Looking Out for "No. 1" from Above

REMOTE SENSING TAKES ON SWEETPOTATO PRODUCTION

By Charmain Tan Courcelle

A plane's eye view may one day help producers striving for higher yields of U.S. No. 1-grade sweetpotatoes.

MAFES agronomist Mark Shankle is leading a team that is exploring the use of remote sensing in sweetpotato production. The research aims to provide answers for growers faced with inconsistent yields of marketable, top-grade sweetpotatoes.

Mississippi is the third-largest producer of sweetpotatoes in the nation, ranking behind North Carolina and Louisiana. Sweetpotatoes grown in the United States are graded based on their size, shape and surface appearance. The roots are separated into U.S. No. 1 and 2 fresh market grades, canner and jumbo processing market grades and a cull grade.

"U.S. No. 1-grade sweetpotatoes are five to eight times more profitable than the other potato grades and represent most of the fresh market," Shankle said. "The processing market for canner and jumbo grades is much smaller than the market for U.S. No. 1's, and producers will let the canners and jumbos roll off the back of the digger with the culls if there is no market demand. They do this because storage and handling are costly and the profit margin is low in the processing market."

A good yield percentage for sweetpotato fields is 60 percent U.S. No. 1-grade roots. But yields of this top grade of sweetpotatoes are often inconsistent across a field.

Shankle said previous attempts to define factors influencing No. 1 yields, including fertilizer rates, have produced mixed results every time. He hopes remote sensing will remove the guesswork from sweetpotato production and allow producers to maximize their yields of No. 1 roots.

One question that Shankle's research will address is the utility of conventional versus unmanned aircraft for collecting spatial information. Shankle is working with Air-O-Space International and EMC, Inc., to monitor crop development with an unmanned aerial vehicle (UAV) and conventional airplane, respectively. The project is funded by the Mississippi Space Commerce Initiative and the Advanced Spatial Technologies in Agriculture program.

"The UAV seems to be a better fit for sweetpotato production because this crop is generally grown in fields lower in acreage (10 to 20 acres) than those used for other row crops," Shankle said. The unmanned craft also has the advantage of providing real-time data.

Shankle's team is assessing whether these positives will add up to better profits on the ground.

Both the UAV and conventional aircraft will be used to collect multispectral data across sweetpotato fields at 41, 65 and 85 days after transplant, which correspond to periods of root initiation, root elongation and preharvest, respectively. The information will then be processed to give a normalized difference vegetation index, which indicates crop health and vigor.

As part of this study, the team will collect "ground-truthed" data, including soil properties (macronutrient and micronutrient content, moisture, compaction and texture), plant leaf nutrient and chlorophyll content, the percentage and type of ground cover, insect populations and sweetpotato grade yield.

Results from the ground-truthing and aerial data collection will then be compared to determine the factors affecting sweetpotato yield variability across a field.

So far, the group has found that soil compaction has an effect on the shape and size of sweetpotatoes. U.S. No. 1 sweetpotatoes are two to three and one-half inches in diameter, three to nine inches in length, well shaped and free of defects.

"We've found that some compaction at lower depths is good because it prevents long roots from forming. On the other hand, compaction near the surface is bad because it causes roots to become misshapen and unattractive," Shankle said.

Other preliminary results from this study suggest soil pH and levels of zinc, boron and sulfur also affect sweetpotato yield variability in a given field.

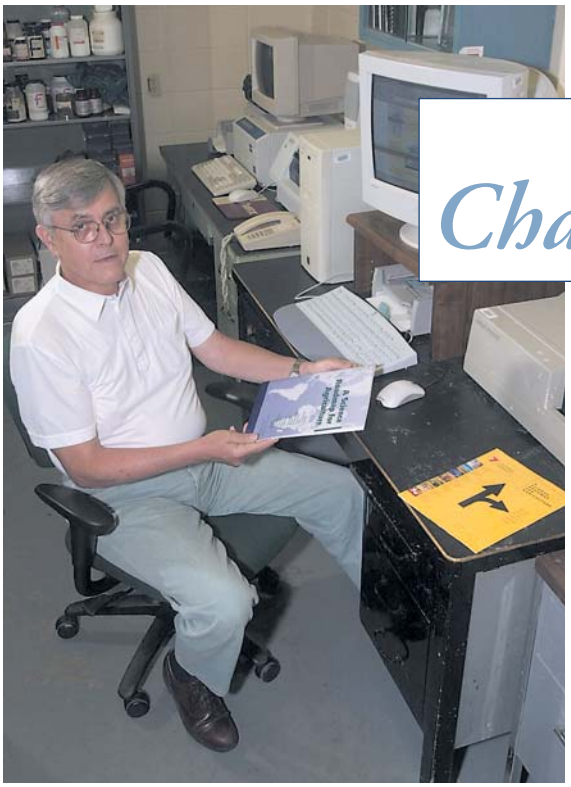
"Many of the factors that we've found to be important are soil characteristics that can easily be managed," Shankle said. "Using remote sensing technologies, we may be able to develop site-specific strategies that will help sweetpotato growers to manage variability in their fields and to maximize yields of U.S. No. 1 potatoes consistently."

Charmain Courcelle

Charmain Courcelle

Shankle, left, and Air-O-Space manager Skip Wright check out the UAV used to collect spatial information in the sweetpotato yield study (photo at left). Shankle collects ground-truthing data with research assistants Jeff Main, left, and Trevor Garrett.

Jim Lytle



Wilson displays a copy of **A Science Roadmap for Agriculture: Seven Challenges to Meeting our Nation's Agricultural Goals.**

SCIENCE ROADMAP
Charts Agriculture's Future

By Eva Ann Dorris

The chapters in the history of American agriculture reveal a phenomenal success story. However, the most exciting chapters are yet to be written. Some of the nation's top research scientists believe there's even more potential for agriculture in what's ahead.

The scientists, an appointed task force of the Experiment Station Committee on Organization and Policy (ESCOP), recently published a handbook entitled "A Science Roadmap for Agriculture: Seven Challenges to Meeting our Nation's Agricultural Goals."

The handbook is a result of brainstorming sessions among 24 scientists from throughout the nation who collectively have hundreds of years of experience in agricultural research. One member of the elite group responsible for the roadmap is Robert P. Wilson, MAFES professor of biochemistry and molecular biology.

The scientists believe the rapidly evolving world of science and agriculture calls for a new approach to defining needs and setting priorities for agricultural research and education. The roadmap outlines seven challenges identified by the task force as areas that must gain the attention of the scientific research community.

Wilson's involvement in the group was a natural complement to responsibilities he recently completed for the National Research Council's Board on Agriculture and Natural Resources and to his more than 30-year career as an agricultural educator and researcher.

"Agriculture has been a success story, but where do we go from here?" Wilson asked. "We've improved the production and management side of agriculture. We've improved genetics. And now we have to use the new biotechnology to produce more or perhaps produce specialty or niche crops.

"I don't think anyone would question that the products we are producing are the best in the world, but we have to figure out how to be sure farmers are rewarded for doing that."

Wilson said the roadmap identifies the type of future research and manpower that will be needed 10 to 15 years from now.

The seven challenges identified by the scientists include developing new and more competitive crop products and new uses for diverse crops; developing new products and new uses for animals; reducing the risks of local and global climatic change on food, fiber, and fuel production; providing the information and knowledge needed to further improve environmental stewardship; improving economic returns to the producer; strengthening families and communities; and ensuring food safety and health throughout the food production chain.

The task force projects the national agricultural research system will need significant new resources — almost $6 billion in new funding — if the roadmap is to provide its intended direction. The funding could be provided from a variety of sources, but Wilson said the majority will come from the government through increased federal investment in the land-grant university system.

The publication, prepared by the National Association of State Universities and Land Grant Colleges (NASULGC) and ESCOP, is being distributed to assist decision makers and advocates as they plan for future program areas for the research and education system. Copies of the report are available upon request from NERA@umail.umd.edu.

CALENDAR OF UPCOMING EVENTS

August 14, 2002
Cotton Field Day,
Delta R&E Center, Stoneville

August 15, 2002
Rice and Soybean Field Day,
Delta R&E Center, Stoneville

September 28, 2002
North Miss. Garden Expo,
North Miss. R&E Center, Verona

October 18-19, 2002
Fall Flower & Garden Festival,
Truck Crops Branch,
Crystal Springs

November 21, 2002
MSU-MAFES
Annual Production Sale, MSU