KSU WHEAT GENETICS CENTER

We need to preserve and improve wheat genetic resources, or we could face starvation, according to Bikram Gill, KSU plant pathologist in charge of the Wheat Genetics Resource Center.

"Currently, wheat supplies about 20 percent of the world's food," said Gill. "This is the same as saying that 1 billion people rely on wheat to live."

The Wheat Genetics Resource Center at KSU collects and preserves strains of wild wheat, Gill said. Currently, the gene bank collection numbers over 5,000 strains.

Maintaining the collection is critical, because domesticated wheat has low genetic variation, Gill said. The major sources of new genes are its ancestors and relatives.

"The ancestors and relatives of domesticated wheat have tremendous genetic variation. They have genes for resistance to all kinds of diseases and insects and to drought," noted Gill.

The Center also develops methods of transferring these useful genes to domesticated wheat, Gill added.

Transferring the genes by artificial crossing is time consuming and difficult. "Out of a thousand crosses, we often will get only one seed. These species have built-in mechanisms to prevent natural crossing," he said.

To circumvent such barriers, researchers use a method called embryo rescue. After pollination between two incompatible species, an embryo will often form. If left alone, the embryo will die. Rescuing the embryo entails removing it from the plant and placing it in a chemical solution. The solution contains all the nutrients and growth regulators the embryo needs to develop into a mature plant. The plant will have genes from both species.

By a process called chromosome engineering, scientists are able to insert a set of wild wheat genes into the genetic material of domesticated wheat.

KSU scientists at the Center recently developed a technique that allows them to keep track of the newly transferred genes visually. The scientists call the technique "chromosome painting."

The new method involves breaking up the chromosomes (thread-like strands of the genetic material DNA) of the wild wheat and labeling them with a fluorescent dye. Using a microscope, scientists can distinguish the wild wheat chromosome pieces from the domesticated wheat chromosomes because of their color. ■

NOXIOUS WEED STRANGLES KANSAS CROPS

NATURAL CONTROL SOUGHT

The 12th most serious noxious weed in the world is getting some attention thanks to research by two scientists with the Kansas Ag Experiment Station.

Jim Nechols, Entomology, and Michael Horak, Agronomy, are researching the use of two natural enemies to combat the strangulation of Kansas crops by field bindweed.

Field bindweed tangles itself around other plants, and it can strangle wheat and soybean crops. It also affects backyard gardens and municipal flower beds.

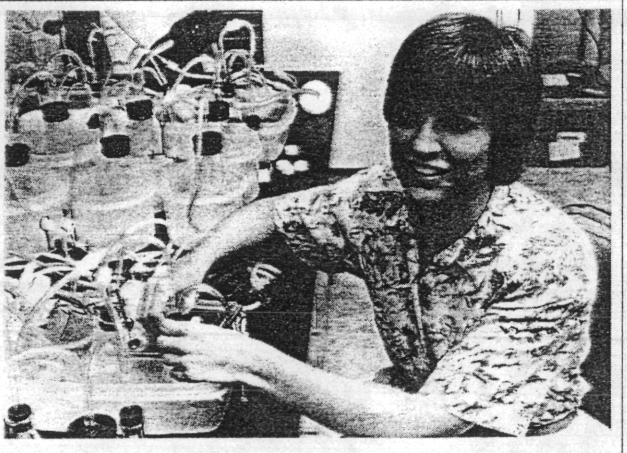
"It competes in all respects for light by covering a plant and diminishing photosynthesis," Nechols said. "The root system of field bindweed is deep, so it competes for water in the ground as well.

"This weed is also capable of physically restricting a plant's growth," Nechols added.

Nechols and Horak have introduced two of the weed's natural enemies into a field research area near the university. Those enemies are the gall mite and the Tyta moth. They are not native to the United States, but neither is field bindweed.

"The gall mites eat the plant from the inside," Nechols said. "They cause the stems and buds to die, and they deform leaves.

"The moth caterpillars strip foliage from the stem," he said. "We need a more quantitative assessment for the moth as a natural enemy but not as much for the gall mite."



BIOLOGICAL CLEANUP OF SOILS —Kathy Banks, environmental engineer with the Kansas Agricultural Experiment Station, studies microbes and plants that could help to degrade hazardous contaminants in soil. Two of the plants being tested for their abilities to reduce soil contaminants are alfalfa and sorghum. Banks says the nitrogen-fixing bacteria associated with alfalfa may contribute to contaminant degradation in places like petroleum spill areas. Sorghum is being tested because of its ability to grow and thrive on such disturbed sites. This is one of many environmental projects Banks is working on with graduate students and other Ag Experiment Station scientists. She came to K-State in 1989 after receiving a Ph.D. in environmental engineering from Duke University. Her B.S. in civil/environmental engineering (1982) is from the University of Florida, and her M.S. in environmental engineering (1985) is from the University of North Carolina.

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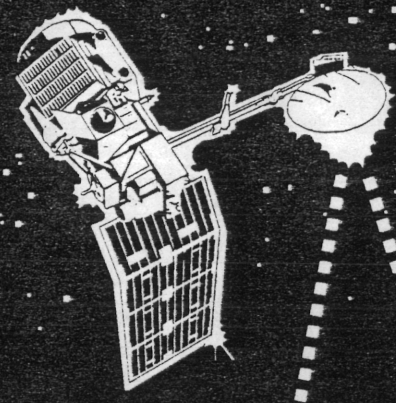

feature story

WHAT WILL AGRICULTURE BE LIKE IN 20 YEARS?

K-State experts make predictions