

Agricultural Science Facing an Educational Crisis

- **Background:** Agriculture is an essential market sector and promoter of human health and wellness. As the global population is projected to exceed nine billion by 2050, we are faced with unprecedented challenges to sustainably produce sufficient food, feed, fiber, and now biofuel feedstocks. Meeting these challenges over the next 40 years will require that more agricultural products be produced than has been in the past 10,000 years combined. Failure to do so will result in food insecurity that could lead to instability in the global, geopolitical landscape.

To meet this challenge, there must be increased sustainable agricultural production on current farmland and losses to disease must be mitigated in an economical and sustainable manner. Globally, losses due to plant diseases range from 9.7 to 14.2% of potential yield per annum with a value of \$220 billion but it is not uncommon for total losses to occur at local or regional scales.

The discipline of plant pathology is fundamental to achieving success in addressing these losses and improving agriculture sustainability. However, since the mid 1970s, our nation has seen a steady decline in state and federal investment and support for agricultural sciences in our higher education system. In plant pathology, the number of departments readily identified with plant pathology has declined from 47 to 32 in 2007 and this trend continues. The number of faculty is also declining (e.g., 25% at the eight major departments of plant pathology during this same time period) resulting in a similar reduction in the number of courses offered. The future looks even worse. The median age of plant pathology faculty is 52 and increasing. One-third of plant pathologists in USDA Agriculture Research Service were eligible for retirement in 2009, and fewer and fewer students are being trained.

- **Problem:** Unfortunately, the challenges in plant health, such as the Irish Potato Famine, chestnut blight, soybean rust, and coffee rust, are not behind us but are likely to become more frequent due to a changing climate and the increasing frequency of extreme weather events as well as the large-scale movement of products around the globe. More not fewer plant pathologists are going to be needed to address future disease epidemics due to new races of pathogens (e.g., wheat rust Ug99) and the movement of pathogens into new geographical areas (e.g., soybean rust into the United States). To maintain food and environmental sustainability as well as economic vitality, all nations must be able to address the serious challenges to preventing and recovering from diseases of plants cultivated for food, fiber, timber, and fuel, and those growing in managed and native ecosystems. These challenges cannot be met without those skilled in the art and science of plant pathology. The United States has been a leader in developing domestic and international scientists who have and are addressing the continued assault of plant diseases and we must maintain this leadership.
- **Solution:** The American Phytopathological Society (APS) recommends the following investments be made to assure that the cadre of skilled plant pathologists necessary to support the global production of food and feedstock for food security and international stability are available:
- The formation of middle- and high-school level training programs that teach the link between agriculture and the products students consume and the factors that affect their availability.
 - Scholarship and internship programs to attract the best students into the agricultural sciences at the undergraduate level accompanied with infrastructure support to offer the course work and laboratory experience so that students pursue advanced degrees in agricultural sciences.
 - Support for innovative recruitment, training, and development programs at the graduate level to ensure that graduate students are broadly trained to meet disease management challenges.
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