarship Endowment*. In addition to this, the department was able to name Dr. Laurence V. Madden as the *Distinguished Professor of Plant Protection* using income generated from the Plant Protection Endowment. Although this recent activity is not indicative of future success in the area of development, it is an indication that the department is actively pursuing advancements in this area. We anticipate having a development and alumni relations strategic plan in place by June 2010.

**Resource Plan**

The department has been and is committed to remaining financially solvent and balanced and has a long history of managing its resources in a sound and responsible manner. Annual expenditures in the Department of Plant Pathology (not including benefits for individuals funded on line item funds or space charge subsidies on the Wooster campus) are ~$5.5 million with about half resulting from direct and indirect expenditures and the rest from funds allocated to the department from OARDC (23%), OSU GF (10%) and OSU Extension (9%). As part of our business plan, we have prepared a detailed budget based on some key assumptions regarding the current and projected economic situation and our strategic initiatives.

**Resource assumptions for the next five years**

Given the recent economic situation, it is difficult to predict what will happen over the next five years regarding the budget. We have based all projections related to line item funding (OARDC, OSU GF and OSU Extension) on the most recent data provided by the CFAES CFO. These projections included a decrease in both the OSU Extension (15.9%) and OARDC (10.5%), respectively, for FY10 and FY11. We assumed 0% reductions in FY12 and FY13 in both of these lines. In the case of the OSU GF, we assumed a 0% reduction in FY10 followed by either a 5% (scenario 1) or a 10% (scenario 2) reduction in FY11 followed by 0% reductions in the FY12 and FY13 OSU GF budgets, respectively. We assumed a 3% increase per year for salary and benefits and a 6% increase per year for OSU GF fees and tuition. Assumptions for each line item were discussed with the fiscal officer responsible for each line item. Projections of revenue for each source were made based on historic trends and in consultation with the appropriate fiscal officer. The electronic version of the spreadsheets included in this plan provides detailed information and notes regarding the rationale behind the assumptions/projections made.
APPENDIX D

Appointments, Promotion, and Tenure document
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1Original version approved by the Department of Plant Pathology, April, 1997; revisions approved by Department of Plant Pathology, January, 1998; September, 2001; January, 2005; September 2008. Awaiting revision in 2011 to reflect changes in membership in PR and DPT committees (to accommodate the smaller number of faculty in the department).
II. PREAMBLE

This document is a supplement to Chapter 47 of the Rules of the University Faculty (Additional Rules Concerning Faculty Appointments, Reappointments, Promotion and Tenure), procedural guidelines for promotion and tenure reviews specified by the OSU Office of Academic Affairs, and any additional policies established by the College of Food, Agricultural and Environmental Sciences (CFAES) or the University. Details on faculty rules can be found on-line at the Board of Trustees web site (http://www.osu.edu/offices/trustees/ChapIndex/index.html) and OAA policies at the web-based Office of Academic Affairs Policies and Procedures Handbook (http://oaa.ohio-state.edu/handbook/tc.html). It is governed by the Criteria and Procedures for Appointments, Promotion and Tenure established by the CFAES and by the CFAES Faculty Reward System Guidelines for Annual Performance Review, Promotion, and Tenure adopted February 8, 2000. Should any of those rules and policies change, the Department shall follow those new rules and policies until such time as it can update this document to reflect the changes. In addition, this document must be reviewed, and either reaffirmed or revised, at least every four years on appointment or reappointment of the Department Chairperson (herein referred to as the Chairperson).

This document requires approval of the Dean of the College of Food, Agricultural and Environmental Sciences (herein referred to as the Dean of the college) and the Executive Vice President and Provost of the University before it can be implemented. It sets forth the mission of the Department of Plant Pathology and, in the context of that mission and the missions of the CFAES and the University, its criteria and procedures for: 1) faculty appointments, 2) faculty promotion and tenure, and 3) rewards, including salary increases. In approving this document the Dean of the college and the Executive Vice President and Provost accept the mission and criteria of the Department and delegate to it the responsibility to apply high standards in these various evaluations.

The faculty and the administration are bound by the principles articulated in the following Faculty Rule:

3335-6-01 General considerations.

(A) Peer review provides the foundation for decisions regarding faculty appointment, reappointment, and promotion and tenure (except when the provisions of rule 3335-6-03 (H) are invoked). Peers are those faculty who can be expected to be most knowledgeable regarding
an individual’s qualifications and performance--normally tenure initiating unit colleagues. Because of the centrality of peer review to these review processes, faculty vested with responsibility for providing peer review have an obligation to participate fully and knowledgeably in review processes, to exercise the standards established in faculty role 3335-6-02 and other standards specific to the academic unit and discipline, and to make negative recommendations when these are warranted to maintain and improve the quality of the faculty. Recommendations by the faculty vested with the responsibility for providing peer review will be accepted unless they are not supported by the evidence presented regarding how the candidate meets the standards established in faculty rule 3335-6-02 and other standards specific to the academic unit and discipline. When, for the reasons just stated, a decision regarding faculty appointment, reappointment, or promotion and tenure differs from the recommendation of the faculty, the administrator or body making that decision will communicate in writing to the faculty body that made the recommendation the reasons that the recommendation was judged not to be supported by the evidence.

(B) In accordance with a policy of equality of opportunity, decisions concerning appointment, reappointment, and promotion and tenure shall be free of discrimination as to race, creed, religion, national origin, age, sex, disability, Vietnam-era veteran status, or sexual orientation.

III. DEPARTMENT MISSION AND VISION

The Department of Plant Pathology was established in 1967 as a unit of the College of Agriculture, The Ohio State University. The name of the College has since been changed to the College of Food, Agricultural and Environmental Sciences.

The mission of the Department of Plant Pathology at The Ohio State University (adopted by the faculty in 1995, amended 2000, 2001 and 2008) is critical to and supports the strategic missions of the University and the College of Food, Agricultural, and Environmental Sciences. The faculty, staff and students of the Department of Plant Pathology, through their research, teaching and outreach engagement efforts directly address key facets of the three CFAES’ strategic signature areas of 1) food safety / security and human health; 2) environmental quality and sustainability; and 3) advanced bioenergy and biobased products. Faculty within the department communicate unbiased information to citizens around the globe.

The OSU Department of Plant Pathology is the sole academic unit dedicated to plant health and agricultural microbiology in Ohio's Higher Education system and is one of only 16 stand-alone plant pathology departments in the U.S. Our vision is to be considered the most credible source of unbiased, science-based information in the U.S. on plant diseases and plant health management. We strive to be recognized as a leader, both nationally and internationally, for the highest quality research and educational programs on plant-microbe interactions and plant health management.
IV. APPOINTMENTS

A. Criteria for appointment

In light of the stated mission of The Ohio State University to attain "international distinction in education, scholarship, and public service", the Department of Plant Pathology commits itself to appointing to the faculty only those persons who will enhance or have strong potential to enhance the quality of the Department and advance its mission as stated above in Section III. Criteria for appointment shall follow Faculty Rule 3335-6-02 *Criteria for appointment, reappointment, and promotion and tenure*.

1. Tenure Track faculty

A minimum requirement for appointment at the rank of assistant professor is completion of an earned doctorate in plant pathology or a related field of study. In addition, the candidate must have a record of scholarly achievement that demonstrates, as judged by the faculty, a strong potential to attain tenure and advance through the faculty ranks. Criteria for appointment at higher ranks will be consistent with criteria for promotion to those ranks discussed herein in Section VII *Reviews for Promotion and Tenure and for Promotion*.

Probationary periods of appointment of tenure track faculty will be in accordance with Faculty Rule 3335-6-03 *Probationary service, duration of appointments for regular faculty*. An appointment to the rank of assistant professor is always probationary and may not exceed six years, including prior outside service credit. An assistant professor is reviewed for promotion and tenure no later than the sixth year of appointment as an assistant professor and informed by the end of the sixth year as to whether promotion and tenure will be granted at the beginning of the seventh year. An appointment as professor or associate professor will generally entail tenure. However, a probationary period not to exceed four years may be granted by the Office of Academic Affairs upon petition of the Department and the College of Food, Agricultural and Environmental Sciences. Faculty Rule 3335-6-03, paragraph D (*Exclusion of time from probationary periods*) provides for time to be excluded from the probationary period for birth or adoption of a child, personal illness, care of sick or injured persons, or other factors beyond a faculty member's control that significantly interfered with productivity. Although probationary faculty may apply for consideration of an exclusion at any time within the limits of the rule, individuals are not required to apply for excluded time under any circumstances.

2. Auxiliary faculty

Auxiliary faculty include compensated and no-salary faculty who serve the Department in some significant capacity but are not in tenure-track positions at the University. In the Department of Plant Pathology, compensated auxiliary faculty, who are hired to perform a specific service, may
include visiting faculty on leave from other academic institutions or temporary faculty. No-salary auxiliary faculty may include visiting faculty on leave from other academic institutions and adjunct faculty. Adjunct faculty include government scientists (primarily employees of the United States Department of Agriculture) who are housed within the Department and other allied professionals who contribute in a significant way to the academic work of the Department. All auxiliary appointments are made for only one year and require formal annual renewal if they are to be continued. Appointments of visiting faculty may not exceed three continuous years.

Visiting faculty who hold academic titles at other academic institutions will be appointed at the same rank they hold at their own institution with the modified title of Visiting Associate Professor, etc. Adjunct faculty, whether or not they are housed within the Department of Plant Pathology, will be expected to have substantial involvement in the academic work of the Department, including such activities as participation or substantial collaboration in Departmental research programs, advising students, providing seminars or guest lectures in courses, serving on Department committees, and/or appropriate outreach activities. Criteria for appointment to and promotion in academic rank for adjunct faculty shall be the same as for tenure-track faculty. Adjunct faculty will hold modified titles of Adjunct Associate Professor, etc.

3. Courtesy faculty

Courtesy faculty have no-salary joint appointments to the Department of Plant Pathology. Appointees are regular Ohio State University faculty from other tenure initiating units. Courtesy appointments will be made only for faculty who are substantially involved in the academic work of the Department. This may include significant involvement or collaboration in departmental research programs, and/or participation in activities such as advising plant pathology students, team teaching in departmental or cross-listed courses, providing guest lectures, or participation in departmental extension programming. Courtesy appointments are made at the same rank held in their home Department. Courtesy appointments do not require formal annual renewal, but continuation will require ongoing contributions to departmental activities.

4. Emeritus faculty

Emeritus faculty have no-salary appointments in the Department of Plant Pathology. Appointments as emeritus faculty are made only for retired faculty of the University who had been regular faculty members in the Department prior to retirement, and who have made a request to the Department for emeritus status. Emeritus faculty do not require formal annual review.

Emeritus faculty may not vote in the governance of the Department or participate in promotion and tenure decisions. Office, laboratory, and other facilities may be provided to emeritus faculty members, depending on the available resources and the stated needs of the retired individual. The Chairperson makes all decisions regarding use of facilities. Use of departmental resources will be evaluated yearly by the Chairperson.
B. Search and appointment procedures

1. Tenure track faculty

For each prospective tenure track faculty position, the Chairperson will appoint a search committee composed of four Department faculty. Faculty from both campuses will be included on all search committees, typically two from the Columbus campus and two from the Wooster campus. A fifth member from another academic unit with activities relevant to the position will usually be appointed as a member of each search committee. The Chairperson will appoint one of the members of the search committee to serve as committee Chairperson, usually one of the departmental faculty residing at the campus on which the new appointment is to be made. The Chairperson will also appoint one of the committee members (other than the Chairperson) as the Procedures Oversight Designee’ (formerly known as the Affirmative Action’ representative). The committee will develop a position description, which must be approved by the Chairperson and by a majority vote of the faculty. The Chairperson will then submit the position description and a justification statement to the administrative cabinet of the College of Food, Agricultural and Environmental Sciences to obtain permission to initiate a search.

All search procedures for tenure track faculty will be in accordance with University procedures as outlined in the bulletin A Guide to Effective Searches published by the Office of Human Resources and the Office of Academic Affairs, and with guidelines from the College of Food, Agricultural and Environmental Sciences. The position will be advertised in an appropriate manner to attract national and international attention to the opening. Vigorous efforts will be taken to attract a diverse pool of highly qualified candidates. Complete records will be kept of the manner in which the search is conducted and of all contacts with prospective candidates. Application files will be kept in a secure location, but made accessible to all Department faculty for their review. Following the open application period, members of the search committee will carefully review the files of all applicants and seek relevant information from other sources as appropriate. The criteria used in evaluation of the candidates and all records of the search process will be documented. All Department faculty will be encouraged to review the files at this time and make their views known to members of the search committee. Based on their own views, and comments from the faculty and the Chairperson, the search committee will select the applicants for interview (usually 3 or 4 individuals). The committee chair will notify the Chairperson in writing of their choices, listing criteria for the selection of these candidates based solely on valid academic experience and achievement.

The Chairperson and search committee chair will together arrange for and conduct campus interviews of the final candidates. Interview procedures will include visits to both the Columbus and Wooster campuses, presentation of a formal seminar, visits with appropriate administrators of the College of Food, Agricultural and Environmental Sciences, and the opportunity for each member of the faculty to visit with each candidate either privately or in small groups of faculty. Following completion of the interviews, the Chairperson will call a meeting of the entire faculty to discuss the
candidates. After full discussion of all candidates, a vote of the entire faculty will be taken. If a candidate receives a positive vote from \( \frac{2}{3} \) of the faculty who participated in the interview process (including the Chairperson), the voting process will be considered complete and the Chairperson will forward a recommendation to the Dean of the college to extend an offer to this candidate. If no candidate receives support from at least \( \frac{2}{3} \) of the faculty in the initial vote, discussion will then be re-opened. Following discussion, the faculty will vote again to see if any of the interviewed candidates is found acceptable to at least \( \frac{2}{3} \) of the faculty. If, after discussion and several ballots, no candidate ultimately receives support from \( \frac{2}{3} \) of the faculty, further candidates will be interviewed until a candidate can be found who engenders such support. All offers at the rank of associate professor or professor, with or without tenure, and all offers involving the acceptance of prior service credit require the prior approval of the Office of Academic Affairs. Offers to foreign nationals require prior consultation with the Office of International Education.

Faculty members may be selected through the actions of an Interdisciplinary Program of the University, using procedures approved for the specific Interdisciplinary Program. A candidate can request academic appointment (i.e., tenure-initiating-unit appointment) in the Department of Plant Pathology after the person has been selected by the members of the Interdisciplinary Program. Such a request must include a copy of the curriculum vitae of the candidate, and a letter outlining the reasons for desiring the appointment in the Department. The Chairperson will call a meeting of the faculty to discuss the candidate, and then a vote will be taken of the full faculty (including the Chairperson). A candidate must receive a \( \frac{2}{3} \) positive vote for appointment. The Chairperson informs the Dean of the college and the administrative leader of the Interdisciplinary Program in writing of the outcome of the vote.

2. Auxiliary faculty

Visiting faculty usually come to the Department as a result of an association with an individual member of the faculty and plan to work in their laboratory for a defined period of time while they are on leave from their own institution. Appointments of visiting faculty are made by approval of the Chairperson following the development and approval of specific plans for scholarly activities to be undertaken during the time the visiting faculty member will be in residence in the Department. Appointment for more than one year requires a majority vote of the faculty. Scientists from outside the University may work in faculty laboratories without appointment for up to three months with permission of the Chairperson.

Adjunct faculty usually come to the Department as a result of: 1) their employment as a scientist within a unit of a governmental research organization (usually the United States Department of Agriculture) located on the Columbus or Wooster campus, 2) their interest in direct participation or collaboration in the academic programs of the Department, and 3) the Department's willingness to provide them with office and/or laboratory space. Request for an adjunct appointment in the Department for a government scientist will usually follow appointment of the person to a scientific position by the governmental agency and may be initiated by the scientist or by faculty members of the Department. In some cases, requests for adjunct status may come from allied professionals not
in residence within the Department (i.e., using office and/or laboratory facilities under Departmental control) who wish to participate in the academic programs of the Department. In all cases of requests for adjunct status, a complete, updated curriculum vita of the candidate will be submitted to the Chairperson who will transmit copies to all Department faculty. At a faculty meeting, the candidate will appear before the faculty, indicate his/her interest in joining the Department with adjunct faculty status, and outline the role that he/she intends to take in the academic programs of the Department. Adjunct status will be granted upon a positive vote of the faculty present and approval of the Chairperson, the Dean of the college, and the Office of Academic Affairs. Adjunct faculty may participate in all Departmental activities but are not accorded voting rights. The activities of adjunct faculty resident within the Department will be reviewed annually by the same procedures used for regular faculty, discussed herein in Section V. Annual reviews. The activities of all other adjunct faculty will be reviewed annually by the Chairperson and brought to the attention of the faculty. If at any time the regular faculty of the Department judge that any adjunct member of the faculty has not maintained a substantial involvement in the academic work of the Department, renewal of adjunct status can be disapproved by majority vote of the regular faculty, effective at the end of any annual appointment period. If adjunct status is revoked, further use of departmental space and facilities will be reevaluated and may be denied by the Chairperson if no longer deemed appropriate.

3. Courtesy faculty

Request for a courtesy appointment in the Department for a faculty member from another tenure initiating unit within the University may be initiated by that person or by faculty members of the Department. A complete, updated curriculum vita of the candidate will be submitted to the Chairperson who will transmit copies to all Department faculty. At a faculty meeting, the candidate will appear before the faculty, indicate his/her interest in joining the Department with courtesy faculty status, and outline the role that he/she intends to take in the academic programs of the Department. Courtesy faculty status, at the same rank as in the tenure initiating unit, will be granted upon a majority vote of the faculty and approval of the Chairperson. Courtesy faculty may participate in all Departmental activities but are not accorded voting rights. The activities of courtesy faculty will be reviewed annually by the Chairperson and brought to the attention of the faculty. If at any time the faculty of the Department judge that a courtesy member of the faculty has not maintained a substantial involvement in the academic work of the Department, courtesy faculty status can be disapproved by majority vote of the faculty, effective at the end of any academic year. If courtesy status is revoked, further use of Departmental space and facilities, if any, will be reevaluated and may be denied by the Chairperson if no longer deemed appropriate.

4. Emeritus faculty

Request for appointment as an emeritus faculty member must originate with the retired or retiring faculty member. Typically, the request is made in a letter to the Chairperson 3 months before or after the retirement date. The Chairperson then conducts a vote of the full faculty (including the Chairperson) for appointment. A positive vote is necessary for appointment. The Chairperson
notifies the retired faculty member and Dean of the college in writing of the outcome of the vote. No annual reappointment is necessary.

C. Nature of appointments for tenure-track faculty

Tenure-track faculty members in the Department of Plant Pathology have appointments in one or more areas from three separate funding sources: The Ohio State University general fund (OSU); Ohio Agricultural Research and Development Center (OARDC); and The Ohio State University Extension (OSUE). An OSU appointment is primarily for classroom teaching and student advising, but also includes broad scholarly activity. An appointment with OARDC is primarily for research directed towards the OARDC mission. An appointment with OSUE is for extension (outreach) teaching. All faculty appointments, regardless of funding source, carry responsibility for graduate student advising and for scholarly activity.

V. ANNUAL REVIEWS

The Department of Plant Pathology has a longstanding tradition of conducting two types of annual peer reviews of faculty performance, each with a unique and specific purpose. The ANNUAL PROMOTION AND TENURE REVIEW is held each June by the Departmental Promotion and Tenure (DPT) Committee. At this time, the DPT committee meets individually with each member of the Department faculty to obtain his/her views on the progress towards promotion and tenure of each promotion and tenure-eligible member of the Department faculty. Membership on the DPT committee, the role of the DPT committee in annual reviews for promotion and tenure, and the procedures used by this Department for evaluation of probationary and tenured faculty for promotion and tenure are discussed herein in Section VII, Reviews for Promotion and Tenure and for Promotion. Further discussion of annual reviews in this section shall be limited to the second peer review procedure used by this Department, the ANNUAL PROGRAM REVIEW.

A. Program Review Committee

The program review of each faculty member in the Department is conducted annually, generally in January or February, by the Program Review (PR) Committee. The PR committee consists of six persons: the Chairperson and associate chair (ex officio), the two professors who are elected by the faculty during the previous year to serve on the DPT committee the summer prior to the faculty program review, and two additional faculty members (any rank), preferably one each from the Columbus and Wooster campuses, who are elected by the faculty during the previous year to serve on this committee for a 1-year term. Election of these latter two members normally occurs in September prior to the review. If any of the four elected members of the PR committee becomes unavailable and cannot serve on the review, then the Chairperson shall appoint a replacement.
purpose of the Program Review is: 1) to evaluate the extent and quality of the teaching, extension, student advising, research, and service activities of each member of the Department faculty during the previous calendar year, 2) to engage each faculty member in a constructive, evaluative discussion of his/her performance, 3) to review with each faculty member their plans for the coming year as outlined in their Annual Statement of Responsibilities and Expectations and any associated changes in their Position Description, and 4) to make recommendations to the Chairperson regarding the content of the Chairperson's annual performance review letter written to each faculty member.

B. Program review document and review sessions

Each year in advance of the program review, every faculty member prepares an annual program review document according to procedures specified by the Chairperson. This document, usually submitted to the Departmental office by a specified date in early January, includes: 1) all accomplishments by the faculty member in teaching, extension, student advising, scholarship, and service during the previous calendar year and any indicators of quality or impact of performance, either as an individual or member of a team; 2) an Annual Statement of Responsibilities and Expectations that outlines his/her plans for the coming year, and 3) a Position Description that briefly outlines the overall responsibilities of the position in the areas of teaching (classroom and extension), research and/or creative scholarly work, outreach, and service, and any requested changes in this description. Members of the PR committee have access to the program review documents of all faculty and are requested to read them prior to the actual review. Copies of the previous three years’ annual performance review letters for all faculty are made available to the committee. Review sessions are conducted on both the Columbus and Wooster campuses. In each session, the FPR committee meets with each member of the faculty for up to one hour. During the meeting, the faculty member is given the opportunity to highlight to the committee his/her most significant accomplishments during the previous year. Members of the committee ask pertinent questions and provide constructive comments to the faculty member on his/her performance and plans for the coming year as outlined in the Annual Statement of Responsibilities and Expectations. Any proposed changes in the Position Description are discussed, but changes must be approved by the Chairperson in private dialogue with the faculty member. A make-up review session is held for faculty who are unable to schedule their review during the primary meetings of the FPR committee. Make-up reviews may be scheduled with one or more members of the committee linked up via telephone.

C. Performance letters

Following completion of all reviews, the PR committee makes recommendations to the Chairperson regarding comments that should be included in the annual performance review letter written to each faculty member. The Chairperson, with the assistance of the associate chair, then prepares draft performance review letters for each member of the faculty. These letters include background information on their current appointment (including percent OSU/OSUE/OARDC, as described in Section IV.C [page 8], of this document) and years since appointment or last promotion (assistant and associate professors). Comments are then made on their performance during the last calendar year in teaching and/or extension, scholarship, and service, as compared with goals set at the last
review in their Annual Statement of Responsibilities and Expectations and their Position Description. Comments are made on their plans for the coming year and suggestions are made for improvement as appropriate. Draft letters are given to all members of the FPR committee for further comment. After receiving final comments from committee members, the Chairperson, with the assistance of the associate chair, prepares the final letters, delivers them to each faculty member, and places a copy in their personnel file. Copies of the final letters are made available to members of the FPR committee for their review, but are not retained by them. If a faculty member wishes to write a rebuttal to his/her performance review letter, he/she may do so and a copy of the rebuttal will be attached to the copy of the performance review letter that is retained in the faculty member's personnel file. Although individual meetings with the Chairperson are not scheduled annually for each faculty member to discuss his/her performance evaluation, such a meeting will be scheduled following delivery of the annual performance review letter if requested by either the Chairperson or the faculty member.

VI. MERIT SALARY INCREASES AND OTHER REWARDS

A. Criteria

Acceptable work is required of all faculty members -- exceptional work will be rewarded. All faculty are expected to demonstrate continued intellectual engagement as members of this Department. Annual salary increases will be given to faculty based solely on meritorious performance, except in cases when a "cost of living" increase for all employees is mandated by the University. In determining merit, consideration will be given to performance during the previous year, to the record of performance during the past several years, and to the appropriateness of the salary level with regard to the individual's overall record of accomplishments. Consideration also will be given to the achievement of any specific written goals as specified in the previous annual performance review letter to the individual from the Chairperson.

Faculty performance will be evaluated in light of individual contributions made to advancement of the Department's mission, as stated herein in Section III. The roles and responsibilities of individual faculty with regard to components of the Departmental mission vary considerably and are reflected by their appointment (see section IV.C, page 8). However, all faculty are expected to advise graduate students and to engage in scholarly activity. Most faculty in the Department of Plant Pathology have appointments that are split among two, or in some cases all three areas of responsibility (OSU/OARDC/OSUE). In making judgments about faculty performance, expectations for accomplishments will be related to the relative proportion of assigned responsibilities in each area. Additional details of performance expectations in each of these areas are specified herein in Section VII of this document.

The mission of the Department and the necessity for positive interactions and contributions within the community of scholars cannot be achieved without the demonstration of faculty citizenship and collegiality. All faculty members are expected to make positive contributions with respect to
academic service, contribute to and participate in professional organizations and activities, and contribute to and participate in the academic functions of the Department. Areas of participation include: attendance and participation in seminars, invited speaker programs, faculty meetings, committee meetings, student activities where faculty participation is expected or invited, etc. Faculty members also are expected to demonstrate respect and responsible behavior towards peers, staff, students and customers. In this regard, a record of good citizenship within the Department will be an important consideration when evaluating faculty performance for the determination of salary increases, although this will be considered as a part of the evaluation of teaching performance, scholarship and quality of service provided. Special consideration will be given to faculty who provide extraordinary service, but this will not relieve them of demonstrating excellence in scholarly activities.

Faculty who are on professional leave, serving as visiting professors, or participating professionally in approved off-campus assignments, will not be penalized by loss of a salary increase while away from the Department. In these cases, the faculty member will provide to the Chairperson and associate chair a timely progress report of his/her activities containing sufficient information for their review.

B. Procedure for determining annual merit increases

Among the most important decisions made by the Chairperson and associate chair are those concerned with recommendations for annual salary increases. All available information will be carefully weighed in making salary decisions. The Chairperson and associate chair will stay abreast of activities of all faculty members by keeping thorough records, by frequent consultation with each faculty member, by holding meetings of the entire faculty, and by any other communication needed to stay in touch with faculty progress. In this regard, particular emphasis will be given to the ANNUAL FACULTY PROGRAM REVIEW and the ANNUAL PROMOTION AND TENURE REVIEW. Information obtained from both these review sessions and from written documents submitted by each faculty member prior to each review (updated P&T dossiers and Faculty Program Review reports) will be weighed carefully when evaluating faculty performance. No mathematical formula will be used for evaluation of faculty, but consideration will be given to accomplishments in all areas of faculty responsibility, that is, teaching, scholarship, and service.

Determining recommendations for annual salary increases is particularly difficult because each department is allocated a fixed amount of funds that can be distributed as merit increases. Thus, for any person to receive an above-average salary increase, someone else must receive less. Working together, the Chairperson and associate chair will determine for each tenure-track faculty member a recommended salary increase based on the total funds available and the performance criteria specified above. In making this determination, consideration will be given not only to the percentage increase in salary represented by the proposed raise, but to its actual dollar amount, and to the appropriateness of the individual’s salary level with regard to his/her overall record of accomplishments and the salaries of other departmental faculty. In particularly meritorious cases,
applications to the Dean of the college will be made for special excellence/equity raises, if supplementary funds for such are available in a given year. Faculty that are promoted will also receive a promotional raise in addition to their annual supplement. A decision to recommend no salary increase is an option that will be considered in cases that are particularly non-meritorious. All salary recommendations will be brought to members of the Dean’s cabinet at a meeting called each year to obtain their comments and approval. Results of salary decisions will be communicated to each faculty member in writing, usually in June, when final approvals have been received.

Faculty who have concerns about their salary or annual adjustments to their salary should schedule a meeting with the Chairperson to discuss their concerns and obtain explanations for decisions that have been made regarding their salary. If they are still not satisfied, they may appeal their case to the Faculty Salary Grievance Committee of the FAES Faculty Council. In order to be eligible to have their appeal considered, faculty must 1) be regular faculty members, 2) have not had a salary appeal decision rendered by this body in the last three academic years, and 3) demonstrate that their salary is at least 5% below the average salary of all other faculty in the department of the same rank. In this regard, the faculty of the Department of Plant Pathology voted on October 29, 1998, that ‘there are no apparent distinct salary markets among faculty in the Department of Plant Pathology’ and thus all salary grievance comparisons will be made with the average salary of all faculty within a given rank, exclusive of the Chairperson. Appeals to the Faculty Salary Grievance Committee must be initiated no later than October 31 in order to facilitate completion of the review before salary recommendations are made for the next academic year.

C. Other rewards

Allocation of Departmental resources for use by individual faculty in the conduct of their specific research, teaching and/or extension programs will be based on their need for these resources, the availability of the resources within the Department, and the record of the faculty member in productive use of Departmental resources. Departmental resources include laboratory and office space, Departmental equipment, assigned laboratory technicians, and allocated Departmental operational funds. Decisions regarding allocation and reallocation of Departmental resources to individual faculty will be made by the Chairperson and associate chair on the basis of merit using the same criteria specified above for merit salary increases.

VII. REVIEWS FOR PROMOTION AND TENURE AND FOR PROMOTION

A. General considerations

Promotion to associate professor and awarding of tenure, and promotion to full professor, are based on convincing evidence that the faculty member has achieved excellence as a scholar and teacher, and as one who provides effective service to the Department, College, University, and/or profession.
It should be emphasized that faculty members have appointments in one or more areas from three funding sources: OSU general funds, OARDC, and OSUE, as described in Section IV.C (page 8). Thus, faculty performance shall be evaluated in the context of their specific appointment, their position description, and their agreed-upon annual goals, with primary emphasis given to areas where the individual has more substantial commitments. In all instances, however, superior scholarship, in accordance with the criteria set forth in Faculty Rule 3335-6, is an essential qualification for promotion. Teaching, research and/or creative work, outreach, and service are not considered to be acts of scholarship, in and of themselves. Excellent performance in these activities will be rewarded with salary increases. However, for tenure and promotion in rank, sufficient evidence of superior scholarship is required.

**Teaching** in the Department of Plant Pathology includes activities such as formal (credit-earning) classroom teaching, continuing education, advising undergraduates and graduate students, directing thesis research and independent study projects, and/or extension (outreach) education. Depending on his/her appointment, an individual may have responsibility for none to several formal OSU courses. For extension or outreach education, teaching is through workshops, in-service’ training, short-courses, demonstrations in grower ‘field-days’, preparation of written and electronically-distributed educational materials, one-on-one instruction and diagnostic and clinical activities, and other non-degree educational programs. **Scholarship** in the Department occurs through individual or team-based accomplishments that lead to the generation of some element of creative or innovative activity that is peer reviewed and published in an appropriate form. Typically this involves research in any aspect of the nature and control of plant diseases and their impact on society. However, this also may include creative activity in any area relating our discipline to human society and its needs and/or to the development of new and innovative methods for teaching and extension in areas of expertise within plant pathology. To be considered scholarship, an activity must 1) lead to the creation of something that did not exist before; 2) must be validated by peers and by external sources, and 3) must exemplify one or more of the forms of discovery, integration, transformation, or application (see CFAES Faculty Reward System Guidelines for Annual Performance Review, Promotion, and Tenure). **Service** is expressed as: active participation in committees of the Department, College, or University; service to the profession and to professional organizations; and application of professional expertise in service to the community, state, and nation. In all cases, a high standard of Departmental and University citizenship is required as part of the service expectations for promotion and tenure. Citizenship is shown in terms of positive contributions to Departmental, College, and University committees; participation in Departmental activities; maintaining a high level of collegiality; and working towards the improvement and advancement of the Department, College, and University (see also Section IV.C, page 8). When faculty show special ability in service, this will be part of the consideration given during promotion and/or tenure review, but such special ability or performance in service will not relieve the candidate of demonstrating excellence in scholarship.

**B. Criteria for promotion and for tenure**

1. **Criteria: Promotion to rank of associate professor with tenure**
As specified by Faculty Rule 3335-6, tenure will not be awarded below the rank of associate professor. The awarding of tenure and promotion to the rank of associate professor must be based on evidence that the faculty member: 1) has achieved excellence as a teacher and scholar; 2) provides effective service; and 3) can be expected to continue a program of high quality teaching, scholarship, and service relevant to their specific appointment and the missions of the Department, College, and University. Every candidate will be held to a high overall standard of excellence, but the nature of the appointment (see Section IV.C, page 8) and assigned responsibilities will be of major importance in evaluating the candidate. That is, clear demonstration of excellence is essential in the areas central to the candidate’s assigned responsibilities. A less than excellent performance in the area of primary responsibility cannot be counterbalanced by excellence in an area of lesser responsibility.

2. **Criteria: Promotion to rank of professor**

Promotion to the rank of professor is based on convincing evidence that the faculty member: 1) has a sustained record of excellence in classroom teaching, student advising, and/or extension (outreach) education; 2) has produced a significant and focused body of scholarship that is nationally or internationally recognized for its impact on the field of plant pathology or related areas of science; and 3) has demonstrated leadership in service. Individuals seeking promotion to full professor will be assessed in relation to the nature of their appointment (OSU general funds, OARDC, OSUE [see Section IV.C, page 8]) and assigned responsibilities. Exceptional performance and leadership in the areas with greatest responsibilities are required. The Department expects an individual that is worthy of promotion to full professor to be a role model for less senior faculty, for students, and for the profession. Promotion to professor will not result from simply performing adequately for a given number of years as an associate professor.

C. **Procedures**

1. **General considerations**

The Department conducts two peer reviews annually. The **ANNUAL PROGRAM REVIEW** (see V, above) is a review of the academic programs for the previous calendar year of all faculty. The **PROMOTION AND TENURE REVIEW** is an assessment of all faculty who are not tenured full professors.

The purpose of the Department’s promotion and tenure review is to obtain a thorough, critical, and objective evaluation of the progress of all promotion and tenure eligible faculty towards promotion and tenure. Procedures for promotion and tenure reviews follow the policies set forth in Faculty Rule 3335-6-04 of the University, the procedural guidelines established by the office of academic affairs, and the specific policies established by the College. All candidates for promotion and tenure are reviewed by the eligible voting faculty (defined below), and by the Chairperson. Candidates will also be reviewed at the College and University levels. The Chairperson is responsible for informing the candidate in writing of the decisions by the eligible faculty of the Department, the Dean of the
college, and Executive Vice President and Provost (including the recommendation to the board of trustees).

2. Review procedures at the Department level

**DPT committee responsibility and composition.** The Departmental Promotion and Tenure (DPT) committee is charged with: 1) evaluating annually all candidates for promotion and tenure, or promotion and making recommendations to the Chairperson on P&T actions, 2) advising the Chairperson on content of annual P&T letters to all assistant and associate professors; 3) presenting the case of candidates to the eligible faculty (defined below) for their consideration and vote on promotion and tenure, or promotion; 4) advising the Chairperson annually on the reappointment of all probationary faculty; and 5) preparing a report for the Chairperson describing the eligible faculty’s and DPT committee’s assessment of quality and effectiveness of teaching, quality and significance of scholarship, and quality and effectiveness of service of candidates being submitted to the College for promotion and tenure consideration. The DPT committee shall consist of four tenured professors and the Chairperson (ex officio). Terms on the committee are for 2 years, with two new members elected every year, and the two senior members rotating off the committee. Members of the committee are elected by all faculty (not just those eligible to vote on promotion) in the Department. An individual cannot serve for consecutive terms; a minimum of one year must elapse from completion of a term on the committee before a faculty member can be elected to serve another term. Normally two of the elected members are based on the Columbus campus and two on the Wooster campus. If availability prevents two individuals from each campus from serving, then at least one faculty member on the committee must be from each campus. The chair of the DPT committee, hereafter referred to as the reporter, is elected by committee members for a one-year term, but can be reelected for a second one-year term. Ex officio members cannot serve as the reporter. Each year, the DPT committee also elects one of its members (other than the reporter) as the ‘Procedures Oversight Designee’ or POD. The two most recently elected members of the DPT committee serve the following winter as part of the Department’s Program Review (PR) Committee (see V, above); that is, these individuals serve a one-year term on the PR in the middle of their two-year term on the DPT committee. New DPT committee members normally are elected the September prior to the start of new deliberations in June. If a member of the DPT committee cannot serve, due to illness or other cause, then the Chairperson shall appoint a replacement.

**Eligible faculty.** Except for probationary professors, eligible faculty are tenured faculty members in the Department of higher rank than the candidate, excluding the Chairperson and members of the University administration. For tenure of probationary professors, eligible faculty are tenured professors excluding the Chairperson and members of the University administration. Eligible faculty with a conflict of interest (e.g., familial or comparable relationship with the candidate, business relationship with the candidate) will not vote.

**DPT committee meetings annual evaluations.** In early June of each year, the DPT committee starts its annual evaluation of candidates. All faculty members below the rank of professor and nontenured
professors are evaluated each year. The fourth year review of probationary faculty follows the same process as the review of all other faculty below the rank of tenured full professor, except that the Dean of the college must also approve the renewal of the appointment. A completely updated draft of the dossier for each candidate will be given to the DPT committee and made available to all faculty members in the Department at least 2 weeks prior to the deliberations of the DPT committee in June. All candidates must maintain an updated dossier in the format prescribed by the office of academic affairs. In addition, they must include their initial Position Description and all subsequent Annual Statements of Responsibilities and Expectations. Notification for the need of the draft dossier is given to the candidates by the Chairperson at least 2 months before the start of deliberations. The candidate has primary responsibility for preparing and maintaining a dossier documenting his or her career accomplishments, and for providing information on quality of teaching, scholarship, and service. The DPT committee and Chairperson will give advice on the proper preparation of the dossier.

The committee meets individually with every faculty member of the Department (both those eligible and not eligible to vote on promotion) to discuss the progress of all candidates. This is usually done in June. The purpose of these meetings is to obtain a peer evaluation of the accomplishments of each candidate in teaching, scholarship, and service. The candidates for promotion also meet with the DPT committee as part of this process to obtain their peer evaluations and for a presentation of their self evaluation. During this stage of the review, a report from the candidate’s teaching evaluation (TE) committee (see E.1, Documentation, below) is made available to the DPT committee. The candidate’s annual performance review letters and annual promotion and tenure review letters from the previous 3 years are made available to the DPT committee. The DPT committee will consider all of these discussions and all available documentation in arriving at its recommendations.

Solicitation of letters of evaluation. If it is time for mandatory review of probationary faculty (e.g., during the sixth year of the probationary period for assistant professors), or if sufficient accomplishments have been made for a faculty member not undergoing mandatory review (see below), outside letters of evaluation from peers shall be solicited. Evaluations from current or past students or from other clientele (e.g., growers, county agents, industry professionals) also may be solicited, as appropriate. The Chairperson has responsibility for obtaining letters of evaluation, based on names and credentials of individuals recommended by the DPT committee, the candidate, and his/her own judgement. No more than half of the letters in the final dossier can be from persons suggested by the candidate. The candidate can also suggest that certain individuals not be asked to write letters due to conflicts of interest or other legitimate causes. A minimum of five letters of evaluation will be obtained. The Chairperson shall follow University guidelines in wording the request for evaluation of the candidate. Evaluators may be asked to review different aspects of the candidate’s dossier, depending on the appointment of the individual and qualifications of the evaluator. For instance, if a candidate has appointments in OARDC and OSUE, different individuals may be asked to evaluate contributions in research and extension teaching. Evaluators will be given the most up-to-date draft of the candidate’s dossier and related documentation, such as reprints of journal articles or descriptions of teaching effectiveness. All solicited letters received must be included in the dossier. Unsolicited evaluations are not included. The decision to solicit letters and
continue with the review generally is made in June following the DPT annual evaluations.

**Non-mandatory review process.** In the case of faculty members not undergoing mandatory review, following evaluation of all promotion and tenure eligible faculty, members of the DPT committee come to agreement on whether each candidate’s accomplishments are sufficient to warrant a full review and vote by the eligible faculty. The committee then informs the Chairperson in writing of its recommendation. If the DPT committee recommends for or against full non-mandatory review of any probationary faculty member and the Chairperson agrees, the decision of the DPT committee is final. If the Chairperson disagrees with the DPT recommendation, a vote of the eligible faculty will be taken to decide if a full non-mandatory review will proceed. A majority positive vote of the eligible faculty will move a full non-mandatory review forward. In the case of associate professors, the same procedure will apply. In all cases, candidates are informed of the recommendation of the DPT committee regarding moving their case forward to a full review. Any faculty member not required to undergo mandatory review may decide that a full review (including solicitation of outside letters and putting forward the dossier for a vote of the eligible faculty) not be done, even if the DPT committee recommends that full review is warranted. In those cases, a full review is not initiated. If an associate professor makes a specific request in writing to the DPT for a full review, this request may be denied by this procedure for two successive years. However, if again in the third year this associate professor requests to the DPT that a full review be done, letters are solicited and the review moves forward even though the DPT committee continues not to recommend full evaluation. Normally, solicitation of letters, full review of the dossier, vote of the eligible faculty, and forwarding of the dossier to the Dean of the college are not done for associate or assistant professors with less than 5 years in rank. However, exceptional individuals with less time in rank can be fully evaluated and voted on by the eligible faculty if the DPT committee recommends that earlier promotion is reasonable.

**Annual voting on probationary faculty.** For all probationary faculty prior to the year of mandatory review, the DPT committee makes a recommendation to the Chairperson on renewal of the appointment. Nonrenewal of probationary faculty appointments must result from application of fourth year review procedures as specified in Faculty Rule 3335-6-03(C)(3). If the DPT committee recommends renewal and the Chairperson agrees, the reappointment is approved. If the DPT committee recommends nonrenewal, a letter shall be written to the Chairperson outlining reasons for the negative recommendation on this case. If the Chairperson believes renewal is appropriate, regardless of the recommendation of the DPT committee, the reappointment is approved. If the Chairperson agrees with the DPT committee that nonrenewal may be appropriate a vote of the eligible faculty shall take place. If the DPT committee recommends renewal, but the Chairperson believes that nonrenewal may be appropriate, the case also shall be directed to the eligible faculty for a vote. To conduct a vote on renewal, the chair of the DPT committee distributes ballots to the eligible faculty, along with a copy of the letter from the DPT committee to the Chairperson and the most recent version of the dossier of the probationary faculty member. If less than a majority (50%+1) of the voting eligible faculty recommend renewal of the appointment and the Chairperson agrees that nonrenewal is appropriate, or if the Chairperson independently decides that nonrenewal is appropriate regardless of the vote of the eligible faculty, he writes letters to the probationary
faculty member and Dean of the college to inform them of the numerical outcome of the vote and reasons for the decision. Then the entire dossier including these letters is sent to the Dean of the college who will make the final decision when there is a recommendation of nonrenewal for probationary faculty prior to the year of mandatory review. When probationary faculty undergo the ‘Fourth Year Review’, a vote of the eligible faculty is taken as above. Then, regardless of the decision, the entire dossier and a letter of assessment, which includes the result of the vote, is written by the Chairperson and submitted to the Dean of the college who must decide on approval or disapproval of the renewal of the appointment. Probationary faculty are notified each year in writing by the Chairperson regarding the decision on their appointment renewal, usually as part of the annual evaluation letter (see below).

Discussion and voting on final dossier of candidates. Once a final copy of the complete dossier is prepared for a faculty member eligible for promotion, including the letters of evaluation, the Chairperson makes the final dossier available to all eligible faculty for evaluation and vote. The Chairperson, or designee, verifies the accuracy of citations, the Position Description and annual Statements of Responsibilities and Expectations, and other aspects of the dossier. The dossier is available for at least one week. This is normally done in early September. Then, the DPT committee presents the case of the candidate for promotion in a meeting of the eligible faculty members. The presentation by the reporter of the DPT committee summarizes the dossier and gives the strengths and weaknesses of the case. The eligible faculty must judge performance against the original Position Description and the sequence of Annual Responsibilities and Expectations Statements. After a general discussion, the DPT committee distributes ballots to the eligible faculty and counts the votes. A 2/3 positive vote of the total eligible faculty present for the discussion and voting is required for a positive recommendation. The reporter of the DPT committee then prepares a report on the faculty assessment, including the numerical vote of the eligible faculty, and a summary of the eligible faculty’s evaluation (based on the initial discussions with all faculty and subsequent discussion of the final dossier in the meeting of eligible faculty), and forwards the report to the Chairperson for inclusion in the dossier.

Evaluation letter by Department Chairperson and candidate’s potential response. The Chairperson then prepares a detailed written assessment of the candidate and his/her recommendation regarding promotion, or promotion and tenure, and includes this letter as part of the dossier package. As soon as the faculty report and Chairperson’s letter have been completed, the candidate is notified in writing by the Chairperson of the completion of the review by the Department and of the availability of the complete dossier package. The candidate must notify the Chairperson in writing within 5 calendar days of notification of the completion of the review whether or not he/she wishes to see a copy of the complete dossier package (including all internal and external reports and letters of evaluation). If the candidate chooses to examine the complete dossier package, he/she may provide the Chairperson with written comments on the Departmental review for inclusion in the dossier package within 10 calendar days of notification of the completion of the review. The DPT committee and/or Chairperson may provide written responses to the candidate’s comments for inclusion in the dossier package. Only one iteration of comments on the Departmental level review is permitted.
**Forwarding of the dossier.** For mandatory review of probationary faculty, the Chairperson shall forward the complete dossier package, with all internal and external evaluations, candidate comments on the Department review, and DPT committee and/or Chairperson responses to those comments, if any, to the Dean of the college. Forwarding the dossier to the Dean of the college occurs regardless of the recommendations of the eligible faculty or Chairperson for mandatory review of probationary faculty. For nonmandatory review of candidates for promotion and tenure, or for promotion, once external letters of evaluation have been sought only the candidate may stop the review process (e.g., discussion and voting by the eligible faculty, letters by the DPT committee and Chairperson, and forwarding of the dossier package to the Dean of the college). The candidate may withdraw from review at any stage by so informing the Chairperson in writing. If the review process has moved beyond the Department, the Chairperson shall inform in writing the Dean of the college or the Executive Vice President and Provost, as relevant, of the candidate’s withdrawal. Withdrawal from mandatory tenure review during the final probationary year means that tenure will not be granted.

**Annual promotion and tenure evaluation letters from Department Chairperson to all faculty below rank of tenured full professor.** Each year a letter is written to every faculty member below the rank of tenured full professor that summarizes the DPT review for the given year, whether or not a complete dossier package (including outside letters) is prepared and a full review conducted. The letter is written by the Chairperson, with input from all members of the DPT committee. The letter contains a constructive and candid appraisal of the progress the candidate is making in teaching, research, and service. Areas that need improvement are emphasized, with recommendations for achieving high quality performance. The Chairperson delivers the letter to each faculty member and places a copy in his/her personnel file. A copy of the letter is forwarded to the Dean of the college for each probationary faculty member. Copies of the final letters are made available to members of the DPT committee for their review, but are not retained by them.

**D. Documentation**

All candidates for tenure and promotion must demonstrate and document clear excellence in teaching (degree granting or extension/outreach), research or other forms of scholarship, and service. The nature and extent of the contribution will be commensurate with assigned responsibilities and the amount of time allocated for each activity.

1. **Teaching**

Documentation of teaching excellence for all candidates shall consist of student evaluations, peer evaluations, and a self evaluation. However, specific documents will depend on the type of teaching activity in which the candidate is involved. For instance, evaluation of extension outreach teaching will be substantially different from evaluation of credit-based classroom teaching. In all cases, however, excellence requires demonstrated high-level accomplishment for most of the following
measures of teaching:

- Mastery of the subject matter;
- Continuous growth in subject matter knowledge;
- Ability to organize and communicate class material with logic, conviction, and enthusiasm;
- Objectivity;
- Contributions to curricula or program development;
- Creativity in course or program development, methods of presentation and incorporation of new materials and ideas;
- Capacity to enhance students’ awareness of the relationship between subjects studied, important problems, and other fields of knowledge;
- Advising undergraduates, graduate students, and extension clientele; and
- Directing graduate and undergraduate research programs.

In addition to the above, the following measures of teaching performance are expected of extension teachers:

- An understanding of the needs for knowledge by outreach students/clients/users;
- The ability to communicate effectively with outreach students;
- The ability to anticipate the needs of outreach students and respond with appropriate educational activities;
- The development and delivery of outreach education programs;
- Changed practices, policies or behavior from outreach education;
- The development of teaching materials; and
- Extension publications and juried presentations.

**Teaching Evaluation committee Responsibility and composition.** To ensure that a constructive and systematic review of teaching is performed, a Teaching Evaluation (TE) Committee will be appointed by the Chairperson for all promotion-and-tenure-eligible faculty. The TE committee consists of two tenured faculty members from the Department who are senior in rank to the candidate, and they will serve in this role for the duration of time that the person is in rank. That is, a TE committee will be formed for a newly-appointed faculty member and another TE committee will be established when the faculty member is promoted to associate professor. A change in the committee membership may be approved by the Chairperson when a committee member is not available, or when a member or the candidate requests to the Chairperson (with cause) that the membership change. The functions of the TE committee will be to counsel with the candidate, coordinate the evaluation of his/her performance in teaching and extension education, make an annual report on his/her progress each June to the DPT committee, and assist and actively mentor the candidate in assembling pertinent evaluative information for inclusion in his/her dossier.

The TE committee has responsibility for working with the candidate regarding the ongoing systematic appraisal of teaching performance. Members of the TE committee work with the
candidate over time to develop and implement a strategy for the evaluation of teaching (classroom or extension). That is, the TE committee will determine, after consultations with the candidate, the appropriate evaluations of teaching based on the appointment of the candidate. This is a pro-active procedure in that many of the decisions on teaching evaluation methods will be made before the teaching is performed. The TE committee will provide a written report annually to the DPT committee during their deliberations each June.

Student evaluations of individual courses are required for every regular (credit-based) classroom course taught. University-supplied SEI evaluation forms will be used for all classes, although more specialized evaluation forms can be used to supplement university forms. The TE committee of the candidate will determine procedures for the distribution and collection of evaluation forms, and the compiling and comparison of results. Evaluation forms will be distributed by someone identified by the TE committee (not the candidate) and will be returned to the TE committee. The summary SEI report from the university should be given directly to the TE committee. Because extension (outreach) teaching is done in situations that are much more variable than classroom teaching, evaluation of extension (outreach) presentations will be done using the EEET instrument provided by OSUE where this is deemed appropriate by the TE committee. Where use of the EEET is deemed inappropriate, other approaches may be used as approved by the TE committee.

For faculty members with substantial classroom teaching responsibilities, additional means of student evaluation are appropriate, as decided by the TE committee. These may include exit interviews of undergraduate advisees and surveys of former students. Letters of evaluation from former graduate students may also be appropriate in many cases. The TE committee will select the students to provide the evaluations.

The TE committee takes responsibility for the oversight of the peer review of teaching. In this capacity, the TE committee may ask other faculty to observe the classroom and/or extension presentations, depending on the area of specialization of the candidate, and give a report to the TE committee, or members of the TE committee may do this directly. Peer evaluation of classroom teaching should include TE committee review of course materials, including syllabi, exams, and instructional material, as well as observations of classroom teaching. Course material may be sent to faculty at other universities in the same specialty for appraisal. These evaluations will be done as part of an organized plan, determined in the periodic meetings of the TE committee with the candidate, rather than by haphazard appearance of evaluators at lectures. Representative lectures from all courses will be observed. Peer evaluation of extension (outreach) teaching includes TE committee review of extension publications (e.g., Newsletters, Fact Sheets, Bulletins, Electronic Media products, etc.), computer programs, teaching material (e.g., slides, overheads, electronic and computer demonstrations), and observations of extension presentations. Peer evaluations of teaching materials will also be solicited from extension faculty in other universities, if appropriate. Surveys of county agents or district specialists in OSUE, using evaluation instruments developed by OSUE, may provide information relevant for peer evaluation. However, county agents and district specialists can also be considered students of the candidate in that instructional material is often aimed at these individuals. Thus, flexibility must be shown in evaluation of extension teaching.
Other forms of teaching evaluation used by the TE committee may include assessment of the success of the candidate’s former graduate students and post-docs; extent to which teaching materials developed by the candidate have been adopted by faculty at other institutions; extent to which the candidate is invited to provide expertise on teaching; extent to which the candidate is requested to give invited lectures (including extension presentations) in other departments, or other universities, or states; membership on national teaching committees; and teaching awards.

A self-evaluation of teaching (classroom and/or extension) will be conducted through the preparation of a statement by the candidate of his or her approach to, and goals for, teaching; self-assessment of accomplishments; and a description of the strategies for improvement. A draft of this statement will be prepared after two years in rank and shared with the TE committee for evaluations and feedback. This self-evaluation statement should be revised at least every other year.

**Annual Teaching Evaluation letters.** As indicated above, each TE committee will provide a written report annually to the DPT committee during their deliberations each June. This is required every year, even if the candidate did not engage in any direct classroom or extension education efforts during that year. TE letters should address all teaching activities of the candidate since the last letter was written to the DPT committee. Assessments should be made wherever appropriate on any or all of the measures of teaching effectiveness listed above. These are outlined in the APT document of the College of Food, Agricultural, and Environmental Sciences in Section VI.A.1, and in the CFAES Faculty Reward System Guidelines.

Teaching Evaluation letters should be addressed to the entire DPT committee, listing the chair of the committee first and then the others by name. The original TE letter with signatures will be placed in each candidate’s official file maintained in the Columbus office. Copies of each TE letter will be distributed to all current members of the DPT committee for their use during the annual review process, but following completion of this process, all copies will be destroyed except for one set that will be maintained in the Wooster office. Each TE committee will give a copy of the TE letter to the candidate for whom the letter was written to provide annual feedback on evaluation of their teaching effectiveness. The TE committee should schedule a time to meet with the candidate to discuss points in the letter if either the committee members or the candidate wishes to do so. Copies of TE letters WILL NOT be made available each year to the faculty at large during the annual evaluation process. Updated dossiers which are made available annually to all faculty members include only the ‘Core’ portion of the document which outlines accomplishments, but does not include evaluative material. However, when a case comes to the eligible faculty for P&T consideration, all TE letters will be made available to all eligible faculty. At that time, a series of TE letters will exist and progress in teaching effectiveness can be seen.

2. Scholarship

Excellence of scholarship is indicated by validation of the candidate’s work by their peers. For most faculty in the Department, the primary demonstration of scholarship is publication of results of
scholarly activity in peer-reviewed scientific journals, books, and the invited presentation of research results at professional meetings or seminars. For some faculty members, other scholarly output may be as important as journal articles. Examples include patents and the development of products or processes used by University customers (e.g., plant cultivars and disease resistant germplasm, new disease management programs) or the development of peer-reviewed extension or pedagogical publications. Less traditional forms of scholarly excellence could include computer-assisted learning material or computer software that has been judged to be of high quality and has been adopted by others, development of products which break new intellectual ground and enjoy substantial adoption, or new efforts in distance education which are used by peer institutions or peer-validated by some other means. In all cases, documentation of the quality of scholarly contributions or impact of the work as validated by peers is essential.

An essential part of the dossier of a candidate is a listing of the publications and other scholarly works and the description of the contribution of the candidate to each item. Significance of the contributions is the key factor in the evaluations, not simply the order of authors in multi-authored publications. The quality and appropriateness of the publication outlets (e.g., journals) will be evaluated in the review. Flexibility must be given here in the evaluation because one peer-reviewed venue might be the most appropriate outlet for a given candidate based on the type of scholarly work being conducted, whereas another may be more appropriate for a different candidate. Quality, significance, focus, and depth of individual research publications or scholarly outputs and the overall program of scholarly activity, within the context of the candidate’s appointment, will be evaluated internally (through the deliberations of the DPT committee and discussions with Departmental faculty) and externally through letters of evaluation. Both the quantity and quality of scholarly work are important to document, as is the pattern of production of scholarly work during the probationary period or period since the last promotion.

Obtaining external funds for conducting research is an important component of a high-quality research program. Although obtaining funding from highly-competitive, peer-reviewed granting programs is one measure of quality of a candidate’s scholarly achievements, lack of funding from certain granting programs is not necessarily an indication of poor quality. That is, external funds are not obtained simply to demonstrate significance of the research, but to provide a means so that research can be done. All faculty have an obligation to obtain the necessary funding to support their research, but the source of the funding should be appropriate for their appointment and nature of their studies.

Other measures of quality of scholarship include: invitations to speak at national and international scientific conferences, to give seminars or workshops at other universities, and to write book chapters or to edit books on areas of expertise; prestigious awards received; and membership and activity on regional and national research (or policy) related committees. Serving as an associate or senior editor of scientific journals and serving on review panels for national or regional competitive grants programs are further measures of scholarship quality, even though these can also be considered service functions.
External evaluation of scholarship is important for assessing the quality of the research conducted by a candidate. However, primary responsibility for assessing quality, and assessing statements made by external reviewers, rests with the Department.

A self evaluation of scholarship will be performed and included in the dossier. One approach to self evaluation is to describe the most significant accomplishments in scholarship (e.g., discoveries published in journal articles and books) over the past 5 years. Factors to consider include the relevance of scholarly work to the field, the cutting edge nature of the scholarly work, appropriate impact measures, productivity and/or efficiency of research and creative works, and the level of risk taking. This summary will be prepared initially after three years in rank and updated yearly for probationary faculty and every other year for nonprobationary faculty. It is the responsibility of the faculty member to share this summary with the DPT committee during the annual evaluation by submitting it with their dossier.

3. Service

All faculty members are expected to contribute actively to the governance of the Department, the College and the University. Documentation of service should include a listing and description of the candidate’s contributions to the general activities of the Department, College, University, and profession. This includes, but is not limited to, service on committees of the Department, College, or University, participation in Departmental faculty meetings, serving in supportive administrative roles, representing the University in service to the non-academic community, and serving in special roles such as with commodity groups, community development groups, youth support groups, etc. Documentation of quality or impact of the service is required. Examples include leadership of certain activities, demonstrated by chairing committees, as well as organizing national or international professional programs. Serving the profession by invitation or election, particularly as an officer or editor, at the state, regional, national, or international level are clear indicators of the quality of service.

As discussed previously in this document, citizenship within the Department is a critical component of service, and must be documented. High quality service and good citizenship require that the candidate works in a positive manner for the improvement of the Department and the services provided. Documentation of citizenship is obtained from the discussions with each faculty member during the annual evaluation of candidates (see VII.C.2).

Although service within the University can be evaluated by members of the Department, external evaluators may provide useful appraisal of service at the national or international level.
VIII. APPEALS

If a candidate believes that a nonrenewal decision or negative promotion and tenure decision has been made in violation of University rules and policies, then the candidate may appeal the decision. Procedures for appealing a decision are described in rule 3335-5-05(A)(1) of the Administrative Code.

IX. SEVENTH YEAR REVIEWS

As specified in Faculty Rule 3335-6-05, in rare instances the Department may petition the Dean of the college to conduct a seventh year review for an assistant professor who had been denied promotion and tenure the previous year. A faculty member previously denied promotion and tenure cannot request a seventh year review, cannot appeal the denial of a seventh year review, and cannot appeal a negative decision of a seventh year review, as specified in the Faculty Rule. Both the eligible faculty and the Chairperson must agree on a seventh year review before a petition can be made to the Dean of the college.

The DPT committee must first decide if a seventh year review should be recommended. Such a review will only be considered if substantial new information is obtained that raises questions about the original negative decision. If three of four (or two of three) of the DPT committee members vote positively to recommend such a review, the reporter of the DPT committee distributes ballots to the eligible faculty for a vote. If two-thirds of the voting eligible faculty vote to consider a review, then this recommendation is given to the Chairperson. The Chairperson then writes a letter to the Dean of the college requesting a new review, if his/her recommendation also favors a seventh year review. If the Dean of the college and Executive Vice President and Provost approve the request, then a review during the seventh year is conducted. Approval for a new review must occur before the start of the seventh year of employment. This review follows the same guidelines as described above for the mandatory review of probationary faculty. Should the new review result in a negative decision, the faculty member’s last day of employment is that stated in the letter of nonrenewal issued following the original negative decision.
APPENDIX E

Pattern of Administration document
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PATTERN OF ADMINISTRATION

Department of Plant Pathology
College of Food, Agricultural and Environmental Sciences
The Ohio State University

Approved by the Department
December, 2008

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Revision awaiting College approval. Additional modifications needed in 2011 to reflect (small)
changes in the Mission and Vision statements and changes in some departmental operations. For
instance, the Undergraduate Studies Committee is now subsumed within the Academic Affairs
Committee, and some key committees operate with fewer faculty members than listed here. The
External Review Document has the most up-to-date description of current operating
procedures.
I. INTRODUCTION

This document is intended as an overview of the policies, procedures and practices defining the Patterns of Departmental Administration in the Department of Plant Pathology in the College of Food, Agricultural and Environmental Sciences at The Ohio State University. This document should be viewed as a supplement to and is not intended to be in conflict with the Rules of the University Faculty or other rules and procedures published by the University or those periodically updated and available online under the Board of Trustees website (http://www.trustees.admin.ohio-state.edu) and in the Office of Academic Affairs Policies and Procedures Handbook available at (http://oaa.ohiostate.edu/handbook/tc.html). The document is subject to continuing revision based upon faculty input and refinements in Department, College, and University goals and approval by the Dean and Provost. At the beginning of each four-year term of the Department Chairperson, either a revision or reaffirmation of this document will be made available to all present and prospective members of the Department, and a copy will be deposited in the Office of the Dean of the College, and the Office of the Executive Vice President and Provost. Included in the Patterns of Departmental Administration is Section IX entitled Appointments, Promotion and Tenure, which sets forth the criteria and procedures according to which recommendations are made concerning appointments, dismissals, salary adjustments, promotion in rank, and matters affecting the tenure of the faculty. Changes in any portion of this document will be circulated whenever necessary, and a revised edition of the total document will be published.

II. DEPARTMENT MISSION AND VISION

The Department of Plant Pathology was established in 1967 as a unit of the College of Agriculture, The Ohio State University. The name of the College has since been changed to the College of Food, Agricultural and Environmental Sciences.

The mission of the Department of Plant Pathology at The Ohio State University is critical to and supports the strategic missions of the University and the College of Food, Agricultural, and Environmental Sciences. The faculty, staff and students of the Department of Plant Pathology, through their research, teaching and outreach engagement efforts directly address key facets of the three CFAES’ strategic signature areas of 1) food safety / security and...
human health; 2) environmental quality and sustainability; and 3) advanced bioenergy and biobased products. Faculty within the department communicate unbiased information to citizens around the globe.

The OSU Department of Plant Pathology is the sole academic unit dedicated to plant health and agricultural microbiology in Ohio's Higher Education system and is one of only 16 stand-alone plant pathology departments in the U.S. Our vision is to be considered the most credible source of unbiased, science-based information in the U.S. on plant diseases and plant health management. We strive to be recognized as a leader, both nationally and internationally, for the highest quality research and educational programs on plant-microbe interactions and plant health management.

III. FACULTY AND SENIOR STAFF OF THE DEPARTMENT OF PLANT PATHOLOGY

A. Types of Faculty

In accordance with Rule 3335-5-19, the term "faculty" shall include persons appointed by the Board of Trustees with "Regular", "Auxiliary", and "Emeritus" titles on full or part-time appointments, with or without salary. Details on departmental policies regarding appointment, promotion and tenure of faculty are found in the Appointments, Promotion and Tenure document of the Department of Plant Pathology.

1. Regular (Tenure Track) Faculty - Regular full-time faculty include those persons with titles of Professor, Associate Professor, Assistant Professor or Instructor who serve on appointments totaling 50% or more service to the University with the Department of Plant Pathology as the Tenure Initiating Unit (TIU). A regular faculty member may hold a no-salary courtesy appointment in another TIU or joint appointments in a non-tenure initiating unit such as an interdepartmental center.

Regular faculty members from other TIUs may be given appointments as Courtesy Faculty in the Department of Plant Pathology if they are substantially involved in the academic work of the department. Courtesy faculty are non-voting members of the faculty but are encouraged to participate in the departmental programs.

2. Auxiliary Faculty - Auxiliary faculty include compensated and no-salary faculty who serve the department in some significant capacity but are not in tenure-track positions at the University. In the Department of Plant Pathology, compensated auxiliary faculty, who are hired to perform a specific service, may include visiting faculty on leave from other academic institutions or temporary faculty. No-salary auxiliary faculty may include
visiting faculty on leave from other academic institutions and adjunct faculty. Adjunct faculty include government scientists (primarily employees of the Agricultural Research Service within the United States Department of Agriculture) who are housed within the department and other allied professionals who contribute in a significant way to the academic work of the department. Adjunct faculty, whether or not they are housed within the Department of Plant Pathology, will be expected to have substantial involvement in the academic work of the department, including such activities as participation or substantial collaboration in departmental research programs, advising students, providing seminars or guest lectures in courses, serving on department committees, and/or appropriate outreach and engagement activities. Adjunct faculty will hold modified titles of Adjunct Associate Professor, etc. Adjunct faculty are non-voting members of the faculty.

3. **Emeritus Faculty** - Emeritus faculty are those persons who have retired after serving as regular faculty members in the Department of Plant Pathology and who, upon retirement, have requested and were recommended for emeritus status by the Chairperson of the Department of Plant Pathology (herein referred to as the “Chairperson”), the Executive Vice President and Dean of the College of Food, Agricultural and Environmental Sciences (herein referred to as the “Dean of the college”), and the Executive Vice President and Provost. They hold no-salary appointments in the Department of Plant Pathology and are non-voting members of the faculty.

**B. Voting Faculty**

The faculty eligible to vote on matters before the department or vote during departmental faculty meetings will be limited to members of the regular faculty with appointments in the Department of Plant Pathology as their TIU. Auxiliary faculty are encouraged to attend faculty meetings and participate in all departmental activities but are not accorded voting rights.

**C. Graduate Faculty**

Appointment of faculty as members of the Graduate Faculty will be done in accordance with eligibility defined in the Graduate School Handbook, Section IV.3.2. Members of the Graduate Faculty are appointed in either Category P, able to advise students pursuing either the M.S. or the Ph.D. degree, or in Category M, able to advise students pursuing only the M.S. degree. Regular tenure-track faculty with the rank of Assistant Professor or above are eligible for appointment as Category M and P. The Graduate Studies Committee appoints Category M Graduate Faculty and nominates those for Category P to the Policy and Standards Committee of the Council on Research and Graduate Studies for approval. Members of the Graduate
Faculty, depending on their appointment category, may act as advisors to graduate students enrolled in M.S. and Ph.D. programs of study and may serve as members of graduate student advisory committees (SAC).

D. Senior Staff

Senior Staff include all Extension Associates, Office Administrative Staff, the Academic Program Coordinator, Research Scientists and others as designated by the Chairperson. Senior staff are invited to participate fully in all departmental meetings in a non-voting capacity and to serve on appropriate committees.

IV. OVERVIEW OF DEPARTMENTAL ADMINISTRATION & DECISION MAKING

Departmental policy and program decisions are made in a number of ways such as by: (1) the Department faculty as a whole; (2) standing or ad hoc committees of the Department; or (3) the Chairperson. The nature of each issue and importance of the decision to be made usually determines how it is addressed. Department governance proceeds on the general principle that the more important the matter to be decided, the more widespread the agreement on a decision needs to be. Matters of general importance are usually handled first through one of the standing or ad hoc committees and then discussed in a full departmental meeting. Matters of lesser importance or of a more specific nature may be decided by appropriate departmental committees themselves or by the Chairperson. Any item or matter of concern can be placed on the agenda of a departmental meeting by informing the Chairperson.

The Department operates on the faculty-governance or general consensus principle. The more important items will be decided by a majority vote of the voting faculty on the decision or action to be taken. Prior to a formal vote, open and shared discussions, both formal and informal, among the faculty members constitute the primary means for reaching agreement on basic decisions. Formal voting procedures may not be required or appropriate for many decisions. In rare instances where a decision of the Chairperson departs from the majority opinion of the faculty, the Chairperson will explain the reasons for the departure from the majority decision to the faculty in writing, where possible, or at a department meeting, with an opportunity provided for faculty to comment. This communication shall outline the decision of the majority of the faculty, the decision of the Chairperson, and the reason the decisions differ. Where possible, this statement of reasons shall be provided before the departure occurs.

A. The Chairperson

The Chairperson is the administrative head of the department, with general administrative responsibility for all aspects of departmental programs, subject to the approval of the Dean of the college (Faculty Rule 3335-3-35). The Chairperson represents the faculty of the department in dealing with the Dean of the college or
others in the college and university administration. The Chairperson is appointed for a term of four years by the Dean of the college and is eligible for reappointment after review by the faculty and the college cabinet.

The primary duties of the Chairperson are as follows:

1. To develop and prepare, in consultation with the faculty, a pattern of departmental administration. This document will be made available to all present and prospective members of the faculty and deposited in the offices of the Dean of the college, and of the Executive Vice President and Provost. At the beginning of each four-year term of the Chairperson, the Pattern of Administration document will be reviewed and revised, in consultation with the faculty, and either a revision or reaffirmation of the original document will be given to members of the department, the offices of the Dean of the college, and of the Executive Vice President and Provost. The POA will also be posted on the department’s web site.

2. To develop and prepare, in consultation with the faculty and in accordance with the pattern of departmental administration, a statement setting forth the criteria and procedures according to which recommendations are made concerning appointments and/or dismissals, salary adjustments, promotions in rank, and matters affecting the tenure of the faculty. This Appointments, Promotion and Tenure (APT) document will be made available to all present and prospective members of the faculty and deposited in the offices of the Dean of the college, and of the Executive Vice President and Provost. At the beginning of each four-year term of the Chairperson, the APT document will be reviewed and revised, in consultation with the faculty, and either a revision or reaffirmation of the original document will be given to members of the department, the offices of the Dean of the college, and of the Executive Vice President and Provost. The APT document will also be posted on the department’s web site.

3. To plan and oversee implementation of a progressive program of scholarship, teaching and service with the members of the Department, appropriate stakeholders, and the Vice-President for Agricultural Administration and the Administrative Cabinet, the College of Food, Agricultural and Environmental Sciences. The department Chairperson will assure that every faculty member has duties and responsibilities commensurate with his or her appointment and that the departmental workload is distributed equitably among faculty. While faculty are expected to exercise ‘self-determination’ in conducting their research or other scholarly activity, the Chairperson assigns teaching responsibilities and is responsible for determining whether a scheduled course is to be cancelled. Except for elected positions, the Chairperson makes appointments for departmental service. In making faculty assignments
the chair must balance the needs of the department with the preferences of
the faculty member within the context of the department's policy on faculty
duties and responsibilities described in Section IV.

4. To consult with the faculty on all major policy matters. Such consultation
will occur at a meeting of the faculty as a whole, whenever practicable, or in
formal or informal conferences and discussions with individuals or groups of
faculty members, as appropriate. The following are generally considered as
policy matters: curriculum; definition of new or replacement faculty
positions and recruitment and selection of new faculty members; major
budgetary matters; cooperative endeavors with other university units; major
space assignments or alterations; shared departmental equipment; assignment
of supporting staff; operation of support facilities (e.g., general laboratories,
greenhouses). Some matters may be more appropriately discussed on an
individual rather than a group basis. Such matters include, but may not be
limited to, recommendations for committees, performance evaluations of
staff, and assignments of teaching, research and/or outreach-engagement
responsibilities.

5. To see that adequate supervision and training are given to those members of
the faculty and staff who may profit by such assistance.

6. To evaluate faculty members and staff periodically for annual performance
and to evaluate faculty members for promotion and/or tenure consideration in
accordance with procedures specified in the departmental Appointments,
Promotion and Tenure document. The Chairperson will inform faculty
members when they receive their annual performance review of their right to
review their primary personnel file and to place in that file a response to any
evaluation, comment or other material contained in that file.

7. To recommend to the Dean of the college, after consultation with
Departmental faculty, appointments, promotions, dismissals and matters
affecting the tenure of the members of the Department in accordance with
procedures specified in the departmental Appointments, Promotion and
Tenure document.

8. To encourage high-quality scholarship in programs of research, educational
investigation, and outreach-engagement by appropriate faculty, staff and
students.

9. To promote continuous improvement of instruction by providing for
appropriate evaluation of each course, including written evaluation by
students of the course and instructors, and periodic course review by the
faculty. To continuously improve methods of evaluation of instruction used
in the department.

10. To lead in maintaining a high level of morale among faculty, staff, and students and to see that all faculty, regardless of their assigned location, are offered the departmental privileges and responsibilities appropriate to their rank.

11. To prepare, in consultation with the faculty, annual and special budget recommendations and reports of departmental activities for consideration by the Vice-President for Agricultural Administration and the Administrative Cabinet, College of Food, Agricultural and Environmental Sciences.

12. To operate the business of the Department with efficiency and dispatch; to evaluate continuously the instructional and administrative processes of the Department and lead in the study of methods of improving them.

13. To provide a schedule of department meetings for the academic year to all faculty and senior staff during each Fall Quarter and distribute an agenda in advance of each meeting.

14. To see that appropriate minutes of all faculty meetings are taken, made available and maintained and to maintain records of all other actions covered by the Pattern of Administration and the Appointments, Promotion and Tenure document.

15. To appoint, with appropriate input from the faculty, the Associate Chairperson, members of standing and ad hoc committees and, when appropriate, designate committee chairpersons.

B. The Associate Chairperson

The Department of Plant Pathology has an Associate Chairperson located on the campus where the Chairperson is not located (ie. at Wooster if the Chairperson is located in Columbus and vice versa). This position is not a full-time administrative position, but rather an administrative appointment to a member of the faculty in addition to other research, teaching, and/or outreach-engagement responsibilities as defined in consultation with the Chairperson.

The Associate Chairperson is appointed by the Chairperson after consultation with the faculty and approval by the Dean of the college. The Associate Chairperson is appointed for a term of four years, serving concurrently with the Chairperson, and is eligible for reappointment after review by the faculty and the Chairperson. The Associate Chairperson must be reappointed after a new Chairperson is appointed.
regardless of length of service.

The primary duties of the Associate Chairperson are to work in partnership with the Chairperson to oversee the management and well-being of the department and to handle local operations on the campus on which she/he is located including:

1. To act as oversight administrator and facilitator for faculty, staff and students located on that campus, with regard to research, teaching and outreach-engagement functions, as appropriate;

2. To oversee management of departmental office functions and business operations, including the operational budget for that campus, personnel issues, and facilities management on that campus;

3. If located on the Wooster campus, to coordinate all departmental research program administration, including monitoring project initiations, reviews, terminations and annual reports; reviewing grant proposal submissions from the Wooster faculty (completing ePA005's); and other activities as appropriate. If located on the Columbus campus, to oversee the academic programs of the department including classroom and curricular logistics, teaching equipment and budgets, student issues, and other activities as appropriate.

4. In the absence of the Chairperson, to represent the department on that campus, and to represent the Chairperson at meetings or functions which the Chairperson cannot attend.

The Associate Chairperson and the Chairperson will work as a team to facilitate efficient administration of the department on both the Columbus and Wooster campuses. Other functions may be delegated to or coordinated with the Associate Chairperson as deemed appropriate by the Chairperson.

In the event of short-term (≤30 days) absence of the Chairperson, the Associate Chairperson will serve as Acting Chairperson for the department. In the event of longer absences (≤30 days), an Acting Chairperson for the department shall be recommended to the administration by the faculty.

C. Standing and **ad hoc** committees

It is the intent of the Department of Plant Pathology that all faculty, senior staff and other representative staff and students be actively involved in departmental affairs. All faculty members have the opportunity to participate in determining the policies, directions and nature of the department and have the responsibility to provide service
by contributing to and participating in departmental academic functions. To this end, a structure of standing committees is maintained. In addition, *ad hoc* committees shall be formed by the Chairperson as needed to meet special circumstances. In consultation with the faculty, the Chairperson will provide each *ad hoc* committee with a written charge. The Chairperson will see that each faculty member has an opportunity, at some time, to participate on departmental standing or *ad hoc* committees. Members and chairpersons of all committees shall be appointed by the Chairperson, except for those specified below whose members or chairpersons are elected by the faculty at large or by committee members.

Standing committees of the Department of Plant Pathology, selection of members and committee responsibilities are as follows:

**Departmental Promotion and Tenure Review:** The Departmental Promotion and Tenure Review committee is charged with: 1) evaluating candidates for tenure and/or promotion, and advising the Chairperson in writing on the content of the annual letter written to each Assistant and Associate Professor advising her/him on progress towards tenure and/or promotion; 2) presenting the case of candidates to the ‘eligible faculty’ for consideration; 3) preparing a letter to the Chairperson describing the eligible faculty’s assessment of quality and effectiveness of teaching, quality and significance of scholarship, and quality and effectiveness of service of each candidate being submitted to the College for promotion and tenure consideration; and 4) working with the Chairperson to continually update promotion and tenure procedures within the department. Details of committee operations and promotion and tenure procedures are in section VII of the departmental Appointments, Promotion and Tenure Document.

The DPT committee shall consist of four tenured professors and the Chairperson (*ex officio*). At the beginning of each academic year, two new members are elected to each serve a 2-year term beginning October 1 and the two longest-serving members rotate off the committee. An individual cannot serve for consecutive terms; a minimum of one year must elapse from completion of a term on the committee before a person can be elected to serve another term. Normally two of the members are based on the Columbus campus and two on the Wooster campus, but at least one member on the committee must be from each campus. The chairperson of the committee, hereafter referred to as the ‘reporter’ is elected by the committee members to serve a 1-year term, but can be reelected for a second 1-year term. Each year, the committee also elects one of its members (other than the recorder) to serve as the ‘Procedures Oversight Designee’.

**Program Review:** The Program Review committee meets annually in January or February with each member of the faculty, Extension Associate, Research Scientist, and others as designated by the Chairperson. The committee is charged with: 1)
evaluating the extent and quality of the teaching, extension-outreach, student advising, research and/or service activities of each person during the previous calendar year; 2) engaging each person in a constructive, evaluative discussion of her/his performance; and 3) making recommendations to the Chairperson regarding the content of the Chairperson’s annual performance review letter written to those being reviewed by this process. Details of committee operations and program review procedures are in section V of the departmental Appointments, Promotion and Tenure Document.

The committee consists of five persons: the Chairperson, the two Professors who have completed one year’s service on the DPT committee, and two additional faculty members (any rank, preferably one each from the Columbus and Wooster campuses) who are elected by the voting faculty at the beginning of the academic year in which the review is held. The Associate Chairperson serves as non-voting ex officio member of the Program Review committee. The Chairperson serves as chair of the Program Review committee.

**Graduate Studies:** The Graduate Studies committee is responsible for the conduct and administration of the graduate program in the Department of Plant Pathology. The committee oversees operation of the graduate program and serves as liaison between the college, Graduate School, and Graduate Faculty members in the department. Duties of the committee as prescribed by the Graduate School are listed in Section IV.2 of the Graduate School Handbook. The committee works closely with the departmental Graduate Faculty in carrying out these duties and obtains consensus for its policies, particularly in the areas of graduate curricular requirements, admission criteria, assigning advisors, and examination procedures. In the Department of Plant Pathology, the Graduate Studies committee also is responsible for: 1) making decisions on admitting students to the Plant Pathology graduate program; 2) awarding departmental Graduate Associateships; 3) monitoring departmental resources allocated to graduate student support by the Chairperson; and 4) keeping the Chairperson appraised of the status of all aspects of the departmental graduate program.

The committee consists of four members of the Graduate Faculty and one graduate student. At the beginning of each academic year, one new faculty member is elected by the voting faculty to serve a 4-year term beginning October 1 and the longest-serving member rotates off the committee. An individual cannot serve for consecutive terms; a minimum of one year must elapse from completion of a term on the committee before a person can be elected to serve another term. Normally two of the faculty members are based in Columbus and two in Wooster, but at least one member on the committee must be from each location. One graduate student currently enrolled in the departmental Ph.D. program is elected to serve a 1-year term on the committee. At the request of the Chairperson, two candidates for this position
are submitted to the faculty by the Plant Pathology Graduate Student Association and the faculty choose between these. The student member is a full voting member of the committee except in any area that, in the opinion of the Graduate Studies chairperson, would compromise confidentiality among currently enrolled graduate students. The chairperson of the Graduate Studies committee is elected to serve a 3-year term by the entire voting faculty. If possible, the chairperson shall be elected from among current faculty members serving on the committee. However, if an appropriate person is not available among current committee members, another member of the Graduate Faculty will be elected. The Graduate Studies chairperson shall serve a full 3-year term, even if their total service on the committee will then exceed four years. In the case where the chairperson remains on the committee beyond a fourth year, no new member of the committee will be elected that year so that the committee membership will remain at four. Normally, the committee chairperson will be elected one year prior to beginning their 3-year term of service to facilitate orderly transfer of committee leadership. A quorum shall consist of four voting members, except in cases where the student member is not allowed to vote, in which case a quorum shall consist of three members.

**Undergraduate Studies:** The Undergraduate Studies committee is responsible for coordination of the undergraduate education programs of the department and serves as the department’s official conduit for handling all issues pertaining to undergraduate programs. The committee is charged with: 1) initiating, studying and evaluating undergraduate curriculum and making recommendations to the department Academic Affairs committee on undergraduate curricular matters; 2) overseeing the Plant Health Management Major and the Plant Pathology Minor; 3) defining and articulating space, personnel, equipment, and budgetary needs in support of undergraduate teaching and making recommendations to the Chairperson; 4) enhancing the undergraduate experience in the department including recruitment, retention, advising, awards and scholarships, career planning and placement; and 5) promoting undergraduate teaching in the department.

The committee consists of four (or five, if appropriate) members from the regular faculty plus the staff person who is serving as the Academic Program Coordinator. At the beginning of each academic year, one new faculty member is elected by the voting faculty to serve a 4-year term beginning October 1 and the longest-serving member rotates off the committee. After new members are elected, the committee selects a committee chairperson from among its members, pending approval by the Chairperson. All committee members are eligible for reappointment. If a member must be replaced temporarily, the Chairperson shall appoint a replacement for the duration of absence, with the regular member resuming her/his term for the remaining period of appointment unless the term has expired. A quorum shall consist of four members.
**Academic Affairs:** The Academic Affairs committee is responsible for oversight and coordination of the instructional programs and academic policies of the department, including academic advising, and advises the Chairperson on academic matters. The committee works closely and cooperatively with the departmental Graduate Studies and Undergraduate Studies committees and with the college of FAES Academic Affairs Committee. Faculty, staff or students can bring any concerns involving curriculum or academic issues directly to this committee. The committee is charged with: 1) reviewing, evaluating, and making recommendations to the faculty and the Chairperson on current, new or revised course offerings, curricula, or specific instructional programs within the department; 2) monitoring and recommending actions on course scheduling, course prerequisites, and programmatic credit requirements; 3) serving as a review body for new or revised course proposals in Plant Pathology and other departments, as appropriate; 4) reviewing all petitions from faculty for variances in curricular requirements; and 5) serving as a liaison between the Graduate Studies and Undergraduate Studies committees.

The committee consists of five regular faculty members, which include two persons each who are members of the Graduate Studies and Undergraduate Studies committees, plus a committee chair. In addition one non-voting graduate student is elected to the committee. The Chairperson and Associate Chairperson serve as non-voting *ex officio* members and as liaison to the College administration. Faculty members representing the Graduate Studies and Undergraduate Studies committees are selected by members of those committees to each serve a 2-year term beginning October 1. At the beginning of each academic year, one new member from each committee is selected to serve on the Academic Affairs committee and the longest-serving member from each committee rotates off. One graduate student currently enrolled in the department graduate program is elected to serve a 1-year term on the committee. At the request of the Chairperson, two candidates for this position are submitted to the faculty by the Plant Pathology Graduate Student Association and the faculty choose between these. The committee chair is appointed by the Chairperson from among the regular faculty to serve a 3-year term beginning October 1. In addition to chairing the committee, the committee chairperson represents the department at ad hoc meetings with Academic Affairs chairs from other departments and with the FAES Academic Affairs committee, when appropriate. All members are eligible for reappointment except the committee chairperson. If a member must be replaced temporarily, the Chairperson shall appoint a replacement for the duration of absence, with the regular member resuming her/his term for the remaining period of appointment unless the term has expired. A quorum shall consist of four voting members.

**Teaching Evaluation:** Teaching evaluation committees are appointed to work with each Assistant and Associate Professor. These committees are charged with ensuring
that a constructive and systematic annual review of teaching (including classroom, extension-outreach, and student advising activities) is performed for the faculty member to whom they are assigned. Specific responsibilities include: 1) counseling with the faculty member and actively mentoring her/him in assembling pertinent evaluative information for inclusion in her/his P&T dossier; 2) coordinating or conducting the evaluation of her/his teaching performance; 3) making an annual written report on her/his progress each June to the Departmental Promotion and Tenure Review committee. Details of committee operations and teaching evaluation procedures are in section VII. D. 1. of the departmental Appointments, Promotion and Tenure Document.

Each Teaching Evaluation committee consists of two tenured faculty members from the department who are senior in rank to the candidate. They are appointed by the Chairperson and serve in this role for the duration of time that the faculty member to whom they are assigned remains in rank. A new committee is assigned upon promotion to Associate Professor and cannot include those who served on the previous committee.

**Department Relations:** The Department Relations committee is responsible for facilitating improved communications and interactions among faculty, staff and students in the department and for communications of department activities outside the department. The committee is charged with: 1) making arrangements for social events within the department; 2) working with the Chairperson, Associate Chairperson and Academic Program Coordinator on preparing items for college and university newsletters, APS Phytopathology News, and communications with alumni. The committee works closely and cooperatively with faculty, staff and students in the department.

Individual Department Relations committees exist at both Columbus and Wooster campuses. These campus-centric committees involve as many faculty, staff and students that wish to participate. The chair of each committee is selected by those participating in each campus committee. Terms of appointment are for one year with reappointment optional. The chairpersons of the two committees together serve as a general Department Relations committee to coordinate department-wide activities among the two committees.

**Recognitions:** The Recognitions committee is responsible for submitting nominations of departmental faculty, staff, students and/or alumni for awards, prizes or other recognitions given by the college or university, appropriate professional organizations, or other sources. The committee works closely with the Chairperson and Associate Chairperson and members of the department to assure that worthy persons are identified and nominated. Individuals who are nominated are expected to provide the committee with appropriate material to facilitate their nomination.
The committee consists of two faculty members, normally one from Columbus and one from Wooster, who are each appointed by the Chairperson for a 1-year term with reappointment optional.

**Seminar:** The Seminar committee is responsible for coordinating the departmental seminar series that is offered as Plant Pathology 995 each Autumn, Winter and Spring Quarter. The committee contacts graduate students, as appropriate, to arrange for them to give seminars and also arranges for faculty or outside speakers. The committee is responsible for appropriate publicity of seminars and arranges for evaluation of graduate student seminars and grading student participation of those enrolled for PP 995.

The committee consists of two faculty members, one each from Columbus and Wooster, who are appointed by the Chairperson for a 1-year term. They are eligible for reappointment the following year. Normally, members of the Seminar committee are appointed one year in advance of their service in order to facilitate a smooth transition of these responsibilities and to make advance plans for the Autumn Quarter seminar series. In addition, one graduate student currently enrolled in the department graduate program is elected to serve a 1-year term on the committee. At the request of the Chairperson, two candidates for this position are submitted to the faculty by the Plant Pathology Graduate Student Association and the faculty choose between these prior to the beginning of the academic year. If appropriate, both can be selected to serve.

**Teaching Experience Coordinator:** The Teaching Experience Coordinator (TEC) oversees the classroom teaching experience program for graduate students through the Mentored Teaching in Plant Pathology course (Plant Pathology 901). Prior to engaging in a teaching experience, a student is required to submit a brief written summary of the experience to be undertaken to include a statement regarding desired learning outcomes, the means of evaluation and assessment that will be used to gauge their teaching effectiveness, and the number of Plant Pathology 901 credit hours sought. This summary shall be reviewed and signed by both the student seeking credit and their mentor and then serves as a contract between the student and mentor. The TEC’s primary roles are to review each request on a case-by-case basis and to ensure fairness and equity in the amount of credit approved across the range of teaching experiences undertaken. The TEC oversees planning for the assessment of the student’s teaching effectiveness by the mentor to ensure that the assessment is planned, implemented, summarized and shared with the student in a timely fashion to maximize the impact and learning for the student.

The Teaching Experience Coordinator is appointed annually by the Chairperson from among the faculty and can be reappointed for an indeterminate time.
**Extension-Outreach Experience Coordinator:** The Extension-Outreach Experience Coordinator (EEC) oversees the extension experience program for graduate students through the Mentored Extension/Outreach Teaching in Plant Pathology course (Plant Pathology 902). Prior to engaging in an extension-outreach experience, a student is required to submit a brief written summary of the experience to be undertaken to include a statement regarding desired learning outcomes, the means of evaluation and assessment that will be used to gage their extension-outreach effectiveness, and the number of Plant Pathology 902 credit hours sought. This summary shall be reviewed and signed by both the student seeking credit and their mentor and then serves as a contract between the student and mentor. The EEC’s primary roles are to review requests on a case-by-case basis and to ensure fairness and equity in the amount of PP 902 credit approved across the range of extension-outreach teaching experiences undertaken. The EEC oversees planning for the assessment of the student’s teaching effectiveness by the mentor to ensure that the assessment is planned, implemented, summarized and shared with the student in a timely fashion to maximize the impact and learning for the student.

The Extension Experience Coordinator is appointed annually by the Chairperson from among the faculty and can be reappointed for an indeterminate time.

**Summer Research Internship in Plant Pathology Advisory:** The Summer Research Internship in Plant Pathology (SRIPP) Advisory committee acts in an advisory capacity to the Academic Program Coordinator who oversees the department’s SRIPP program. Specific responsibilities of the committee include providing guidance to the Coordinator on: 1) recruitment of highly-qualified undergraduate students; 2) design, structure, operation and funding of the program; and 3) evaluation and improvement of the program for the coming year.

The committee is chaired by the department’s Academic Program Coordinator and is composed of all department faculty who are or plan to host an SRIPP intern.

**Representative to FAES Faculty Council:** The departmental representative to the CFAES Faculty Council serves as a member of the CFAES Faculty Council and represents the department in all deliberations and activities of the Council. She/he keeps the Chairperson and the faculty abreast of all Council activities and takes issues or concerns from the department to the Council.

The representative to the FAES Council is elected from among the faculty by the voting faculty for a 3-year term that begins October 1. The current representative is not eligible to be reelected to this post for a consecutive 3-year term.

**Representative to FAES Staff Advisory Council:** The departmental representative
to the CFAES Staff Advisory Council serves as a member of the CFAES Staff Advisory Council and represents the department in all deliberations and activities of the Council. She/he keeps the Chairperson and the faculty abreast of all Council activities and takes issues or concerns from the department to the Council.

The representative to the CFAES Staff Advisory Council is appointed by the Chairperson in consultation with the staff for a 3-year term that begins October 1. The current representative is eligible to be reelected to this post for a consecutive 3-year term. The Chairperson holds a meeting with all staff members at each location each quarter.

**Plant Pathology Graduate Student Association:** The Plant Pathology Graduate Student Association (PPGSA) is composed of all currently enrolled graduate students in the Department of Plant Pathology. Currently enrolled graduate students of other disciplines and any interested undergraduate students are welcome to join the PPGSA with full voting rights. Faculty, staff, alumni, professionals, etc. are welcome to join the PPGSA as non-voting associates or honorary members.

The purpose of the organization is: 1) To promote communication and interaction between students, faculty, staff and administrators; 2) To provide a forum for discussing pertinent issues; 3) To serve as a vehicle for acting on students' requests for information and their suggestions for broadening and improving the quality of their educational experiences; and 4) To promote the participation of graduate students in the discipline of Plant Pathology at national and international scientific meetings relevant to their educational experience.

Active participation in PPGSA is a personal decision for each member. No dues are charged. Elections are held each winter quarter with the new officers starting their terms at the beginning of spring quarter. Officers include President, Vice President, Treasurer, Secretary at Wooster, and Secretary at Columbus. A faculty advisor to PPGSA is selected by members of PPGSA at the beginning of each academic year to serve a one year term, starting October 1, with appointment renewable annually.

Representatives from the PPGSA serve as the official liaison between graduate students and the department. One representative located on the Columbus campus and one located on the Wooster campus are identified annually by members of PPGSA from among senior graduate students. Representatives are encouraged to actively participate in department meetings in a non-voting capacity; bring graduate student issues to the Chairperson, Associate Chairperson, faculty and senior staff; and communicate department policies and issues to the graduate student body. The Chairperson holds a meeting with PPGSA members at each location each quarter.

**Faculty Search Committees:** When an open faculty position has been authorized to
be filled, the Chairperson appoints a member of the faculty to chair a search committee composed of faculty from both Columbus and Wooster campuses and additional faculty from other academic units as appropriate. The duties of the search committee chair and the committee are:

1. Work with the Chairperson to select members of the search committee;

2. Meet with Chairperson/Associate Chairperson to fully understand the details of the position as approved by the CFAES administration (Assistant/Associate, start-up, FTE split, responsibilities), and lab/office facilities available;

3. Meet with search committee to brief them regarding the requirements of the position and organize committee activities including the search process (i.e. what information to require of candidates, how files will be handled, how information will be kept, etc.) and timetable (i.e. advertisement period, screening candidates, interviews, etc.);

4. Work with Chairperson and search committee to develop final position description, prepare advertisements for the position, and develop overall recruitment plan and strategy;

5. Meet with Dean or her/his designee and the Chairperson/Associate Chairperson to discuss college/university requirements and desires regarding diversity and affirmative action;

6. Work with search committee and Chairperson to develop “minimum qualifications” for position with regard to affirmative action. Develop a diversity/affirmative action plan to identify and recruit qualified minority candidates. Appoint a member of the search committee as the Procedures Oversight Designee (makes sure that affirmative action and other processes are handled appropriately);

7. Work with administrative staff to set up system for tracking all applications, communicating with candidates, making files available for review and any other details. Make sure that candidates are notified of the status of their application during the process and after the search is completed;

8. Work with search committee to develop process for uniform evaluation of candidate files. Develop standard evaluation criteria and forms;

9. After close of application period, meet several times with search committee and Chairperson/Associate Chairperson to review files and comments received from non-committee members. Discuss all applicants and select candidates for
10. Work with Chairperson to schedule and organize details of interviews. Make sure that department faculty, staff and students and appropriate people in other departments are notified of schedules and details as appropriate;

11. Work with Chairperson/Associate Chairperson and faculty and search committee to conduct interviews; and

12. During the entire process, work with Chairperson to keep faculty appraised of the status of the search.

OPERATIONAL COMMITTEES FOR KOTTMAN HALL, COLUMBUS

**Laboratory, Space and Equipment:** The Laboratory, Space and Equipment committee facilitates efficient and equitable use of common laboratory and office space and common research equipment located in Kottman Hall. Specific responsibilities include: 1) examining use patterns of common space and working with the Chairperson or Associate Chairperson, as appropriate, to make changes that foster more efficient and equitable use; 2) evaluating procedures relating to common laboratory space, autoclaves, cold rooms, incubators and other common equipment, and making changes that would improve effectiveness, cleanliness, proper equipment maintenance, and safety of operations, including oversight of an active laboratory safety program; 3) determining needs for new common equipment and make recommendations to the Chairperson/Associate Chairperson; and 4) reviewing assigned space in Kottman Hall and providing recommendations to the Chairperson/Associate Chairperson in making new space allocations, if needed.

The committee is composed of four or five department faculty and/or staff located in Kottman Hall with the Chairperson or Associate Chairperson, as appropriate, serving *ex officio*. Members and the committee chairperson are appointed annually by the Chairperson or Associate Chairperson, as appropriate, with reappointment optional. The committee functions informally, meeting when needed. It works closely with the Chairperson/Associate Chairperson relative to funding for maintaining common equipment.

**Greenhouse and Phytotron:** The Greenhouse and Phytotron committee facilitates efficient and equitable use of greenhouse and phytotron facilities located in Kottman Hall. Specific responsibilities include: 1) providing for cleanliness and proper maintenance of equipment and space in the greenhouse, headhouse and phytotron areas; 2) devising procedures for sign-up and general use of growth chambers and other facilities in the phytotron area; 3) reviewing greenhouse space assignments and operating procedures as necessary; 4) advising the Chairperson or Associate
Chairperson, as appropriate, and the Greenhouse Superintendent in decisions on maintenance and needed purchases for the phytotron and greenhouse areas; 5) overseeing an active safety program for activities in the greenhouse and phytotron areas.

The committee is composed of three of four department faculty and/or staff located in Kottman Hall plus the Greenhouse Superintendent, with the Chairperson or Associate Chairperson, as appropriate, serving ex officio. Members and the committee chairperson are appointed annually by the Chairperson or Associate Chairperson, as appropriate, with reappointment optional. The committee functions informally, meeting when needed. It works closely with the Chairperson and/or Associate Chairperson relative to funding for maintenance of greenhouse and phytotron facilities.

Teaching Supplies and Equipment: The Teaching Supplies and Equipment committee oversees purchase and utilization of teaching supplies and maintenance of teaching equipment in the Department of Plant Pathology located in Kottman Hall. The committee maintains an inventory of teaching microscopes, ensures that teaching microscopes are in good repair, and works to obtain new or replacement microscopes as needed. Members liaison with the teaching faculty to determine needs for teaching supplies and equipment and make recommendations to the Chairperson and/or Associate Chairperson.

The committee is composed of four department faculty and/or staff located in Kottman Hall with the Chairperson or Associate Chairperson, as appropriate, serving ex officio. Members and the committee chairperson are appointed annually by the Chairperson or Associate Chairperson, as appropriate, with reappointment optional. The committee functions informally, meeting when needed. It works closely with the Chairperson/Associate Chairperson relative to funding for maintaining teaching equipment.

OPERATIONAL COMMITTEES FOR SELBY HALL, WOOSTER

Laboratory, Space and Equipment: The Laboratory, Space and Equipment committee facilitates efficient and equitable use of common laboratory and office space and common research equipment located in Selby Hall. Specific responsibilities include: 1) examining use patterns of common space and working with the Chairperson or Associate Chairperson, as appropriate, to make changes that foster more efficient and equitable use; 2) evaluating procedures relating to common laboratory space, distilled/deionized water facilities, autoclaves, cold rooms, incubators and other common equipment, and making changes that would improve effectiveness, cleanliness, proper equipment maintenance, and safety of operations, including oversight of an active laboratory safety program; 3) determining needs for
new common equipment and make recommendations to the Chairperson and/or Associate Chairperson; 4) overseeing procedures and operations of the glassware cleaning and laboratory supply stocking area in conjunction with the Chairperson or Associate Chairman, as appropriate; and 5) reviewing assigned space in Selby Hall and providing recommendations to the Chairperson and Associate Chairperson in making new space allocations, if needed.

The committee is composed of four or five department faculty and/or staff located in Selby Hall with the Chairperson or Associate Chairperson, as appropriate, serving ex officio. Members and the committee chairperson are appointed annually by the Chairperson or Associate Chairperson, as appropriate, with reappointment optional. The committee functions informally, meeting when needed. It works closely with the Chairperson/Associate Chairperson relative to funding for maintaining common equipment.

**Greenhouse and Phytotron:** The Greenhouse and Phytotron committee facilitates efficient and equitable use of greenhouse and phytotron facilities located in Selby Hall. Specific responsibilities include: 1) providing for cleanliness and proper maintenance of equipment and space in the greenhouse, headhouse and phytotron areas; 2) devising procedures for sign-up and general use of growth chambers and other facilities in the phytotron area; 3) reviewing greenhouse space assignments and operating procedures as necessary; 4) advising the Chairperson or Associate Chairperson, as appropriate, and the Greenhouse and Field Superintendent in decisions on maintenance and needed purchases for the phytotron and greenhouse areas; 5) overseeing an active safety program for activities in the greenhouse and phytotron areas.

The committee is composed of three of four department faculty and/or staff located in Selby Hall plus the Greenhouse and Field Superintendent, with the Chairperson or Associate Chairperson, as appropriate, serving ex officio. Members and the committee chairperson are appointed annually by the Chairperson or Associate Chairperson, as appropriate, with reappointment optional. The committee functions informally, meeting when needed. It works closely with the Chairperson and/or Associate Chairperson relative to funding for maintenance of greenhouse and phytotron facilities.

**Field Operations:** The Field Operations committee oversees operations of field facilities and equipment associated with the Department of Plant Pathology on the Wooster campus, particularly at the Snyder Farm. Specific responsibilities include: 1) working closely with the Greenhouse and Field Superintendent to devise and implement procedures that assure efficient, safe and equitable utilization of field facilities, personnel, and equipment; 2) advising the Chairperson or Associate Chairperson, as appropriate, and the Greenhouse and Field Superintendent in decisions on maintenance and purchase of equipment for field research; 3) reviewing
field plot allocations and land use patterns on departmental lands at Snyder Farm and elsewhere and recommending appropriate changes and procedures to the Greenhouse and Field Superintendent; 4) overseeing an active safety program in all field operations; and 5) advising the Chairperson or Associate Chairperson, as appropriate, in her/his role as supervisor of the Greenhouse and field Superintendent.

The committee is composed of three or four department faculty and/or staff who are heavily involved in field-based research and are located on the Wooster campus, plus the Greenhouse and Field Superintendent, with the Chairperson or Associate Chairperson, as appropriate, serving *ex officio*. Members and the committee chairperson (who must be a faculty member in Plant Pathology) are appointed annually by the Chairperson or Associate Chairperson, as appropriate, with reappointment optional. The committee functions informally, meeting when needed. It works closely with the Chairperson and Associate Chairperson relative to supervision of field operations and personnel and funding for maintenance of field facilities and equipment.

**D. Department Meetings**

The Department of Plant Pathology shall hold a full department meeting once per quarter (typically in September, December, March and June) during each academic year, and more often if needed, to conduct the business of the department. All regular, courtesy and auxiliary faculty, senior staff, and representatives of the staff and graduate students will be invited to attend. Regularly scheduled department meetings generally will alternate locations between Columbus and Wooster with the exception of the September meeting which is typically held in Mt. Vernon (the halfway point between Columbus and Wooster). The Chairperson will call the meeting and preside unless a designee has been appointed. A schedule of department meetings for the academic year will be developed a year in advance and given to those invited to attend. At least a week prior to the meeting, a tentative agenda will be developed by the Chairperson and distributed for comment to those invited to attend. A final agenda will be distributed to those in attendance. Agenda items may be submitted to the Chairperson by any faculty, staff or student at any time and such items will be added to the agenda for the next available meeting. Special department meetings may be called at any time by the Chairperson or at the request of the majority of the regular voting faculty. In the latter case, the Chairperson shall schedule a meeting within 3 weeks of being notified in writing by the faculty of the need for such a meeting. For all department meetings, a quorum shall be defined as a simple majority of the regular voting faculty in the department, including the Chairperson. Matters brought to the faculty for a vote will be decided by a majority vote of the voting faculty present, provided a quorum is in attendance.

Representatives of the staff and graduate students will be selected by each of these groups and invited to participate in all regularly-scheduled department meetings. Staff and student representatives can submit agenda items, fully participate in the meeting, and present staff
and student issues for faculty consideration, but do not have voting privileges.

Minutes of department meetings shall be taken, prepared and made available to all members of the department via the department’s intranet following the meeting. These minutes will be open for discussion at the next department meeting.

In addition to the quarterly department meetings described above, the Chairperson will meet monthly with the faculty and senior staff at each location to disseminate information and dialogue about important issues and opportunities. The Chairperson will hold similar meetings with the staff and graduate students on each campus once per quarter.

V. FACULTY TEACHING WORKLOAD POLICY

University requirements for faculty teaching workload policies and guidelines are located in the OSU Office of Academic Affairs Policies and Procedures Handbook and can be found on-line at http://oaa.ohio-state.edu/handbook/tc.html. Much of the information below is paraphrased from that section of the OAA Handbook but also includes policies and guidelines specific to the Department of Plant Pathology.

The Ohio State University educates more graduate and undergraduate students than any other institution in the state. These students are educated in a research intensive environment that differs significantly from other state institutions, where there is less emphasis on highly innovative leading-edge scholarship. Education at Ohio State takes place not only in classrooms but also in the laboratories of eminent scientists, in faculty offices and seminar rooms, and on farms throughout Ohio. Much of the education at Ohio State takes place within credit-bearing courses but much of it also takes place in more informal activities relating to research and scholarship. Each of our colleges is engaged in a similar mission, although the emphasis on teaching, research, and service varies from college to college. Within colleges, the mission of each department varies in the relative emphasis on teaching, research, and service, and the activities of individual faculty also vary in emphasis at any given time depending on each individual's strengths, interests, and the needs of the department.

The Faculty Teaching Workload Policy of The Ohio State University recognizes the important role of undergraduate education, but also recognizes that several professional colleges and departments, have only graduate programs and that undergraduate education is not within the purview of their mission. It is expected that departments with active baccalaureate, masters, and doctoral programs should have a norm of at least 50% of the total departmental workload devoted to teaching. It is understood that there will be significant differences in the missions of the many departments and, as a result, there will be differences among departments in the relative amounts of effort faculty spend in their teaching, research/creative activity, and service responsibilities. This means that within departments there may be significant differences in the assignment of responsibilities to
individual faculty members. Such differences in responsibilities should reflect individual faculty strengths, interests, and abilities to contribute to the overall missions of the departments.

**Faculty teaching workload guidelines** - Overall workload expectations are set to ensure a balance of faculty time and effort spent in teaching, research, and service. In general, the activities of each faculty member are proportionate to how they are funded by OARDC (research and graduate student advising), OSUE (extension-outreach activities) or the OSU General Fund (GF) (teaching and advising). The typical faculty member in Plant Pathology has an appointment involving two or three of these funding lines. Each faculty member is expected to produce a mix of accomplishments consistent with their appointment. Achievement of this balance for the department, through the assignment of duties to individual faculty, is the responsibility of the department Chairperson. Within the department, teaching is broadly defined to include formal classroom teaching, undergraduate and graduate student advising, and extension outreach activities. All faculty are expected to maintain some involvement in undergraduate and/or graduate student advising, but the amount of time devoted to classroom teaching and extension outreach activities depends on the responsibilities and funding allocation of their particular position. Faculty with paid extension appointments from OSUE are expected to devote a percentage of their total effort to extension outreach activities approximately proportionate to their percentage OSUE appointment. Faculty with paid OSU GF appointments are expected to participate in classroom teaching. Those with OSU GF appointments of 10-30% are expected to teach/co-teach a full course at least every other year or portions of multiple courses every year. Those with OSU-GF appointments of 31-50% are expected to teach 2-3 full courses per year, depending on departmental needs and their own professional strengths, interests and abilities. Faculty with OSU-GF appointments greater than 50% are expected to teach 4-6 classes per year. Faculty who are paid predominately or exclusively on OARDC research appointments will be primarily engaged in research activities. Regardless of appointment, every member of the faculty is expected to devote a minimum of 25% of their total effort to some type of teaching activities. Their remaining time should be devoted to sponsored and departmental funded research/creative activities, service, and other professional responsibilities which further the goals of the department, college and university.

**VI. FACULTY DUTIES & RESPONSIBILITIES**

University requirements for a faculty duties & responsibilities policy are located in the OSU Office of Academic Affairs Policies and Procedures Handbook and can be found online at [http://oaa.osu.edu/handbook/tc.html](http://oaa.osu.edu/handbook/tc.html). Much of the information below is paraphrased from that section of the OAA Handbook but also includes policies and guidelines specific to the Department of Plant Pathology.

The department Chairperson is responsible for assuring that every faculty member has
duties and responsibilities commensurate with his or her appointment and that the departmental workload is distributed equitably among faculty. While faculty are expected to exercise "self-determination" in conducting their research or other scholarly activity, the Chairperson assigns teaching responsibilities and, except for elected positions, makes appointments for departmental service. In making these assignments the chair must balance the needs of the department with the preferences of the faculty member within the context of the department's policy on faculty duties and responsibilities described below.

Many faculty members voluntarily take on a variety of professional activities that fall outside the department's policy on faculty duties and responsibilities. These activities often benefit the department or University and, to the extent possible, will be taken into account in considering a faculty member's total workload. However, fairness to other faculty and the department's need to meet its programmatic obligations may become issues when a faculty member seeks relief from departmental obligations in order to devote considerable time to personal professional interests that may not contribute to departmental goals. The Chairperson may decline to approve such requests when approval is not judged to be in the best interests of the department.

During on-duty quarters (all four quarters in the case of 12-month faculty) faculty members are expected to be available for interaction with students, service assignments, and other responsibilities even if they have no formal course assignment that quarter. Other than when on vacation or sick leave, on-duty faculty members should not be away from campus for extended periods of time unless on an approved leave (see section on Leaves and Absences). Faculty Rule 3335-5-08 requires that all overnight absences from campus must be approved by the Chairperson and absences for more than ten consecutive working days during a quarter must be approved by the Chairperson and the Executive Vice President and Provost.

Every department, must have a written policy for the equitable assignment and distribution of faculty duties and responsibilities. Faculty Rule 3335-3-35 requires that such a policy be a part of the academic unit's Pattern of Administration.

Instructional Activity - As indicated in the previous section on workload guidelines, in the Department of Plant Pathology, teaching activities include not only formal classroom teaching, but also undergraduate and graduate student advising, and extension outreach activities. All faculty are expected to maintain some involvement in undergraduate and/or graduate student advising, but the amount of effort each member of the faculty devotes to classroom teaching and extension outreach will depend on the responsibilities of their particular position. Faculty with paid extension appointments from OSUE are expected to devote a percentage of their total effort to extension outreach activities approximately proportionate to their percentage OSUE appointment. Faculty with paid OSU-General Funds appointments are expected to participate in classroom teaching. Those with OSU-GF appointments of 10-20% will be expected to teach a full course at least every other year or parts of courses every year. Those with OSU-GF appointments of 21-50% will be expected
to teach 1-3 full courses per year, depending on departmental needs and their own professional strengths, interests and abilities. Faculty who are paid predominately or exclusively on OARDC research appointments will be primarily engaged in research activities. Regardless of appointment, every member of the faculty is expected to devote a minimum of 25% of their total effort to some type of teaching activities.

Scholarly activity - All faculty are expected to be engaged in scholarly activity in some area of study that is appropriate to the discipline of plant pathology. As affirmed in the CFAES Faculty Reward System Guidelines for Annual Performance Review, Promotion and Tenure, scholarly activities are exemplified by one or more of the forms of discovery, integration, transformation, or application and are characterized by the creation of something that did not exist before, the novelty or utility of which has been validated by peers and/or external sources. In the Department of Plant Pathology, validation of scholarship by peers will be accomplished in nearly all cases by publication in appropriate peer-reviewed professional journals, publications or electronic media outlets or in peer-reviewed book chapters or books. The amount of scholarly activity expected will vary among faculty depending on their assignment and other responsibilities, but in all cases a sustained pattern of significant scholarly output will be expected. In addition to publication, it is expected that all faculty will support their programs of scholarly activity by seeking and obtaining sufficient extramural funding from appropriate sources.

Service Activity - All faculty are expected to participate fully in departmental activities, to contribute to college and university functions and to participate in other professional activities and organizations as appropriate. Faculty are generally expected to devote 10-15% of their time to service activities. The departmental APT document (Merit salary increase - criteria) specifies that “All faculty members are expected to make positive contributions with respect to academic service, contribute to and participate in professional organizations and activities, and contribute to and participate in the academic functions of the Department. Areas of participation include: attendance and participation in seminars, invited speaker programs, faculty meetings, committee meetings, student activities where faculty participation is expected or invited, etc. Faculty members also are expected to demonstrate respect and responsible behavior towards peers, staff, students and customers. In this regard, a record of good citizenship within the Department will be an important consideration when evaluating faculty performance for the determination of salary increases.”

Mechanisms for departure from average expected level of activity in each area - As indicated above, the department Chairperson is responsible for assuring that every faculty member has duties and responsibilities commensurate with his or her appointment and that the departmental workload is distributed equitably among faculty. In general, the amount of time each faculty member is expected to spend on classroom teaching, extension outreach, scholarly activities and service will be reflected in their actual appointment and position description. If faculty wish to deviate significantly in their activities from the above guidelines, they should discuss special circumstances or changes in their situation with the
Chairperson. Consideration will be given to making changes in position responsibilities within the framework of the needs of the department.

Required Disclaimer - The above policy does not constitute a contractual obligation. Fluctuations in demands and resources in the department and college and the individual circumstances of faculty members may warrant temporary deviations from the policy.

VII. COURSE OFFERINGS & TEACHING SCHEDULES

University policies regarding course offerings and teaching schedules are located in the OSU Office of Academic Affairs Policies and Procedures Handbook and can be found online at http://oaa.ohio-state.edu/handbook/tc.html. Much of the information below is paraphrased from that section of the OAA Handbook but also includes policies and guidelines specific to the Department of Plant Pathology.

Curricular requirements for undergraduate and graduate programs in the Department of Plant Pathology are developed by the Undergraduate Studies and Graduate Studies committees and affirmed by the faculty. Scheduling of classes is overseen by the Academic Affairs committee. Faculty develop syllabi for existing and proposed new classes and propose class schedules. Approval of new classes and class schedules is the responsibility of the Academic Affairs committee. In approving and scheduling classes, consideration will be given to the teaching specialties and preferences of faculty, but the primary consideration in scheduling classes must be to provide for the needs of students in Plant Pathology and those from other departments who need specific courses to meet their degree requirements. Every effort will be made to assure the regular availability of required courses and the sensible timing of high demand offerings so that all students have a fair chance at fitting such courses into their schedules. It is the department Chairperson's responsibility to assure that the schedule of course offerings each quarter makes the most effective use of the department's instructional resources.

Faculty Rule 3335-8-16 establishes a standard that an elective course below the 300-level should have an enrollment of at least twelve and an elective course at the 300-level or above should have an enrollment of at least eight for the course to be taught. If enrollment falls below these levels, permission must be obtained from the Chairperson to offer the course. This decision will be dependent on student needs for the course to complete degree requirements, particularly graduate students. Patterns of enrollment in all departmental course offerings will be examined every several years. Courses with enrollments that are frequently below minimum will be discussed and may be discontinued or offered less often when adequate enrollment can be expected. Faculty who teach courses that are canceled because of low enrollment will be assigned to teach other courses. Faculty may not cancel courses on their own. The Chairperson is responsible for determining whether a scheduled course is to be canceled.
VIII. ALLOCATION OF DEPARTMENT RESOURCES

The departmental APT document (Merit salary increase - other rewards) specifies that “Allocation of departmental resources for use by individual faculty in the conduct of their specific research, teaching and/or extension programs will be based on their need for these resources, the availability of the resources within the department, and the record of the faculty member in productive use of departmental resources. Departmental resources include laboratory and office space, departmental equipment, assigned laboratory technicians, and allocated departmental operational funds. Decisions regarding allocation and reallocation of departmental resources to individual faculty will be made by the department Chairperson and/or Associate Chairperson on the basis of merit using the same criteria specified above for merit salary increases.”

IX. LEAVES & ABSENCES

University options for faculty development and policies governing both unpaid leaves of absence and faculty professional leaves are located in the OSU Office of Academic Affairs Policies and Procedures Handbook and can be found on-line at http://oaa.ohio-state.edu/handbook/tc.html under the section on Faculty Development. The Department of Plant Pathology follows these university policies fully and has no special policies regarding leaves and absences.

X. SUPPLEMENTAL COMPENSATION & PAID EXTERNAL CONSULTING ACTIVITY

University policies governing supplemental compensation and paid external consulting activities are located in the OSU Office of Academic Affairs Policies and Procedures Handbook and can be found on-line at http://oaa.ohio-state.edu/handbook/tc.html under the section on Supplemental Compensation & Paid External Consulting Activity. The Department of Plant Pathology follows these university policies fully and has no special policies regarding supplemental or external compensation.

XI. GRIEVANCE PROCEDURES

Faculty with concerns about any departmental action or procedure should first discuss the situation with the department Chairperson or Associate Chairperson, as appropriate. Concerns regarding departmental procedures can be placed on the agenda for a faculty meeting and discussed by the faculty as a whole and appropriate action taken. If concerns still exist about a departmental action, faculty can discuss the matter with the Dean of the college or appropriate member of the college cabinet. University policies governing faculty appeals and grievances on salary and P&T matters are located in the OSU Office of
Academic Affairs Policies and Procedures Handbook and can be found on-line at http://oaa.ohio-state.edu/handbook/tc.html under the section on appeals and grievances. Procedures for filing complaints against faculty members and hearing procedures are covered in Faculty Rule 3335-5-04.

Staff with concerns should first discuss them with their immediate supervisor and then come to the department Chairperson or Associate Chairperson, as appropriate, if issues remain unresolved. Staff can bring general concerns to the entire faculty through their representative by placing the item on the agenda at a faculty meeting. Concerns of staff that cannot be resolved at the departmental level should be brought to the Office of Consulting Services within OSU Human Resources.

Students with concerns should first discuss them with their faculty advisor before approaching others. Specific grievance procedures to be followed by graduate students in the Department of Plant Pathology are outlined in the departmental Graduate Program Handbook. Concerns about procedural matters within the Plant Pathology graduate program can be brought to the attention of the faculty through representatives of the Plant Pathology Graduate Student Association, either to the Chairperson, the chair of the Graduate Studies Committee, or to the faculty at a department meeting.
APPENDIX F

Graduate Student Handbook
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Welcome to the Department of Plant Pathology. Graduate education is very important to our mission and considered a major focus of our department. We value the strong and positive interactions between students, faculty and staff. Although this handbook is a guide for your degree program, it is your advisor and others that will help you develop your program and answer questions that arise.

We recognize that each student has individual interests and strengths. Although there are specific graduate program requirements in the department, your individual program will reflect your specific objectives and goals.

Typically, students will have a major advisor assigned before starting the graduate program, although occasionally a student will need to select an advisor after enrolling. The selection of your major advisor is very important and should be done as early as possible. Your advisor will be a mentor and supervisor, and will be an important guide for you throughout your graduate program and career.

In addition to the Plant Pathology Graduate Student Handbook, you should retain a copy of the university's Graduate School Handbook: www.gradsch.osu.edu/Depo/PDF/Handbook/Handbook.pdf. The Graduate School Handbook "contains the rules, policies, and guidelines applicable to the graduate community at The Ohio State University." Additional rules and requirements are specified by the Graduate Studies Committee (GSC) of the Department of Plant Pathology. There have been significant revisions to the Graduate School Handbook in the past year, so please refer to the current online version.

Early in your program you should consult with your major advisor and establish a Student Advisory Committee (SAC). You, your major advisor and SAC should meet to determine the courses to be taken for your graduate degree. This list of courses should be put on Form I and placed in your file. It is important to discuss thesis or dissertation research with your SAC as early as possible. We hope the following guidelines will be helpful to you in development of your graduate program. Although some of the departmental policies given in this edition of the Handbook may change, you will be expected to fulfill the degree requirements in effect at the time you begin your graduate program. In the case of substantial revisions, the Graduate School and/or the Department of Plant Pathology will clarify how this may impact your program requirements.
Graduate Student Code of Research and Scholarly Conduct

Approved by the Council on Research and Graduate Studies, May 2004

Graduate students and Graduate Faculty aspire to professional behavior that is consistent with the highest ethical and moral standards. The Graduate School at The Ohio State University expects that graduate students will demonstrate responsibility and integrity in pursuing their creative and scholarly interests. The academic enterprise is dependent upon such behavior. Graduate students are responsible for learning about appropriate standards for ethical research and scholarly conduct and for following all university policies related to ethical research and scholarly conduct.

When graduate students join the Ohio State community, they become members of disciplinary, scholarly, and professional communities that extend beyond the university. Graduate students are expected to learn, respect, and abide by the professional codes of ethics and responsibilities that are commonly accepted in their field of study or area of research. These codes include but are not limited to the following: a responsibility to contribute an original body of work to one's chosen discipline and the recognition that one's work is based on the work of others which must be respected and properly acknowledged. Graduate students also have the responsibility to treat university faculty, staff, and other students respectfully and professionally.

Graduate Faculty, advisors, and graduate programs should actively encourage their students to participate as members of their chosen disciplinary, scholarly, and professional communities. Graduate students should be encouraged to seek and share knowledge wherever and whenever possible. Academic advisors and other faculty members should educate graduate students through example and discussion, addressing such issues as academic honesty, research, publication, recruitment, and hiring practices, and applicable fellowship and graduate associateship responsibilities. Disciplinary codes of ethics and norms should be discussed among graduate students and faculty. Such communication is a means of setting high standards of behavior in graduate study and beyond.

Source: Graduate School Handbook, Appendix B

Graduate students are expected to be familiar with relevant policies and procedures at The Ohio State University. Detailed information may be found in the University's Code of Student Conduct is available online (studentlife.osu.edu/resources/). Graduate School staff may be contacted at (614) 292-6031 for additional assistance.
Academic Standards

Policies for academic standards are set by the Graduate School and the Department of Plant Pathology. The minimum Academic and Professional Standards established by the Graduate School are described in the Graduate School Handbook, Section V.

Additional information is available in this handbook under "Graduate Student Review, Evaluation, and Denial of Further Registration," p. 26.

A student will be denied further registration if:
1. The student fails the Final Oral Master’s Examination twice.
2. The student fails the Ph.D. Candidacy Examination twice.
3. The student completes the M.S. degree in this department and is judged to be not of Ph.D. caliber by the Master's degree examining committee. Approval to continue to the Ph.D. degree must be given by the Master's degree examining committee and reported on Form II. A student may be approved for the Master’s degree but not approved for continuation to the Ph.D. degree.

A student will be issued a written warning by the Graduate School and may later be denied further registration based on the following:
1. The student refuses or is unable to follow the educational plan suggested by his/her advisor or SAC, or meet the goals specified by the advisor for reasonable progress.
2. The student fails to meet the minimum grade standards or time limits under Graduate School rules.
3. It is the judgment of the GSC through formal evaluation of graduate students that the student is not making reasonable progress towards the completion of his/her graduate program. This applies to completing degree requirements as well as meeting the research and other goals established by his/her advisor and SAC in a proficient and timely manner.
Admissions

Admission to the Plant Pathology Graduate Program is the responsibility of the Department GSC. In addition to the university application form, students must provide Graduate Record Examination scores, official transcripts of all college/university-level coursework, three letters of recommendation, a statement of intent describing personal background, research experience and professional interests, and a curriculum vitae.

A four-year baccalaureate or higher degree, or its equivalent, from an accredited college or university is required prior to beginning graduate studies. Applicants normally should have a cumulative grade point average of 3.0 or higher in all previous college coursework. The department desires, as a guideline, Graduate Record Exam (GRE) scores of 1160 or higher for the verbal plus quantitative portions of the exam, and a score of 4.0 or greater on the analytical writing section. Applicants whose native language is not English must submit a recent, official Test of English as a Foreign Language (TOEFL) score or Michigan English Language Assessment Battery (MELAB) score. Specific university requirements can be found on the Graduate Admissions website: gradadmissions.osu.edu/TOEFL_requirement.html. All available information is considered by members of the GSC for a decision regarding admission. Prior to final acceptance of the student, one or more members of the Graduate Faculty in the department must tentatively agree to advise the applicant. Agreeing to advise a student does not mean that financial support will be provided.

International students must provide evidence that they have sufficient financial support as a condition for admission. This requirement is in part administered by the Graduate Admissions Office.

Graduate Studies Committee (GSC) Responsibilities

The GSC is responsible for the conduct and administration of graduate programs. General responsibilities are given in Section XIV of the Graduate School Handbook. The GSC of the Plant Pathology graduate program will:

1) evaluate applicants and make decisions regarding admission to the graduate program;
2) make decisions on the offering and renewal of departmental associateships (under the authority delegated by the departmental chair);
3) approve student petitions to the Graduate School;
4) oversee annual performance reviews of each graduate student;
5) monitor standing and progress of each student; and

6) nominate faculty for category M or P of the graduate faculty.

A graduate student or a faculty member may petition the GSC for a waiver of any of the graduate program requirements. A petition by a graduate student must be approved by the SAC prior to submission to the GSC.

The GSC consists of five voting members. Four members are department faculty elected by the graduate faculty of the department. One member is a senior graduate student in the department nominated by the students and elected by the faculty. The Chair and Associate Chair of the department will be non-voting members of the GSC. Faculty members of the committee will be elected to four year terms. The graduate student member will be appointed for a one year term but may be reappointed for a second year. The student member will not participate in the review of current graduate students, renewal of associateships, matters relating to the academic performance of current students, or in nomination of faculty to the graduate faculty, but will be a voting member in regard to all other decisions made by the committee. In particular, the student member will participate in the review of all graduate program applications in Plant Pathology and will vote to admit/deny decisions. Approval to admit or offer financial support requires four out of five favorable votes.

Part Time Students

Students wishing to pursue a graduate degree on a part-time basis (i.e., students registered for less than 7 hours of graduate credit per quarter prior to their Candidacy Exam) will be admitted only when there is evidence that the student can make timely progress toward the desired degree.

Graduate Student Funding

Funding for support of graduate students comes from various sources including department funds, OARDC Research Associateships, University fellowships/programs, extramural grants and contracts, foreign government scholarships/fellowships, or private foundations. The department and the graduate faculty do not have an obligation to provide financial support to every student who has been admitted to the graduate program. When funding is provided by grants or contacts, the student holding such an appointment will be selected by the faculty member, and continued support will depend on availability of funds and student performance (i.e., being in good standing, including making reasonable progress).
The department has two basic stipend rates for GRA appointments, an M.S. degree rate and a Ph.D. degree rate. In most cases, the rate of the stipend will be based on the current departmental rate for M.S. or Ph.D. students and must be approved by the GSC Chair. Graduate Associateships supported by departmental funds are awarded and annually renewed on the basis of merit by the GSC. These appointments usually are made on a yearly basis and are for four quarters. Their renewal is based in part on the student’s progress as documented annual review of the student’s progress. However, at the discretion of the GSC Chair, funding may be awarded on a quarter by quarter basis. M.S. students that wish to pursue a Ph.D. in Plant Pathology should consult with their faculty advisor and the Graduate Studies Chair regarding graduate funding support (preferably a year in advance of projected completion of M.S.) as satisfactory completion of the M.S. degree will not assure that funds will be available for Ph.D. studies.

Except in unusual circumstances, students will not be supported by departmental funds beyond 9 quarters for completion of an M.S. degree or beyond 17 quarters for completion of a Ph.D. degree (inclusive of the time to earn a Master's degree in this department). Renewal will also depend upon reasonable progress by the student as determined by the annual student evaluation, being in good standing, and the continued availability of department funds. Students who will not continue to be supported will be notified one quarter in advance. The GSC may consult with faculty advisors regarding alternative sources of support (e.g., grants).

Students holding 50% FTE GRA appointments receive a full tuition and fee authorization as described in the Graduate School Handbook (Section IX). The Graduate School specifies the minimum registration requirements for Graduate Associateships:

- Nine credit hours during each quarter a 50 percent or greater GA appointment is held, except during the summer quarter, when the minimum is seven;
- Seven credit hours during each quarter a 25 percent appointment is held;
- For doctoral students who have passed the candidacy examination, three credit hours each quarter a 50 percent GA appointment is held, including summer quarter. This change, which took effect Autumn 2008, reflects that the definition of full-time has been reduced to three credit hours per quarter for all post-candidacy doctoral students whether they are funded or self-funded.

The Plant Pathology Graduate Program recommends that all full-time M.S. and pre-candidacy Ph.D. students register for 18 credit hours.

Post-candidacy doctoral students on a 50 percent GRA appointment must register for a maximum of 3 credits. This will typically be 2 credits of PLNTPTH 999 and 1 credit of
PLNTPTH 995 during the Autumn, Winter and Spring quarters; and 3 credits of PLNTPTH 999 during the Summer quarter. Registration for more than 3 credits post-candidacy requires approval by the faculty advisor and SAC, and a petition to the Departmental GSC, which is forwarded to the College of Food, Agricultural, and Environmental Sciences, and to the Graduate School.

Benefits

Students holding 50% FTE GRA appointments receive a full tuition and fee authorization as described in the Graduate School Handbook (Section IX). Fee authorizations include Instructional and General fees and nonresident fees. Other fees, including parking and late penalties, must be paid by the student. GAs may be appointed for less than 50 percent (partial appointment). With the approval of the Dean of the Graduate School, GAs may be appointed at 25 percent time, averaging 10 hours per week; however, only one half of their fees will be authorized.

Annual leave (vacation) and sick leave benefits are not provided to students on GRA appointments. Nevertheless, it is expected that students who GRA appointments for four quarters will need time off. Since students are expected to do research during quarter breaks, time off must be scheduled with the major advisor to prevent any major disruption regarding the GRA duties or progress of the student's graduate program. Other benefits that are available to eligible graduate student employees are detailed on the OSU Human Resources web site: hr.osu.edu/benefits/ga_studentemployeebenefits.aspx. This web site also includes information on student health insurance and health plan coverage for graduate associateships. The Student Health Insurance web site also has additional details and contact information: shi.osu.edu.

The department also tries to provide graduate students with transportation to national or regional meetings of the American Phytopathological Society (or other appropriate organization), when these meetings are within driving distance. In some cases faculty may be able to provide additional support for their students.

Responsibilities of Students on GRA Appointments

Students on GRAs will assist their faculty advisor in research and normally will be supervised by their advisor. When the GRA is supported by a faculty member's grants or contracts, the student will conduct research related to that grant as assigned by their advisor. On occasion, a student receiving financial support from the department may also be required to assist in teaching lab sections and preparing materials for courses. Each student's supervisor will assign duties either
in writing or verbally.

Students on regular GRA appointments (50%) are required to provide up to 20 hours of service per week to the department. Occasionally students hold 25% GRA appointments with a workload of up to 10 hours of service per week. However, students are expected to put in hours well beyond these requirements in their coursework and research. Consistent with this, students on a regular 50% GRA appointment are generally not allowed to engage in outside employment. A graduate student's principal objective is to earn a graduate degree, and it is expected that other time, after satisfying the GRA commitment, will be devoted to their graduate education. A Graduate Associateship provides financial support and valuable working experience.

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**Graduate Student Teaching Responsibilities and Ph.D. Teaching Requirements**

**Graduate Students and Teaching**

The department values all aspects of teaching to include classroom and extension-outreach teaching and student advising/mentoring. Because of this core commitment to teaching, the department believes strongly in providing graduate students with meaningful opportunities to both explore their interests and aptitudes for teaching and to enhance their teaching effectiveness. Similarly, the department has a rich tradition of service-oriented leadership and believes that a strong commitment to service is a key quality of those graduating from the Graduate Program in Plant Pathology. As a result, the department has an expectation that all graduate students receiving departmental funding will be required if asked to provide teaching support.

**Service in Teaching**

Regardless of personal interest in classroom teaching, any graduate student receiving, or that has received departmental funding, may be asked to help support the teaching mission of the department. The chair of the department will work with faculty members to determine the teaching support needs in the department and will make all teaching support assignments. Teaching service may or may not meet the requirements for PLNTPTH 901, Mentored Teaching in Plant Pathology, but will count toward meeting the Ph.D. requirement. This teaching assistance may take many forms including: preparation of laboratory material (media, microbe cultures, etc.), literature reviews to support lecture preparation, internet reviews of topics, proctoring of examinations, and grading of examinations and student assignments. Preparing and delivering lectures, serving as a mentored laboratory instructor, or working with a faculty mentor to offer online or distance education courses may also be acceptable for PLNTPTH 901.
Ph. D. Teaching Requirement: Developing Skills and Building Experience

Teaching is an important aspect of the mission of the Department of Plant Pathology whether it is classroom teaching or extension/outreach. It is also an important part of graduate education and the department is committed to ensuring that our graduate students have ample opportunities to explore this aspect of their professional development. Teaching opportunities in the department are varied and encompass both classroom and extension/outreach teaching. Although not required of students pursuing the M.S. degree, all students working toward the Ph.D. degree, irrespective of source of funding, are expected to develop their skills related to teaching during his/her graduate program. The intellectual rigor and time commitment of the teaching experiences pursued will vary but should be the equivalent of a 3-5 credit course. For students seriously interested in teaching, the department offers two mentored teaching courses – PLNTPTH 901 (Mentored Teaching in Plant Pathology) and PLNTPTH 902 (Mentored Extension/Outreach Teaching in Plant Pathology) – designed to provide professional classroom and extension/outreach teaching opportunities, respectively. Students that successfully complete these courses will have their teaching experience documented on their transcripts. Details of these two courses are provided in Appendix I and II. An abbreviated overview of how students plan for their mentored teaching experiences is provided below.

Students interested in pursuing mentored teaching experiences should discuss their goals with their advisor and SAC. Prior to enrolling in PLNTPTH 901 or 902, students are required to submit a brief written summary of the experience to be undertaken to include a statement regarding desired outcomes, the means of evaluation and assessment that will be used to gauge their teaching effectiveness and learning, and a request indicating the number of PLNTPTH 901 or PLNTPTH 902 credit hours sought to the department’s Teaching Experience Coordinator (TEC) or Extension/Outreach Experience Coordinator (EEC), respectively. The amount of credit will vary based on the intellectual rigor and time commitment involved. The mentor for these teaching experiences may, or may not be, the student's faculty advisor. The TEC and EEC are faculty members in the department who are appointed on an annual basis by the Department Chairperson. Once approved by the TEC or EEC, the summary serves as a contract between the student and the faculty mentor.

Office Space

It is the policy of the department to provide office space for all graduate students in our program. Unfortunately, lack of available space may prevent this, particularly in Columbus. At such time, priority will be given to Columbus-based senior graduate students (completion of 3 quarters or
more). We believe student interaction is a valuable part of a graduate student's experience, and effort will be made to provide desks for all students.

**Student Advisory Committee (SAC)**

All students will select an SAC to advise them during their degree program. In most cases students will be admitted to a graduate program under the direction of a faculty advisor. Occasionally a student may be given the opportunity to choose a faculty advisor depending on their program interests, however this opportunity will be associated with a departmental associateship and it will be stated at the time the associateship is offered. A temporary advisor will be appointed by the Graduate Studies Committee Chair at the initiation of the quarter of residence for these students. The major advisor should be selected as soon as possible and no later than the end of the second quarter of residence. In consultation with the student, an SAC consisting of at least three faculty members including the major advisor will be appointed. The major advisor will serve as the committee chairperson. Including the major advisor, at least two of the SAC members must be regular faculty in the Department of Plant Pathology. The membership of the SAC should be reported on Form I.

Students will be allowed to change major advisors if another graduate faculty member in the program is willing to advise them. If considering such a change, students are encouraged to consult with the Graduate Studies Chair or another Graduate Studies Committee member. It is the student's responsibility to locate a new advisor and the new advisor will not necessarily be obligated to continue any financial support paid to the student by his/her previous advisor. For students who earn two graduate degrees in Plant Pathology, there is no expectation that the same faculty member serve as advisor for both degrees. SAC members, with additional faculty when required by University rules, are to serve on the M.S. degree Final Examination, the Ph.D. Candidacy Examination, the Ph.D. Dissertation Reading Committee, and the Ph.D. Final Examination.

Early in your program, you should meet with your advisor and SAC members to collectively select the courses to be taken for the degree sought and to discuss thesis or dissertation research and writing. The major advisor is responsible for directing the student's research and approving the research problem; however, the final responsibility for the content of the thesis or dissertation lies with the student. The student and the major advisor are encouraged to seek the advice of all SAC members and to keep them posted as to the student’s progress. SAC members are encouraged to play an active role in advising the student, and it is recommended that each student meet with their SAC at least every 6 months. In cases involving petitions to the GSC or
the Graduate School regarding the student's academic standing, or disputes between the student and his/her advisor, the SAC will be asked to make a written recommendation to the GSC.

**Proposed Coursework and Potential Substitutions to Graduate Program Requirements**

By the end of the first year, with the guidance and approval of the advisor and SAC, students should have determined their proposed coursework. This is to be documented in Form I, Graduate Program Requirements, and submitted to the Graduate Studies Chair for the student's file. The coursework content should meet the graduate program requirements as outlined below for the M.S. or Ph.D. degrees. Occasionally, the student and SAC may decide that substitutions for these requirements are justified. Such substitutions should be clearly documented, with a short justification, on Form I. Subsequent modifications to Form I should be justified in writing and submitted to the Graduate Studies Chair.

**First Year Proposal Requirements**

*For all graduate students entering OSU Summer 2009 and thereafter (approved June 2009)*

All Ph.D. students and M.S. thesis degree plan students are expected to prepare a research proposal of their thesis research within the first 3 quarters after enrollment. The proposal format will be determined by the student’s major advisor and SAC.

Upon approval of the proposal by the student's major advisor and SAC, the student will be expected to undertake two additional requirements. First, all first-year students will present their proposals to the department in an oral seminar (20 minutes in length) during an annual symposium held during the end of Spring Quarter. This symposium will be organized by the current Plant Pathology Seminar Committee with the involvement of the Plant Pathology Graduate Students Association. The symposium presentation will replace the current seminar requirement for first year students. However, all first year students will still be required to take Plant Pathology 995 each quarter.

All graduate students are required to attend the Spring Symposium for First-Year Grad Students. This is an essential element of the overall PLNTPTH 995 experience. It is very important that our first year students have the support and feedback from senior students, faculty and staff afforded by this event.
A second requirement is that the student will present their research proposal to their SAC and defend the proposal in an oral exam by the SAC. This presentation and defense will normally take at least an hour, but may last up to 2 hours. While required, this oral defense is not a candidacy exam of any kind, but simply a means by which the SAC can determine the student’s proficiency and further needs for development in coursework or research. Recommended modifications to the proposal should be made within a month of this exam.

M.S. Degree Requirements

Students pursuing a Master’s degree who anticipate going on to the Ph.D. degree should select the Master’s thesis degree plan. However, a Master’s non-thesis degree plan is available.

Course and Credit Hour Requirements

All students will take PLNTPTH 401 - General Plant Pathology if they have not had a comparable introductory course in Plant Pathology.

Master’s degree students are required to complete a minimum of 45 credit hours of graduate work with a minimum cumulative GPA of 3.0. At least 37 credit hours must be earned at OSU.

All Plant Pathology Master’s degree students are required to take:

(Also see handout on new Semester core requirements)

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Pathology 600.01</td>
<td>Phytobacteriology</td>
<td>3 credits</td>
</tr>
<tr>
<td>Plant Pathology 600.02</td>
<td>Plant Virology</td>
<td>3 credits</td>
</tr>
<tr>
<td>Plant Pathology 602</td>
<td>Plant-Microbe Interactions</td>
<td>4 credits</td>
</tr>
<tr>
<td>Plant Pathology 603</td>
<td>Plant Disease Management</td>
<td>5 credits</td>
</tr>
<tr>
<td>Plant Pathology 660</td>
<td>Mycology</td>
<td>5 credits</td>
</tr>
</tbody>
</table>

Master’s Thesis Degree Plan

As specified by the SAC, a typical Master’s thesis degree plan may include 30 to 35 credit hours of courses, not counting seminar (PLNTPTH 995). The thesis will count at least an additional 10 to 15 credit hours and will be registered for under PLNTPTH 999, Research. After meeting with the student to determine the student’s proficiency and needs for coursework, and during the development of Form I, Graduate Program Requirements, the SAC may reach the decision to recommend substitutions in courses listed above with other courses that are appropriate for the
student's graduate program. Such changes should be listed and each individually justified on Form I and a copy sent to the Graduate Studies Chair for signature and approval. Often changes in coursework are also necessary later in a student’s program of study. Justification for these substitutions should be listed as an amendment to Form I, again subject to approval by signature by the Graduate Studies Chair.

The Master’s degree final oral examination in defense of the thesis will be given by the SAC. The examination can be comprehensive in nature and need not be confined to the thesis topic. The student is considered to have passed the Master’s Examination successfully only when the decision of the Examination Committee is unanimously affirmative. Form II, Results of the Master's Examination and Recommendation to Continue to the Ph.D. Degree, will be used to report the results of the examination and provide a recommendation regarding continuation to the Ph.D. degree. A student may pass the Master’s degree examination but may not be recommended for continuation to the Ph.D. degree. Form II will be placed in the student’s permanent file.

Form II (Word) is available on the department intranet: plantpath.osu.edu/intranet/grad-student-forms/)

If the final oral examination for the Master’s degree is judged unsatisfactory, the rules pertaining to a second examination as listed in the Graduate School Handbook must be followed.

**Master’s Non-Thesis Degree Plan**

The Master’s non-thesis degree plan is available in Plant Pathology. The requirements and restrictions for this degree are as follows:

a) The University requirements include: no thesis, completion of minimum of 45 credit hours of graduate course work with a cumulative GPA 3.0, and satisfactory performance on a departmental comprehensive written exam of at least 4 hours duration.

b) The department additionally requires special projects in two of three areas: teaching, extension or research. The nature of each project will be determined by the SAC and will be completed by formal written reports approved by the SAC. To meet these requirements, the student will schedule PLNTPTH 901 - Mentored Teaching in Plant Pathology (3 to 5 credit hours), PLNTPTH 902 - Mentored Extension/Outreach Teaching in Plant Pathology (3 credit hours) or PLNTPTH 693 - Independent Study (3 to 5 credit hours) depending on the project subject area of teaching, extension or research, respectively. These hours will count toward the
45 credit hours required by the University. At their discretion, the SAC may require an oral examination in addition to the 4 hour written examination.

Descriptions of PLNTPTH 901 and 902 are in Appendix I and II at the end of this handbook.

c) No PLNTPTH 999, Research, credit will be included in the 45 credit hours required.

**Master’s Degree Based on Candidacy Examination**

Upon the recommendation of the adviser and SAC, a student in the Ph.D. program may earn a Master’s degree on the basis of satisfactorily completing the doctoral Candidacy Examination, if he/she does not already hold an equivalent Master’s degree in Plant Pathology. The student must apply for this degree immediately following completion of the Candidacy Examination as outlined in the Graduate School Handbook (Section VI: Master's Degree Programs, General Information, Earning Master’s Degree On the Basis of Candidacy Examination).

**Doctor of Philosophy (Ph.D.) Degree Requirements**

Doctoral degree programs give students the opportunity to achieve a high level of scholarly and technical competence. The doctoral degree program consists of a coherent schedule of courses and laboratory and/or field-based research. Success in coursework does not guarantee success in dissertation research, which must constitute an original and significant contribution to the field of plant pathology. Normally, a dissertation should include or be equivalent to several publications in peer-reviewed scientific journals.

**Course and Credit Hour Requirements**

*(Also see handout on new Semester core requirements)*

Core 600-level graduate courses in Plant Pathology

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PLNTPTH 600.01</td>
<td>Phytobacteriology</td>
<td>3 credits</td>
</tr>
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<tr>
<td>PLNTPTH 603</td>
<td>Plant Disease Management</td>
<td>5 credits</td>
</tr>
<tr>
<td>PLNTPTH 660</td>
<td>Mycology</td>
<td>5 credits</td>
</tr>
</tbody>
</table>

In addition, a minimum of sixteen additional credit hours of graduate courses at the 700 or 800
level are required for the Ph.D. degree. At least three of the following courses must be taken:

<table>
<thead>
<tr>
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<th>Course Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>PLNTPTH 702</td>
<td>Plant Disease Epidemiology</td>
<td>4 credits</td>
</tr>
<tr>
<td>PLNTPTH 703</td>
<td>Agricultural Genomics</td>
<td>3 credits</td>
</tr>
<tr>
<td>PLNTPTH 830</td>
<td>Current Topics in Plant Pathology</td>
<td>1-2 credits</td>
</tr>
<tr>
<td>PLNTPTH 842</td>
<td>Biochemistry of Plant Response to Infection</td>
<td>3 credits</td>
</tr>
<tr>
<td>PLNTPTH 843</td>
<td>Ecology of Plant-Associated Microbes</td>
<td>5 credits</td>
</tr>
</tbody>
</table>

Ph.D. students accepted into the Plant Molecular Biology and Biotechnology (PMBB) Program and majoring in Plant Pathology must take:

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
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<td>Phytobacteriology</td>
<td>3 credits</td>
</tr>
<tr>
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<td>Plant Virology</td>
<td>3 credits</td>
</tr>
<tr>
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<td>5 credits</td>
</tr>
</tbody>
</table>

and two of the following courses:

<table>
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</thead>
<tbody>
<tr>
<td>PLNTPTH 703</td>
<td>Agricultural Genomics</td>
<td>3 credits</td>
</tr>
<tr>
<td>PLNTPTH 842</td>
<td>Biochemistry of Plant Response to Infection</td>
<td>3 credits</td>
</tr>
<tr>
<td>PLNTPTH 843</td>
<td>Ecology of Plant-Associated Microbes</td>
<td>5 credits</td>
</tr>
</tbody>
</table>

PMBB students must also fulfill the PMBB program’s course requirements.

Additional Plant Pathology courses, such as PLNTPTH 655 - Quantitative Methods in Applied Biology, PLNTPTH 685 - Diagnostic Field Plant Pathology, and PLNTPTH 841 - Molecular Mechanisms of Pathogenicity may be recommended by the student's SAC.

After meeting with the student to determine the student’s proficiency and needs for coursework, and during the development of Form I, the SAC may decide to recommend substitutions in courses listed above with other courses more appropriate for the student's graduate program. Such changes should be listed and each individually justified on Form I and a copy sent to the Graduate Studies Chair for signature and approval. Often changes in coursework are also necessary later in a student’s program of study. Justification for these substitutions should be listed as an amendment to Form I, again subject to approval by signature by the Graduate Studies Chair.

As specified by the SAC, a typical Ph.D. degree program may include from 75 to 95 credit hours of coursework, not including PLNTPTH 995 - Seminar. Research credits will typically be 40 to
60 credit hours and will be registered for under PLNTPTH 999 - Research.

To lower the requirement for total credit hours, credits for qualified courses taken elsewhere may be transferred to The Ohio State University. This requires approval of the advisor, the SAC, and the GSC, and should be done within the first 2 quarters of enrolling (Graduate School policy). In most cases, a formal transfer is not needed because it is rare for a full-time Ph.D. student to have less than 120 credit hours by the time of graduation. The exception could be for part-time students or students enrolling for the minimum number of credit hours. See more details and important requirements for these transfers below under “Important Residency Requirements”.

The requirement for 75-95 credit hours of course work comes from the department, not the Graduate School. The SAC has great flexibility here. For instance, the SAC may give “credit” to a student for three graduate courses taken at another institution prior to coming to The Ohio State University. This is not an official credit transfer, but an in-house acknowledgment that some of our course requirements have been met. This also would not reduce the requirement of 120 graduate credit hours beyond the baccalaureate degree required to earn a doctoral degree. The specific courses taken, as well as the exact number of credit hours in courses, are determined by the SAC based on the specifications in the departmental Graduate Student Handbook. In the example above, the SAC would decide whether one-to-three additional courses should be taken by the student at OSU, or if research credit should be taken.

**Important Credit Hour and Residency Requirements**

*For PhD students, the following Graduate School requirements must be fulfilled after the master's degree has been earned or after the first 45 hours of graduate credit have been completed.*

From Graduate School Handbook, Section VII, Doctoral Degree Programs:

**Credit Hours and Residency Requirements VII.2**

**Minimum Hours.** A minimum of 120 graduate credit hours beyond the baccalaureate degree is required to earn a doctoral degree (Revision from 135 to 120 approved by Graduate Council, April 20, 2009). If a master’s degree has been earned by the student, then a minimum of 75 graduate credit hours beyond the master’s degree is required. [Note: unlike the 45 credit hours for the master’s
degree, this can include 999 research credit hours. [If the master’s degree was earned at another university, the credits must be transferred to this university for the credits to count towards the doctoral degree. The SAC must determine which of these course requirements have been met and how many units can be transferred to OSU.] A student must be registered for at least three graduate credit hours during the quarter(s) of the candidacy examination, the quarter of the final oral examination, and the quarter of expected graduation.

**Master’s Credit.** When a doctoral student has taken a master's degree at this university and has earned graduate credit in excess of the minimum required for that degree, the student’s advisor, with the approval of the Graduate Studies Committee, notifies the Graduate School of the courses to be counted toward the 75 graduate credit hours required for the doctoral degree. This notification must occur no later than the end of the first quarter of enrollment beyond completion of the master’s degree. Such graduate credit hours would be those normally earned as part of the doctoral degree program. No more than 20 hours of research (998 or 999) may be counted.

**Petition.** The Graduate Studies Committee may petition the Dean of the Graduate School to waive the 120 graduate credit-hour requirement when it imposes an undue delay on a student’s earning a doctoral degree. The student must fulfill all other doctoral degree requirements.

**Residency.** The purpose of the residency requirements is to give students the opportunity to engage in intensive, concentrated study over an extended period of time in association with faculty members and other students in an atmosphere conducive to a high level of intellectual and scholarly activity. The following requirements must be fulfilled after the master’s degree has been earned or after the first 45 hours of graduate credit have been completed:

1. a minimum of 45 graduate credit hours must be completed at this university
2. a minimum of three out of four consecutive quarters with an enrollment of at least 9 graduate credit hours per quarter must be completed while in residence at this university (Revision from 10 to 9 credit hours approved by Graduate Council, April 20, 2009).
Changes in Registration Requirements for Post-Candidacy Doctoral Students

Please be aware of the following registration requirements for post-candidacy students, effective Autumn Quarter 2008.

Admission to Candidacy: Provided that the student is in good standing at the end of the quarter in which the candidacy examination is completed, satisfactorily completing that examination admits the student to candidacy for the doctoral degree in that program at the end of that quarter and is considered a post-candidacy doctoral student.

1) The definition of full-time has been reduced to three credit hours per quarter for all post-candidacy doctoral students whether they are funded or self-funded (registration for more than 3 credit hours requires special approval as noted elsewhere);

2) continuous academic year registration is now required for post-candidacy doctoral students admitted Autumn Quarter 2008 or after (although leaves of absence could be requested); and

3) summer quarter registration will be optional starting in Summer Quarter 2009 (note: summer quarter registration is required to hold a 50 percent GRA appointment).

A student is normally expected to enroll primarily in 999 or in program-approved courses after satisfactorily completing the candidacy examination. Post-candidacy doctoral students are considered full time if enrolled for three credit hours. Post-candidacy doctoral students must also fulfill the post-candidacy residency requirement of a minimum of six graduate credit hours over a period of at least two quarters after admission to candidacy. Candidacy status established in one doctoral program is not transferable to another doctoral program.

Can a post-candidacy doctoral student register for additional credit hours above three? (www.gradsch.ohio-state.edu/Depo/PDF/PostcandidacyFAQ.pdf)

Yes. A decision to register for more than three credits should be made following discussions between the student and his or her advisor and should meet with the approval of the local graduate program. In making such decisions, advisors and graduate programs should consider the academic and professional relevancy of the additional credits for individual doctoral students, and not simply budget implications for the department. The expectation is that registrations above three credits should be made for academic and professional reasons, including opportunities for a graduate student to pursue a graduate interdisciplinary specialization or a graduate minor.

For post-candidacy students, the request to register for over 3 credits must be submitted to the
Graduate Studies Chair in Plant Pathology at least one quarter prior to registration. This is subject to approval by the Graduate Studies Committee; the College of Food, Agricultural, and Environmental Sciences; and the Graduate School.

In the situation where a post-candidacy student wishes to enroll in a course, how the credits are distributed between the proposed course, research (PLNTPTH 999) and seminar (PLNTPTH 995) is at the discretion of the student and their advisor. However, in the situation that official registration for PLNTPTH 995 is not possible, attendance in PLNTPTH 995 is still expected of all students.

Candidacy Examination

For Ph.D. students, the Candidacy Examination is a test of the student’s comprehension of plant pathology and allied areas of biology and agricultural science and the ability to engage in critical thinking and express ideas clearly. The Candidacy Examination is comprehensive and consists of both written and oral parts. The exam is given after the student has completed all or nearly all of the required course work. The Notification of Candidacy Examination form (available on the Graduate School web site) must be sent to the Graduate School at least two weeks prior to the date of the oral examination. The Graduate School requires that the student be in GOOD STANDING (i.e., cumulative grade point average [CGPA] of 3.0 or greater and making reasonable progress) before this examination can be scheduled. Reasonable progress is defined in the Graduate Student Review section. In Plant Pathology it is expected that the student demonstrates research ability and aptitude before scheduling the exam. The examining committee for the Ph.D. Candidacy Examination shall consist of at least four Graduate Faculty members plus the Graduate School Representative (if required by the Graduate School), who is selected by the Graduate School. Members of the SAC serve on this committee. At least two members of the examining committee shall be from the Department of Plant Pathology and the major advisor will serve as chair of the committee.

The written portion of the Ph.D. Candidacy Examination shall be in the form of either questions submitted by each of the committee members or a research proposal. The topic of the proposal shall be agreed upon by the members of the committee and cannot be in an area directly related to the candidate's dissertation research. It is important to note that the SAC, and not the student, chooses the type of candidacy exam.
The written portion of the exam shall be scheduled so that the answers or proposal can be returned to the respective members of the committee at least two weeks in advance of the date scheduled for the oral part of the examination. Members of the examining committee shall mark their portions of the written examination or the proposal either satisfactory or unsatisfactory and return them, along with any comments, to the Chair of the examining committee. The written portion of the exam will be returned to the student prior to the oral exam. The written and oral portions of the Candidacy Examination constitute a single examination.

The oral portion of the Candidacy Examination, held after completion of the written portion, will last two hours. The oral portion must be completed within one month after the written portion.

**Videoconferencing.** Prior approval to conduct the examination using video conferencing is required. Students should submit a Request for Videoconferencing form to the Graduate School prior to the examination (available on the Graduate School web site, [Forms and Publications](https://www.gradschool.com/forms.php)). All doctoral candidacy oral examinations involving video conferencing must adhere to the Graduate School's guidelines for videoconferencing (Graduate School Handbook, Appendix A--Guidelines for Video Conferencing Relating to Master’s and Doctoral Examinations).

The student is considered to have completed the Candidacy Examination successfully only when the decision of the Candidacy Examination Committee is unanimously affirmative. If the examination is judged unsatisfactory, Graduate School policies pertaining to **Results of the Candidacy Examination** will be followed (Graduate School Handbook, Section VII, Doctoral Degree Programs).

**Dissertation Committee**

The Dissertation Committee is made up of at least four faculty with the major advisor serving as the chair. The members of the SAC serve on this committee.

THE STUDENT IS REQUIRED TO HAVE THE PH.D. DISSERTATION DRAFT IN THE HANDS OF EACH MEMBER OF THE DISSERTATION COMMITTEE AT LEAST TWO WEEKS PRIOR TO SUBMISSION TO THE GRADUATE SCHOOL (i.e., four weeks before the Final Oral Examination).
Committee members may find it necessary to recommend changes before an examination can be scheduled. It is the duty of each member of the committee to certify whether the Ph.D. dissertation draft represents a significant contribution to knowledge of sufficient importance to warrant holding a Final Oral Examination. After approval by the dissertation committee, the draft must be submitted to the Graduate School no later than two weeks before the final oral examination. The decision regarding final approval of the dissertation will be made following the final oral examination.

**Final Ph. D. Seminar**
Ph. D. students are required to give a public seminar covering their research accomplishments prior to receiving their degree. This seminar may be given as part of PLNTPTH 995 or as a separate seminar usually presented on the day of their Final Oral Examination. Based on the recommendation of the SAC, the seminar can be given before or as part of the Final Oral Examination in accordance with rules in the Graduate School Handbook (Section VII, Final Oral Examination).

**Final Oral Examination**
After approval of the dissertation draft, the Final Oral Examination will be scheduled through consultation of the student with the major advisor and other members of the SAC. The Graduate School Representative will be selected by the Graduate School.

The student is considered to have completed the Final Oral Examination successfully after a unanimous affirmative vote by the Final Oral Examination Committee members. The results of this exam are reported on the Final Oral Examination Report form.

If the examination is judged unsatisfactory, the Final Oral Examination Committee must decide whether the student will be permitted to take a second Final Oral Examination and must report that decision on the Final Oral Examination Report form. For policies relating to the second Final Oral Examination, refer to the Graduate School Handbook.

The Graduate School requires that the final approved version of the dissertation be completed within five years after successfully completing the Candidacy Examination. This is a maximum time limit for the University. In Plant Pathology, it is expected that the dissertation be completed in substantially less than five years after the candidacy exam if the student is making reasonable progress. A summary of the Ph.D. degree graduation requirements is given in the current edition of the Graduate School Handbook.
Departmental Seminar

Graduate students are required to register for PLNTPTH 995 Seminar during Autumn, Winter and Spring quarter of each academic year unless they have a direct conflict with another scheduled class. Absence from seminar must be approved by the faculty seminar coordinators. The PLNTPTH 995 grade (Satisfactory or Unsatisfactory) will be based on attendance and participation.

Except for first year students (see section on First Year Research Proposal Requirements), graduate students are required to present one seminar each year at a public venue to meet degree requirements. The presentation of a minimum of one seminar for the M.S. degree (usually, but not always, a final research report) and two seminars for the Ph. D. degree (usually, but not always, a research proposal and a final research report) is required in PLNTPTH 995. Other seminar presentations to meet the one-per-year requirement may be made outside of PLNTPTH 995, but the audience must consist of more than their immediate laboratory research group. Examples of seminars or presentations that would be appropriate include oral presentations at scientific meetings (e.g. American Phytopathological Society, American Society of Plant Biologists, American Society for Microbiology), Extension presentations to clientele groups, and research focus group presentations (e.g. Wooster Area Molecular Biology Association WAMBA; Kowlett seminar series in Columbus; or OSU Molecular Microbe and Plant Interactions). Classroom teaching does not fulfill this requirement. The faculty advisor is responsible for monitoring the number and type of seminars given by their students in order to fulfill requirements. A plan for meeting the seminar degree requirement will be proposed on Departmental Form I and reviewed by the SAC. The date and type of seminar presented will be recorded on the student's Annual Progress Report.

Based on the number of open PLNTPTH 995 seminar times available during any quarter, seminar coordinators will schedule students to present seminars as needed to complete the seminar schedule. When requested by the seminar coordinators, students are expected to present a seminar regardless of whether or not they have already met minimum requirements by giving a seminar in another venue. The topics and student presenters are to be determined by the faculty seminar coordinators in consultation with students and their faculty advisors.

Registration Guidelines for PLNTPTH 999, RESEARCH

Research is an integral part of graduate student training in Plant Pathology. Both M.S. and Ph.D. students in Plant Pathology are required to take the maximum number of credit hours of PLNTPTH 999 each quarter. Our department strongly encourages all full-time M.S. students
and pre-candidacy Ph.D. students to register for 18 credit hours each quarter. Tuition expenses do not increase above 10 credit hours, therefore registering for PLNTPTH 999 credits does not result in increased expenses for full time students. Follow the guidelines to determine the number of credit hours of PLNTPTH 999 to register for in any particular quarter.

a) M.S. and pre-candidacy Ph.D. students; taking courses:
   Courses, X number of credit hours (includes 1 credit PLNTPTH 995 AU, WI or SP)
   PLNTPTH 999 (18 minus X) credit hours for a maximum of 18 credit hours

b) M.S. and pre-candidacy Ph.D. students; AU, WI and SP quarters, not taking other regular courses:
   PLNTPTH 995 1 credit hour
   PLNTPTH 999 17 credit hours

c) M.S. and pre-candidacy Ph.D. students; SU quarter, not taking other regular classes (some exceptions may apply to international fellowships or scholarships)
   PLNTPTH 999 18 credit hours

d) For post-candidacy students, 3 credits is considered full-time and therefore students holding 50% GRA appointments will retain student health insurance and other applicable benefits. Typically this will include 2 credits of PLNTPTH 999 and 1 credit of PLNTPTH 995. Requests to enroll for more than 3 credits must have the approval of the student's advisor and SAC and should be submitted to the Graduate Studies Committee one quarter in advance. See the section, "Changes in Registration Requirements for Post-Candidacy Doctoral Students" for further details.

Form I, Graduate Program Requirements

All students must file in the department office a copy of Form I entitled, Graduate Program Requirements. This form is available on the department's intranet: plantpath.osu.edu/intranet/grad-student-forms/

Form I must be given to the GSC Chair for signature and placed in the students permanent file as soon as possible, but no later than the end of the student’s second quarter of enrollment during the academic year. After approval by the SAC, Form I will be the approved course schedule for the student's entire degree program. This form will be presented to the committee for any oral examination related to the degree program and will serve as the basis for the request to take the
Ph.D. Candidacy Examination. Information in this form also will be used by the GSC for periodic review of each student’s progress. It is the duty of the graduate student, in consultation with the major advisor, to see that all records are correct and up-to-date. Students completing the M.S. degree and continuing for a Ph.D. need to complete a new Form I.

**Maintaining a Research Notebook**

All graduate students pursuing thesis or dissertation research are expected to maintain a detailed and comprehensive research notebook, and make it available upon request by the advisor or SAC. The exact format of the notebook should be determined by the advisor. Keeping such a notebook is an essential element in graduate research training and for effective communication between the student and advisor. Unless otherwise agreed to by the advisor, all original data, notebooks and research materials are the property of the University and will be left with the advisor when a student leaves the laboratory.

**Graduate Student Review, Evaluation and Denial of Further Registration**

Graduate students in the department are evaluated formally and informally in various ways. The Graduate School monitors cumulative grade point average (CGPA) every quarter (Graduate School Handbook, Section V. Academic and Professional Standards). To be in good standing in the Graduate School, a student must maintain a graduate cumulative point-hour ratio (CPHR) of 3.0 or better in all graduate credit courses and must maintain reasonable progress toward Graduate School or graduate program requirements. A student with fewer than 15 earned hours of graduate credit whose CPHR is below 3.0 will receive a “poor performance” letter from the Graduate School urging consultation with the advisor. A student whose graduate CPHR falls below 3.0 after 15 graduate credit hours have been attempted is placed on probation by the Dean of the Graduate School. A student who is on probation in the Graduate School may not be appointed or reappointed as a graduate associate. A student on probation whose record continues to deteriorate will be warned that dismissal is likely if the record does not improve. Special warnings include performance criteria tailored to the individual student, usually in consultation with the Graduate Studies Committee chair.

The advisor and SAC informally evaluate the student throughout the year with every interaction. There is also a formal review of each graduate student that occurs yearly which is under the auspices of the GSC. During this review, Form I is updated and Form III, the **Graduate Student Evaluation, Goal Setting and Progress Report Form**, is completed by the advisor for each student regardless of the source of financial support. Students are reviewed based on their...
Knowledge of Field, Productivity, Communication Skills, Technical Skills, Intellectual Skills, and Professionalism (e.g., cooperation), and goals are set for each of these areas. The advisor indicates whether or not the student is making REASONABLE PROGRESS. Reasonable progress means that the student is having satisfactory performance in Knowledge of Field, Productivity, Communication Skills, Technical Skills, Intellectual Skills, and Professionalism. The student can respond in writing to any comments made by the advisor in the review form. The review form is placed in the student's permanent file and copies are made available to all faculty members of the student's SAC and the GSC. The GSC Chair may contact the advisor and/or the student if issues are raised in the annual review that warrants attention.

Although completing Form III, the Graduate Student Evaluation, Goal-Setting and Progress Report Form, is mandatory for each student on an annual basis, advisors may use this form at any time to monitor student progress, to address unsatisfactory performance, or when the student fails to meet academic standards (See section on Academic Standards). If the faculty advisor indicates that a student is not making reasonable progress, then a copy of the completed review form is given to all members of the student’s SAC, and a new Graduate Student Evaluation, Goal-Setting and Progress Report Form (Form III) must be completed within a minimum of 5 weeks. The student or the faculty advisor may request a meeting of the SAC when a review indicates unsatisfactory progress. The completed Form III will be placed in the student’s permanent file and copies will be made available to all faculty members on the GSC.

A student who is evaluated by the faculty advisor as not making reasonable progress after two evaluations will be notified by the GSC Chair of the consequences of the unsatisfactory performance. The GSC chair will also send copies of Form III(s) and a letter indicating the student is not making reasonable progress to the Graduate School. As described in the Graduate School Handbook, Section, Academic and Professional Standards, Reasonable Progress: A student who does not maintain reasonable progress toward a degree or who does not fulfill other graduate program requirements, including those regarding professional standards and misconduct, may be denied further registration in that program by the Graduate School on the recommendation of the Graduate Studies Committee chair. No student may be denied further registration in a graduate program without first being warned by the Graduate School that such action may take place. The Graduate School specifies the conditions the student must satisfy in order to demonstrate reasonable progress and to continue enrollment in the graduate program. Conditions consist of completion of course work or other requirements as approved by the Graduate Studies Committee. A student who has been warned that further registration in the graduate program may be denied and who then satisfies the specified conditions is placed in good standing by the Graduate School.
A student who is judged as not making reasonable progress towards the degree may seek an alternative faculty advisor. It is not the GSC’s responsibility to identify or appoint another faculty advisor. Continuation in a departmental graduate degree program with a new faculty advisor must be approved by the GSC. Additionally, a student that has not made reasonable progress towards a degree cannot be appointed as a departmental Graduate Associate and the current associate appointment funding will be terminated. Student financial support supplied by a faculty advisor is at the discretion of the faculty advisor. Graduate Associate appointments may be terminated prior to the end of the appointed period only with written approval of the Graduate School.

**Thesis and Dissertation Binding**

Graduate students are responsible for expenses associated with printing and copying final drafts of the thesis or dissertation. Students must provide a good quality, bound copy of their thesis or dissertation to the department and to the major advisor(s). The departmental copies are to be bound in a permanent cloth-backed binding. Departmental copying facilities may be used for making preliminary copies of the thesis or dissertation for reading committee use. More information on binding is available from the University Libraries in Columbus and the OARDC Library in Wooster.

**Publication of Thesis or Dissertation Research**

Graduating students are expected to work with their major advisors to prepare manuscripts for publication from suitable portions of their thesis or dissertation research and submit these manuscripts to appropriate professional journals. Ph.D. students are required to have at least one manuscript submitted to a peer reviewed journal prior to the students’ dissertation defense. A copy of the submitted manuscript must be given to the members of the SAC at least two weeks prior to the final exam. Ph.D. students are strongly encouraged to have at least one manuscript accepted prior to graduation.

**Grievance Procedures**

Concerns and all points of grievance should be resolved through discussion with the major advisor, the SAC, the GSC Chair and the Department Chair, in this order of priority. When resolution of a problem is not possible through this normal pathway, further recourse may be obtained using grievance procedures established by the Council on Research and Graduate Studies. Copies of these procedures are available from the Graduate School.
Ownership of Research Data and Intellectual Property

Research is an integral part of graduate student education. Students participating in the research efforts of the Department have a unique privilege that requires ethics and a high degree of integrity. Additionally, students should recognize that they are conducting research for educational purposes only and that all data and intellectual property are owned by The Ohio State University. Students do not "own" the research data they generate during their graduate program.

Sole ownership of research data and intellectual property is clearly defined as the property of The Ohio State University in the following University Rules and Federal and State laws. University Rules: The policy on Patents and Copyrights established by the Board of Trustees pursuant to University Rule 3335-13-06 govern the University's ownership of all intellectual property created by OSU faculty and students.

Federal Law: The Bayh-Dole Act (1980) created a uniform federal policy that gives universities the right to retain title to inventions made under federally-funded research programs.

State Law: The Ohio Revised Code section 3345.14 provides that all rights to discoveries and inventions that result from research or investigation conducted at a state university, or by employees of a state university acting within the scope of their employment, or with funding, equipment or infrastructure provided by or through a state university, shall be the sole property of that University.
APPENDIX I
Mentored Teaching in Plant Pathology

Plant Pathology 901 (PLNTPTH 901)

Instructors: Faculty in the Department of Plant Pathology

Credit: 1-5 credit hr (G) – repeatable to a maximum of 10 credit hours.

Quarters Offered: All quarters - Arranged

Prerequisites: Graduate standing and completion of OSU’s University Center for the Advancement of Teaching (ucat.osu.edu). Completion of Agricultural Education 631, Methods in Teaching Agriculture or Education 851, College Teaching strongly encouraged.


*Teaching @ The Ohio State University: A Handbook*, 2001, available online at ucat.osu.edu/read/teaching/toc.html

Due to the diversity of the mentored teaching experiences undertaken, no reading list is presented. Instead, the use of *Teaching Tips* the *Teaching @ Ohio State Teaching Handbook* is suggested as they are excellent resources for new college and university teachers – especially for graduate students interested in teaching.

Course Objectives: PLNTPTH 901 (Mentored Teaching in Plant Pathology) is designed to provide graduate students interested in college teaching with intensive hands-on opportunities that culminate in both the exploration of their aptitude as educators and the development of their teaching skills and effectiveness. The long-term goal of PLNTPTH 901 is to prepare students to be effective college teachers in the fields of plant health science, plant pathology and/or plant-microbe interactions.

Overview of Course: Course participants will work either one-on-one or in small groups with a faculty mentor to gain experiences focused on direct interactions with students and on the scholarly aspects of teaching. Because no two students are identical, the breadth and scope of the teaching experiences undertaken will be individualized depending on the mutual interests and strengths of the students and faculty mentors.

Course Logistics: Upon becoming a graduate student in the Department of Plant Pathology, each student along with their advisor and Student Advisory Committee (SAC) members are expected to discuss his/her desires/expectations for participating in a mentored teaching
experience. According to the Graduate Handbook in Plant Pathology, “all students working toward the Ph.D. degree, irrespective of source of funding, are expected to develop their skills related to teaching during his/her graduate program.” These teaching experiences may take several forms to include extension-outreach, formal classroom or laboratory teaching or the mentoring of undergraduate students that are conducting independent research. PLNTPTH 901 is designed to provide a learning opportunity and credit for those interested in classroom teaching. Prior to engaging in the mentored teaching experience for which Plant Pathology 901 credit is sought, students are required to submit a brief written summary of the experience to be undertaken to include a statement regarding desired outcomes, the means of evaluation and assessment that will be used to gauge their teaching effectiveness and learning, and a request indicating the number of PLNTPTH 901 credit hours sought to the department’s Teaching Experience Coordinator (TEC). The TEC is a faculty member in the department who is appointed on an annual basis by the Department Chairperson. This summary must be reviewed and signed by both the student seeking credit and the faculty mentor working with the student. In essence, once approved, this summary serves as a contract between the student and the faculty mentor. The TEC’s primary roles are to review each request on a case-by-case basis and to ensure fairness and equity in the amount of credit approved across the range of teaching experiences undertaken. The TEC will use the following criteria when reviewing summaries and approving credit hour requests: (a) the intellectual scope and rigor of the experience proposed; (b) the time commitment required by the student to successfully complete the experience; (c) the amount of coaching and evaluation done on the part of the faculty mentor; and (d) the level and credit hours associated with the course in which the student is assisting (the amount of PLNTPTH 901 credit approved for a given teaching experience will not exceed the amount of credit earned by students enrolled in the course). For example, students working with a faculty mentor to deliver a laboratory session of General Plant Pathology (PLNTPTH 401 – 5-credit hour course) which involves 10-20 hours of pre-quarter planning and preparation, attendance at three, 1-hour class sessions per week, active participation in two, 2-hour lab sessions per week, co-development of quizzes (with faculty mentor), maintenance of scheduled office hours, grading (for review by the faculty instructor), and weekly assessment meetings with the student’s faculty mentor, would be considered a 5-credit hour PLNTPTH 901 experience. Preparing and providing a guest class session, the development of a new laboratory exercise or the mentoring of an undergraduate research intern are examples of activities that would typically be worthy of 1-2 credit hours of PLNTPTH 901. The following activities, although related to and in support of the department’s teaching mission, in and of themselves would not typically be considered appropriate for PLNTPTH 901 credit: literature reviews to support the preparation of lecture materials; proctoring of examinations; grading of examinations and/or assignments; preparation of laboratory materials (media, cultures, plant materials, etc); and WWW or internet reviews of subjects.

**Evaluation and Assessment:** Graded S/U. Regardless of the intensity or duration of the teaching experience undertaken, some formal means of assessing and documenting the student’s teaching effectiveness and quality is required to receive a satisfactory grade in PLNTPTH 901. The specific means of assessment and feedback is entirely up to the student and faculty mentor. Examples may include the use of the Student Evaluation of Instruction (SEI) Form, subjective
evaluations completed by students, periodic classroom or laboratory assessments by the faculty mentor, or evaluation of course materials, teaching notes, etc. Depending on the scope and goals of the experience, student assessments of the faculty mentor’s teaching might also be a useful means for students to gauge their own teaching effectiveness and serve as a useful learning tool. The key is that some form of assessment be planned, implemented, summarized and shared with the student in a timely fashion to maximize the impact and learning of the student. Copies of the written assessment should be placed in the student’s file and given to the TEC.

**Academic Misconduct:** Academic misconduct erodes the integrity of the University and is unacceptable. Suspected cases will be forwarded to the University’s Committee on Academic Misconduct for action as outlined in the OSU Student Resource Guide / Code of Student Conduct which is available online at [http://studentaffairs.osu.edu/resource_csc.asp](http://studentaffairs.osu.edu/resource_csc.asp).

**Students with disabilities:** If you have a disability, please let your faculty mentor know. We will work with any student who desires an accommodation based on the impact of a disability but you need to let us know before we can be accommodating. Additional assistance is also available through the Office for Disability Services - Room 150 Pomerene Hall (Columbus) or by calling (614) 292-3307.
APPENDIX II
Mentored Extension/Outreach Teaching in Plant Pathology

Plant Pathology 902 (PLNTPTH 902)

Instructors: Faculty, Extension Associates and OSU Extension Educators

Credit: 1-3 credit hr (G)

Quarters Offered: All quarters - Arranged

Prerequisites: Graduate standing

Course Objectives: PLNTPTH 902 (Mentored Extension/Outreach Teaching in Plant Pathology) is designed to provide graduate students interested in Extension/Outreach Educational Programming with intensive hands-on opportunities that culminate in both the exploration of their aptitude as extension educators and the development of their skills and effectiveness in this area. The long-term goal of Plant Pathology 902 is to prepare students to be effective extension educators in plant health science and plant pathology.

Overview of Course: Course participants will work either one-on-one or in small groups with a faculty/staff mentor to gain experiences focused on direct interactions with growers and/or industry groups and on the scholarly aspects of developing and/or delivering extension-outreach programs and educational materials. Because no two students are identical, the breadth and scope of the extension/outreach experiences undertaken will be individualized depending on the mutual interests and strengths of the student and faculty/staff mentor.

Course Logistics: Upon becoming a graduate student in the Department of Plant Pathology, each student along with their advisor and Student Advisory Committee (SAC) members are expected to discuss his/her desires/expectations for participating in a mentored teaching experience. According to the Graduate Handbook in Plant Pathology, “all students working toward the Ph.D. degree, irrespective of source of funding, are expected to develop their skills related to teaching during his/her graduate program.” These teaching experiences may take several forms to include extension-outreach, formal classroom or laboratory teaching or the mentoring of undergraduate students that are conducting independent research. Plant Pathology 902 is designed to provide a learning opportunity and credit for those interested in extension-outreach teaching. Prior to engaging in an extension/outreach experience for which Plant Pathology 902 credit is sought, students are required to submit a brief written summary of the experience to be undertaken to include a statement regarding desired outcomes, the means of evaluation and assessment that will be used to gage their extension/outreach teaching effectiveness and a request indicating the amount of Plant Pathology 902 credit hours sought to the department’s Extension Experience Coordinator (EEC). The EEC is a faculty member in the department who is appointed on an annual basis by the Department Chairperson. This summary
shall be reviewed and signed by both the student seeking credit and their mentor. In essence, once signed, this summary serves as a contract between the student and mentor. The EEC’s primary role is to review requests on a case-by-case basis to ensure fairness and equity in the amount of credit approved across the range of extension/outreach teaching experiences undertaken. The EEC will use the following criteria when reviewing summaries and approving credit hour requests: (a) the intellectual scope and rigor of the proposed experience; (b) the time commitment required by the student to successfully complete the experience; (c) the amount of coaching and evaluation done on the part of the faculty mentor; and (d) the type, quantity, quality, and potential effectiveness of educational materials developed.

**Evaluation and Assessment:** Graded S/U. Regardless of the intensity or duration of the extension/outreach experience undertaken, some formal means of assessing and documenting the student’s teaching effectiveness and the quality of any educational materials developed by the student is required in order to receive a satisfactory grade in Plant Pathology 902. The specific means of assessment and feedback is entirely up to the student and mentor but should provide a means for students to gage their own extension/outreach teaching effectiveness and serve as a useful learning tool. The key is that some form of assessment be planned, implemented, summarized and shared with the student in a timely fashion to maximize the impact and learning of the student. Methods for assessment of student performance may include the OSUE Evaluation of Effective Extension Teaching (EEET) materials, subjective evaluations completed by growers, peers or other audience participants, periodic assessments by mentors, or other effective means of evaluation. Copies of the written assessment should be placed in the student’s file and given to the EEC.

**Academic Misconduct:** Academic misconduct erodes the integrity of the University and is unacceptable. Suspected cases will be forwarded to the University’s Committee on Academic Misconduct for action as outlined in the OSU Student Resource Guide / Code of Student Conduct which is available online at [http://studentaffairs.osu.edu/resource_csc.asp](http://studentaffairs.osu.edu/resource_csc.asp).

**Students with disabilities:** If you have a disability, please let your faculty mentor know. We will work with any student who desires an accommodation based on the impact of a disability but you need to let us know before we can be accommodating. Additional assistance is also available through the Office for Disability Services - Room 150 Pomerene Hall (Columbus) or by calling (614) 292-3307.
APPENDIX III
Ph.D. Candidacy Examination

In the Plant Pathology graduate program, we are not only concerned that students master a significant body of knowledge, but that they are adequately prepared for, and capable of, carrying out original, independent dissertation research. The Candidacy Examination should test for depth in an area of specialization and breadth in related fields of biology. In addition, students should demonstrate critical thinking skills.

Choice for the Written Exam and Expectations. The student’s advisor and SAC will make the decision on the type of written exam for the Candidacy Examination. This decision will be made at least 6 weeks prior to the anticipated start of the written examination. The student should be told what the expectations of the SAC will be regarding the written examination. If the proposal option is selected, these expectations should specify: the coverage and depth of the proposal, the format of the proposal, the time allocated to writing the proposal, and how the evaluation of the proposal will be made. The student will also be told whether they will have the option to revise the proposal if the first submission is unacceptable. The time for revision, if any, is part of the total time allocated for the proposal writing. In addition, the student should be advised regarding how much coursework to review.

The Written Proposal. Prior to the General Examination the candidate will prepare a written research proposal in lieu of answering written questions submitted by each SAC member. Since this is formally the written part of the examination, the Graduate School must be notified of the start and expected completion dates of the written portion of the examination.

The subject of the proposal will be decided upon by the student and the advisor and then approved by all members of the SAC before the student begins writing. The actual hypotheses and objectives of the proposal should represent the student's own ideas.

The proposal should not be in an area directly related to the student's own dissertation topic, but can be in the same general area (e.g., physiology, disease resistance, bacterial genetics, virology, or epidemiology). The SAC and advisor should decide what is appropriate for each student. Specifically, the proposal should involve a significantly different biological (host/pathogen) system, and the student should avoid using essentially the same strategies and techniques that are part of his/her dissertation research.

The proposal should be prepared in a format similar to that used by USDA/NRI, NSF, SARE, or
other competitive grant programs, as suggested by the SAC. Students generally should be given one or more example proposals to demonstrate the format and style of proposals for particular programs. The proposal should include a literature review, justification and experimental plan. Since few actual proposals are funded without preliminary results, the student may be allowed to use hypothesized results, as justified, to narrow or focus the problem. The amount of research proposed should be equivalent to two calendar years or more.

Students should be instructed that the quality of the research questions they ask (i.e., the objectives) is often the most important part of the proposal, since the questions/objectives need to justify the research and explain its significance. Clearly written and well thought out testable hypotheses must accompany the objectives so that the student can demonstrate that he/she knows how to design experiments with appropriate controls and use alternative approaches to testing the same hypothesis. The student should demonstrate that he/she knows what prior preliminary results would be needed to convince a grant review panel that the hypotheses are correct and the approach is feasible. Although much good research involves hypothesis building following careful and systematic data collection and analysis, this type of study does not lead to a suitable proposal because the student can only propose to go on a “fishing trip”.

Although the preparation of the proposal is obviously “open book,” it should represent the sole work of the student. However, unlike other written examinations, the student is free to consult with others. The advisor and SAC members may give the student their feedback by pointing out strengths and weaknesses and suggesting readings, but they should refrain from directly telling the student what to write or specifying all the basic ideas in the proposal. No one, other than the student, may edit the proposal prior to submission to the committee.

After the proposal is submitted to the SAC, the members should decide within one week if it is acceptable. An evaluation form may be used by the SAC. If the proposal is acceptable, written feedback should be given to the student in the same manner as in the standard written exam, by identifying points that need to be corrected or improved, but not by giving the answers. If the proposal is unacceptable, the student should be notified by the SAC as to: 1) whether this is considered a failure of the written portion of the exam; or 2) whether he/she should revise or substantially re-write the proposal, after being given a general idea of how much more is expected. An acceptable proposal should be completed within the time allotted for the written portion of the examination. Additional time will not be given to revise the proposal. If 4 weeks are given to write the proposal, and the student submits the proposal after 3 weeks, he/she could be given a week to modify the proposal after the SAC committee members review it if a modification option was originally specified by the SAC and the SAC decided that modification
was required for a passing grade. If the proposal was submitted on the last day of the allotted
time, no further revisions will be made. If the student fails the written exam, it is the decision of
the SAC as to whether or not the student can take the examination again. If a new written
examination is given, the advisor and SAC will decide on the type of written exam.

The Oral Examination for the Research Proposal Option. The written research proposal
should serve as a starting point for the questioning and a “springboard” to examine the breadth
and depth of the student's knowledge of topics introduced in the proposal. The student may take
a maximum of 10 minutes to summarize the proposal or respond to written comments/criticisms
by the SAC before the commencement of questions. In addition to defending the experimental
plan itself and addressing specific errors or omissions flagged by the SAC, the student is
expected to answer questions concerning the theory behind the hypotheses and any techniques
used, the significance of the topic, and any relevant biology. Questions are not limited to the
proposal and in later rounds of questioning the SAC members may ask any type of question. A
broad, well documented proposal will serve as a better basis for the oral examination than a
narrow limited one, so the need for unrelated questions will vary on a case-by-case basis. It is
important that the SAC ascertain that the candidate has mastered a sufficient body of knowledge
and is prepared for independent research. It is suggested that the first hour of questioning should
be related to the proposal, and the second hour should allow questioning on a broader topic area.

The student should be familiar with 800-level course material and current literature related to the
proposal topic (in the broad sense) and be able to discuss the major concepts from 400 and 600
level courses in plant pathology and undergraduate courses in related areas. However, the
amount of detailed general information that the student is expected to recall and the amount of
time spent on this type of questioning would not be as great as in a standard comprehensive
examination.
APPENDIX IV
List of Department and Graduate School Forms and Publications

Plant Pathology - Forms
Plant Pathology forms can be obtained from the Academic Program Coordinator or on the department intranet: plantpath.osu.edu/intranet/grad-student-forms/ (password and username required)

<table>
<thead>
<tr>
<th>Form I</th>
<th>Graduate Program Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form II</td>
<td>Results of Master’s Examination and Recommendation to Continue to the Ph.D. Degree</td>
</tr>
<tr>
<td>Form III</td>
<td>Graduate Student Evaluation and Goal Setting Form</td>
</tr>
</tbody>
</table>

Graduate School - Forms and Publications
Graduate School forms can be obtained from the Graduate School or online: http://www.gradsch.ohio-state.edu/forms-library.html

A list of forms and publications authored by the Graduate School.

Academic Programs
Combined Undergraduate/Graduate and Professional/Graduate Program Form
Program Plan for Dual Degree
Graduate Specialization Transcript Designation
Request for Transfer of Graduate Program
Graduate Minor Forms
Graduate Interdisciplinary Specialization Forms

Awards and Grants
AGGRS (Alumni Grants for Graduate Research and Scholarship) Application
AGGRS Guidelines
Funding for the Creation and Implementation of Graduate Minors and Graduate Interdisciplinary Specializations
Graduate Associate Teaching Award (GATA) Guidelines

Dissertations and Theses
Guidelines for Preparing Theses, Dissertations, and D.M.A. Documents
Petition to Delay Dissemination of Dissertations and Theses Form
Guidelines, Access to and Distribution of Dissertations
Sample Pages for Theses, Dissertations, and D.M.A. Documents
Ohio State Graduate Degrees Offered
Guidelines, Submission of Electronic Master's Theses

**Examinations**
- Notification of Doctoral Candidacy Examination
- Doctoral Draft Approval/Notification of Final Oral Examination
- Request for Video Conferencing form
- Status Beyond Master’s Degree

**Financial Support**
- Presidential Fellowships Announcement
- Presidential Fellowships Nomination Form
- Fellowship Announcement
- Personal Data Worksheet
- Graduate School Matching Tuition and Fee Award Form
- Graduate School Matching Tuition and Fee Award Guidelines
- Out-of-State Research

**Forms To Activate Fellowship**
- W4 Tax Form
- Personal Data Worksheet

**Funded Graduate Students**
- Graduate Associate Appointments, Standard Document
- Funded Graduate Students - Instructions
- Short-Term Absences and Leaves of Absence - Guidelines
- Short-Term Absences and Leaves of Absence - Request For Leave
- Short-Term Absences and Leaves of Absence - Affidavit of Domestic Partnership
- Short-Term Absences and Leaves of Absence - Affidavit of Termination of Domestic Partnership
- Short-Term Absences and Leaves of Absence - FAQ
- Fact Sheet-Benefit Improvements for 2006-07
- Graduate Associate Appointments, Standard Document (Word Format)

**Graduate Faculty**
- Nomination to a Graduate Faculty Appointment Application

**Graduate School Handbook**
- Graduate School Handbook
**Graduation (Ph.D, D.M.A. and Master's)**
- Master Student Procedures – Final Quarter
- Doctoral Student Procedures - Final Quarter
- Application to Graduate- Master’s
- Application to Graduate- Doctoral
- Master's Degree Checklist
- Doctoral Degree Checklist
- Graduation Deadline Dates
- Commencement Absence Form

**Guidelines and Best Practices**
- Graduate Courses on University Teaching and Mentored Teaching
- Guidelines, Access to and Distribution of Dissertations
- Guide for Graduate Studies Committee Chairs, Edition 2006-07
- Mentoring and Advising Graduate Students
- Guidelines, Recruitment Grants
- Changes in Registration Requirements for Post-Candidacy Doctoral Students: Overview and FAQ

**New Students**
- New Student To Do List

**Newsletters**
- Archive

**Professional Development**
- CIC Traveling Scholar Application
- Preparing Future Faculty Application

**Professional Doctorates (Non-Ph.D degrees)**
- Final Approval-Professional Doctorates
- Application to Graduate - Professional Doctorate

**Recruitment**
- Graduate Study at Ohio State (brochure)
- Do Something Great
Registration
Deadlines (by quarter)
Reactivation After a Two Year Absence
Petition to Late Add/Drop/Audit Current Quarter
Petition to Late Add/Drop/Audit Previous Quarter
Senior Petition Form
Course Enrollment Form
Request for Transfer of Graduate Credit

Plant Pathology Graduate Forms and Publications
plantpath.osu.edu/intranet/grad-student-forms/

Plant Pathology Graduate Student Handbook, updated September 2009 (pdf). This handbook is also available on our external website:
plantpath.osu.edu/graduate-programs/about-us/grad-handbooks

Form I - Graduate Program Requirements (Word)
Form II - Results of the Master's Examination and Recommendation to Continue to the PhD Degree (Word)
Form III - Graduate Student Evaluation, Goal Setting and Progress Report Form (Word)
APPENDIX V
Resource Information

Student Conduct, including academic and research misconduct
• Code of Student Conduct
  studentaffairs.osu.edu/resource_csc.asp

• Student Conduct, Office of Student Life (formery Student Judicial Affairs)
  studentconduct.osu.edu

• Office of Academic Affairs, Committee on Academic Misconduct
  oaa.osu.edu/coam.html

• University Research Committee Interim Policy and Procedures Concerning Misconduct in Research or Scholarly Activities
  orc.osu.edu/files/2011/01/Misconduct_Policy.pdf

• Guidelines for the Review and Investigation of Allegations of Scholarly Misconduct by Graduate Students - available from the Graduate School, 250 University Hall, Columbus

• Drugfree Workplace Policy
  hr.osu.edu/hrnews/2-05policy730.aspx

Research Policies and Resources
• Office of Research
  research.osu.edu

• Office of Research, Office of Sponsored Programs (formerly the Research Foundation)
  rf.osu.edu

• Responsible Conduct of Research - Instruction
  orrp.osu.edu/irb/training/rcr/nih.cfm

• Office of Research, Technology Licensing and Commercialization, including policies and guidelines related to patents, copyrights, conflicts of interest, plant varieties, consulting, entrepreneurship, intellectual property, and technology transfer
  otl.osu.edu

• Human Subjects, Office of Responsible Research Practices, Institutional Review Board
  orrp.osu.edu/irb/training/citi.cfm
• Animal Care and Use, Office of Responsible Research Practices, Institutional Animal Care and Use Committee (IACUC)
orrp.osu.edu/iacuc/

• Biosafety, Office of Responsible Research Practices, Institutional Biosafety Committee
orrp.osu.edu/ibc/

• Conflict of Interest, Office of Research Compliance
orc.osu.edu/2011/08/08/annual-osu-conflict-of-interest-disclosure-process/

Student Records and Privacy
• The Ohio State University's Policy Concerning Privacy and Release of Student Education Records, Family Educational Rights and Privacy Act (FERPA)
registrar.osu.edu/policies/releaseinfo.asp

Policies (Human Resources)
hr.osu.edu/policy

Information Technology Policies and Services
• Office of the Chief Information Officer
cio.osu.edu

• Policy on Responsible Use of University Computing Resources
cio.osu.edu/policies/responsible_use.html

University Libraries
library.osu.edu

Disability Policies and Resources
• Rights and Responsibilities of OSU Students and Employees
ada.osu.edu/resources/links-rights.htm

• Office for Disability Services Current Students
www.ods.ohio-state.edu/current.asp

• Faculty
www.ods.ohio-state.edu/faculty.asp

• Equal Employment for Individuals with Disabilities, Policy 4.45
http://hr.osu.edu/policy/policy445.pdf

• Web Accessibility Center  www.wac.ohio-state.edu/
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APPENDIX G

Course Requirements
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### B.S. in Agriculture
### Major: Plant Health Management
### Effective Summer 2012

All students must complete two Global Issues courses. This requirement is the successor to the diamond and asterisk requirement. All students must take a Social Diversity requirement which in the GE was completing Rural Sociology 1500 or Sociology 1101.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAES 100 or Dept Seminar</td>
<td>.5, .5 Social Science 1 (Rural Soc 1500 or Soc 1101)</td>
<td>3</td>
</tr>
<tr>
<td>Writing Level 1 (ENG 1110)</td>
<td>3 Social Science 2 (AEDECON 2001 or Econ 2001)</td>
<td>3</td>
</tr>
<tr>
<td>Writing Level 2 (from list)</td>
<td>3 Historical Study</td>
<td>3</td>
</tr>
<tr>
<td>Agr Comm 3130 or Comm 2110</td>
<td>3 Culture &amp; Ideas or Historical Study</td>
<td>3</td>
</tr>
<tr>
<td>Math 1148 or 1150</td>
<td>4 Literature</td>
<td>3</td>
</tr>
<tr>
<td>Data Analysis (from list)</td>
<td>3 Art</td>
<td>3</td>
</tr>
<tr>
<td>Biology 1101, 1113, 1115H, Entomol 1101, HCS 2201, or MolGen 1101</td>
<td>5 Contemporary Issues/College Capstone</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry 1210 or 1910H</td>
<td>5 Minor</td>
<td>12-15</td>
</tr>
<tr>
<td>Chemistry 1220 or 1920H</td>
<td>4 Major</td>
<td>36</td>
</tr>
<tr>
<td>Biology 1114, Entomol 2102, MolGen 3300, HCS 2202</td>
<td>3-5 Internship/Experiential Learning (PLNTPTH 4191)</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Major Requirements (24-27 credit hours) (23-24 credit hours if student has taken ENTMLGY 1101):

- **ENR 3000 (lecture) and ENR 3001 (lab): Soil Science** | 4 |
- *H&CS 2201: Ecology of Managed Plant Systems OR H&CS 2202: Form and Function of Cultivated Plants* | 3 |
- H&CS 5422: Principles of Weed Ecology and Management | 3 |
- MOLGEN 3436: Introductory Plant Physiology | 3 |
- PLNTPTH 5603: Plant Disease Management | 3 |
- PLNTPTH/ENTMLGY 5604: Capstone Course: Problem-Based Studies in Plant Health | 2 |

Also select one of the following core plant pathology courses (required):

- PLNTPTH 3001: General Plant Pathology- lecture and PLNTPTH 3002: General Plant Pathology- lab | 4 |
- PLNTPTH 6001: Advanced Plant Pathology | 3 |

Also select one of the following core entomology courses:

- ENMLGY 4600: Introduction to Insect Science | 1 |
- ENMLGY 3000: General Entomology | 3 |

Also select one of the following entomology support courses (required):

- ENMLGY 4601: General Insect Pest Management | 2 |
- ENMLGY 4602: Urban Landscape and Greenhouse Entomology | 2 |
- ENMLGY 4603: Agricultural Entomology | 2 |

#### Electives (enough to bring total in major to 36 hours realizing if student took HCS 2201 or ENTMLGY 1101 as GE, these hours will not count in major):

- BIOCHEM 2210: Elements of Biochemistry | 4 |
- BIOCHEM 4511: Introduction to Biological Chemistry | 4 |
- CHEM 2310: Introductory Organic Chemistry | 4 |
- CHEM 2510: Organic Chemistry I | 3 |
- CHEM 2520: Organic Chemistry II | 4 |
- EEOB 3310: Evolution | 3 |
- EEOB 3410: Introduction to Ecology | 3 |
- ENR 5270: Soil Fertility | 3 |
- ENR 5272: Urban and Sports Turf Soils | 3 |
- ENMTLGY 3330 H4440: Social Insects | 3 |
- ENMTLGY 4604: Urban Entomology | 2 |
- ENMTLGY 4606: Introduction to Forensic Entomology | 2 |
- ENMTLGY 4607: Veterinary Entomology | 2 |
- ENMTLGY 5130: Field Insect Taxonomy | 3 |
- ENMTLGY 5420: Insect Behavior Mechanisms and Function | 3 |
- ENMTLGY 5500: Biological Control of Arthropod Pests | 3 |
- ENMTLGY 5600: Principles and Applications of IPM | 3 |
- ENMTLGY 5800: Pesticide Science | 3 |
- ENMTLGY 6310: Insect Physiology and Molecular Biology | 3 |
- ENMTLGY 6410: Insect Ecology and Evolutionary Processes | 3 |
- H&CS 4325: Plant Genetics | 3 |

**TOTAL** | 36 |

*If student took one of these classes as a GE course, these 3 credit hours must be made up in the major electives.*

9/29/2011
## B.S. in Agriculture
### Major: Plant Pathology
### Effective Summer 2012

All students must complete two Global Issues courses. This requirement is the successor to the diamond and asterisk requirement. All students must take a Social Diversity requirement which in the GE was completing Rural Sociology 1500 or Sociology 1101.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAES 100 or Dept. Seminar</td>
<td>.5, .5</td>
<td>Social Science 1 (Rural Soc 1500 or Soc 1101)</td>
</tr>
<tr>
<td>Writing Level 1 (ENG 1110)</td>
<td>3</td>
<td>Social Science 2 (AED Econ 2001 or Econ 2001)</td>
</tr>
<tr>
<td>Writing Level 2 (from list) (2367)</td>
<td>3</td>
<td>Historical Study</td>
</tr>
<tr>
<td>Agr Comm 3130 or Comm 2110</td>
<td>3</td>
<td>Culture &amp; Ideas or Historical Study</td>
</tr>
<tr>
<td>Math 1148 or 1150</td>
<td>4</td>
<td>Literature</td>
</tr>
<tr>
<td>Data Analysis (from list)</td>
<td>3</td>
<td>Art</td>
</tr>
<tr>
<td>Biology 1101, 1113, 1115H, ENTMLGY 1101, HCS 2201, or MOLGEN 1101</td>
<td>5</td>
<td>Contemporary Issues/College Capstone (3597)</td>
</tr>
<tr>
<td>Chemistry 1201 or 1910H</td>
<td>5</td>
<td>Minor</td>
</tr>
<tr>
<td>Chemistry 1220 or 1920H</td>
<td>4</td>
<td>Major</td>
</tr>
<tr>
<td>Biology 1114, ENTMLGY 2101, HCS 2202, MolGen 3300</td>
<td>3-5</td>
<td>Internship/Experiential Learning (PLNTPTH 4191)</td>
</tr>
</tbody>
</table>

### Major Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOLGEN 4500: General Genetics</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIOL 4000: Basic and Practical Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>ENR 3000 (lecture) and ENR 3001 (lab): Soil Science</td>
<td>4</td>
</tr>
<tr>
<td>PLNTPTH 5603: Plant Disease Management</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH/ENTMLGY 5604: Capstone Course: Problem-Based Studies in Plant Health</td>
<td>2</td>
</tr>
<tr>
<td>MOLGEN 3436: Introductory Plant Physiology</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 2310: Introductory Organic Chemistry</td>
<td>4</td>
</tr>
</tbody>
</table>

Select one of the following plant pathology options:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLNTPTH 3001 AND PLNTPTH 3002: General Plant Pathology-lecture AND lab</td>
<td>4</td>
</tr>
<tr>
<td>PLNTPTH 6001: Advanced Plant Pathology</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two of the following (4-6 credit hours):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLNTPTH 5010: Phyto bacteriology</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5020: Virology</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5030: Nematology</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5040 and 5041: Science of Fungi: Mycology Lecture and Lab</td>
<td>4</td>
</tr>
<tr>
<td>PLNTPTH 5110/ENTMLGY 5110: Ecology &amp; Mgmt of Pathogens &amp; Insects Affecting Trees in Forest &amp; Urban Envts</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5120: Diseases of Ornamentals</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5130: Turf Diseases and Integrated Turf Health Management</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5140: Diseases of Field Crops</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5150: Fruit and Vegetable Diseases</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5685: Plant Disease Diagnosis</td>
<td>2</td>
</tr>
</tbody>
</table>

Electives: Select a minimum of one course from the following to fulfill major (4-6 credit hours):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOCHEM 2210: Elements of Biochemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 2510: Organic Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 2520: Organic Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>ENR 5270: Soil Fertility</td>
<td>3</td>
</tr>
<tr>
<td>ENR 5272: Urban and Sports Turf Soils</td>
<td>3</td>
</tr>
<tr>
<td>ENTMLGY 3000: General Entomology</td>
<td>3</td>
</tr>
<tr>
<td>ENTMLGY 4600: Introduction to Insect Science</td>
<td>1</td>
</tr>
<tr>
<td>ENTMLGY 4601: General Insect Pest Management</td>
<td>2</td>
</tr>
<tr>
<td>ENTMLGY 4602: Urban Landscape and Greenhouse Entomology</td>
<td>2</td>
</tr>
<tr>
<td>ENTMLGY 4603: Agricultural Entomology</td>
<td>2</td>
</tr>
<tr>
<td>ENTMLGY 4604: Urban Entomology</td>
<td>2</td>
</tr>
<tr>
<td>ENTMLGY 4606: Introduction to Forensic Entomology</td>
<td>2</td>
</tr>
<tr>
<td>ENTMLGY 4607: Veterinary Entomology</td>
<td>2</td>
</tr>
<tr>
<td>HCS 4325: Plant Genetics</td>
<td>3</td>
</tr>
<tr>
<td>HCS 4411: Grain, Oilseed, and Fiber Crops</td>
<td>3</td>
</tr>
<tr>
<td>HCS 5412: Forages, Grasslands, and Prairies</td>
<td>3</td>
</tr>
<tr>
<td>HCS 5422: Principles of Weed Ecology and Management</td>
<td>3</td>
</tr>
<tr>
<td>HCS 5450: Vegetable Crop Production and Physiology</td>
<td>3</td>
</tr>
<tr>
<td>HCS 5460: Fruit Crop Physiology and Production</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIOL 5000: General Microbiology</td>
<td>5</td>
</tr>
<tr>
<td>MICROBIOL 5081: Microbial Genetics</td>
<td>3</td>
</tr>
<tr>
<td>MOLGEN 5643: Plant Anatomy</td>
<td>3</td>
</tr>
</tbody>
</table>

PLNTPTH 5010, 5020, 5030, 5040 and 5041, 5110(ENTMLGY 5110), 5120, 5130, 5140, 5150, and 5685 (if not taken above) | 2-4 | 9/29/2011 |
The Minor in Plant Pathology is designed to provide essential knowledge and training for careers that involve plant health management of agronomic crops, landscape/nursery plants, turfgrass, and forest plants. The minor is specifically targeted to Turfgrass Science, Crop Science, Landscape Horticulture, Forestry, and Urban Forestry majors, although it is open to all students interested in plants, mycology, biology, microbiology, and microbiology. The Minor in Plant Pathology is also valuable for students interested in the biology of plant disease and plant-microbe interactions, such as majors in Biology, Plant Biology and Microbiology.

Students pursuing the Minor in Plant Pathology are required to take Plant Pathology 3001, 3002 – General Plant Pathology – to develop a foundational understanding of plant pathology. This class has a prerequisite of a general biology class. Upon completion of Plant Path 3001, 3002 and Plant Path 5603 Plant Disease Management course, students must take one course that deals with diseases of a particular cropping system such as ornamental plants and flowers (Plant Path 5120), forest and shade trees (Plant Path 5110), turfgrass (Plant Path 5130), field crops (Plant Path 5140) and fruits and vegetables (Plant Path 5150). Additional courses in plant pathology, microbiology, soil science and plant biology are available as elective coursework.

The Minor in Plant Pathology consists of ~12-14 credit hours selected as follows.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Required Courses (7 credit hours):</strong></td>
<td></td>
</tr>
<tr>
<td>PLNTPTH 3001: General Plant Pathology Lecture</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 3002: General Plant Pathology Lab</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5603: Plant Disease Management</td>
<td>3</td>
</tr>
<tr>
<td><strong>Select one of the following courses (2-3 credit hours):</strong></td>
<td></td>
</tr>
<tr>
<td>PLNTPTH 5110: Ecology and Management of Pathogens and Insects Affecting Trees in Forest and Urban Environments</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5120: Diseases of Ornamentals</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5130: Turf Diseases and Integrated Turf Health Management</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5140: Diseases of Field Crops</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5150: Fruit and Vegetable Diseases</td>
<td>2</td>
</tr>
<tr>
<td><strong>Electives (Select one-two of the following courses) (2-4 credit hours):</strong></td>
<td></td>
</tr>
<tr>
<td>ENR 5270: Soil Fertility</td>
<td>3</td>
</tr>
<tr>
<td>ENTMLGY 3000: General Entomology</td>
<td>3</td>
</tr>
<tr>
<td>MICROBIOL 4000: Basic and Practical Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>MICROBIOL 5000: General Microbiology</td>
<td>5</td>
</tr>
<tr>
<td>MOLGEN 3436: Introductory Plant Physiology</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 2001: Sick Plants in a Hungry World</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5010: Phytopathology</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5020: Virology</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5030: Nematology</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5040 and 5041: Science of Fungi: Mycology Lecture and Lab</td>
<td>4</td>
</tr>
<tr>
<td>PLNTPTH 5110: Ecology and Management of Pathogens and Insects Affecting Trees in Forest and Urban Environments (If not taken above)</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5120: Diseases of Ornamentals (If not taken above)</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5130: Turfgrass Diseases and Integrated Turf Health Management (If not taken above)</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5140: Diseases of Field Crop (If not taken above)</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5150: Fruit and Vegetable Diseases (If not taken above)</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5685: Plant Disease Diagnosis</td>
<td>2</td>
</tr>
</tbody>
</table>

* A minimum of 12 credit hours are required for the Minor in Plant Pathology. Plant Pathology classes taken to fulfill major requirements generally cannot be used towards a minor. In the case that 3001 and/or 3002 are taken in a major, a student should select at least 12-45 credit hours from the list above, excluding 3001 and 3002.

**TOTAL credit hours for minor in plant pathology** ~12-15

1. The minor is not available to student majoring in Plant Pathology or Plant Health Management.
2. A minimum overall GPA for courses comprising the minor shall be 2.00
3. A minor should be declared at the time a student accumulates 60 hours.
4. A maximum of one course may overlap between the minor and the GE (Writing and Communication, Foreign Language, Literature, Visual and Performing Arts, Culture and Ideas, Historical Study, Quantitative Reasoning, Data Analysis, Natural Science, Social Science, Cross-Disciplinary Seminar, Service-Learning, Education Abroad)
5. Courses taken on a pass/non pass basis may not be applied to the minor.
6. At least six credits must be at the 3000 level or above.
Master in Plant Health Management
Semester Curriculum Advising Sheet

Requirements and Curriculum

Master in Plant Health Management students are required to complete a minimum of 30 credit hours of graduate work with a minimum cumulative GPA of 3.0. At least 25 credit hours must be earned at OSU.

<table>
<thead>
<tr>
<th></th>
<th>Quarter Credit Hrs</th>
<th>Semester Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses</td>
<td>34</td>
<td>25</td>
</tr>
<tr>
<td>Targeted course in Plant Pathology or Entomology</td>
<td>3-4</td>
<td>2-3</td>
</tr>
<tr>
<td>Special Study or Internship</td>
<td>2-3</td>
<td>1-2</td>
</tr>
<tr>
<td>Directed Electives</td>
<td>6-10</td>
<td>0-2</td>
</tr>
<tr>
<td>Total credits</td>
<td>45-51</td>
<td>30</td>
</tr>
</tbody>
</table>

Course and Credit Hour Requirements

All students seeking a Master in Plant Health Management will take the following courses. Note this is an interdisciplinary program, so some core requirements are in the School of Natural Resources and Dept. of Horticulture and Crop Science.

Required Courses (25 credits):

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLNTPTH 5603 Plant Disease Management</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5685 Plant Disease Diagnosis</td>
<td>2</td>
</tr>
<tr>
<td>ENTMLGY 5600 Principles and Applications of Integrated Pest Management</td>
<td>3</td>
</tr>
<tr>
<td>ENTMLGY 5800 Pesticide Science</td>
<td>3</td>
</tr>
<tr>
<td>ENR 5270 Soil Fertility</td>
<td>3</td>
</tr>
<tr>
<td>H&amp;CS 5422 Principles of Weed Ecology and Management</td>
<td>4</td>
</tr>
<tr>
<td>H&amp;CS 5621 Physiology of Cultivated Plants</td>
<td>3</td>
</tr>
<tr>
<td>H&amp;CS 8887 Experimental Design</td>
<td>4</td>
</tr>
</tbody>
</table>

Choose one of the following from Plant Pathology/Entomology (2-3 credits):

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLNT PTH 5110/ENTMLGY 5110 Ecology and Management of Pathogens and Insects Affecting trees in Forest and Urban Environments</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5120 Diseases of Ornamentals</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5130 Turfgrass Diseases and Integrated Turf Health Management</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5140 Diseases of Field Crops</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5150 Diseases of Fruit and Vegetables</td>
<td>2</td>
</tr>
<tr>
<td>ENTMLGY 5130 Field Insect Taxonomy</td>
<td>3</td>
</tr>
<tr>
<td>ENTMLGY 5500 Biological Control of Arthropod Pests</td>
<td>3</td>
</tr>
<tr>
<td>ENTMLGY 6701 Biodiversity Analysis for Ecosystem Sustainability and Resilience</td>
<td>2</td>
</tr>
</tbody>
</table>

Select one of the following field of study/special internship classes (1-2 credits):

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTMLGY 6193 Individual Study</td>
<td>1-2</td>
</tr>
<tr>
<td>PLNTPTH 6193 Individual Study</td>
<td>1-2</td>
</tr>
<tr>
<td>PLNTPTH 8902 Mentored Extension/Outreach in Plant Pathology</td>
<td>1</td>
</tr>
</tbody>
</table>

Electives

Through careful consultation with their advisors, students must take elective courses that best reflect their personal interest. The following are courses supporting different “fields of interest”. Other classes may also be considered to meet individual needs of student. These courses should be approved by the student’s advisor.
In addition, the following courses may also be taken as electives if they were not taken above:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTMLGY 5130</td>
<td>Field Insect Taxonomy</td>
<td>3</td>
</tr>
<tr>
<td>ENTMLGY 5420</td>
<td>Insect Behavior Mechanisms and Function</td>
<td>3</td>
</tr>
<tr>
<td>ENTMLGY 5500</td>
<td>Biological Control of Arthropod Pests</td>
<td>3</td>
</tr>
<tr>
<td>ENTMLGY 6193</td>
<td>Individual Studies</td>
<td>1</td>
</tr>
<tr>
<td>ENTMLGY 6410</td>
<td>Insect Ecology and Evolutionary Processes</td>
<td>3</td>
</tr>
<tr>
<td>ENTMLGY 6701</td>
<td>Biodiversity Analysis for Ecosystem Sustainability and Resilience</td>
<td>2</td>
</tr>
<tr>
<td>ENTMLGY 6702</td>
<td>Entomological Techniques and Data Analysis</td>
<td>2</td>
</tr>
<tr>
<td>ENTMLGY 6704</td>
<td>Systems Analysis from Molecules to Ecosystems</td>
<td>2</td>
</tr>
<tr>
<td>ENTMLGY 7910</td>
<td>The Nature and Practice of Science</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5110/ENTMLGY 5110</td>
<td>Ecology and Management of Pathogens and Insects Affecting Trees in Forest and Urban Environments</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5120</td>
<td>Diseases of Ornamentals</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5130</td>
<td>Turf grass Diseases and Integrated Turf Health Management</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5140</td>
<td>Diseases of Field Crops</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5150</td>
<td>Diseases of Fruit and Vegetables</td>
<td>2</td>
</tr>
<tr>
<td>PLNTPTH 5040</td>
<td>Science of Fungi: Mycology Lecture</td>
<td>3</td>
</tr>
<tr>
<td>PLNTPTH 5041</td>
<td>Science of Fungi: Mycology Lab</td>
<td>1</td>
</tr>
<tr>
<td>PLNTPTH 6001</td>
<td>Advanced Plant Pathology</td>
<td>3</td>
</tr>
</tbody>
</table>

**Final Exam**

As per the requirement of the graduate school, each student will complete a Final Master’s Examination which will include both a written and oral examination. The examination will evaluate the student’s proficiency and understanding of his/her field of study, with emphasis on the topic selected from students special projects/internships.