



Technology News

October/November issue

NRCS Technology News~

United States Department
of Agriculture
Natural Resources
Conservation Service
Science and Technology

"NRCS Technology News," provided by Science and Technology, delivers pertinent information to our customers about new technology, products, and services available from the Soil Survey and Resource Assessment and the Science and Technology deputy areas.

"NRCS Technology News" is in a format that is available to all NRCS field staff. The formatted color version is available at <http://www.nrcs.usda.gov/technical/SandT/TechNews/TechNews-OctNov04.pdf>.

Features in this issue include:

MESSAGE FROM THE DEPUTY CHIEFS

Tech Centers and GIS Labs Open in Three Locations

Lawrence E. Clark and Maurice J. Mausbach

CONSERVATIONIST'S CORNER

Sylvia Gillen, State Conservationist, Utah

NEW PRODUCTS AND SERVICES

#1 Soil Information Software Updated

TECHNOLOGICAL ADVANCES

#2 Legal Status Explained on PLANTS Database

#3 Low Phytate Soybeans Researched

#4 Soil Data Mart Sees Increasing Demand

NEW PERSONNEL APPOINTMENTS

#5 Program Offers Global Experience

#6 Wallace Retires from Agency

MESSAGE FROM THE DEPUTY CHIEFS

Tech Centers and GIS Labs Open in Three Locations

Lawrence E. Clark and Maurice J. Mausbach

The three new national technology support centers and three remote sensing laboratories are up and running. The center for the east is located in Greensboro, North Carolina, the center for the west is in Portland, Oregon, and the center serving the central states is located in Fort Worth, Texas. These centers were established to provide technological direct assistance and technology transfer (including collaboration with others for technical training) to States and the Pacific Basin and Caribbean Areas. In addition, the center staffs are responsible for acquiring and developing new science and technology in order to provide cutting-edge technological support. These centers are also charged with developing and maintaining national technical standards and other technological procedures, references, and tools to help landowners protect their natural resources.

The open house for each center was held recently. At the east national technology support center's open house, a Memorandum of Understanding was

signed between the agency and North Carolina Agricultural and Technical State University (A&T) by NRCS Chief Bruce Knight, and A&T Chancellor James C. Renick. Under the partnership agreement, A&T faculty and the center staff are encouraged to work collaboratively on research and technology transfer opportunities.

Each center will lead technological advances and have national responsibilities in three specialized areas. The East center is responsible for animal waste utilization, social sciences and soil quality. The Central center is responsible for grazing lands, wildlife and wetlands. The West center is responsible for bioenergy, water quality and quantity, and air quality and atmospheric change.

Each center is staffed with the following experts: agronomist, forester, rangeland specialist, soil scientist, biologist, agricultural engineer, sociologist, economist, water management specialist, environmental compliance specialist and plant materials.

The East center and remote sensing lab will serve the Caribbean Area and 24 states. The Central center and remote sensing lab will serve 13 states. The West center and remote sensing lab will serve the Pacific Basin and 13 states.



Chief Bruce Knight and Chancellor James Renick sign Memorandum of Agreement at the East National Technology Support Center's Open House.



CONSERVATIONIST'S CORNER

Sylvia A. Gillen, State Conservationist, Utah

Science and technology continue to guide practical conservation work in Utah. Coordination with the NRCS National Science and Technology Consortium has helped us make some significant contributions in the areas of soil science and nutrient management.

Partnership members of the Utah AFO/CAFO Committee identified the need to develop a model to estimate nitrogen, phosphorus, and biological oxygen demand runoff from animal feeding operations, since few models adequately captured this information. NRCS State Agronomist Kerry Goodrich consulted with consortium members and developed an Animal Feedlot Runoff Risk Index that will be presented by Goodrich in a paper at the upcoming National Nonpoint Source Monitoring Conference in Maryland.

The index considers factors such as distance to water, feedlot slope, vegetation, water diversion and capture, lot surface type, precipitation, and hauling/scraping frequency. Although the model was correlated from ten year above and below feedlot data gathered on a limited number of feedlots, it is believed the model provides valid "ball park" values that will serve as a reasonable guide to those doing nutrient management planning.

The Bureau of Land Management asked NRCS to conduct a soil survey on the Grand Staircase-Escalante National Monument. Our survey team utilized new technology to add photographic depictions of landscapes with soil map units laid overtop that go with a narrative description of the soils that a layperson could understand. This imitates the setting of an NRCS soil scientist and a customer standing in the field with the soil scientist pointing at the three dimensional landforms and soils around them and describing them in layman's terms.

The original idea was conceived by Acting State Soil Scientist Randy Lewis, however, Corey Meier, soil scientist, presented the concepts at the bi-annual meeting of the Western Regional Cooperative Soil Survey in June. The NRCS National Cartography and Geospatial Center liked the idea and is considering the presentation in the design of a new web based Soil Data Viewer that will be available soon for use by the general public.

New soil survey technology is in high demand. Several counties and the State Department of Environmental Quality have asked our survey team to revisit existing soil survey data and perform field tests to evaluate the permeability of soils in and

around recreational property on Cedar Mountain, where concerns exist over ground water and reservoir contamination from septic systems. In this case we are using GIS and remote sensing interpretations as an aid to guide sampling efforts.

In short, technology allows our agency to operate more efficiently, while improving the accuracy, defensibility and relevance of our products. My hat is off to the fine cadre of technology specialists in our agency and especially to those in Utah that are leading the charge.

NEW PRODUCT

#1 Soil Information Software Updated

The National Soil Information System (NASIS) is a software program that is used for the development and maintenance of soil survey information. Since the initial release of NASIS in 1994, enhancements and upgrades have occurred generally on an annual basis. This time the application modifications will result in a major overhaul and redesign.

The primary purpose of the NASIS Redesign project is to move NASIS from its current computer environment of a UNIX X-window based system that utilizes the INFORMIX relational database management system software to a platform that is more in line with other NRCS computer applications. This new platform will use Microsoft and it is anticipated that this change will improve many of the network problems we have been experiencing.

A secondary part of the redesign is to incorporate several new functionalities into NASIS. They include: Data Compare tool; a Data Aggregation tool; integration with the Laboratory Information Management System database from the Soil Survey Laboratory; and integration with the Official Series Description and Soil Classification databases.

We also are looking at opportunities to improve the screen layouts or interface into NASIS to make the system easier to use. A NASIS users' group was organized in 2003 to assist the NASIS design team in addressing this issue. The user group suggested about 85 possible changes and enhancements. Incorporating these enhancements will likely result in changes in the way that some operations are handled, but in the end these upgrades should provide soil scientists and other users with easier access to NASIS.

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TECHNOLOGICAL ADVANCES

#2 Legal Status Explained on PLANTS Database

The National Plant Data Center has achieved a first by capturing the comprehensive legal status (threatened and endangered, noxious, or wetland indicator status) for related plants on its Plant Profile pages. This feature allows users to visit any Plant Profile and immediately grasp the complex legal protections for a plant. It was developed in cooperation with the NRCS Information Technology Center.

A plant's legal status applied at one taxonomic level of classification often automatically applies to another. However, until now, there has never been a listing or location that communicates these legal status relationships between synonyms and related plant species, varieties, or subspecies.

For example, *Chorizanthe robusta* is listed as federally endangered—previous listings would have stopped here. But, now PLANTS also displays the endangered status of its two varieties; *robusta* and *hartwegii*.

It is also important when a state classifies the legal status for an entire genus without specifying particular species. For example, California lists the genus *Cynodon* (Bermudagrass) as a noxious weed. This means that all Bermudagrass species in California are considered noxious. The PLANTS Database now communicates this relationship at each species' Plant Profile (i.e. *Cynodon dactylon*) because of the genus legal status.

To access Plant Profiles on the PLANTS Database, visit the homepage at <http://plants.usda.gov> and enter a plant of interest into the PLANTS Name Search bar. You can search by scientific name, common name, or plant symbol.

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Cypripedium pubescens Willd.
var. *pubescens* (greater yellow
lady's slipper)

3 Low-Phytate Soybeans Researched

All animals require phosphorus in their diet; however the ability of animals to

digest and assimilate it varies greatly. Monogastric animals (chicken, swine, etc) lack a key intestinal enzyme (phytase). This deficiency leads to excretion of the undigested phosphorus,

leading to soil saturation by phosphorus when manures are applied to soils over time and to water pollution as excess phosphorus enters streams and rivers. It also creates economically inefficient animal production. Phytate phosphorus exists in grains and legumes as phytic acid. Approximately 70 percent of the total phosphorus in plant material is in the phytate form.

Increasing concern over phosphorus content of swine and poultry manure has led to the development and study of low-phytate soybeans and corn. In normal feed grains, phytate molecules bind with phosphorus. Non-ruminant animals, such as poultry and swine, do not have the ability to digest the phytate, and the phytate phosphorus passes unused through the animal into the manure. Because this phytate phosphorus is not available to the animal, the most common way to ensure that livestock is getting the appropriate amount of phosphorus is through the addition of inorganic (mined) phosphorus to the ration. Although the added phosphorus adds expense to the feed, it is needed for optimal growth rates. The organic (phytate bound) phosphorus only increases the amount of phosphorus in the manure, which can contribute to surface water contamination and other environmental issues.

There are several benefits when using of low-phytate soybeans. The greatest benefit will come from the decrease in phosphorus levels of poultry and swine manure. The increased utilization of organic phosphorus from the feed and the discontinued use of inorganic phosphorus will reduce phosphorus

content in the manure. Current estimates for decreased phosphorus levels in manure are as high as 50 percent. In combination with phytase, there will be further reduction of the phosphorus in the manure.

Although research is ongoing current low-phytate strains have lower germination rates in the field. A lot of work is left to be done to create a low-phytate variety that has acceptable yield rates. Either increased seeding rates or continued testing will be necessary to solve this problem. In addition, current strains have lower yields and this problem will need to be solved before the seed is made commercially available. Nonetheless, it is estimated that the lower yields apparent when low-phytate seeds are released will be similar to yields experienced with the release of other genetically modified soybeans, i.e. round-up ready. Industry estimates for a commercially available low-phytate soybean is a minimum of 2-3 years.

USDA's Agricultural Research Service (ARS), land grant universities and seed manufacturers are continuing to research and experiment the low-phytate soybean. The patent for creating low-phytate soybeans is owned by the ARS and therefore, will likely be made available to seed manufactures at low rates.

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4 Soil Data Mart Sees Increasing Demand

More than half of the Nation's soil survey information is now available on the Soil Data Mart (<http://soildatamart.nrcs.usda.gov>) and demand for soil survey data is increasing. Since the Data Mart went on line last January, users have downloaded more than 28,000 data sets and have requested more than 16,000 reports directly from the Data Mart. Nearly a third of these downloads came from unknown top level domains, probably as direct links from the agency's electronic Field Office Technical Guide (eFOTG). Another 20 percent of downloads came from a variety of government domains directly accessing the Soil Data Mart website. The remaining downloads and requests came from a variety of domains, including net, com, edu, us, mil, org, and arpa and from several foreign countries.

PERSONNEL NEWS

5 Program Offers Global Experience

NRCS is participating in the Department of State's Embassy Science Fellowship Program (ESFP) for the third year since its inception. The Program allows U.S. embassies to acquire the expertise needed in their missions while simultaneously providing governmental technical staff an opportunity to gain valuable international experience, training, and networking resources. During FY 2004, the International Programs Division facilitated the placement of three NRCS employees in the ESFP.

These statistics reflect a steady increasing trend as more data become available on the Soil Data Mart. As of October 19, more than 1,400 soil survey areas have complete spatial and attribute data available on the Soil Data Mart. Another 350 have attribute data only (tables, no maps). Target date for fully populating the Data Mart is January 1, 2005. At that time, nearly all areas of the country should have at least attribute data (tables). Spatial data (digital maps) should be available for those areas where soil maps have been digitized.

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SURINAME, SOUTH AMERICA – **Philip Hays**, Hydrologist, Fayetteville, Arkansas, transferred technology for the development and evaluation of sediment and surface-water quality monitoring efforts to characterize mercury contamination that resulted from gold mining practices. The tools and methodologies developed for Suriname to address the problems of awareness, education, amelioration, and reducing mercury release will have great applicability to other South American countries.

MOZAMBIQUE, AFRICA -- **James Newman**, District Conservationist, Corozal, Puerto Rico, is currently working with the Ministry of Public Works and Housing scientists at the University of Mondlane and local municipal governments to recommend

ways to increase the sustainable use of new and rehabilitated water supply and sanitation facilities in rural areas and small towns. Some problems faced by Mozambique may become prevalent in the U.S. as our population increases and as the security of our water resources is threatened. This assignment will allow Newman to help strengthen the reputation of NRCS as the world leader in natural resources conservation and sustainable development by demonstrating technical competence, sensitivity to social and cultural issues, and dedication to public service.

UKRAINE, EUROPE – **Stefanie Aschmann**, Bioenergy Team Leader at the West National Technical Support Center, Portland, Oregon, is currently

providing support to the Ukrainian Land Resource Management Center (ULRMC) in their mission to use remote sensing, geographic information systems, and other information technologies to address problems in environmental management, hazardous situations, natural resources stewardship, and communication and management of environmental health risks. ULRMC hopes that there will be an increased interest by the donor community to fund future climate change-related projects.

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6 Wallace retires from agency after 13 years of service

Barbara Wallace



Barbara Wallace who served as editor of Technology News since its inception retired in September. As editor, she ensured Technology News provided timely, relevant and insightful information to a broad audience. Prior to her retirement, she worked on the Social Sciences Institute staff for nearly 9 years. Her responsibilities included providing communication and marketing assistance to institutes and centers in the National Science and Technology Consortium. She was instrumental in securing the agency's access to leadership development training broadcasts sponsored by the Chamber of Commerce. She developed the NRCS' The Leader in You program and managed the program for 8 years. We salute Barbara for a wonderful career with NRCS, which began as an RC&D coordinator in Connecticut, and wish her a happy retirement.

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NRCS TECHNOLOGY NEWS

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