Researcher to Study Gene Flow 'Hot Spots' in Canola

April 24 2008

A University of Arkansas researcher and her colleagues have won a joint grant from the U.S. Department of Agriculture and the Environmental Protection Agency to look at the combined effects of global climate change on weed biology, focusing in particular on transgenic hybrid weeds created by cross-pollination with genetically modified crop plants. The joint award of $520,000 is one of only four in the country.

Cindy L. Sagers, professor of biological sciences in the J. William Fulbright College of Arts and Sciences, and colleagues at the Environmental Protection Agency and Fresno State University will study gene flow from canola plants that have been genetically modified to be herbicide and pesticide resistant. Genetically modified canola, Brassica napus, has been approved as a crop in certain states on a limited basis since 1999, but interest in it has grown because of its potential use as a biofuel. In fact the first field trial in Arkansas for genetically modified canola took place this winter.

However, canola has a promiscuity problem.

“Canola will hybridize with about 40 species, and one of those is a particularly bad weed pest,” Sagers said. Thus, the crop plant has the potential to create “superweeds” that spread and resist efforts to get rid of them.

While working at the EPA office in Corvallis, Ore., Sagers learned how to hand-pollinate canola and its cousin mustards so that the researchers

can study hybrids in a laboratory setting. The researchers also began examining the problem from a geospatial context, contacting extension agents in the northern Midwest, consulting online flora and herbaria, mining plant databases and funneling all of that information into a map of the distribution of weeds that are sexually compatible with canola.

“I learned the value of a multidisciplinary approach to solving a well-defined problem,” Sagers said. “There were geographers, geneticists and ecologists working on the same project.” This research laid the ground work for the currently funded project.

For the USDA/EPA project, Sagers and her colleagues are working with the University of Arkansas Center for Advanced Spatial Technologies to create more detailed distribution maps of canola and its sexually compatible relatives, focusing in particular on field mustard Brassica rapa, which grows in every state in the nation except Alaska.

In 2009 and 2010, they will be able to track the gene flow and gene flow rates of genetic modifications. They seek patterns in population biology that might make the plants more or less likely to hybridize and create “super weeds.”

“We’re asking, ‘what is the influence of domesticated fields on native plants?’” Sagers said.

With the distribution maps, they will be able to build predictive models that will show what could happen with global climate change. They will be able to show how temperature changes might affect flowering and cross-pollination with related plants and weeds.

Source: University of Arkansas