National Soil Dynamics Laboratory

Highlights

Spring 2011

United States Department of Agriculture

Agricultural Research Service

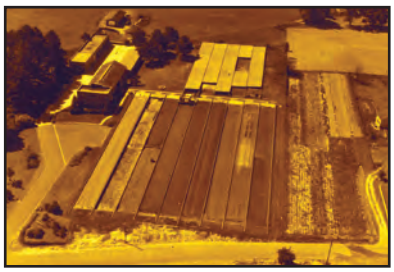
Contents

NSDL Celebrates 75 Years

The U. S. Department of Agriculture (USDA)'s National Soil Dynamics Laboratory (NSDL) marked its 75th anniversary on November 18, 2010 with a celebration of the unit's research accomplishments that have ranged from creation of a new soil science discipline to contributions to undersea cable communications technology. The laboratory has operated since 1953 by the Agricultural Research Service (ARS), USDA's chief intramural scientific research agency.

Originally known as the Farm Tillage Machinery Laboratory, the facility was built in 1935 on the campus of Auburn University. *It is renowned for its 13 historic soil bins, each about the length of a football field*, said H. Allen Torbert, NSDL research leader. The Laboratory was named an historic landmark in 1990 by the American Society of Mechanical Engineers and the American Society of Agricultural Engineers.

The bins, which resemble huge outdoor bowling lanes, are used for testing the impact of farm equipment on soil. The bins contain the major soil types found in the southeastern United States, varying from sand to clay.



The outdoor bins were needed to conduct research on the effects of full-scale machines, Torbert explained. *The NSDL was the world's first full-size outdoor laboratory for tillage tools and traction*

Continued on p. 2

Dynamically Speaking

H. Allen Torbert
Research Leader

The National Soils Dynamics Laboratory is proud of it's 75 year history and accomplishments, some of which are described in this document. We are looking forward to many more years of innovative research for American agriculture. *Highlights* will acquaint readers with our history, staff, and research efforts. The National Soil Dynamics Laboratory conducts research in three major areas: Conservation Systems Research, Global Change Research, and Waste Management Research. We are making significant progress in solving farmer problems associated with these areas, and it is our aim to provide future updates concerning the progress of these programs. Please visit our web site (*http://www.ars.usda.gov/msa/auburn/nsdl*) which provides more detailed information regarding these research programs. We plan to periodically send out a similar document highlighting our current efforts and providing useful information to readers regarding research progress. I hope you will enjoy reading the *National Soil Dynamics Laboratory Highlights*.

National Soil Dynamics Laboratory
http://www.ars.usda.gov/msa/auburn/nsdl
334-887-8596

Upcoming Events

Dates	Meeting	Location
Feb. 17-18	Tuskeegee Univ. Farmers Conf.	Tuskeegee, AL
Feb. 22	East-Central AL Crops Mtg.	Shorter, AL
Feb. 24	GA Conservation Tillage Alliance Mtg.	Ashburn, GA
Feb. 27–28	Joint ACIA/SSCA Ann. Mtg.	Panama City, FL
Mar. 11-12	Georgia Organics Ann. Mtg.	Savannah, GA
Jun. 8-10	SWCS-AL Ann. Mtg.	Mobile, AL

Recent Publications

Arriaga, F.J., T.S. Kornecki, K.S. Balkcom, and R.L. Raper. 2010. A method for automating data collection from a double-ring infiltrometer under falling head conditions. Soil Use Mgmt. 26:61-67.

Balkcom, K.S., F.J. Arriaga, K.B. Balkcom, and D.L. Boykin. 2010. Single-and twin-row peanut production within narrow and wide strip tillage systems. Agron. J. 102:507-512.

Balkcom, K.S., D.W. Reeves, J.M. Kemble, R.A. Dawkins, and R.L. Raper. 2010. Tillage requirements of sweet corn, field pea, and watermelon following stocker cattle grazing. J. Sustain. Agric. 34:169-182.

McCormack, M.L., S.G. Pritchard, S. Breland, M.A. Davis, S.A. Prior, G.B. Runion, R.J. Mitchell, and H.H. Rogers. 2010. Soil fungi respond more strongly than fine roots to elevated CO_2 in a model regenerating longleaf pine-wiregrass ecosystem. Ecosys 13:901-916.

Prior, S.A., G.B. Runion, H.H. Rogers, and F.J. Arriaga. 2010. Elevated atmospheric carbon dioxide effects on soybean and sorghum gas exchange in conventional and no-tillage systems. J. Environ. Qual. 39:596-608.

Runion, G.B., S.A. Prior, H.H. Rogers, and R.J. Mitchell. 2010. Effects of elevated atmospheric CO_2 on two southern forest diseases. New For. 39:275-285.

Sistani, K.R., C.H. Bolster, T.R. Way, H.A. Torbert, D.H. Pote, and D.B. Watts. 2010. Influence of poultry litter application methods on the longevity of nutrient and *E. coli* in runoff from tall fescue pasture. Water Air Soil Pollut. 206:3-12.

Watts, D.B., H.A. Torbert, and S.A. Prior. 2010. Soil property and landscape position effects on seasonal nitrogen mineralization of composted dairy manure. Soil Sci. 175:27-35.

Watts, D.B., H.A. Torbert, S.A. Prior, and G. Huluka. 2010. Long-term tillage and poultry litter impacts soil carbon and nitrogen mineralization and fertility. Soil Sci. Soc. Am. J. 74:1239-1247.

All of our publications are available on our web site:
http://www.ars.usda.gov/msa/auburn/nsdl

75 Years … continued from p. 1

equipment, and its research spawned the scientific discipline of soil dynamics and influenced the design of almost all modern agricultural equipment.

During World War II, the laboratory was shared with the U.S. Army, which conducted research on traction of military equipment.

During the 1960s, the laboratory helped design a *sea plow* used to bury trans-Atlantic communication cables. More recent research activities have included collaboration with the Army on ways to convert garbage into pulp that can be used to improve soils and help establish native grasses in heavily used areas such as training grounds.

Current studies include work on how different farm management practices, such as conservation tillage and crop rotations, affect farm productivity and impact the soil's ability to store carbon from the atmosphere, thereby limiting greenhouse gas production and reducing soil erosion and compaction.

In addition to Torbert, participants at the celebration included Edgar G. King, ARS Mid-South Area Director; and former NSDL directors Arthur W. Copper, who led the lab from 1953 to 1966, Robert L. Schafer and Charles Elkins, who together related the history of the laboratory. The program also included an overview of current and future research at the NSDL.

Research Projects in Three Major Areas

Conservation Systems Research (CSR)


Francisco J. Arriaga
Soil Scientist


Kip S. Balkcom
Agronomist


Leah M. Duzy
Agricultural Economist


Ted S. Kornecki
Agricultural Engineeer


Andrew J. Price
Weed Scientist

The *CSR* team is charged with developing integrated conservation agriculture systems for corn, cotton, peanut, potential energy crops, small grain, soybean, and vegetable growers that improve farm profitability, while enhancing air, soil, and water quality. Specific research objectives of the unit are (1) develop cover crop management technologies that enhance soil protection from rainfall events, increase soil organic matter accumulation, and suppress weeds; (2) develop and evaluate row crop production technologies that enhance sustainability, productivity, and environmental quality of degraded soils and increase plant available water; and (3) integrate new components and technologies into conservation management systems that reduce soil erosion, drought stress, and risk associated with production agriculture.

Global Change Research (GCR)


Stephen A. Prior
Plant Physiologist


Hugo H. Rogers
Plant Physiologist


G. Brett Runion
Plant Pathologist

The mission of the *GCR* team is to determine and interpret agroecosystem responses to atmospheric and soil processes induced by global change. The overall goals are to reduce uncertainty regarding the effects of rising atmospheric CO_2 concentration on crops, pastures, invasive weeds, and plant diseases and to determine the role of agronomic management practices in the production of CO_2 and other greenhouse gases, as well as the sequestration of atmospheric CO_2 as organic C in soils. This program addresses the carbon issue at several scales, from controlled laboratory environments to outdoor field exposures to elevated CO_2.

Waste Management Research (WMR)


H. Allen Torbert
Soil Scientist


Dexter B. Watts
Soil Scientist


Tom R. Way
Agricultural Engineer

The mission of the *WMR* team is to gain knowledge to improve soil/plant nutrient management with emphasis on soil carbon, nitrogen, and phosphorus, and to develop systems to optimally integrate animal manure into sustainable agricultural practices while safeguarding environmental integrity. The overall goals are to develop *Best Management Practices* for managing animal manures, develop new application technologies and determine the long-term impacts of animal manures and other organic waste on soil and the environment.

Support Staff of the NSDL

Jerry Carrington – Engineering Technician
Barry Dorman – Environmental Engineer
Tammy Dorman – Program Support Assistant
Andrew Eason – Biological Science Technician
Gary Foster – Biological Science Lab Technician
Kirk Iversen – Soil Scientist
Corey Kichler – Agricultural Engineer
Dexter LaGrand – Computer Specialist
Larraine Long – Office Automation Assistant
Karl Mannschreck – Agronomic Technician
Gary Martin – Agronomic Technician
Trent Morton – Agronomic Technician
Bill Quackenbush – Agronomic Technician
J. Ashley Robinson – Agronomic Technician
Juan Rodriguez – Soil Scientist
Marlin Siegford – Engineering Technician
John Walden – Machinist
Jeffrey Walker – Agronomic Technician
Bobby Washington – Agricultural Engineer
Morris Welch – Engineering Technician

National Soil Dynamics Laboratory

411 S. Donahue Drive

Auburn, AL 36832-5806

334-887-8596

http://www.ars.usda.gov/msa/auburn/nsdl

Happenings

Dr. Andrew Price presented *Sustainable Weed Management* at the *Alabama Food and Farm Forum* in Selma, AL.

Dr. Ted Kornecki presented *Equipment Technologies* at the *Randle Farms Organic Conservation Till Vegetable Production Field Day* in Auburn, AL.

Dr. Allen Torbert presented *Conservation tillage research studies to protect environmental quality and enhance producer profitability* at the *Southern States – Grow-Master Program - GA, FL, AL* in Perry, Georgia.

Dr. Andrew Price, spoke at producer workshops in Lauderdale, Lawrence, Limestone, and Madison Counties, AL. about glyphosate resistant Palmer amaranth biology and control in cotton, corn, and soybean conservation systems.

Dr. Stephen Prior attended the Gulf States Horticultural Expo in Mobile, AL and the Alabama Farmers Federations' Greenhouse, Nursery & Sod Conference in Birmingham, AL. He gave presentations discussing strategies for carbon sequestration and reducing greenhouse gas emissions from nursery production systems.

Dr. Francisco Arriaga and **Mr. William Quackenbush** visited the 2nd grade class of Ms. Amanda Ramey at Liberty Park Elementary School in Vestavia Hills, AL. The two, along with **Kirk Iversen** (Auburn University), spoke to the 2nd grade class about basic soil concepts as part of their science education curriculum. They incorporated demonstrations that showed soil particle size distribution, runoff production, water movement and soil biology.

Drs. Francisco Arriaga, **Kip Balkcom**, and **Andrew Price**, gave invited presentations at the 10th Annual Conservation Production Systems Conference held in Americus, GA. The three spoke about bioenergy and carbon sequestration, cover crop management, and herbicide resistance management, respectively. The Conference brought together some 100 attendees, mostly agronomic and vegetable producers.

Drs. Francisco Arriaga, **Kip Balkcom**, **Ted Kornecki**, **Andrew Price**, **Allen Torbert**, and **Dexter Watts** and **Ms. Leah Duzy** gave presentations at the 32nd Southern Conservation Agricultural Systems Conference in Jackson, TN.

Dr. Ted S. Kornecki displayed a prototype of improved roller/crimper for cover crop termination and management at the Alabama Chapter, Soil and Water Conservation Society Field Day at Belle Mina, AL. Dr. Kornecki presented research results regarding cotton population and yield affected by different rolling/crimping directions with respect to cotton planting direction.

Help us save paper!

If you received this by surface mail, help us save paper by sending us your e-mail address.

Send to: NSDL-Highlights@ars.usda.gov