Southern Cover Crop Conference

July 18-19, 2016

Mount Olive and Goldsboro, North Carolina

Southern Cover Crop Conference

July 18-19, 2016

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Conference Schedule

Sunday – Meet and Greet, 6-8 pm
Meet and greet social at the Magnolia Room and Pool Deck of the Best Western Plus (909 N. Spence Av., Goldsboro, NC). Complimentary food and beverages will be served.

Monday, July 18

University of Mount Olive, 634 Henderson St, Mount Olive, NC

7:30-8:30 am	Registration and light breakfast	Lobby, Raper Hall
8-8:20 am	Welcome and Opening Remarks	Auditorium, Raper Hall
8:30-9:45 am	Workshops A	Raper Hall and Communications Building
9:45-10 am	Break, visit exhibitors	Raper Hall
10-11:15 am	Workshops B	Raper Hall and Communications Building
11:30 am-1 pm	Lunch and Keynote	Arena
1-2:15 pm	Workshops C	Raper Hall and Communications Building
2:15-2:30 pm	Break, visit exhibitors	Raper Hall
2:30-3:45 pm	Workshops D	Raper Hall and Communications Building
3:45-4 pm	Break, visit exhibitors	Raper Hall
4-5 pm	Southern Farmer Panel on Cover Crop Use	Auditorium, Raper Hall
5-6 pm	Social	Raper Hall

Tuesday, July 19

Center for Environmental Farming Systems (CEFS)/Cherry Research Farm, 801 Stevens Mill Rd, Goldsboro, NC

7:30-8:30 am	Sign in	Registration Tent
8-8:30 am	Welcoming Remarks	Equipment Barn A
8:30-11 am	Poster Session	Equipment Barn B
8:30, 9:30, 10:30 am	Scheduled Presentations:	
	• Summer Cover Crop Mechanical Termination	Field Section 2
	• Cover Crops in High Tunnels	Field Section 6
	• Equipment Demonstration and Conservation Systems	Field Section 12
8:30-11 am	Concurrent Demonstrations:	Demonstration Field
	Summer Cover Crop Mulch with Peppers	Field Section 3
	Summer Cover Crops before Strawberries	Field Section 4
	Cover Crop Rooting/Multi-species	Field Section 5
	Grazing Summer Cover Crops	Field Section 7
	Grazing Winter Cover Crops and No-till Soybeans	Field Section 8
	Dawn Biologic Equipment Demo	Field Section 9
	Cover Crop N Availability Calculator	Field Section 10
	Reseeding Winter Cover Crops in Cotton	Field Section 11
11 am	Boxed lunch served	Equipment Barn A
11:20 am-1 pm	Tour of CEFS (optional)	Loading Area
1-3 pm	Southern Cover Council Meeting	Best Western Plus, 909 N. Spence Ave, Goldsboro, NC

Meals

Meals included in registration are Monday and Tuesday lunches.

Monday Lunch is provided by University of Mount Olive's Dining Services. Vegetarian option will be available.

Hor d'oeurves will be available during the Social Hour from 5 to 6 PM in Raper Hall.

Tuesday lunch is provided by Green Planet Catering. This will be a boxed lunch and can be taken to go on the road if needed, or eaten with leisure under the equipment barn. Vegetarian option is available. Boxed lunches cannot be taken on the CEFS tour trams. The boxed lunches will be available from 11 am to 1 pm.

Coffee, tea, water, and light snacks will be offered throughout the day on Monday and on Tuesday morning.

We have included a map on page XX of restaurants in Goldsboro for supper options.

Exhibitors

Please visit all of the excellent exhibitors at this conference! They are located in the lower hallway of Raper Hall on Monday, and inside Equipment Barn B on Tuesday. Note, Dawn Biologic will have equipment in the field (Field Section 9).

Internet

Wifi provided on Monday by the University of Mount Olive. Password: covercrop2016

Poster Session

An academic poster session will be displayed under Equipment Barn B at CEFS on Tuesday.

Continuing Education Credits

A number of workshops and the field demonstration have been approved for CCA CEUs and for NC pesticide credits. Please be sure to sign the appropriate sheets (and have appropriate numbers handy) at the classrooms where these credits are available. Contact Molly Hamilton (molly_hamilton@ncsu.edu or 828-273-1041) with any questions.

Transportation and Parking

Handicapped accessible parking is available at University of Mount Olive - please follow signs to handicapped parking. Please inform attendant if you need assistance at CEFS.

Parking at University of Mount Olive, 634 Henderson St, Mount Olive: Please follow signs to parking areas. They are noted on the campus map provided at the end of this booklet.

Parking at the Center for Environmental Farming Systems/Cherry Research Farm, 801 Stevens Mill Rd, Goldsboro: Please follow signs and attendants for parking.

School buses are provided to transport attendees from the hotels (Best Western Plus and Hampton Inn in Goldsboro) to University of Mount Olive (UMO) on Monday and to CEFS on Tuesday. The buses will only accommodate 100 of the 350 attendees (first come, first serve) and will leave the Best Western Plus front door promptly at 7:00 am on Monday, and at 7:15 am on Tuesday. They will leave UMO, returning to the hotels, on Monday evening at 6 pm, and will leave CEFS on Tuesday every 30 minutes from 11:30 am to 1:30 pm.

Monday Workshops

Workshop A 8:30 – 9:45 AM

Full workshop descriptions and speaker bios starting on page XX

Track	Title	Speaker	Location
Nutrient Management and Fertility	Cover Crop nitrogen accumulation and fixation: Conserving residual N with cover crops; N management with legume cover crops (Repeats at 10 AM)	Dr. Jack Meisinger, USDA-ARS and Dr. Dave Butler, UTK Moderator: Peyton Sapp, UGA Extension, Burke Co.	Room 117 Raper Hall
Soil Biology	Cover crops, soil biology and mineral availability: The dirt on mycorrhizas, cover crops and soil health and the farmer's perspective (Repeats at 1 PM)	Dr. Michelle Schroeder Moreno, NCSU and Alex Hitt, Peregrine Farms, NC Moderator: Dr. Forbes Walker, UTK	Room 111 Raper Hall
Economics	Economics of cover crops I: Profitability of cover crops in row crop production and federal cost share for cover crops (Repeats at 1 PM)	Dr. Leah Duzy, USDA-ARS, Auburn, AL, Amanda Smith, UGA, Don Barker, USDA-NRCS, NC, and Myron Johnson, Farmer, AL	Room 112 Raper Hall
Cover Crops for Weed Control	Cover crops and living mulches for integrated weed management in vegetable crops, orchard floors, and row crops (Repeats at 1 PM)	Dr. Carlene Chase, UFL and Dr. Gill Giese, Shelton Vineyards	Room 120 Raper Hall
Cover Crop Establishment, Termination, and Residue	Cover crop establishment, termination, and residue	Dr. Kip Balkcom, USDA-ARS, Auburn, Dr. Ted Kornecki,	VCR Room Communications

Management	management: Techniques and tools (Repeats at 10 AM, 1 PM, and 2:30 PM)	USDA-ARS, Auburn, and Ronnie Barentine, UGA Extension	Building
Beneficial Insects, Pollinators, and Pest Control	Choosing and managing cover crops to support beneficial insects for pest control and pollination (Repeats at 1 PM)	Dr. Nancy Lee Adamson, Xerces Society and USDA-NRCS, Dr. Mark Schonbeck, VA Asso. for Biological Farming Patryk Battle, Living Web Farm, NC	Room 130 Raper Hall
Cover Crop Varieties and Mixtures	Customizing cover crop species mixtures to meet farmer needs, and the behavior of cover crop mixtures (Repeats at 10 AM)	Dr. Denise Finney, Penn State University, Dr. Steve Mirsky, USDA-ARS	Auditorium Raper Hall
Soil Moisture Management	Managing soil moisture using cover crops: Challenges, opportunities and the role of peer learning networks (Repeats at 1 PM)	Dr. Wendy-Lin Bartels, UFL, Joel Love, UF Extension, Kirk Brock, Farmer, FL, and Dr. Danielle Treadwell, UFL	Room 239 Raper Hall
Grazing Cover Crops	Grazing cover crops in croplands (Repeats at 1 PM)	Dr. Jason Warren, OK State University and Dr. Jose Dubeux, UFL Moderator: Dr. Alan Franzluebbers, USDA-ARS, Raleigh NC	Room 238 Raper Hall

Workshop B 10 – 11:15 AM

Full workshop descriptions and speaker bios starting on page XX

Track	Title	Speaker	Location
Nutrient Management and Fertility	Cover Crop nitrogen accumulation and fixation: Conserving residual N with cover crops; N management with legume cover crops	Dr. Jack Meisinger, USDA-ARS and Dr. Dave Butler, UTK Moderator: Peyton Sapp, UGA Extension, Burke Co.	Room 117 Raper Hall
Soil Biology	Cover crops, soil biology, and disease suppression: What do we know? (Repeats at 2:30)	Dr. Mark Coyne, UK and Dr. Kathryne Everts, UMD Moderator: Dr. Frank Louws, NC State University	Room 111 Raper Hall
Economics	Economics of Cover Crops II: Economic tools to use for cover crop decisions and the economics of cover crops in vegetable production (Repeats at 2:30 PM)	Lauren Cartwright, USDA-NRCS, Columbia, MO and Arnold Caylor, Director, Auburn University North Alabama Horticulture Research Center	Room 112 Raper Hall
Cover Crops for Weed Control	Rolled rye for management of glyphosate-resistant Palmer amaranth; and Managing	Dr. Andrew Price, USDA-ARS and Rachel Atwell, NCSU	Room 120 Raper Hall

	weeds and reducing tillage with cover crops in organic grains (Repeats at 2:30 AM)		
Cover Crop Establishment, Termination, and Residue Management	Cover crop establishment, termination, and residue management: Techniques and tools (Repeats at 1 PM, and 2:30 PM)	Dr. Kip Balkcom, USDA-ARS, Auburn, Dr. Ted Kornecki, USDA-ARS, Auburn, Ronnie Barentine, UGA Extension, and Myron Johnson, farmer, AL	VCR Room Communications Building
Effective Extension Outreach on Cover Crops	Reaching the elusive non-operator landowner (and other key audiences)	Ron Nichols, USDA-NRCS	Room 130 Raper Hall
Cover Crop Varieties and Mixtures	Customizing cover crop species mixtures to meet farmer needs, and the behavior of cover crop mixtures	Dr. Denise Finney, Penn State University, Dr. Steve Mirsky, USDA-ARS	Auditorium Raper Hall
Grazing Cover Crops	Introducing annuals in grazed pastures (Repeats at 2:30 PM)	Mr. Johnny Rogers, NCSU, Dr. Bisoondat Macoon, MS State University, and J.B. Daniel, USDA-NRCS, Farmville VA Moderator: Dr. Alan Franzluebbers, USDA-ARS, NC	Room 238 Raper Hall
USDA Southeast Regional Climate Hub (SERCH)	Using cover crops to maintain crop yields under variable climate (repeats at 2:30 PM)	Steve McNulty, USDA SERCH John Lee, NRCS Arkansas & Liaison to the USDA SERCH	Room 239 Raper Hall

Workshop C 1 – 2:15 pm

Full workshop descriptions and speaker bios starting on page XX

Track	Title	Speaker	Location
Nutrient Management and Fertility	Nitrogen release from cover crops: Factors affecting N release from cover crops and predicting available N from cover crops in vegetables and row crops (Repeats at 2:30 PM)	Dr. Steven Mirsky, USDA-ARS, Julia Gaskin, UGA, and Russell Hedrick, JRH Grain Farms, NC Moderator: Dr. Tyson Raper, University of TN-Knoxville	Room 117 Raper Hall
Soil Biology	Cover crops, soil biology and mineral availability: The dirt on mycorrhizas, cover crops and soil health and the farmer's perspective	Dr. Michelle Schroeder Moreno, NCSU and Alex Hitt, Peregrine Farms, NC Moderator: Dr. Forbes Walker, UTK	Room 111 Raper Hall
Economics	Economics of cover crops I: Profitability of cover crops in row crop Production and federal cost share for cover crops	Dr. Leah Duzy, USDA-ARS, Auburn, AL, Amanda Smith, UGA, Don Barker, USDA-NRCS, NC, and Myron Johnson, Farmer, AL	Room 112 Raper Hall
Cover Crops for Weed Control	Cover crops and living	Dr. Carlene Chase, UFL and	Room 120

	mulches for integrated weed management in vegetable crops, orchard floors, and row crops	Dr. Gill Giese, Shelton Vineyards	Raper Hall
Cover Crop Establishment, Termination, and Residue Management	Cover crop establishment, termination, and residue management: Techniques and tools (Repeats at 2:30 PM)	Dr. Kip Balkcom, USDA-ARS, Auburn, Dr. Ted Kornecki, USDA-ARS, Auburn, and Ronnie Barentine, UGA Extension	VCR Room Communications Building
Beneficial Insects, Pollinators, and Pest Control	Choosing and managing cover crops to support beneficial insects for pest control and pollination	Dr. Nancy Lee Adamson, Xerces Society and USDA-NRCS, Dr. Mark Schonbeck, VA Asso. for Biological Farming Patryk Battle, Living Web Farm, NC	Room 130 Raper Hall
Cover Crop Varieties and Mixtures	Grass and legume cover crop varietal options (Repeats at 2:30 PM)	Dr. Twain Butler, The Noble Foundation and Dr. Edzard van Santen, Auburn University	Auditorium Raper Hall
Soil Moisture Management	Managing soil moisture using cover crops: Challenges, opportunities and the role of peer learning networks	Dr. Wendy-Lin Bartels, UFL, Joel Love, UF Extension, Kirk Brock, Farmer, FL, and Dr. Danielle Treadwell, UFL	Room 239 Raper Hall
Grazing Cover Crops	Grazing cover crops in croplands	Dr. Jason Warren, OK State University and Dr. Jose Dubeux, UFL Moderator: Dr. Alan Franzluebbers, USDA-ARS, Raleigh NC	Room 238 Raper Hall

Workshop D 2:30 – 3:45 PM

Full workshop descriptions and speaker bios starting on page XX

Track	Title	Speaker	Location
Nutrient Management and Fertility	Nitrogen release from cover crops: Factors affecting N release form cover crops and predicting available N from cover crops in vegetables and row crops	Dr. Steven Mirsky, USDA-ARS, Julia Gaskin, UGA, and Russell Hedrick, JRH Grain Farms, NC Moderator: Dr. Tyson Raper, University of TN-Knoxville	Room 117 Raper Hall
Soil Biology	Cover crops, soil biology, and disease suppression: What do we know?	Dr. Mark Coyne, UK and Dr. Kathryne Everts, UMD Moderator: Nathan Lowder	Room 111 Raper Hall
Economics	Economics of Cover Crops II: Economic tools to use for cover crop decisions and the economics of cover crops in vegetable production	Lauren Cartwright, USDA-NRCS, Columbia, MO and Arnold Caylor, Director, Auburn University North Alabama Horticulture	Room 112 Raper Hall

		Research Center	
Cover Crops for Weed Control	Rolled rye for management of glyphosate-resistant Palmer amaranth; and Managing weeds and reducing tillage with cover crops in organic grains	Dr. Andrew Price, USDA-ARS and Rachel Atwell, NCSU	Room 120 Raper Hall
Cover Crop Establishment, Termination, and Residue Management	Cover crop establishment, termination, and residue management: Techniques and tools	Dr. Kip Balkcom, USDA-ARS, Auburn, Dr. Ted Kornecki, USDA-ARS, Auburn, Ronnie Barentine, UGA Extension, and Myron Johnson, farmer, AL	VCR Room Communications Building
Effective Extension Outreach on Cover Crops	Lessons from three years of soil health experience in the coastal plain of South Carolina	Dr. Robin 'Buz' Kloot, USC and Carl Coleman, Farmer, SC	Room 130 Raper Hall
Cover Crop Varieties and Mixtures	Grass and legume cover crop varietal options	Dr. Twain Butler, The Noble Foundation and Dr. Edzard van Santen, Auburn University	Auditorium Raper Hall
Grazing Cover Crops	Introducing annuals in grazed pastures	Mr. Johnny Rogers, NCSU, Dr. Bisoondat Macoon, MS State University, and J.B. Daniel, USDA-NRCS, Farmville VA Moderator: Dr. Alan Franzluebbers, USDA-ARS, NC	Room 238 Raper Hall
USDA Southeast Regional Climate Hub (SERCH)	Using cover crops to maintain crop yields under variable climate	Steve McNulty, USDA SERCH John Lee, NRCS Arkansas & Liaison to the USDA SERCH	Room 239 Raper Hall

Farmer Cover Crop Panel 4-5 PM in AUDITORIUM

Farmer panel bios start on page xx

WORKSHOPS

Nutrient Management and Fertility

Cover crop nitrogen accumulation and fixation: Conserving residual N with cover crops and N management with legumes Room 117, Raper Hall at 8:30 AM and 10 AM

This session will begin with a focus on conserving residual N with grass and brassica cover crops. Grass or brassica cover crops can benefit soil-crop systems in several ways: by reducing nutrient leaching (especially reducing nitrate-N leaching), by providing additional carbon for improving soil health, and by adding surface residues that reduce erosion and surface runoff nutrient losses. Research results will be summarized and discussed that show grass or brassica

covers can reduce nitrate-N concentrations in the soil leachate by 20% to 80% compared to no cover. Management factors that improve N conservation include selection of a species with vigorous fall growth, early establishment, and seeding methods having good seed-soil contact. The second part of this session will focus on N management with legume cover crops, and biological N fixation provided by the symbiotic relationship between rhizobia bacteria and legume cover crops. Reported legume N accumulation and fixation rates and reported N fertilizer equivalency will be summarized, with a focus on cool- and warm-season annual legumes adapted to the southeastern US. Factors affecting N fixation, including species and cultivar selection, biomass accumulation, soil N pools, soil constraints, and growth in mixtures with non-legumes. The session will end with a facilitated discussion of opportunities and barriers for using grass, brassica and legume cover crops to manage N fertility for cash crops. This session qualifies for 1 hour CCA CEU (NM)

Dr. Jack Meisinger is a Soil Scientist with USDA-ARS in Beltsville, MD. His research focuses on N management in dairy and row crop farms. Email: John.Meisinger@ars.usda.gov

Dr. David Butler is an assistant professor in Organic, Sustainable, and Alternative Crop Production at the University of TN, Knoxville. Dr. Butler's research focuses primarily on soil-plant interactions within organic and other alternative cropping systems. Email: dbutler@utk.edu

Moderator: Peyton Sapp is the County Extension Coordinator in Burke County, Georgia. Email: psapp@uga.edu

Nitrogen release from cover crops: Factors affecting N release form cover crops and predicting available N from cover crops in vegetables and row crops Room 117, Raper Hall at 1 PM and 2:30 PM

Cover crops can greatly influence nitrogen management either through providing available nitrogen for cash crops or by immobilizing nitrogen and creating the need for greater nitrogen fertilizer for cash crops. The amount of nitrogen available from cover crops and the timing of its release is complex. Nitrogen availability from decomposing cover crops is affected by climate, management, plant quality, and species mixture composition. This session provides participants with a framework for how to understand these factors, their interactions, and subsequent influence on nitrogen availability. We will introduce a new calculator for farmers that can predict nitrogen release or immobilization from cover crops. The Cover Crop Nitrogen Availability Calculator uses cover crop biomass and quality along with soil temperature and moisture from nearby weather stations to available nitrogen and timing of release from cover crops. Finally, we will hear from a farmer who is using cover crop mixtures to enhance the soil biology on his farm and how this has affected his nitrogen fertilizer use. The session will end with a discussion of opportunities and barriers for using cover crops to provide a greater proportion of the nitrogen fertility needed for cash crops.

This session qualifies for 1 hour CCA CEU (NM)

Dr. Steven Mirsky is a Research Ecologist for the USDA-ARS in the Sustainable Agricultural Systems Laboratory, Beltsville, Maryland. He conducts research on the multi-functional role of cover crops in field crop production and how management influences their performance. steven.mirsky@ars.usda.gov

Julia Gaskin is an extension specialist coordinating sustainable agriculture programs at the University of Georgia. She is a soil scientist and has been working with cover crops to improve soil quality. Email: jgaskin@uga.edu

Russell Hedrick is the owner and operator of JRH Grain Farms in Hickory, NC. He has many years of experience with growing cover crops and cover crop mixes on his corn and soybean farm. Email: jrhgrainfarmsllc@gmail.com

Moderator: Dr. Tyson Raper is the Cotton and Small Grains Specialist for the University of Tennessee. His agronomic research and extension program is focused on increasing the efficiency, sustainability and productivity of cropping systems within the Southeast and Midsouth.

Soil Biology

Cover crops, soil biology and mineral availability: The dirt on mycorrhizas, cover crops and soil health and the farmer's perspective Room 111, Raper Hall at 8:30 AM and 1 PM

In addition to influencing subsequent crop yields, cover crops enhance above-ground biological diversity, below-ground diversity, and overall soil health. The session will begin with a focus on arbuscular mycorrhizal fungi (AMF) and how soil management practices such as cover crops can enhance their benefits to subsequent crops and soil health attributes. This discussion will include a summary of research results on the effects of summer cover crops, composts, AMF, and vermicompost in a strawberry production system. The second part of the session will feature Alex Hitt from Peregrine Farm in North Carolina. Mr. Hitt will share his practical experience gained from nearly 30 years of using diverse cover crops and long term rotations in vegetable production. The session will end with time for facilitated discussion and audience questions.

The session qualifies for 1 hour CCA CEU (NM)

Dr. Michelle Schroeder-Moreno is an Associate Professor in the Department of Crop Science at NC State University and serves as the Assistant Director of Education Programs at CEFS. She directs the Agroecology education programs at NCSU and develops research projects that focus on understanding the benefits of mycorrhizal fungi and associated sustainable management practices for a variety of production systems. Email: michelle_schroeder@ncsu.edu

Alex Hitt is the owner and operator of Peregrine Farm in Pittsboro, NC. He has a B.S. in Soil Science from Utah State University, and has been farming organically at Peregrine Farm for 36 years. Email: abhitt@bellsouth.net

Moderator: Forbes Walker is the Environmental Soils specialist for the University of Tennessee Extension. He is responsible for coordinating educational and research programs in Tennessee in the areas of the areas of nutrient and manure management, the appropriate use of alternative fertilizer materials, waste utilization, nutrient cycling and water quality. Email: frwalker@utk.edu

Cover crops, soil biology, and disease suppression: What do we know? Room 111, Raper Hall at 10 AM and 2:30 PM

The importance of soil biology is increasingly being recognized. Cover crop selection and use influences, and is influence by, that biology. This session will begin with an overview of soil biology. Studying soil biology is a wild zoological ride. We will briefly identify the major categories of soil organisms (viruses, bacteria, fungi, protozoa, nematodes, earthworms, microarthropods), how they are monitored, and how they relate to soil function and to each other. We will discuss the consequences of cover crop management and its effect on these organisms and their function, including population changes, activity, and the potential for management. Particular attention will be given to bacteria and fungi that form symbiotic associations with higher plants (rhizobia, mycorrhizae) and new approaches to using plant growth promoting rhizobacteria (PGPR). We will then look at some of the big unanswered questions in soil biology such as: what are the consequences of C:N manipulation in soil environments; can there be too much of a 'good' inoculum; and can rapid decomposition be a bad thing?

We will also explore how cover crops can affect plant disease through impacts on both beneficial microbes and soil-borne pathogens. Research has shown that several cover crops can suppress foliar and soil-borne disease in vegetable production. For example, a hairy vetch (*Vicia villosa*) plus rye (*Secale cereal*) combination cover crop that was killed and rolled no-till prior to planting pumpkins reduced anthracnose and white fleck (*Plectosporium tabacinum*). In another study, a sorghum sudangrass (*Sorghum bicolor* × *S. arundinaceum* var. *sudanense*) cover crop incorporated into soil as a green manure suppressed root knot nematode on the subsequent potato crop. Both hairy vetch and crimson clover (*Trifolium incarnatum*) green manures suppressed Fusarium wilt on watermelon. In concert with the suppression of Fusarium wilt, soil respiration increased, which is an indication of increased microbial activity. Other changes in beneficial microbial activity occurred, such as increased mycorrhizal colonization of watermelon roots.

The session will end with a discussion of the opportunities for and barriers to using cover crops to influence soil biology to achieve management goals.

The session qualifies for 1 hour CCA CEU (NM)

Dr. Mark Coyne is a Professor of Soil Microbiology at the University of Kentucky in the Department of Plant and Soil Sciences. Email: mark.coyne@uky.edu

Dr. Kathryne Everts is a Professor and University Extension Specialist at the University of Maryland's Lower Eastern Shore Research & Education Center. Her research program focuses on the management of vegetable diseases that are economically important in the mid-Atlantic region and supports her extension efforts. Email: keverts@umd.edu

Moderator (session B): Dr. Frank Louws is a professor of Plant Pathology and Director of the NSF-NC State University Center for Integrated Pest Management. He conducts research and extension in farming production systems to advance vegetable and strawberry production systems and suppress diseases. Email: frank_louws@ncsu.edu

Moderator (session D): Nathan Lowder works on the NRCS National Soil Health Division promoting soil health principles to producers so they may improve soil health on their operations. He also farms with his family while implementing the use of mixed species covers and no-till on cropland and pastureland. Email: Nathan.lowder@nc.usda.gov

Economics

Economics of cover crops I: Profitability of cover crops in row crop production and federal cost share for cover crops Room 112, Raper Hall at 8:30 AM and 1 PM

As agricultural producers consider adopting cover crops, many of their questions focus on economic issues, such as impact cash crop yield, costs associated with adopting cover crops, and overall economic benefits. In most cases, agronomic benefits of cover crops directly influence the economic feasibility of adopting cover crops. Economists from Alabama and Georgia will discuss current research being conducted on profitability of cover crops in row crop and vegetable production in the southern United States, including enterprise budgets for cover crop seed production. A representative from UDSA-NRCS in North Carolina will highlight Federal conservation programs that include cover crops. A 4th generation grower from Alabama will discuss how, regardless of cost, cover crops are a cheap way to improve moisture availability for dryland production. This grower will also discuss economic benefits of timely cover crop planting.

This session qualifies for 1 hour CCA CEU (CM)

Dr. Leah Duzy is an Agricultural Economist with USDA-ARS at the National Soil Dynamic Laboratory in Auburn, AL. Her research focuses on the economic impact of conservation technologies and strategies that reduce economic risks, increase farm profitability, and improve soil quality and productivity. Email: Leah.Duzy@ars.usda.gov

Amanda Smith is an Extension Educator and Instructor in the Agricultural and Applied Economics Department at the University of Georgia-Tifton. Her extension interests include production economics of conservation including tillage, precision agriculture, and irrigation systems, and risk management education. Email: aziehl@uga.edu

Don Barker is a NC NRCS District Conservationist in Goldsboro, NC. He provides technical assistance to farmers and landowners to implement natural resource conservation practices. Email: don.barker@nc.usda.gov

Myron Johnson is a 4th generation dryland crop farmer in Henry County, Alabama, relying heavily on cover crop use on his 2,000 acre small grain, cotton, and peanut farm. He also has cow/calf production, does custom grain and cotton harvesting, and is a U.S. patent holder for a cover crop roller licensed to Kelley Manufacturing Company of Tifton, Georgia. Phone: 334-550-8619

Economics of Cover Crops II: Economic tools to use for cover crop decisions and the economics of cover crops in vegetable production Room 112, Raper Hall at 10 AM and 2:30 PM

For conservation planners, it is sometimes difficult to clearly predict benefits and costs of cover crops for producers who are considering adopting the practice. For producers, it is difficult to understand how cover crops will work in their operations. This is especially true for producers raising multiple crops, vegetable crops, or livestock. Attendees will be introduced to *The Cover Crop Economic Decision Support Tool*, developed by USDA-NRCS economists, to address some of the economic and financial questions associated with cover crops. This tool is an Excel based, partial budgeting tool developed to assist landowners, producers, and planners make informed decisions regarding those questions. The tool highlights changes in operating costs and benefits over both the short-term and long-term, assessing both profitability and affordability of cover crops. This session will also feature the Director of the North Alabama Horticulture Research Center in Cullman, AL. He will discuss his experience with assisting vegetable producers in converting to cover crops from an economic perspective. This session qualifies for 1 hour CCA CEU (CM)

Lauren Cartwright is an Agricultural Economist with USDA-NRCS in Missouri and her work focuses on conservation economics and new technologies to improve soil health. She is one of the developers of the USDA-NRCS Cover Crop Economics Tool. Email: lauren.cartwright@mo.usda.gov

Arnold Caylor is the Director of Auburn University's North Alabama Horticulture Research Center (NAHRC). The NAHRC has research focusing on cover crops for vegetable cropping systems both in the summer and winter. Email: cayloaw@auburn.edu

<u>Cover Crops for Weed Management</u>

Cover crops and living mulches for integrated weed management in vegetable crops, orchard/vineyard floors, and row crops Room 120, Raper Hall at 8:30 AM and 1 PM

In annual cropping systems, cover crops can be used for off-season weed management, residues can be utilized as weed-suppressive mulches for cash crop production, and living mulches can be intercropped with cash crops to smother weeds. This workshop will explore benefits and limitations of using cover crops and living mulches for weed suppression in vegetable and strawberry cropping systems. This session will also address cover crops in vineyards.

In the eastern US, many wine regions experience relatively high seasonal rainfall/humidity, deep fertile soils, and long growing seasons that contribute to excessive vine vigor. Therefore, in addition to erosion mitigation, mulching, and other typical benefits, cover crops in the eastern US are used to regulate vine vigor and size in order to optimize grape and wine composition. Vine responses to cover crops (vine vegetative vigor and size, yield, root

distribution and density, and fruit and wine composition) will be discussed. The agronomic performance of various cover crops (biomass, stand density, weed biomass and nematode occurrence and frequency) will also be presented.

This session qualifies for 1 hour NC pesticide credits for N,O,D,X and 1 hour CCA CEU (CM)

Dr. Carlene Chase is an Associate Professor at the University of Florida. Her research is focused on reducing the environmental impact of weed management. Some of her current research interests are: cover crops and living mulches for weed suppression, allelopathy, and integrated weed management for organic and sustainable cropping systems. Email: cachase@ufl.edu

Dr. Gill Giese PhD, Virginia Tech 2014, is winemaker and viticulturist at Shelton Vineyards in Dobson, NC. His research interests include cover crop impact on vine vigor and root systems, grape and wine composition, fungicide efficacy, vine/cover crop water use, foliar nitrogen to optimize berry composition, and trellis/cultivar evaluation. Email: ggiese@sheltonvineyards.com

Rolled rye for management of glyphosate-resistant Palmer amaranth; and managing weeds and reducing tillage with cover crops in organic grains Room 120, Raper Hall at 10 AM and 2:30 PM

This presentation will cover development of integrated weed management systems that combine the beneficial effects of herbicides, conservation tillage, crop rotations, cover crops, and agronomic crop competitiveness. The role of cover crops in glyphosate-resistant Palmer amaranth control will also be discussed. The second half of this session will summarize a reduced tillage cover crop method of managing weeds in organic corn and soybean production. Cereal rye is used as a cover crop prior to organic soybean, and both monoculture legumes and cover crop mixtures are planted prior to organic corn. Fertility management in organic corn production when using cover crop mulches will be discussed. Information will be included on cover crop termination, planter design for planting into high biomass cover crop mulches, weed control, and N fertility management.

This session qualifies for 1 hour NC pesticide credits for N,O,D,X and 1 hour CCA CEU (CM)

Dr. Andrew Price is a Plant Physiologist at the National Soil Dynamics Laboratory in Auburn, AL. His research focuses on conservation tillage and management techniques for glyphosate-resistant Palmer amaranth. Email: andrew.price@ars.usda.gov

Rachel Atwell is a graduate student in the Crop Science Department at NC State University under the advisement of Chris Reberg-Horton, NCSU Organic Grain Cropping Specialist. Rachel has several graduate student research projects focused on cover crop use for weed suppression.

<u>Cover Crop Establishment, Termination, and Residue Management</u>

Cover crop establishment, termination, and residue management: Techniques and tools VCR Room, Communications Building at 8:30 AM, 10 AM, 1 PM and 2:30 PM

Many benefits associated with cover crops in the Southeast are related to cover crop biomass production. Therefore, decisions regarding cover crop management are extremely important because they directly influence cover crop residue production and subsequent cover crop benefits. These decisions must be evaluated each year on a site- and situation-specific basis to maximize agronomic and economic benefits, while minimizing risk across the farming operation. In this workshop, we will briefly highlight how cover crops affect cash crop growth parameters like soil temperature and moisture. We will also demonstrate how decisions regarding cover crop management, such as planting date and termination date affect relationships between biomass production, cash crop growth parameters, soil quality, and crop production benefits. In addition, we will highlight equipment and/or equipment modifications, including termination equipment that growers should consider to help them manage high-residue cover crops to facilitate successful row crop and vegetable crop establishment. Information presented will be based on research trials and practical experience by researchers and an extension specialist who specializes in managing cover crops. In addition, a farmer will share his experience in two of the workshop sessions.
This session qualifies for 1 hour CCA CEU (CM) and 1 hour NC pesticide credits for N,O,D,X

Dr. Kip Balkcom is a USDA-ARS Research Agronomist with the National Soil Dynamics Lab in Auburn, AL. His research includes conservation tillage and high-residue cover crops for various cropping systems in the Southeast designed to promote soil health and crop productivity. Email: kip.balkcom@ars.usda.gov
Dr. Ted Kornecki is a USDA-ARS Agricultural Engineer with the National Soil Dynamics Lab in Auburn, AL. He works with developing and modifying equipment to work in cover crops and high residue management. Email: ted.kornecki@ars.usda.gov
Ronnie Barentine is the County Extension Coordinator for Pulaski County, Georgia. He has served Georgia Agriculture Extension for 23 years, and has interest in conservation tillage and cover crop management for farm health and profitability. Email: barentin@uga.edu
Myron Johnson is a 4th generation dryland crop farmer in Henry County, Alabama, relying heavily on cover crop use on his 2,000 acre small grain, cotton, and peanut farm. He also has cow/calf production, does custom grain and cotton harvesting, and is a U.S. patent holder for a cover crop roller licensed to Kelley Manufacturing Company of Tifton, Georgia. (speaking at workshops B and D at 10 AM and 2:30 PM). Phone: 334-550-8619

<u>Beneficial Insects, Pollinators, and Pest Control</u>

Choosing and managing cover crops to support beneficial insects for pest control and pollination Room 130, Raper Hall at 8:30 AM and 1 PM

Cover crops support various insects beneficial for agriculture, in addition to improving soil, crop, and watershed health. Our most important crop pollinators are bees. Both native bees and the European honey bee benefit from diverse diets and need pollen and nectar resources when crops are not in flower. Natural enemies of crop pests are more numerous and diverse when production systems include cover crops which provide diverse habitats.

Conservation biological control maintains ecological relationships between predators and prey (pests) to keep prey populations below economic thresholds without eliminating prey. If pests are eliminated, predators die out or leave the field. When any disturbance knocks out both groups, predators take much longer to return than prey (pests). Cover crops, green fallow, residues, diverse perennial borders, and hedgerows all provide nectar and pollen, habitat, and refuge from disturbance when annual crops are harvested, allowing natural enemies to recolonize the next crop. Many crop pest predators and parasitoids depend on nectar and pollen at some stage of their life, while consuming insects at other stages.

Growing cover crops to full bloom before termination supports pollinators, predators, and parasitoids, can improve crop yield and quality, and reduces the need for pesticides. Covers with conspicuous flowers like buckwheat, crimson clover, vetch, and phacelia produce floral nectar and pollen. Cowpeas, sunflower, kenaf, and some other covers also attract and support beneficial insects with extrafloral nectaries. Flowering rye, oats, and other cereal grains provide pollen that sustains predators such as ladybugs, minute pirate bugs and soldier beetles. Although some grass and legume covers can harbor aphids and other pests that affect related crops, these can also become alternate prey for predators, which then stay in the field to protect the next production crop. In addition, many ground-dwelling predators (spiders, ground and rove beetles, big-eyed bugs, minute pirate bugs) require cover for habitat, which living, frost-killed, or roll-crimped cover crops can provide. See http://www.sare.org/Learning-Center/Bulletins/Cover-Cropping-for-Pollinators-and-Beneficial-Insects.

In this session, we will highlight the most common covers used in the southeast to support beneficial insects, introduce some less commonly used covers, discuss potential management trade-offs or co-management opportunities (flowering, seed drop, fertility, and alternate hosts, for example), and highlight specific management techniques to address regionally specific pest concerns such as stink bugs. During the session, we also want to learn from participants what has been working (or not working) on farms throughout the southeast. This session qualifies for 1 hour NC pesticide credits for N, O, D, and X and 1 hour CCA CEU for Integrated Pest Management

Dr. Nancy Lee Adamson is a Pollinator Conservation Specialist for the Xerces Society for Invertebrate Conservation and the NRCS East National Technology Support Center. She promotes pollinator and other beneficial insect conservation through habitat protection and restoration on farm lands. Contact: Nancy@xerces.org or 336-370-3443.

Dr. Mark Schonbeck has worked for 29 years as a researcher, consultant and educator in sustainable and organic agriculture. He has participated in on-farm research on mulching, cover crops, minimum tillage, and nutrient management for organic vegetables. Email: mark@abundantdawn.org

Patryk Battle Is the Director of Living Web Farms a network of research and educational farms. He has farmed organic vegetable acreage for over 25 years in Western NC, using extensive cover cropping systems in his

production management He was an early adopter of and innovator in the principles of Farmscaping and solves most pest issues with maximized plant diversity. Email: pat@livingwebfarms.com

Cover Crop Varieties and Mixtures

Customizing cover crop species mixtures to meet farmer needs, and the behavior of cover crop mixtures Auditorium, Raper Hall at 8:30 AM and 10 AM

Cover crops can provide a range of functions from reducing erosion and nutrient leaching to enhancing soil health over the long-term. Given that farmers often seek a variety of benefits from cover crops, multi-species mixtures are a strategy that can be used to promote multiple functions simultaneously. It is important to recognize, however, that cover crops are biological tools that respond to their environment; the extent to which a cover crop provides a specific function depends not only on the species selected, but also management and site conditions (management history, soils, and climate). Similarly, environment shapes how cover crops perform when grown in mixtures. In this workshop, we will review key aspects of managing cover crop mixtures such as selecting species to meet your specific goals, determining optimal seeding rates for the species in your mix, and establishing and terminating a mixture. We will also review how mixtures influence nutrients, weeds, water, greenhouse gases, and soil biology and discuss the challenges involved in managing mixtures for consistent results based on research and farmer experiences in the Mid-Atlantic US.

This session qualifies for 1 hour CCA CEU (CM)

Dr. Denise Finney is an Assistant Professor of Biology at Ursinus College in southeastern Pennsylvania. She has conducted research on nutrient and weed management with cover crops in a variety of production systems ranging from coffee in Central America to field crops in central Pennsylvania to vegetables in the southeastern US. Much of her most recent research and extension efforts have focused on the management of and benefits derived from diverse cover crop mixtures. Email: denisemfinney@gmail.com

Dr. Steven Mirsky is a Research Ecologist for the USDA-ARS in the Sustainable Agricultural Systems Laboratory, Beltsville, Maryland. He conducts research on the multi-functional role of cover crops in field crop production and how management influences their performance. steven.mirsky@ars.usda.gov

Grass and legume cover crop varietal options for the Southern United States Auditorium, Raper Hall at 1 PM and 2:30 PM

This session will explore both general principles and technical details to consider for cover crop selection. General concepts to be covered include the importance of considering the cover crop's intended purpose, specific location, and time of establishment, as well as ease of establishment and termination. The session will include examples of the tradeoffs that must be considered when selecting species and formulating mixes, such as the compromise between maximizing biomass with grasses and optimizing N fixation with legumes. Practical suggestions will be offered, such as the "one-quarter-to- one" rule of thumb (the seeding rate

for the small grain component of a mix is reduced to a quarter of the normal seeding rate while maintaining the full seeding rate for the legume component).
The session will include detailed discussion and comparison of the attributes of the most common cover crop choices for the South, including:

- rye (Secale cereale)
- oat (Avena sativa)
- wheat (Triticum aestivum)
- triticale (X Tritiosecale)
- annual ryegrass (Lolium multiflorum)
- crimson clover (Trifolium incarnatum)
- Austrian winter pea (Pisum sativum)
- hairy vetch (Vicia villosa)
- white lupin (Lupinus albus)
- canola/rapeseed (Brassica. napus)
- turnips (B. rapa)
- black mustard (B. nigra)
- white mustard (Sinapis alba)
- radish (Raphanus sativus)

This session qualifies for 1 hour CCA CEU (CM)

Dr. Twain Butler is a Professor and Forage Agronomist at the Noble Foundation. His research focus is on developing year-round grazing systems and also works with grass and legume cover crops in the South. Email: tjbutler@noble.org
Dr. Edzard van Santen was a faculty member in Agronomy and Soils at Auburn University (1988-2016). His research was focused on applied cultivar development and cover crop systems for the South. He is currently a Professor in Agronomy and Director of the IFAS Statistical Consulting Unit at the University of Florida. Email: evsanten@ufl.edu

Soil Moisture Management

Managing soil moisture using cover crops: Challenges, opportunities, and the role of peer learning networks Room 239, Raper Hall at 8:30 AM and 1 PM

The capacity for cover crops to reduce soil erosion and moisture loss has emerged as a promising adaptation strategy within the context of a variable and changing climate. Since 2010, a regional network of agricultural stakeholders has gathered biannually to explore options for managing climate risk in row crop production. Discussions among these producers, Extension professionals, and researchers from Florida, Georgia and Alabama have focused repeatedly on the potential for cover crops to mitigate extreme weather events, such as heavy rainfalls or dry spells. The climate learning network supports on-going, cross-state farm tours that document producer experiences of using seasonal climate forecasts (El Niño and La Niña)

to modify cover crop management. Furthermore, participants discuss long-term climate change, sharing self-collected weather data and examining different interpretations of extreme events. “When it rains it pours,” producers state in relation to rainfall frequency and intensity. “We expect a 4-inch rain. What we don’t expect is a 9.8 inch rain!” Despite receiving sufficient annual precipitation, producers have noticed that rain seems to fall in one or two intense events followed by longer dry spells. Subsequently, researchers altered the way they analyze historical climate data. In this panel, Wendy-Lin Bartels will describe how the tri-state climate learning network has provided a forum for peer-to-peer learning about options for climate risk management. Producer, Kirk Brock, and agricultural advisor, Joel Love, will share challenges and benefits associated with using cover crops to reduce soil moisture loss. Cover crop management demonstration site data from Danielle Treadwell will compliment these experiences. Our case study exemplifies how agricultural stakeholders have become active participants in the collaborative generation of scientific knowledge.

This session qualifies for 1 hour CCA CEU (Soil and Water Management)

Dr. Wendy Lin Bartels is a Research Assistant Scientist in the School of Forest Resources and Conservation at the University of Florida. Her research examines approaches to stakeholder engagement, science communication, and partnership development within the context of climate change, adaptation, and natural resource management. Email: wendylin@ufl.edu

Joel Love is a BMP Education/Outreach Coordinator with the University of Florida/IFAS in North Florida, and has worked with farmers who have implemented cover crop management for erosion control, water conservation, water quality protection and enhanced weed control. Email: jclove@ufl.edu

Kirk Brock farms 1,000 non irrigated acres in north Florida where he has implemented conservation tillage production of corn, cotton, peanuts, and soybeansnd small grains. He relies on cover crops to help with moisture management on his farm. Email: kirkbrock@centurylink.net

Dr. Danielle Treadwell is an Associate Professor in the Horticultural Science Department at the University of Florida. Her areas of research include organic farming systems, cover crop management, vegetable production, and conservation tillage. Email: ddtreadw@ufl.edu

Grazing Cover Crops

Grazing in cover crops in cropland Room 239, Raper Hall at 8:30 AM and 1 PM

Cover crops are an important component of conservation agricultural systems in the southeastern USA. For some producers with extensive experience using cover crops, grazing can be a ‘next step’ in obtaining additional economic value while achieving environmental stewardship. This workshop will cover the fundamentals of forage value of annual cover crops, timing of grazing, methods of grazing to obtain best utilization, balance between forage quantity and quality, impacts on soil, and whole-farm production. Balancing production and environmental quality is a topic to be explored throughout. Potential benefits of grazing cover crops will be described from immediate return from livestock gain, but also from productivity

of following crops. Nutrient cycling issues will be addressed in grazed and non-grazed systems. Utilization of small grains as a dual crop for forage and grain is a key system in the Southern Great Plains and this system will be explored in detail. Soil organic matter changes with repeated use of cover crops will be reported. Challenges for land managers to develop integrated crop-livestock systems will be explored. Specific examples will be shown from different areas of the southern region.

This session qualifies for 1 hour CCA CEU (CM)

Dr. Jason Warren currently serves on the faculty of Oklahoma State University as an assistant professor, and soil and water conservation/management extension specialist. Dr. Warren's research and extension efforts focus on management practices to reduce soil erosion and improve soil quality in both the agricultural and urban landscapes. Email: Jason.warren@okstate.edu

Dr. Jose Dubeux is an Assistant Professor at the North FL Research and Education Center of the University of Florida. Dr. Jose Dubeux has expertise in pasture/forage management, with focus in nutrient cycling in forage production systems. Email: dubeux@ufl.edu

Dr. Alan Franzluebbers is a USDA-ARS Professor in the Department of Soil Science at NCSU. His research program focuses on soil organic matter management for development of sustainable agricultural systems. Conservation agricultural systems, pasture management, integrated crop-livestock production, and agroforestry systems are management themes of current interest. Email: alan.franzluebbers@ars.usda.gov

Introducing annuals in grazed pastures Room 239, Raper Hall at 10 AM and 2:30 PM

Annual cover crops provide ecosystem benefits to perennial-based pasture systems by introducing quality forage at opportune times of the year, creating a more diverse farm habitat, and providing opportunities to renovate overused or underutilized areas of the farm. This workshop will cover opportunities to enhance forage availability with annuals, timing of grazing to gain value, choice of annuals in warm- and cool-season dominated pastures, opportunities to renovate perennial pastures, and impacts of annuals on whole-farm production. Characteristics of selected annual species will be explored, including from broad groups of grasses, legumes, and brassicas. Management considerations will be explored for monocultures, simple mixtures, and complex mixtures of annual cover crops. Grazing management strategies and their impact on forage utilization and nutrient distribution will be explored. Examples will be given of on-farm grazing demonstrations for introducing the concept of planting and grazing annuals to local livestock farmers. Yield, forage quality, and number of grazing days will be described. The importance of soil cover, plant diversity, and rooting habits will be identified for contributing to soil health. Balancing production and environmental quality will be explored in each presentation. Some suggestions will be offered of future research needed to develop better annual forage mixtures.

This session qualifies for 1 hour CCA CEU (CM)

Johnny Rogers is an Extension Associate at NC State University where he is the Amazing Grazing Program Coordinator. Email: jrroger3@ncsu.edu
Dr. Bisoondat Macoon is a research faculty at Mississippi State University working in grassland management and utilization. Email: bmacoon@ra.msstate.edu
JB Daniel is the Forage and Grasslands Agronomist at VA NRCS. Email: j.b.daniel@va.usda.gov
Moderator: Dr. Alan Franzluebbers, USDA-ARS Professor, NC State University

Effective Extension Outreach on Cover Crops

Reaching the elusive non-operator landowner (and other key audiences) Room 130 at 10 AM

The soil health/regenerative agriculture effort continues to gain attention and traction throughout the country and across the globe. But when looking at farming/ranching audience as a whole, how far along the innovation/adoption curve have we really come, and what marketing strategies are needed to turn the cover crop/soil health effort into a widespread movement? Whether the target audience is farmers, landowners, or colleagues, we will help you understand how to share information and educate others on soil health, cover crops, and their benefits. This session will focus on outreach and education techniques, methods, examples, and lessons learned. In addition, attendees will learn more about a growing list of organizations, journalists, and businesses advocating soil health management systems and influencing consumer spending and public policy.

Ron Nichols is a senior marketing communications practitioner with USDA's Natural Resources Conservation Service. He is the architect of NRCS's "Unlock the Secrets in the Soil" communications campaign and has received regional and national industry awards for campaign planning, writing and directing – including the 2014 PRSA Silver Anvil Award and the Lifetime Achievement Award from the Spokane Regional MarCom Association. Email: Ron.nichols@wdc.usda.gov

Lessons from three years of soil health experience in the coastal plain of South Carolina room 130 at 2:30 PM

As a researcher, farmer, extension agent, crop consultant, or conservation partner, ever wonder how to effectively share what you have learned about cover crops with others? This question and many others related to outreach will be answered during this workshop. Whether the target audience is farmers, landowners, or colleagues, we will help you understand how to share information and educate others on cover crops and their benefits. This session will focus on outreach and lessons learned by researcher, Buz Kloot and farmer, Carl Coleman, from three years of cover cropping and soil health experience in the Coastal Plain of South Carolina. As a farmer, Carl has incorporated cover crops into his farming system and seen their benefits first hand: improved soil structure, weed suppression, and providing nutrients to future crops. As a researcher, Buz has been able to observe the effects of the actions of Carl and a number of his neighbors who have also incorporated the soil health philosophy on their farm. Carl and Buz use a mix of personal contacts, joint field day

presentations, social media, and short movies to reach out to neighbors and the farming community in general. This unique collaboration of farmer and researcher singing from the same sheet of music (as it were) appears to be an effective way to communicate to farmers and indeed to some (but not all) professionals and academics in the world of agriculture.

Buz Koot is a research associate professor in the Environmental Health Sciences Department at USC's Arnold School of Public Health. He is passionate about working directly with farmers on soil health projects and research and how they can leverage the cover crop to improve crop performance both in terms of yield and savings in inputs. His documentary "Under Cover Farmers" and his recent series on the "Science of Soil Health" and "The International Year of Soils", available on-line, are examples of his work and passion. Email: kloot@mailbox.sc.edu

Carl Coleman, from Dillion, SC, has never wanted to be anything other than a farmer and while making a living was always the first priority for Carl, he also knew that he wanted to pass the land on to his son, Caleb, in better condition than he found it. The first huge step for Carl was to go no-till 20 years ago. Carl became active in the Dillon Soil and Water Conservation District over a decade ago and has been a Soil and Water Commissioner since 2006. In 2010, Carl planted his first 15 acres of cover crop. There have been many tactical ups and down since then as Carl has had to learn how to manage his land in a new way, but he considers moving to cover crops the most important strategic decision of his farming career since going no-till. Carl has partnered with Dr. Buz Kloot in a number of on-farm research projects including a CIG grant and a crowd-funded wheat fertility experiment and looks forward to pushing the envelope in soil health as he learns to farm with, rather than against natural systems. Email: scfarmer01@gmail.com

<u>USDA Southeast Regional Climate Hub</u>

Using cover crops to maintain crop yields under variable climate Room 239 at 10 AM and 2:30 PM

The Southeast Regional Climate Hub's (SERCH) purpose is to increase the resilience of working lands (agriculture, forest, and grazing lands) to climate change and variability through adaptive management. SERCH connects with Land Grant Universities, extension professionals, and other technical assistance providers to assess their needs; develop new tools or amend existing tools to address and support emerging climate needs; and deliver climate-smart information through established networks.

During this session, Steve McNulty will introduce attendees to SERCH, and will summarize single event, seasonal, and annual trends in climate variability and change specific to the southeastern region. The speaker will highlight changes in growing season temperature, length, inter-annual precipitation, drought frequency and severity, extreme hot days, freeze-free season, and extreme weather events.

Additionally, John Lee will describe the adaptive benefits that cover crops provide in the face of variable and changing climate. His presentation will include an overview of cropping system sensitivities and vulnerabilities to climate variability and change; the role of cover crops in conservation systems; maximizing yield and benefits through sustainable conservation

systems; and cover crop benefits for water and nutrient cycling, soil organic matter, habitat, and biodiversity. John will also introduce a new southeastern workbook that guides agricultural producers and extension professionals through a menu of adaptive management strategies and approaches, such as managing crops to cope with drier conditions and reducing the risk and log-term impacts of extreme weather.

Steve McNulty is Director of the USDA Southeast Regional Climate Hub and a senior Landscape Ecologist with the USDA Forest Service. Steve's research has focused on landscape scale monitoring, forest hydrology, nutrient cycling, adaptive natural resource management, and technology transfer applications. Email: smcnulty@fs.fed.us

John Lee is the NRCS State Agronomist for Arkansas and Liaison to the USDA Southeast Regional Climate Hub. In his role as NRCS Liaison, John is developing a workbook approach addressing climate change through agricultural strategies and practices, as well as delivering adaptive management training materials throughout his year-long Liaison tenure. Email: john.lee@ar.usda.gov

Farmer Panel, Auditorium, 4-5 PM

Farmers from across the Southern region of the U.S. and from diverse areas of production (from cattle to produce and from large to small farms) will discuss their cover crop regimes, challenges, benefits, and top tips.

Bob Waring, Virginia – Bob Waring presently works for the Virginia Department of Conservation and Recreation in the area of precision nutrient management and cover crops. In addition to working for DCR, Bob works on his 4th generation family farm where he integrates multi-species cover crops and variable rate technology into a corn and soybean operation. The farm is approximately 400 acres and is located in Dunnsville VA. Contact: (804) 443 7347 brandonfarms3012@gmail.com

Mitch Lazenby, Alabama – Mitch farms 1,200 acres of peanut, cotton, corn, and soybeans including an additional 800 acres of pasture, hayland, and woodland in the Coastal Plain of east central Alabama utilizing various cover crops and conservation tillage. Contact: (334) 703 2126 or mitch@lazenbyfarms.com

Daniel Parson, Georgia – Daniel Parson is the farmer/educator at the Oxford College Organic farm, a campus farm that grows a variety of vegetables for sale to campus dining, CSA, and local markets. The farm was established in 2014 and uses intensive crop rotations, including cover crops, on less than 3 acres of production. Contact: daniel.parson@emory.edu

Larry Cochran, Oklahoma - Larry, a full time farmer rancher from northwest Oklahoma, has a 100% no-till operation. Larry raises wheat, beans, milo, cow peas, and cover crops on 2000 acres, and has a 250 cow calf and stocker cattle operation. Contact: cochranlc@yahoo.com

Steve Marten, Texas – Marten Farms is located in north Texas and where they no till 4,500 acres of crop land, and run a cow-calf operation on an additional 1,800 acres of rangeland. They grow wheat, canola, grain sorghum, sesame, and cover crops. Contact: techex76@sw.rr.com

Ronnie or Tony Matthis, North Carolina – Ronnie and Tony run their Clinton NC farm, Triple M, Inc., with their father. They raise corn, soybeans, cattle, and hogs, and raise 700 to 800 acres of cover crops which they use to graze cattle. Contact: beefman@centurylink.net

Moderator: Mark Reiter, Soil and Nutrient Management Specialist, VA Tech

Field Demonstrations July 19, 2016 (Tuesday)

Attendance at this field demonstration day qualifies for 2.5 hours CCA CEU (CM). Sign in sheets are at the registration/information area.

Evaluating Nutrient, Soil Health and Economic Benefits of Compost Additions to Summer Cover Crops before Strawberries in North Carolina Field section 1

Conventional strawberry growers in the Southeastern United States (SE) typically utilize soil fumigation as the main method to eliminate soil organisms that inhibit strawberry growth and yields in annual production cycle. While fumigation reduces pathogen populations, it also can considerably diminish beneficial soil organisms causing limits to soil health as well as growing environmental concerns. Soil health challenges can be intensified in the Southeast where warm temperatures and poor soils lead to greater pest pressures and more rapid declines of soil organic matter. Field based strawberry production systems often lack any crop rotation practices and fields sit fallow during the summer months between strawberry seasons.

Production practices, such as cover crops and application of compost have been shown to enhance soil health and yields with various crops; however, there is a lack of understanding of how these practices might be used individually or in combination to promote soil health, yields and nutrient availability for both conventional and organic strawberry producers in the SE. Over the past 8 years, a team of multidisciplinary faculty and students at NC State University have conducted various field based research at the at the Center for Environmental Farming Systems (CEFS)and on-farm research investigating various sustainable soil and pest management practices including summer cover crops, compost additions and applications of beneficial soil microbial inoculants with arbuscular mycorrhizal fungi and vermicompost within conventional and organic strawberry production systems.

For this field demonstration, we will display the summer cover crop mix of pearl millet (*Pennisetum glaucumgenus* L. var. SS635) planted at the rate of 10 lb/acre and cowpea (*Vigna unguiculata* L., var. 'Iron and Clay') planted at the rate of 100 lb/acre with and without compost application applied at the rate of approximately at 3.5 tons/acre. Compost was applied and cover crop planted on June 1 to fit into a field based strawberry system for the SE. In addition to visually contrasting summer cover crop production with and without compost additions in this field demo, participants will be provided with the NC Extension publication, *Sustainable Practices for Plasticulture Strawberry Production in the Southeast* and a HortTech publication, *Economic Viability and Environmental Impact Assessment of Three Different Strawberry Production Systems in the Southeastern United States* that resulted from this research.

Dr. Michelle Schroder-Moreno is an Associate Professor at NC State University. She directs the Agroecology Minor program at NCSU, and develops research projects that focus on understanding the benefits of mycorrhizal fungi and associated sustainable management practices for a variety of production systems. Email: michelle_schroeder@ncsu.edu

Amanda McWhirt is an Assistant Professor at the University of Arkansas where she serves as the Fruit and Vegetable Production Extension Specialist. She completed her PhD work on soil management practices for strawberry production systems at North Carolina State University. She can be contacted at amcwhirt@uaex.edu.

Gina Fernandez, NC State University, Horticulture Department

Mechanical Termination of three physiologically distinct cover crop species Field section 2

Demonstrations scheduled at 8:30, 9:30, and 10:30

The purpose of this demonstration is to explore specific physical plant characteristics that influence and affect cover crop selection and management in vegetable production systems. This demonstration will illustrate two different cover crop termination methods (without herbicide) on three distinctly different plant morphological types. The summer cover crops, sunn hemp (*Crotalaria juncea*), sorghum sudangrass (*Sorghum bicolor*), and lab lab (*Lablab purpureus*), will be terminated either by mowing or with a roller-crimper. Cover crop structure and lignocellulolytic content of the cover crops will be observed and characterized. Other areas of cover crop management that will be identified and discussed include:

- Adaptation
- Cover crop termination date
- Cover crop termination method
- Photoperiod sensitivity of cover crop species
- Frequency and extent of tillage on soil characteristics
- Consequences of unsuccessful termination
- Vegetable crop planting strategies into surface residue
- Additional ecosystem services provided by cover crops.

Dr. Danielle Treadwell is an Associate Professor in the Horticultural Science Department at the University of Florida. Her areas of research include organic farming systems, cover crop management, vegetable production, and conservation tillage. Email: ddtreadw@ufl.edu

Dr. Stuart A. Weiss is the Assistant Research Professor of Agronomy and Agroecologist at the University of the Virgin Islands, Agricultural Experiment Station. His areas of research include cover crop management, conservation agriculture, organic crop & livestock production, soil & water conservation, tropical agricultural cropping systems, sloped agricultural land technologies, small ruminant production, pasture-based livestock finishing systems, forage ecology, biofuel feedstock production, soil health, weed science, entomology, and other related agroecology disciplines. Email: sweiss@uvi.edu or stuweiss@yahoo.com

Ray Archuleta, USDA-NRCS

Cover crop surface mulch for conservation till vegetable cropping systems Field section 3

Water quantity and quality, soil health, and weed management are complex issues on the forefront of our producers' concerns. This team's long-term goal is to increase the adoption of water conservation practices, reduce cultural practices that degrade soil structure and interfere with nutrient cycling, and minimize weed management costs among organic and limited-resource specialty crop producers. Our recent SARE-funded project in Florida and St. Croix, USVI evaluated outcomes of cover crop residue management on vegetable yield, weed suppression, and soil moisture content. The team utilized sunn hemp (*Crotalaria juncea* L.), a tropical legume often used as a summer cover crop in rotation with spring and fall vegetables in the southeastern US, as our primary cover crop species. The objective of this demonstration is to represent our SARE-funded Research and Education project results of experiments in Florida and St. Croix, US Virgin Islands.

Following a late spring frost, sunn hemp was planted on April 18, 2016 and was terminated around the last week of June 2016. Demonstration treatments include: 1) sunn hemp mulch, 2) sunn hemp mulch plus hay, 3) sunn hemp mulch plus black landscape fabric, and 4) sunn hemp mowed and incorporated that served as a check plot. Sunn hemp mulch in treatments 1, 2, and 3 was generated using a no-till roller-crimper and represent conservation vegetable cropping systems. Jalapeño peppers were transplanted following cover crop termination in each of these demonstrations. Participants will be able to observe and measure differences in weed prevalence, soil temperature, and soil volumetric water content. Side-by-side cropping system comparisons will be made to highlight several important ecosystem services (weed suppression, decreased soil temperatures, and increased soil moisture content) that cover crops have the potential to provide to integrated vegetable cropping systems.

Dr. Danielle Treadwell is an Associate Professor in the Horticultural Science Department at the University of Florida. Her areas of research include organic farming systems, cover crop management, vegetable production, and conservation tillage. Email: ddtreadw@ufl.edu

Dr. Stuart A. Weiss is the Assistant Research Professor of Agronomy and Agroecologist at the University of the Virgin Islands, Agricultural Experiment Station. His areas of research include cover crop management, conservation agriculture, organic crop & livestock production, soil & water conservation, tropical agricultural cropping systems, sloped agricultural land technologies, small ruminant production, pasture-based livestock finishing systems, forage ecology, biofuel feedstock production, soil health, weed science, entomology, and other related agroecology disciplines. Email: sweiss@uvi.edu or stuweiss@yahoo.com

Ray Archuleta, USDA-NRCS

Summer Cover Crops for Sustainable Strawberry Production Field section 4

In Florida, winter strawberries are grown on sandy soils that are capable of supporting the sting nematode (*Belonolaimus longicaudatus*) infestations. Since strawberry plants are very

susceptible, when considering cover crop options for off-season management of weeds, it is prudent to select species that are poor hosts or nonhosts of the sting nematode. This is particularly important for organic strawberry production and in buffer zones of conventional strawberry crops where soil fumigants cannot be used. Sunn hemp 'Tropic Sun' (*Crotalaria juncea*) and hairy indigo (*Indigofera hirsuta*) are excellent options for suppressing weeds and sting nematodes while also contributing nitrogen and organic matter. Hairy indigo is preferred in situations where less biomass is desired, but requires sulfuric acid scarification to remove physical dormancy due to hardseededness in a high percentage of the seed. Slenderleaf rattlebox (*Crotalaria ochroleuca*) and American jointvetch (*Aeshynomene americana*) are also poor hosts of the sting nematode; however, they result in less rapid and less effective canopy closure, respectively. They are being considered as components for mixes to enhance cropping system diversity. Seed proportions in mixtures that include 'Tropic Sun' need to be adjusted to avoid dominance of the mixture by sunn hemp. Growers have also expressed interest in a cover crop that could also provide a marketable product. A commercial, shatter-resistant sesame (*Sesamum indicum*) cultivar provides a weed-suppressive canopy. However, its susceptibility to the sting nematode is unknown and the 110 days from planting to harvest may limit its adoption.

The objective of this demonstration is to introduce producers to different cover crops and a mixture that are poor hosts or nonhosts for sting nematode. The eight-week-old, warm-season cover crops in this demonstration include: sunn hemp 'Tropic Sun', hairy indigo, slenderleaf rattlebox, American jointvetch, sesame, and shortflower rattlebox in monocultures at 40, 20, 30, 20, 7, and 40 lb/acre, respectively. These are compared with a 4-way mixture of sunn hemp 'Tropic Sun', hairy indigo, American jointvetch, and shortflower rattlebox at 8, 8, 8, and 12 lb/acre. All cover crops except for sesame (the seed crop) are normally terminated at 50% flowering using a flail mower followed by incorporation, and in Florida, raised beds are formed at 2-4 weeks after termination for winter strawberry production.

Dr. Carlene Chase is an Associate Professor at the University of Florida. Her research is focused on reducing the environmental impact of weed management. Some of her current research interests are: cover crops and living mulches for weed suppression, allelopathy, and integrated weed management for organic and sustainable cropping systems. Email: cachase@ufl.edu

Cover Crop Deep Rooting Demonstrations & 13 Species Above-ground ID Field section 5

Dramatic demonstrations of cover crop rooting depth can be very effective tools for (a) promoting cover crop adoption and (b) helping farmers fully understand the potential for cover crops to increase soil porosity far below tillage depth. This demonstration, which will include a root-viewing pit, will compare the rooting depth of various cover crops (alfalfa, rapeseed, forage radish, cowpea, sorghum-sudangrass) in the field. Also on display will be

living and preserved samples of deep-rooted cover crops grown in root-viewing boxes and 10-foot deep pots. Presenters will emphasize principles and practical tips for growing and showing deep roots. For the above-ground portion of this demonstration, participants will have the opportunity to observe and identify 13 cover crop species growing in the field.

Chris Lawrence has served as State Agronomist covering cropland issues for NRCS in Virginia since 2004. One of Chris' specialties is using hands-on demonstrations to illustrate soil health and management principles. His diverse background includes an M.S. degree in Crop and Soil Environmental Sciences from Virginia Tech and working for five years as an Extension Agent in multiple regions of Virginia. Contact: 804/287-1680 or chris.lawrence@va.usda.gov

Management of soil-borne diseases and salinity with various cover crops in high tunnel under organic production Field section 6

Two of the main challenges to growing produce in high tunnels are managing soil-borne pests and salinity over time. Pathogens and salinity issues can develop quickly due to the semi-closed environment and difficulty in rotating crops within limited space in a high tunnel. Once soil-borne pathogens are established, it is difficult to manage them organically and serious infestations have the potential to make a high tunnel unusable. As fertilizers, such as fish emulsion, manure and animal waste based compost are added, any mineral nutrients that are not removed from the soil by cash crops will remain in the soil because they cannot be leached out of the system by rainfall. This can lead to increased soil salt levels and pH, thus reducing crop productivity. Cover crops can be an excellent management tool for addressing these issues. Brassica cover crops are of interest to organic growers for their biofumigant action in soil to help manage soil-borne pathogens. Sunflowers may also useful to reduce levels of salts in the soil due to the plant's ability of accumulating high level of salts. Cover crops also benefit a high tunnel system by increasing fertility, building up soil organic matter, improving soil physical properties, suppressing weeds and attracting beneficial insects.

Three summer cover crop treatments; a 1) cowpea 'Iron and Clay'(*Vigna unguiculata*) and pearl millet 'Leafy 22' (*Pennisetum glaucum*) combination, a 2) mustard 'Mighty Mustard® Pacific Gold' (*Brassica juncea*), and a 3) sunflower 'Peredovic' (*Helianthus annuus*) were planted in one 26' x 100' Haygrove high tunnel at the demonstration site and in three 30' x96' high tunnels at the Small Farm Unit of the Center for Environmental Farming Systems. Visitors will be able to observe summer cover crops used for multiple purposes in high tunnel production. The brassica was thought to help manage soil-borne diseases, including Southern blight (*Sclerotium rolfsii*) and the sunflower over crop was thought to remove excess minerals. Discussion will focus on choosing cover crop species and cultivars, planting, seeding rates, irrigation techniques, and crop termination in high tunnels. Visitors will also see a low cost

overhead sprinkler system and walk behind tractor with a flail mower attachment used to terminate cover crops to fine mulch.

John Beck is an extension horticulture associate with NC A&T Cooperative Extension. He serves as the horticulture unit coordinator for the NC A&T University Farm, focusing on season extension for small fruit and vegetables. Email: jebeck@ncat.edu

Dr. Sanjun Gu is a Horticulture Extension Specialist at NC A&T. His areas of expertise and interest include general horticulture, organic and conventional vegetable production, vegetable grafting, small fruit production, season extension with high tunnels, plant tissue culture and plant breeding. Email: sgu@ncat.edu

Melissa Bell is research associate with CEFS at NC State University's Horticulture Department. Her focus is on organic vegetable production and education at the CEFS Small Farm Unit.

Summer cover crop grazing and its impacts on regrowth and ground cover Field section 7

Both simple and diverse cover crop seed mixtures can meet summer grazing needs of cattle/ruminants while also improving soil and providing ground cover. This demonstration shows the effects of rotational grazing on summer cover crop regrowth and botanical diversity. This demonstration features the following two cover crop mixtures:

(a) Simple mix – pearl millet + cowpea

(b) Multi-species mix – Ray's Summer Crazy Mix (corn, cowpea, soybean, sorghum-sudangrass, pearl millet, daikon radish, brassica, sunflower)

This demonstration also compares each cover crop mix fertilized with inorganic fertilizer vs. poultry litter. Target planting date for the cover crops is early June, with the objective to commence grazing of small strips in early July. Livestock will be moved to a new strip of forage twice weekly. This will provide a demonstration of recovery time (since grazing removal) on forage regrowth and botanical diversity.

Johnny Rogers is an Extension Associate at NC State University where he is the Amazing Grazing Program Coordinator. Email: jrroger3@ncsu.edu

Dr. Alan Franzluebbers is a USDA-ARS Professor in the Department of Soil Science at NCSU. His research program focuses on soil organic matter management for development of sustainable agricultural systems. Conservation agricultural systems, pasture management, integrated crop-livestock production, and agroforestry systems are management themes of current interest. Email: alan.franzluebbers@ars.usda.gov

Grazing Cereal Rye Cover Crop before No-till Planting Soybeans Field section 8

A potentially useful practice on many farms is to graze winter annual cereal crops grown either as a cover crop or for grain as is common with winter wheat in wheat production areas of the US. Such grazing provides animals with very high quality forage at a time when forage on permanent pastures would be limited in quantity and quality. In grazing systems, growing animals typically recycle about 80 to 90% of ingested nutrients back to the field though deposition of feces and urine. Therefore the nutrient status of the field is minimally compromised by grazing once or more times during winter or early spring. Reports from a

number of studies have documented that cattle gains vary from about 1 lb/head/day to approximately 2.5 lbs/head/day (0.45 to 1.14 kg/d) depending upon the stocking rate and availability of forage when grazing begins.

Removal of the animals for a grain crop needs to be before the plants develop their first hollow stems. Typically, wheat yields are expected to range from 7 to 12% lower after grazing or a loss of yield in the range of 3 to 8 bushels per acre but that loss is usually more than offset by the value of the animal gains from grazing. Similarly, use of rye for a weed suppressing cover crop means that grazing animals need to be removed in time to allow sufficient biomass to help suppress weeds in the subsequent crop.

In this demonstration, the rye cover crop was only grazed once on March 10 and 11, 2016 whereas in hindsight, multiple grazing periods might have been feasible. We did not measure biomass before grazing but 30 dairy steers (total live weight = 8,250 pounds or 3,750 kg) grazed for 10.5 hours total over two consecutive days on a plot of 0.275 acres or 0.11 ha. Expected intake of dry matter (DM) from grazing would be about 75 kg total (2% of body weight) for an estimated one-time grazing yield of 675 kg/DM/ha. Visual appraisal of the standing rye on April 29 revealed little difference in the biomass available for weed suppression in grazed vs. ungrazed plots. However, with multiple grazings it is likely that cover crop biomass might be reduced by about 10%. It is expected that the soybean yield will not be affected by having grazed the rye cover crop only one time. However, it is not certain what the optimal grazing strategy would be to maximize the combined economic return from grazing plus the subsequent soybean crop.

No-till organic soybeans planted into roll-killed cover crop

Current weed management practices in organic soybeans rely heavily on cultivation. Repeated cultivation is expensive and has negative consequences on soil health. Rye cover crop mulches have been evaluated for 7 years in NC for weed suppression abilities and effects on soybean yield. Rye is planted in the fall, and killed at soybean planting time with a roller-crimper or flail mower, creating a thick weed suppressing mulch. Soybeans are planted into this mulch with a modified planter. When rye biomass is above 8,000 lb/acre (or 9,000 kg/ha) of drymatter, there is sufficient weed control that precludes soybean yield loss from weed competition. High rye biomass levels are critical to the success of this production system. However, there is potential for the rye cover crop to be grazed over the winter and still produce enough biomass to suppress weeds in the subsequently planted soybeans.

In this demonstration, ‘Abruzzi’ rye was planted at 120 lb/acre on October 14, 2015. The rye cover crop was fertilized with 60 lb of N in early spring. Soybeans were planted into the rolled rye near June 1, 2016.

Dr. Chris Reberg-Horton is an Assistant Professor at NC State University, where he also manages research studies in organic grain production. Email: chris_reberg-horton@ncsu.edu

Dr. Steve Washburn is a Professor at NC State University with interest and research in dairy management and dairy production systems. Email: steve_washburn@ncsu.edu

Dawn Biologic Equipment Demonstration Field section 9

DuoSeeder II

ZRX (Zone Roller) planter attachment

Travis Martin, Dawn Biologic Regional Representative; tmartin@dawnbiologic.com or 717-723-1232

Using the Cover Crop Nitrogen Availability Calculator Field section 10

Many farmers use legume cover crops or cover crop mixtures to supply nitrogen for their cash crops; however, they often do not know how much nitrogen (N) might be released or immobilized by these cover crops. Better tools to predict the amount of N released by cover crops will aid organic as well as conventional farmers and should encourage the use of cover crops to preserve and increase soil quality. Scientists at UGA College of Agricultural and Environmental Sciences have developed the *Cover Crop Nitrogen Availability Calculator* to predict the amount of available N that could be expected from a cover crop. The tool is based on the N subroutine of the Crop Environment Resource Synthesis (CERES-N) model, which is a well-known crop model that simulates crop growth, soil, water and temperature, as well as soil N dynamics at the field scale over a growing season. The CERES-N model can successfully predict N mineralized from cover crop residues that are incorporated and those left on the soil surface. The Calculator uses analysis of cover crop quality with cover crop biomass measurements and nearby weather station data on soil temperature and soil moisture to predict the timing and amount of N mineralized. Cover crop quality (total N, carbohydrates, cellulose and lignin) is estimated by Near Infrared Spectroscopy (NIRS), which allows quick and relatively low-cost data to be obtained.

The Calculator predicts a cumulative amount of available N during the growing season from the preceding cover crop. This can be positive (N credit) or negative (N debit). Field testing of the Calculator has been performed with summer cover crops (cowpeas and sunnhemp) followed by fall broccoli, heavy rye residue followed by no-till soybeans, white oats followed by cotton, and black-seeded oats/crimson clover followed by organic grain corn. Adjusting N fertilizer based on the Calculator resulted in similar yields to those using standard N fertilization practices.

This demonstration will compare corn growth following no cover crop, “AU Robin” crimson clover (20 lbs/ac seeding rate), “Cosaque” black-seeded oats (100 lbs/ac seeding rate), and “AU Robin” /”Cosaque” Mixture (12 lbs/ac “AU Robin” and 60 lbs/acre “ Cosaque” seeding rate). Cover crops were terminated and biomass was measured on April 5, 2016. Corn was planted April 19th. The Calculator predicted available N of 17 lbs N/acre for “Cosaque”, 114

lbs N/acre for “AU Robin”, and 90 lbs N/acre for the Mixture. The corn, in all treatments, was fertilized with 53 lbs N/ac at planting and, based on calculator measurements, the “Cosaque” cover crop treatment received an additional 50 lbs N/acre and the “No Cover” treatment received additional 67 lbs N/acre at sidedress on June 1 for 100 bu/acre yield goal (dryland). Based on the Calculator results, we did not sidedress the “AU Robin” or Mixture plots.

Julia Gaskin is an extension specialist coordinating sustainable agriculture programs at the University of Georgia. She is a soil scientist and has been working with cover crops to improve soil quality. Email: jgaskin@uga.edu
Miguel Cabrera, Crop & Soil Science Department, University of Georgia
David Kissel, Agricultural & Environmental Services Laboratory, University of Georgia

Utilizing a Clover and Ryegrass Cover Crop in a Dryland Cotton/Sorghum Rotation Field section 11

Dryland production of cotton and sorghum poses challenges for growers in the sandy soils in the Burke County area of Georgia. Cover crops are a proven way to increase water holding capacity and reduce drought risk. Growers are also interested in decreasing inputs (herbicide, insecticide and machinery costs) to remain profitable. The goal of our research was to manage a crimson clover (*Trifolium incartum* ‘AU Robin’; *Trifolium incarnatum* L. ‘Dixie Crimson’) and ryegrass (*Lolium* spp) cover crop to re-seed for the following growing season, which would provide weed control benefits as well as decrease inputs for this system. A farmer in Burke County has used this system successfully for several years. Crimson clover has reliably re-seeded for five years. Ryegrass re-seeding is more variable and depends on the weather and timing of cover crop desiccation.

The cover crop demonstration was planted on October 14, 2015. Two treatments were used to demonstrate the importance of termination timing. In one treatment, the planting strips within the cover crop received herbicide early in the spring (March 22, 2016). In the second treatment, the cover crop was terminated late just before strip tilling cotton (May 2, 2016). Cotton was planted on May 23, 2016 to assess production of viable cover crop seed from each method.

Peyton Sapp is the County Extension Coordinator in Burke County, Georgia. Email: psapp@uga.edu

Equipment demonstration and conservation systems overview Field section 12

Demonstrations scheduled at 8:30, 9:30, and 10:30 AM

During this demonstration, researchers from the USDA-ARS, National Soil Dynamics Laboratory (NSDL) will expose participants to equipment and management techniques associated with conservation systems. Participants will be able to interact with a multi-disciplinary team familiar with successful implementation of conservation systems across vegetables and row

crops, including an agronomist, agricultural economist, agricultural engineer, weed scientist, and field technicians. Participants will have access to cover crop rollers, strip tillage implements, and planters modified to facilitate optimal performance in high-residue cover crop systems. Staff from NSDL will demonstrate termination of a high-residue cover crop with a cover crop roller, a method that may be used with or without supplemental herbicides. Staff from NSDL will also demonstrate a strip tillage implement that facilitates planting into high-residue with minimal soil disturbance. Different strip till attachments producing different levels of surface disturbance will be shown. Additional information about conservation systems will be provided through a continuous-loop video and extension publications and factsheets.

Dr. Kip Balkcom is a USDA-ARS Research Agronomist with the National Soil Dynamics Lab in Auburn, AL. His research includes conservation tillage and high-residue cover crops for various cropping systems in the Southeast designed to promote soil health and crop productivity. Email: kip.balkcom@ars.usda.gov
Dr. Leah Duzy is a USDA-ARS Agricultural Economist with the National Soil Dynamic Laboratory in Auburn, AL. Her research focuses on the economic impact of conservation technologies and strategies that reduce economic risks, increase farm profitability, and improve soil quality and productivity. Email: leah.duzy@ars.usda.gov
Dr. Ted Kornecki is a USDA-ARS Agricultural Engineer with the National Soil Dynamics Lab in Auburn, AL. He works with developing and modifying equipment to work in cover crops and high residue management. Email: ted.kornecki@ars.usda.gov
Dr. Andrew Price is a USDA-ARS Plant Physiologist with the National Soil Dynamics Lab in Auburn, AL. His research focuses on weed control in conservation systems, herbicide resistant weeds, and weed biology. Email: andrew.price@ars.usda.gov
Mr. Kirk Iversen is a part time employee with USDA-NRCS and USDA-ARS in Auburn, AL. He specializes in working with growers related to general agronomic information for conservation systems. Email: kirk.iversen@gmail.com
Mr. Corey Kichler is a USDA-ARS Engineering Technician with the National Soil Dynamics Lab in Auburn, AL. He provides technical support for equipment designs and modifications. Email: corey.kichler@ars.usda.gov
Mr. Trent Morton, is a USDA-ARS Agronomic Technician with the National Soil Dynamics Lab in Auburn, AL. He provides technical support for weed science research. Email: mortota@auburn.edu
Mr. Jeffrey Walker is a USDA-ARS Agronomic Technician with the National Soil Dynamics Lab in Auburn, AL. He provides technical support for cropping systems research. Email: jeffrey.walker@ars.usda.gov

Poster Session (located under pole barn)

Winter cover crops to reduce herbicide inputs in corn

Authors: Allister Holmes, Mike Parker, Mike Trolove, Trevor James - New Zealand Foundation for Arable Research

Abstract: We evaluate the effect of different winter cover crops on the subsequent weed emergence and spring corn growth. It was also used to facilitate discussion with growers. The winter cover crops were sprayed out, mowed or surface incorporated prior to corn planting. The efficacy of pre and post-emergent herbicide

applications was evaluated and compared with the current industry standard of winter fallow followed by a pre-emergent and subsequent post-emergent herbicide application, as well as untreated control.

Impact of practices to improve soil health on profitability and sustainability

Authors: Amanda Free, Bill Robertson, Mike Daniels, Chris G. Henry – University of Arkansas; Steve Stevens - Discovery Farms

Abstract: Producers are continuously focusing on adjustments that can be made to increase efficiency in an effort to improve profitability. Practices that lead to improved efficiency often improve soil health as well as having a positive impact on field's environmental footprint. Utilizing no-till with cover crops is a strategy that has a direct impact on improving both soil health and irrigation water use efficiency. However, producers are often hesitant to adopt new technology. The objective of this study is to evaluate the impact of cover crops on irrigation water use efficiency, profitability, and sustainability. The University of Arkansas Cotton Research Verification/Sustainability Program conducted research along with Discovery Farms in two fields in Southeast Arkansas in 2015. Each field was composed of two irrigation sets allowing for evaluation of farmer standard practices, till/no-cover, to that of a modified production system, no-till/cover. All fields were monitored for inputs and entered into the Fieldprint Calculator. Utilization of the calculator assists producers by making estimates over five calculated sustainability metrics: land use, soil conservation, irrigation water use, energy use, and greenhouse gas emissions. Throughout the study all of the producers' inputs were recorded, providing the information needed to calculate both fixed and variable cost. Soil compaction was consistently lower, and soil moisture was consistently higher in no-till/cover throughout the growing season. Irrigation water movement was 6.7 percent slower in no-till/cover. Water infiltration was improved and less runoff was measured in the no-till/cover. The above factors were believed to have played a major role with no-till/cover producing a higher yield than till/no-cover. Yield was 1186 pounds lint per acre in no-till/cover, and 1011 pounds lint per acre in till/no-cover. The metrics from the Fieldprint Calculator all favored no-till/cover compared to till/no-cover with regards to improving sustainability. Operating expenses, soil conservation, irrigation water use, energy use, and greenhouse gas emissions all decreased per pound of lint produced for no-till/cover compared to till/no-cover, 20%, 68%, 48%,18%, and 17%, respectively. Through the use of cover crops several improvements were observed, resulting in increased yield, decreased footprint size, and increased profitability. Additional research is needed to further evaluate how profitability, irrigation efficiency, sustainability, and soil health are related.

Multifunctionality of cover crops in South Texas: Assessing multiple benefits of cover crops on small farms in a subtropical climate

Authors: Savannah Rugg, Dr. Pushpa Soti, Dr. Alexis Racelis – University of Texas Rio Grande Valley

Abstract: Situated in deep South Texas, the Lower Rio Grande Valley (LRGV) is considered one the most productive agricultural regions in the southern US. With the highest concentration of organic farms in the state (Hidalgo county), the LRGV has a strong potential to be leaders in sustainable agriculture and positively impact the overall health of a region with little access to nutritional food. Finding management practices that comply with organic certification and increase the health of the agroecosytem and the farmers working the land is increasingly pertinent. Cover cropping, or the intentional planting of non-cash crop vegetation, can serve multiple functions in an agroecosystem by decreasing environmental pollutants that originate from the agroecosystem, reducing inputs needed for crop production, and potentially decreasing on-farm costs for

farmers—overall increasing the sustainability of the farm. In this study, four cover crops (Lab lab, Sudan Grass, Sunn Hemp, and Pearl Millet) were analyzed in the subtropical region of south Texas to see how their multiple functions enhance ecosystem services. The four cover crops were assessed to see their potential to increase soil nitrogen, to increase soil organic matter, and to suppress weeds. The preliminary results suggest that these subtropical varieties of cover crops have potential to enhance ecosystem services on agricultural land in the LRGV by increasing soil organic matter (in all varieties), increasing nitrogen in topsoil (Lab lab, Sunn Hemp), increasing the presence of mycorrhizae in the soil (Sunn Hemp), and reducing weeds (Sudan Grass). It was also found that the way in which the different cover crops were seeded did not significantly affect weed suppression, however the overall biomass of the cover crops did have a negative correlation with weed presence in cover crop plots ($r(14) = -0.53$, $p = .05$).

Effects of winter cover crops on production of high tunnel vegetable crops; Results of a two year study

Authors: Luke Freeman, Curt R. Rom – University of Arkansas

Abstract: This two-year study investigated short-season winter cover crops to improve soil quality and reduce nitrogen fertilizer inputs in organic high tunnel production systems. Four winter cover crop species were investigated including Austrian winter peas (*Pisum arvense*), bell beans (*Vicia faba*), mustard (*Brassica juncea* cv. Kodiak), and Daikon radish (*Raphanus sativus* var. longipinnatus). The experiment took place at the Arkansas Agricultural Research and Extension Center in Fayetteville, where cover crops were grown in a high tunnel from mid-Nov to mid-April in a randomized complete block design with three replications. After incorporation, the cover crops were followed by a succession of vegetable crops, including tomato (*Lycopersicon lycopersicum*, cv. 'Plum Dandy') and broccoli (*Brassica oleracea* var. italica, cv. 'Bay Meadows'). Vegetable crops were fertilized at a 0.5x rate (56 kg N ha-1) with the objective to determine the ability of the cover crop treatments to supplement fertilizer inputs. Yield and performance of the vegetable crops were measured to determine the effects of the cover crop treatments compared to a nontreated control. In both years of the study Austrian winter peas yielded significantly greater biomass nitrogen than other treatments, leading to a significant decrease in soil C:N ratio 30 days after incorporation. The seasonal mean tomato leaf chlorophyll measurements were highest following winter pea with significantly greater foliar N compared to other treatments in 2015. Differences in yield were not statistically significant due to plot variation caused by environmental factors, but the winter pea cover crop resulted in a numerical yield increase for tomato in 2015. Broccoli early-season leaf chlorophyll was also increased by the winter pea treatment and plant biomass was significantly greater, but harvest data were not significantly different. We conclude that Austrian winter pea is a suitable winter cover crop for N contribution in a high tunnel production system, but the effects on vegetable yield are inconclusive.

Cool-season legume cover crops and strip-tillage in a semi-arid environment

Authors: Jamie L. Foster, Reagan L. Noland, Matthew Bean, Cristine L.S. Morgan, and Gaylon D. Morgan – Texas A&M AgriLife Research

Abstract: A lower percentage of south Texas farmers have adopted conservation agriculture practices, such as reduced tillage and cover cropping, than throughout the southeastern USA or other regions of Texas. South Texas is characterized by a semi-arid environment and alkaline, heavy clay soils, and dryland farms in the region would benefit from a greater adoption of conservation agriculture practices. Research on the

effectiveness and impact of cover crops and strip-tillage management in south Texas is limited. The objective of this experiment was to determine the impacts of integrated strip tillage and cool-season legume cover cropping on a cotton (*Gossypium hirsutum* 'DP 0935')-sorghum (*Sorghum bicolor* 'GA 3696') rotation. A randomized complete block design with split-plots was used for this experiment from 2012 to 2016. Main effect was row crop strip-tilled into the residue of four legume species (split-plot; *Medicago polymorpha* 'Armadillo'; *M. minima* 'Devine'; *M. lupulina* ' BEEBLK'; or *Trifolium incarnatum* ' Hykon'), or control (fallow/tillage). Herbage mass of the cover crops was not different between species over five years. Cotton grown with conventional tillage in drought years of 2012 and 2014 tended to yield greater than that grown with cover crops, but this was not the case in normal or above average rainfall years of 2013 and 2015. In 2012, 2013, and 2015, sorghum yields were not impacted by cover crop, and in 2015 sorghum yields were greater following BEEBLK than following Hykon or Armadillo. Soil moisture did not vary by treatment at any sampling event. Results indicate that integrated strip tillage and cover cropping can be feasibly integrated in southern Texas.

Unique cover crops for Louisiana sugarcane

Authors: Jim Shrefler, Charles L. Webber III, Paul M. White Jr., Caleb Dalley, Eric C. Petrie and Ryan P. Viator - Oklahoma State University, USDA ARS Sugarcane Research Unit and Calvin Viator, Ph.D. and Assoc., LLC

Abstract: Louisiana sugarcane production practices provide a tremendous opportunity for the use of cover crops following the final sugarcane harvest in the fall of one year and prior to replanting sugarcane during the summer of the next year. A Louisiana sugarcane field is typically replanted every four years due to declining yields and, although it is a costly process, it is both a necessity and an opportunity to maximize the financial return during the next four year cropping cycle. The use of cover crops during this fallow period has the potential to influence not only the following sugarcane crop, but the economics of the production system as a whole. A 2-year experiment was conducted at the USDA, ARS, Sugarcane Research Unit at Houma, LA to determine the impact of fallow planting systems on sugarcane production. The experiment included seven treatments; two cover crops, kenaf (*Hibiscus cannabinus* L.) and cowpeas (*Vigna unguiculata* L. Walp.), three harvest treatments, and a control. The experiment had four replications. The kenaf and cowpeas were planted on 8 May 2013. The three harvest treatments included the removal of the cover crop at 50 days after planting (DAP), the removal of the harvested cover crop at 100 DAP, and lastly, cutting the cover crop at 100 DAP and incorporating the plant material into the soil prior to sugarcane planting. The control treatment did not have a cover crop. Sugarcane variety HoCP 96-540 was planted on 26 August 2013, 110 days after planting the cover crop crops. The plant cane was harvested on 17 November 2014. The cover crop harvest dates, 50 DAP and 100 DAP, significantly influenced the yield and plant partitioning for both cover crops across all parameters measured. Kenaf fresh and dry yields, for the leaves, stalks, and whole plants, increased from the 50 to 100 DAP. Cowpea, in most aspects, followed a similar trend as kenaf as influenced by DAP harvests with the exception of the cowpea leaf fresh and dry weights. Unlike kenaf, the cowpea leaf, fresh and dry weight yields (50 DAP), 19.4 and 2.5 mt/ha, respectively, decreased to 17.0 and 2.4 mt/ha (100 DAP). Although the sugarcane total recoverable sucrose (TRS) (kg/mt) was greater with the kenaf cover-crop treatment 50 DAP (120 kg/mt) compared to the cowpea treatment 50 DAP (111 kg/mt) and the cowpea 100 DAP with the residue incorporated (112 kg/ha), none of the cover crop treatments were significantly better or worse than the control (no cover crop). The average values for the sugarcane production factors across all treatments were 95,700 plants/ha (plant population), 112 mt/ha (sugarcane yield), 114 kg/mt (sugar yield per metric ton

of sugarcane), and 12,841 kg/ha (sugar yield per hectare). The results demonstrate the potential use of these alternative cover crops during the fallow period prior to planting sugarcane without adversely affecting the plant cane yields.

Starter fertilizer and application method effects on weed competition and grain yield when using a cover crop mulch in organic corn production

Authors: Rachel Atwell, Chris Reberg-Horton, Steven Mirsky, Hanna Poffenbarger, Gladis Zinati, Jeffery Moyer

Abstract: Consistent weed control and nitrogen availability are limiting factors to yield in organic corn production. Planting a mixture of cereal and legume cover crops can provide benefits for both weed suppression and fertility provision, however additional fertility may be required to maximize corn yield. Research was conducted at Beltsville, MD, Kinston, NC, and Salisbury, NC from 2012-2014 to evaluate the effect of starter fertilizer sources and application methods on weed competition and grain yield in organic no-till corn production. Fertility treatments included high rate broadcast poultry litter (HBPL), low rate broadcast poultry litter (LBPL), subsurface banded feather meal (SBFM), subsurface banded poultry litter (SBPL), and no starter fertility. Both weedy and weed-free conditions were maintained across all fertility treatments. A cereal rye (*Secale cereale* L.) and hairy vetch (*Vicia villosa* Roth) cover crop mixture was established in the fall uniformly across all fertility treatments and was terminated using a roller-crimper prior to corn planting. Cover crop biomass in excess of 9,000 kg ha-1 and excellent weed suppression was observed in four of the six environments. In a combined analysis of five environments, corn N content and grain yield followed the same pattern of HBPL>LBPL,SBFM>SBPL, no starter. Weed competition only affected corn grain yield at one environment with low N carry-over from previous management. The lowest weed coverage, lowest weed biomass, and highest corn grain yield were observed with the HBPL fertility treatment at this environment which provided for a competitive corn crop with weeds. Results from this study indicate that starter fertilizer materials are often necessary to maximize corn grain yield in organic rotational no-till corn production and that producers have flexibility in selecting fertilizer materials and application methods in most environments. At environments with low N carry-over from previous management, a typical granular fertilizer box cannot supply enough N from organic sources to ensure crop competitiveness with weeds and high corn grain yield.

The Northeast Cover Crops Council: Encouraging and supporting cover crop use in the Northeast US

Authors: Victoria J. Ackroyd, Steven B. Mirsky and Kate L. Tully

State: Maryland

Cover crops help to address some of the key challenges facing agriculture including nutrient pollution, herbicide resistant weeds, and climate change by decreasing loss of N and P to the environment, decreasing erosion, suppressing weeds, and providing habitat and food sources for beneficial organisms including pollinators. A group of researchers, farmers, and agricultural service providers from Delaware, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and Vermont convened on March 31-April 1, 2016 to create the Northeast Cover Crops Council (NECCC). The NECCC will serve as a central clearinghouse for the extensive cover crop research which has been conducted in the Northeast. It will identify knowledge gaps to assist researchers in collaborating across state and institution lines to find solutions to the problems that make it difficult for farmers to grow cover crops. It will determine best management practices to maximize the benefits accrued through the use of cover crops. It will serve as a network through which

farmers can find immediate answers to their cover crop questions. It will provide resources, including a website and a suite of cover crop decision tools. The first tool, based on the Midwest Cover Crops Council online selector tool, is slated for development starting in the fall of 2016. Through such activities, resources, and tools the NECCC will encourage cover crop adoption and support cover crop use in the Northeast.

Establishing cover crops in standing corn in the upper Midwest

Authors: M. Scott Wells, Reagan Noland
State: Minnesota

Abstract: Cover cropping can reduce agricultural runoff and N loss, but has not been widely adopted in the upper Midwest due to climatic challenges in establishment and a lack of reliable management practices. A study was initiated in 2014 to investigate the suitability of five cover crop options (cereal rye (*Secale cereale*), red clover (*Trifolium pratense*), hairy vetch (*Vicia villosa*), field pennycress (*Thlaspi arvense*), and a mixture of oat (*Avena sativa*), pea (*Pisum sativum*), and tillage radish (*Raphanus sativus*)) planted into V7 corn via three interseeding methods (a multi-purpose cover crop InterSeederTM, directed broadcast, and directed broadcast with light incorporation) at the University of Minnesota Southern (Waseca, MN) and Southwestern (Lamberton, MN) Research and Outreach Centers. All cover crops established and survived through the fall except for the mixture, which senesced under the corn canopy at both locations. There were no significant differences ($\alpha = 0.05$) in corn yield at either location. In Lamberton, cover crop option affected tissue N ($P < 0.007$) and dry matter ($P < 0.001$), but performance was not affected by planting method. Only rye (540 kg DM ha-1; 15 kg N ha-1) and pennycress (259 kg DM ha-1; 10 kg N ha-1) overwintered at the Lamberton location. In Waseca, all winter-hardy cover crop options survived the winter. Cover crop option and planting method impacted both spring dry matter and tissue N content ($P < 0.05$). Across planting methods and cover crop options, dry matter values ranged from 233 (broadcast pennycress) to 1103 kg ha-1(broadcast rye), and tissue N (kg ha-1) ranged from 12 (broadcast + incorporation pennycress) to 44 kg N ha-1 (InterSeederTMplanted hairy vetch). Broadcast with incorporation achieved dry matter and tissue N values equivalent to corresponding InterSeederTMtreatments, and significantly greater than broadcast without incorporation in hairy vetch ($P < 0.001$) and red clover ($P = 0.05$), highlighting the benefit of soil disturbance and improved seed-soil contact. At cover crop termination in Lamberton, soil NO3-N was significantly lower ($P < 0.001$) in InterSeederTM rye treatments (4.18 kg NO3-N ha-1) than all other InterSeederTM planted cover crops and the no-cover check (17.61 kg NO3-N ha-1) at depth 1 (0-30 cm) and 2 (30-60 cm) ($P < 0.001$). In Waseca, all established cover crops resulted in less soil NO3-N ha-1 than the mixture and the no-cover control at depths 1 and 2 ($P < 0.001$). Broadcast with incorporation or a cover crop InterSeederTM can be used to effectively establish cover crops in standing corn, reducing N loss while maintaining corn yield.

Comparing long-term changes to soil properties of different tillage systems with cover crops in Southeastern soils

Authors: Wayne Roper, Deanna Osmond, Joshua Heitman, Michael Wagger, Chris Reberg-Horton – NC State University

Abstract: Despite advocacy for cover cropping to improve soil health and stability, many farmers in the United States do not utilize cover crops. Farmers may not be convinced that cover crops provide enough benefit to justify additional management costs. We utilized data from experiments established in the piedmont (30 years) and mountain (20 years) regions of North Carolina to determine the effects of tillage with and without

cover crops in different crop management systems. The piedmont rotation is a nine-tillage study containing combinations of moldboard, chisel, disc, and no-till management. Mountain treatments included an annual winter wheat and crimson clover cover crop planted prior to combinations of organic and conventional management with no-till and disc tillage as well as a control treatment without crop production. Soil samples from individual plots were collected and submitted according to recommendations from North Carolina Department of Agriculture and Consumer Services Agronomic Services and the Cornell Soil Health Testing (CSHT) Laboratory. Cropping and tillage treatments in the piedmont and mountain regions had no significantly different soil health scores from CSHT, and were all rated 'low' to 'very low' even if cover crops or conservation tillage was used. Several soil health indicators including organic matter, aggregate stability, and active carbon were also not differentiated by tillage treatments in either piedmont or mountain plots. Soil protein, which represents the pool of organically bound N, was greatest in no-till systems at both locations and the only distinguishing indicator. There were differences in soil P and K fertility ($p<0.05$) in mountain plots, but none that had practical importance for crop production because all plots contained sufficient nutrients. Cover crops and reduced tillage may provide qualitative benefits to soil health, but soil tests needs to be more sensitive in order to reveal long-term quantitative differences between management systems in Southeastern soils.

Southern Cover Crop Council Meeting

1-3 pm at the Magnolia Room, Best Western Plus, 909 N. Spence Av., Goldsboro, NC

A preliminary meeting will be held for participants interested in forming a Southern Cover Crops Council (SCCC). The formation of this proposed council will benefit regional stakeholders by providing a mechanism to concentrate all regional efforts related to cover crop information. An organizational structure, goals and mission for the council, and future steps to facilitate the formation of the proposed council will be discussed. Participants will be encouraged to assist in the development and future functions of the SCCC.

MAP OF UMO CAMPUS

MAP OF CLASSROOMS AT UMO

MAP OF CEFS

MAP OF FIELD DEMOS

MAP OF GOLDSBORO WITH RESTAURANTS

NOTES:

NOTES:

Thanks to the administrative team that made this event possible. They have endured endless meetings and bureaucratic hurdles.

NC State
Lisa Forehand
Molly Hamilton
Eliot Lee
Amber Polk
Chris Reberg-Horton
Sarah Seehaver

SSARE
Toni Dewit
Amanda Hollar
Candace Pollock
Jami Sealey

NC Department of Agriculture and Consumer Services
Cherry Research Farm Staff

The 2016 Southern Cover Crop Conference is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, through Southern Sustainable Agriculture Research & Education, under award number SC14-001: Institutionalizing Cover Crop Research and Education in the Southeast. USDA is an equal opportunity employer and service provider. Any opinions, findings, conclusions or recommendations expressed here do not necessarily reflect the view of the U.S. Department of Agriculture. Materials published by the Southern Region Sustainable Agriculture Research & Education, NC SARE program.

SOUTHERN SARE
Sustainable Agriculture Research & Education

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National Institute of Food and Agriculture