Graduate Education in Plant Pathology: Goals and Assessment

Goals

The Graduate Program in Plant Pathology is a leader in multidisciplinary graduate curricula offering M.S. and Ph.D. degrees emphasizing research-based diagnosis, management, and prevention of plant disease covering all levels of biological organization from molecular genetics and genomics through ecosystems. The goal of Graduate Education in the Department of Plant Pathology is to prepare graduates to be leaders in these areas of study and to be highly competitive for diverse careers in science, industry, education and government by providing excellent instructional and research opportunities.

To this end, we offer high quality education opportunities that fulfill the following goals:

- Graduate students acquire broad interdisciplinary scientific knowledge, critical thinking and technical skills through graduate course work and by conducting thesis and dissertation research.
- Graduate students develop strong research ethics and team-work ability as part of a larger research community.
- Students acquire communication strengths involving grant-writing, written and oral presentations, and teaching.
- Graduate students actively engage in national and international plant pathology as well as the general scientific research community through seminars, workshops, and conferences.
- Graduate students acquire rich exposure to the cultural diversity of American and global societies.

Attaining and Assessing Goals

Graduate students acquire broad interdisciplinary scientific knowledge, critical thinking and technical skills through graduate course work and by conducting thesis and dissertation research.

The science of plant pathology is inherently interdisciplinary. Our faculty conduct research spanning the basic to applied sciences and focusing on plants, microbes, soils, and agricultural production systems. Plant pathogens consist of diverse organisms from nematodes and fungi to bacteria and viruses. Topics relevant to the study of plant disease range from ecology and epidemiology to molecular genetics and genomics. The required course work in Plant Pathology reflects the interdisciplinary focus of the science. Core coursework centers on Principles of Plant Disease (PlPa 5480) which is the keystone course required for all graduate degree programs. To capture the broad range of the scientific discipline, several distinct Master’s and Ph.D. degree tracks are offered. The Master’s degrees may be research based (Plan A) or a non-thesis (Plan B) Practitioner Program for students that will use the M.S. as a terminal degree. Plan A Master’s Degrees prepare students for successful careers or for further advancement to Ph.D. studies. The M.S. Molecular Option is for students wishing to emphasize molecular and genomic aspects of plant pathology. Both Traditional and Molecular option curricula also are available to Ph.D.
students. Critical thinking is taught as a component of PLPa8200 Plant Pathology Seminar and in journal discussion groups associated with PLPa8103 Molecular Plant-Microbe Interactions. The Plant Pathology Graduate Program is focused on research-acquired knowledge as required for the Ph.D. and as documented by thesis-track Master’s degrees greatly outnumbering non-thesis Master’s degrees.

Graduate students develop strong research ethics and team-work ability as part of a larger research community.

Formal training in scientific ethics begins with graduate course PLPa8123 (Ethics Training) which is required for all graduate students. Students supported on federal grant funds also receive Research Ethics Training in a semester-long course offered by the University. Team-work ability is stressed in the department and numerous opportunities for collaborative research are available. Cooperative interdisciplinary research can be measured based on student publications with multiple authors reflecting teamwork essential for modern research in plant pathology. Other opportunities for team building activities include student led outings and retreats and the highly successful student organized colloquia.

Students acquire communication strengths involving grant-writing, written and oral presentations, and teaching.

Student colloquia are underwritten by grants, gifts and other fundraising activities organized by the graduate students themselves. Additionally, students have the opportunity to take a course in writing NSF style grant proposals (EEB 8550). Numerous opportunities also are available for students to hone grant writing skills by applying for University, College and Departmental awards and fellowships. The Department supports three scholarship/fellowship programs specifically for Plant Pathology Graduate students. In addition, the department provides the opportunity and funds for an internship program that allows students to travel to a different institution, in the United States or internationally, to learn new techniques and have a different exposure to research. These experiences are usually 3 to 12 weeks duration. Oral presentations in the form of departmental seminars (PLPa 8200) are required from all students. The Plant Pathology Program also has a requirement for teaching which serves as a training ground for developing classroom skills. Ph.D. students complete a minimum of one full semester in-classroom Teaching Experience (PLPa 8090, "Teaching Plant Pathology"). Supervised Classroom/Extension Teaching (PLPa 8005) or Teaching in Higher Education (Grad 8101) also are required whereby students acquire formal instruction in pedagogy and are challenged to become innovative educators.

Graduate students actively engage in the national and international plant pathology and general scientific research community through seminars, workshops, and conferences.

Graduate students are encouraged to participate in at least one professional development opportunity (e.g. professional conference) annually. Several travel grants are awarded within the Plant Pathology Program each year including the Steinsra and Meronuck Graduate Student Travel Award as well as the Elwin Stewart Graduate Student Travel Award. These awards provide funding for students to travel to conduct research at other institutions, either domestic or
abroad, or to attend professional meetings of their choice. Commonly, students travel to the American Phytopathological Society Meeting where departmental faculty and staff critique graduate student posters and talks in order to improve their presentations.

*Students acquire rich exposure to the cultural diversity of American and global societies.*

Graduate students in the Plant Pathology Program come from diverse backgrounds representing our nation and the world. The Graduate Program provides students the opportunity to share their experiences and to do research with national and international consequence. Graduate students participate in the Stakman-Borlaug Center for Sustainable Plant Health, an interdisciplinary umbrella that encompasses all aspects of plant health by bringing together experts in plant pathology, agronomy, applied economics, entomology, horticulture, plant breeding, and soil science, to respond to major threats to world crop production and ecosystem health. Student research projects are global in reach consisting of current projects centered in Africa, Asia and South America.

**Assessment of Program Outcomes**

To achieve graduate program objectives, the Department has established the following standards to identify progress toward achieving its goals for graduate education.

- Students and their major professor provide annual written assessment of progress toward obtaining the target graduate degree.
- Student accomplishments are documented by publications, oral presentations, fellowships, and grants.
- Student degrees are granted in a timely manner.
- Employment success of graduates in STEM-related professions.