Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

The Union of Concerned Scientists (UCS) is pleased to submit the following comments to the USDA National Institute of Food and Agriculture (NIFA) for the April 13, 2010, workshop on stakeholder priorities in the area of Plant and Pest Biology.

UCS congratulates the USDA for calling for a new research agenda at a time when the global community is facing unprecedented challenges from climate change, competition for scarce water and land resources, accumulating adverse impacts of current agricultural practices, and growing food insecurity. To meet the goals of NIFA's five new priority research areas—Global Food Security and Hunger, Climate Change, Sustainable Energy, Childhood Obesity, and Food Safety—the new research agenda must support a broader set of research approaches and tools than in the past.

In general, we believe NIFA research should increase focus on agriculture that can maintain productivity while taking into account the broad impacts of agriculture on energy and water use, climate change, pollution, and public health. In order to achieve this goal, NIFA should foster research on integrated systems that provide multiple benefits to society.

UCS recommends that the USDA NIFA assign high priority to and increase funding for the following research areas.

1. Reducing U.S. agriculture's contribution to greenhouse gas emissions and nitrogen pollution. Climate change will be a dominant influence on agriculture in the 21st century. A high priority of NIFA should be the development of systems and practices that enable agriculture to meet or contribute to three related objectives: 1) substantially reduce its greenhouse gas emissions and nitrogen pollution over the next few decades, 2) sequester carbon, and 3) develop the capacity to respond to unpredictable changes in weather and climate. Absent changes, U.S. agriculture is on track to exacerbate climate change and further degrade our environment due to over-reliance on synthetic fertilizers and other practices associated with excess nitrogen and heat-trapping gases.

Among the areas needing attention are techniques for measuring and altering carbon and nitrogen content in agricultural systems, assessments of the climate impacts of conventional and alternative practices, innovative systems that reduce climate impacts and nitrogen pollution, and programs that facilitate farmers' transition to climate-friendly production practices. Given that organic and similar low-input methods have the potential to contribute significantly to reducing the climate change emissions and nitrogen pollution, a particular emphasis should be given to better understanding and improving the contribution of organic methods toward mitigating these problems.

2. Organic agriculture and other integrated, systems-based approaches that provide multiple benefits to people and the environment. As U.S. agriculture's toll on human health, the environment, and climate change mounts, the USDA must build on the systems already proven to maintain productivity while mitigating negative consequences. These systems, variously referred to as sustainable, organic, low input, or regenerative, offer high productivity and other important benefits such as reduced air and water pollution, efficient nitrogen use, and drought tolerance, as well as carbon sequestration and other climate benefits. UCS urges the NIFA to significantly increase research investments to better understand and improve such systems and to disseminate the innovative technologies and practices that hold the greatest promise for productivity and sustainability in a future beset with complex challenges. It is especially important that the climate contribution of such systems be appreciated and emulated.

3. Elucidating the causes and dissemination of antibiotic-resistant foodborne pathogens. The overuse of medically important antibiotics in animal agriculture contributes significantly to the nation's number one public health challenge—antibiotic-resistant diseases, including foodborne pathogens. Because these pathogens can leach into ground and surface water, which can later be used to irrigate crops, it is essential to do more research in how to address this aspect of the food safety problem. Research in this area should be particularly focused on how to minimize the development of these antibiotic-resistant foodborne pathogens, and better understanding the movement of such resistant bacteria in ground and surface water.

4. Classical plant and animal breeding. Classical plant and animal breeding are among the most powerful technologies available to modern agriculture. So far, classical breeding deals better than any other technology with multi-gene traits like yield and stress tolerance that are fundamental to productive and resilient agriculture. At one time, USDA research resulted in many new varieties of classically bred plants and animals freely available to the nation's farmers, and a high return on public funding. Unfortunately, two trends are now threatening to reduce that fountain to a trickle. One is the trend toward the extensive privatization of agricultural research and the other is the decline in public funding in favor of newer technologies like molecular biology and genomics.

NIFA should play a more active role in reinvigorating the *public* agricultural research sector to enrich the array of classically bred plants and animals. These varieties would be a boon to all of agriculture but are especially needed by the nation's organic and sustainable farmers and ranchers who are among the nation's most innovative producers. Classical breeding also has a critical role to play in helping the agricultural sector adapt to climate change and in the area of global food security, since it has been more effective at increasing yields than technologies such as genetic engineering.

Examples of needed conventional breeding research include:

- **Cover crops**—1) Improving stand establishment and nitrogen fixation of legume cover crops, 2) Breeding of cover crops to increase their productivity for multiple edaphic and climatic environments, 3) Optimizing cover crop species mixtures for reducing loss of reactive nitrogen from farms and improving nitrogen availability for subsequent crops, and 4) Using cover crops for soil pathogen suppression.
- **Major crops**—1) Improving cropping methods, such as rotations, and development of crop varieties to reduce weed infestation in organic farming, 2) Improving crop variety response to organic nitrogen and other nutrient inputs, and for improving nitrogen use efficiency, 3) Breeding for improved resiliency and yield in response to climate change stresses—especially drought tolerance, heat tolerance, and saline soil tolerance, 4) Improving the understand the genetic potential in the germplasm of important crops and compatible wild relatives for all of the traits in this section.
- **Pasture crops**—1) Improving nutritional value (such as feed conversion efficiency), biomass production, and digestibility of pasture crops, for managed grazing systems, 2) Reducing methane production from consumption of forages by grazing ruminants, 3) Using forage mixtures for different soil types and climatic regions for improved livestock nutrition and reduced methane production