

## **NASULGC Research Priorities for Plant and Pest Biology November 20, 2007**

The following high priority research areas are couched in terms of the ESCOP Science Roadmap for Agriculture and ranked according to the Experiment Station Section's major priority areas. Addressing these priorities will provide enhanced knowledge and technology to improve the viability and sustainability of agriculture and food systems; the quality of natural resources and the environment; and service to communities, families, and consumers. Integration with extension will be required to address these research priorities, except where basic research is indicated as the most immediate need. Each of these priorities directly supports the CSREES strategic goals as listed below.

### **I. Bioenergy - Biobased Economy** (CSREES Goals 1, 2, 3)

#### **Plant Biology Priorities:**

- Feedstock development and utilization; basic research on lignin, cellulose & other plant components modification & conversion, enzyme-based processing systems, chemical & thermo conversion technologies, and improved bioenergy & bioconversion biocatalysts.
- Sustainable bioenergy systems, bioprocessing by-products, trees & forest products as feedstocks, biomaterials development & utilization, and alternative feedstock production & processing efficiency & bioconversion.
- Water use, quantity and quality issues related to production systems
- Graduate and Post Doctoral Fellowship Programs

#### **Pest Biology Priorities:**

- Develop appropriate or minimalist approaches to pest control

### **II. Food, Nutrition, Health and Well-Being** (CSREES Goals 4, 5)

#### **Plant Biology Priorities**

- Specialty crop systems; genetic manipulation and improvement as well as responses to biotic and abiotic stresses.
- Development of functional foods and the role of specialty and organic crops in nutrition and well-being.
- Improved rapid detection of food borne pathogens, safer fresh produce handling methods, risk reduction in production, processing, and storage systems, creating health-promoting foods, and strategies to address agro-security, bioterrorism, and invasive species threats.

#### **Pest Biology Priorities:**

- Innovative plant technologies and systems, including genetic engineering of food crops to prevent potential toxins, new detection systems for food borne toxins & pathogens, and basic pathogen biology.
- Develop the knowledge base for rapid detection of threat agents, risk assessment for emerging and new threats, and food safety and security.
- Characterization and prevention of pesticide and pollen drift.

### **III. Environmental Stewardship** (CSREES Goals 2, 3, 6)

#### **Plant Biology Priorities:**

- Long term cropping system sustainability and water use, quality and quantity in sustainable production systems.
- Production economics, modeling pests, pest movement, GIS methodology for site-specific management, soil properties with crops grown for biomass, minimizing water use, and multiple uses of crop components.
- Effects of global climate change on agricultural production systems and natural ecosystems as well as research that will inform policy decision-making.
- Improved methods to protect the environment both on and beyond the farm from any negative impacts of agriculture through optimum use of cropping systems including agroforestry, phytoremediation, and site-specific management.

#### **Pest Biology Priorities:**

- More environmentally friendly crop production systems that utilize sustainable weed, insect, and pathogen management strategies that promote environmental stewardship.
- Integrated systems of plant and animal production, and basic biology of pest management.
- Balanced environmental protection and agriculture economic viability, sustainable BMPs, specialty crops production & harvest systems, agro-ecosystem management, agro-chemicals environmental impact, integrated pest management systems, and biocontrol.