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ISU leads the way to cutting-edge ag technology

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Congress passed the Morrill Land Grant Act during the Civil War to encourage state institutions of higher learning for agriculture, mechanical arts and home economics.

Iowa State University was the first school to be founded through the act.

With that kind of history behind it, ISU has held a leading role in agricultural research, and its reputation spans a spectrum from the submicroscopic substances, such as DNA and genes, to the limitless realm of outer space.

Excerpted from ISU News Service coverage, some ways that the university is introducing cutting-edge agricultural technology to the rest of the world follow:

- Soil moisture is being monitored from outer space, according to ISU assistant professor Brian Hornbuckle. He assisted the European Space Agency after it launched a satellite in 2008 to collect data on moisture and salt content in soils.

Hornbuckle led a team from ISU, the University of Iowa and the USDA's National Soil Tilth Laboratory to measure central Iowa soil moisture on the ground.

ESA will take satellite readings and compare them with readings from Hornbuckle's land-based team, then will adjust their readings to calibrate the satellite.

In exchange, the space-based readings will be provided to ISU free of charge.

By getting this experience, Hornbuckle hopes that when NASA launches a soil moisture-measuring satellite, ISU can be part of that program.

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By Nirmalendu Majundar/The Tribune

"If we can understand moisture behavior in certain areas, then we can start to understand some of the variability in crop yields," said Amy Kaleita, an assistant professor in agricultural and biosystems engineering, who helps monitor soil moisture with Hornbuckle.

Eventually, Kaleita thinks the information collected through moisture satellites may be useful for precision farming, using GPS technology to plant and grow crops.

- A first-draft of a domesticated pig genome was announced in November 2009 by the USDA, a three-year process in which ISU played a major role.

"The sequencing of the pig genome is a scientific advance that will offer great benefits for consumers and human health," said Max Rothschild, professor of agriculture in animal science, at the time the project began.

He is director of ISU's Center for Integrated Animal Genomics.

"Understanding the swine genome will lead to health advancements in the swine population and accelerate the development of vaccinations for pigs," said Roger Beachy, director, National Institute of Food and Agriculture. "This ... can help reduce disease and enable medical advancements in both pigs and humans."

The project allows researchers to pinpoint genes that are useful to pork production, immunity or other physiological processes. It will enhance breeding practices, offer insight into diseases that afflict pigs — and, sometimes, humans — and will help in efforts to preserve the global heritage of rare, endangered and wild pigs.

Because its genome is similar to humans, the project could lead to future biomedical advances.

"The pig is an outstanding model to study human diseases," Rothschild said. "Understanding the pig genome should provide enormous opportunities for treating human disorders like obesity, diabetes and heart disease. It also could improve the breeding of pigs to produce human-transplant organs."

ISU and Iowa Pork Producers were among the agencies providing money and/or technical support. For more information, visit www.nifa.usda.gov.

- Leopold Center for Sustainable Agriculture, headquartered at ISU, leads the search for environmentally responsible agricultural technology and practices.

Two examples are:

- The ISU Grass-Based Livestock Working Group" will soon fund ideas for research and demonstration projects to boost the viability of the grass-based livestock industry. In late 2009, Leopold Center said it would fund up to five grants, totaling \$21,000.

"Our strength is in diversity," said ISU Extension small farm specialist Andy Larson, who coordinates the group. "These R&D grants are a great way to create new collaborations and for the working group."

- A team of ISU researchers is studying cropping systems that blend biomass forages, including sorghum and aspen trees, with corn-soybean row crops.

The goal is to create crop combinations that protect soil and water, can be used to produce renewable energy and turn a profit for farmers.

Ken Moore is an agronomist on the ISU research and demonstration farm west of Ames in Boone County.

“The real promise is ... to grow other crops while still being profitable,” he said. “We will evaluate and compare energy and fertilizer inputs, biomass productivity, water, nutrient and carbon cycling across all the cropping systems.”

Project leader Lisa Schulte-Moore, associate professor of natural resource ecology, said the team will compare findings to a continuous corn system.

- Robotics on farm fields. Lie Tang, assistant professor in the ISU College of Agricultural and Biosystems Engineering, helped develop a new agricultural automation and robotics lab for students in advanced agricultural machinery engineering.

Tang developed an automated sensing system for corn plant spacing measurement for Deere Company.

The ag automation lab got a boost from Caterpillar Inc., which made a donation in 2005 to help create a hydraulics facility at the lab. Its work supports projects that merge electronic controls with mechanical components. Agricultural and biosystems engineering students are using this knowledge to design projects like an “autonomous agricultural vehicle” to collect soil samples in agricultural fields.

A new Agricultural and Biosystems Engineering building is on the drawing board. It will be a part of a three-structure complex that will cost \$72.3 million, with \$13.7 million to come from private funding and the remainder to be sought from the Iowa General Assembly.

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