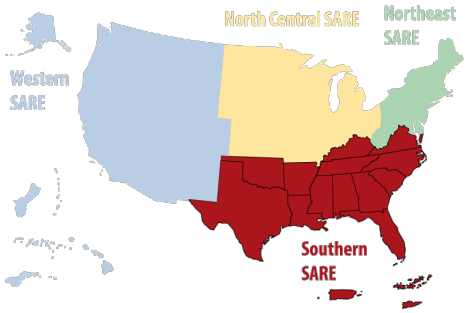
SOUTHERN SARE
Sustainable Agriculture Research & Education



Index 2020

Annual report of SARE-funded grant projects in the Southern region

Southern SARE has fostered sustainable agricultural production and marketing efforts for over three decades through grant programs for farmers/ranchers, researchers, NGOs, government agenices and graduate students. To date, Southern SARE has funded over 1,300 grants, totaling more than $73 million.

In 2020, $5.7 million and 64 grants were awarded across five grant programs: Research & Education, Professional Development Program, Graduate Student, On-Farm Research, and Producer.

This publication lists the presently funded SARE projects throughout the Southern region. To find a complete list of projects funded in each state, visit the Southern SARE website (southern.sare.org) and search the Projects Database.

Grants awarded in 2020 throughout the Southern region

AL	$95,654	4
AR	$149,194	2
FL	$798,448	14
GA	$729,305	6
KY	$80,000	1
LA	$14,961	1
MS	$195,802	3
NC	$670,771	6
OK	$898,066	2
PR	$185,359	5
SC	$34,820	2
TN	$316,330	2
TX	$763,482	8
VA	$709,406	6
USVI	$100,313	2
Total:	$5,741,911	64

History of Southern SARE Grants (1988-2019)

State	R&E	OFRG	PDP	Graduate	Producer	SCIG	Total
AL	$ 2,738,514.00	$ 107,779.00	$ 706,401.00	$ 92,264.00	$ 182,565.00	$ 144,956.00	**$ 3,972,479.00**
AR	$ 5,153,927.00	$ 179,458.00	$ 1,211,917.00	$ 202,967.00	$ 96,767.00	$ 49,829.00	**$ 6,894,865.00**
FL	$ 4,407,331.00	$ 373,862.00	$ 573,326.00	$ 652,812.00	$ 247,100.00	$ 87,296.00	**$ 6,341,727.00**
GA	$ 9,204,835.00	$ 148,325.00	$ 526,896.00	$ 197,529.00	$ 226,360.00	$ 96,594.00	**$ 10,400,539.00**
KY	$ 2,397,109.00	$ 166,906.00	$ 1,457,026.00	$ 79,398.00	$ 200,248.00	$ 58,312.00	**$ 4,358,999.00**
LA	$ 1,119,833.00	$ 14,308.00	$ 271,966.00	$ 113,325.00	$ 77,383.00	$ 19,930.00	**$ 1,616,745.00**
MS	$ 1,094,200.00	$ 14,997.00	$ 961,796.00	$ 47,722.00	$ 107,874.00	$ 64,348.00	**$ 2,290,937.00**
NC	$ 10,022,129.00	$ 163,906.00	$ 2,285,252.00	$ 411,950.00	$ 399,346.00	$ 220,117.00	**$ 13,502,593.00**
OK	$ 1,864,653.00	$ 113,934.00	$ 635,389.00	$ 19,969.00	$ 122,429.00	$ 16,864.00	**$ 2,773,238.00**
PR	$ 905,853.00	$ 42,473.00	$ 10,000.00	$ 10,000.00	$ 83,633.00	$ 10,000.00	**$ 1,210,643.00**
SC	$ 1,644,266.00	$ 142,377.00	$ 568,878.00	$ 73,864.00	$ 157,270.00	$ 43,620.00	**$ 2,630,275.00**
TN	$ 1,622,395.00	$ 74,772.00	$ 429,818.00	$ 151,561.00	$ 229,826.00	$ 126,198.00	**$ 2,634,570.00**
TX	$ 6,196,602.00	$ 258,413.00	$ 643,658.00	$ 268,173.00	$ 241,676.00	$ 40,000.00	**$ 7,648,522.00**
VA	$ 4,309,502.00	$ 155,564.00	$ 526,040.00	$ 288,009.00	$ 395,236.00	$ 112,727.00	**$ 5,787,078.00**
USVI	$ 892,423.00	$ 14,957.00	$ 87,833.00	$ -	$ 21,089.00	$ 10,000.00	**$ 1,026,302.00**
Total	$ 53,573,572.00	$ 1,972,031.00	$ 10,896,196.00	$ 2,609,543.00	$ 2,788,802.00	$ 1,100,791.00	**$ 73,089,512.00**

ALABAMA

The Effects of Probiotics on the Survival Rate of Farmed Shrimp

BOLIGEE, Alabama — In an effort to reduce incidences of disease and increase the survival rate, and subsequent yields, of farmed shrimp, an aquaculture farmer received a Southern SARE Producer Grant to determine if probiotics could be a sustainble way to boost the health of the animals. Probiotics are commonly used in hatcheries, but their effectiveness is limited in grow-out ponds.

Pacific white shrimp. Greene Prairie Aquafarm in Boligee, AL

David Teichert-Coddington of Greene Prairie Aquafarm in Boligee, AL, fed a mixture of three Bacillus species to shrimp on aquaculture farms in Alabama and Florida to protect against such diseases as Vibrio bacteria. The Bacillus species are known to increase growth and survival in shrimp by outcompeting with pathogenic bacteria and stimulate the immune system.

Results showed that the probiotics appeared to decrease the total numbers of pathogenic Vibrio bacteria in the ponds, hence reducing the numbers of shrimp that would be infected. However, survival and yields of shrimp at all test farms were low, with or without probiotic treatments.

There appeared to be a correlation between high Vibrio infections, high numbers of Oscillatoria (a blue-green algae) and high mortality rates in August, suggesting that toxins from algal blooms create additional stressors that weaken the shrimp.

"The viruses and bacterial infections were not the principal cause of mortality," said Coddington. "The histology indicated that we should investigate more about the potential for algal toxins to harm our shrimp."

FS17-304 Use of Probiotics to Increase Survival and Sustainable Yield of Inland Farmed Shrimp

Research and Education Grant

LS20-331 Building Grassroots Infrastructure for Peer-to-Peer Learning and Support for Sustainable Farmers in Alabama, $49,992 , Alabama Sustainable Agriculture Network

LS19-314 Regional Educational Campaign for High Tunnel Vegetable Producers, Limited Resource, and Veteran Farms via On-Farm Pest Exclusion and Natural Enemy Demonstrations, Publications, and Self-help Tools, $49,648 , Auburn University

LS19-307 Biofertilization of Bermudagrass: A step toward sustainable forage production, $221,115 , Auburn University

LS18-289 Development and Implementation of Ecologically Sound, System-based Tactics for Managing Pests and Insect-vectored Diseases in Cucurbit Production in the Southeast, $270,000 , Auburn University

Professional Development Program Grant

ES18-143 Cattle and Small Ruminant IPM Educatonal Materials: A systems approach that will lead to a sustainable future, $79,900, Auburn University

On-Farm Research Grant

OS20-136 Validation of a Spotted Wing Drosophila Growing Degree Day Model for the Southeast for Sustainable Blueberry Production, $16,581 , Auburn University

Producer Research Grant

FS20-322 Increasing Sustainability of Crawfish and Low Salinity Shrimp Production in West Alabama, $12,581 , Greene Prairie Aquafarm, LLC

Graduate Student Grant

GS20-220 Novel Bio Sensor Derived from Cotton Biomass to Monitor Real-Time Soil Moisture and Nitrate, $16,500 , Tuskegee University

ARKANSAS

New Online Training Tool is Available Free to Farmers

FAYETTEVILLE, Arkansas - According to the United States Department of Agriculture's Economic Research Service, 85% of new farm businesses fail within their first five years of production.

Despite this, few programs exist to help develop the business and financial management skills needed to establish a successful farm business.

After receiving feedback about the need for a program like this through their outreach and education efforts, the National Center for Appropriate Technology decided to act.

"We were hearing from farmers at our workshops that our information was helpful but that there was a strong need for information that covered more than just the basics of production," said Margo Hale, the Southeast Regional Director and Sustainable Livestock Specialist at NCAT.

"After the first few years in business, most farmers have a good understanding of production but we saw that farmers and ranchers lacked the business and finance skills needed to keep their operations running. These skills are critical for farmers with three to seven years of experiences who want to take their farm to the next level."

Through a Southern Sustainable Agriculture Research and Education Grant (LS18-292), the NCAT team created a six-part program that uses a combination of presentations, speakers, and take-home resources to teach the economic and social aspects of a successful farm business to beginning farmers. Participants in the program receive training and support across the whole farm business. They develop business plans and record-keeping skills while learning how to access financial management resources, new sources of capital and new markets.

Developed over a two-year period, the curriculum was created by a combination of NCAT staff and outside presenters like the National Agricultural Law Center who provide expert advice on critical topics.

Each part of the program was recorded during an in-person session with farmers from Arkansas and is now available for free in an online format for the first time.

The online course can be accessed through the NCAT/ATTRA Tutorials webpage beneath the Beginning Farmer Tutorials section on the Tutorials Page.

LS18-292 Taking Your Farm to the Next Level: Business and financial planning for sustainable farms and ranches

ARKANSAS PROJECTS CONTINUED

Research and Education Grant

LS19-317 Innovative Nutrient Management Options for Sustainable Pasture Land Intensification, $296,352, University of Arkansas

LS19-316 Forage Establishment and Management in Arkansas' Silvopasture for Small Beef Producers, $251,321, University of Arkansas

LS17-282 High Tunnel Grape Production System: A novel sustainable approach to growing grapes, $266,986, University of Arkansas

Graduate Student Grant

GS19-218 Educational Resources to Develop Value-added Products from Farmers' Market Surplus, $14,475, University of Arkansas

GS19-208 Evaluation of Different Ensiling Methods and the Effect on Feeding Value of the Residual Material from Edamame Soybean Processing, $16,500, University of Arkansas

GS19-207 The Impacts of Native Plant Diversity on Native Bee Development and Soil Health, $13,101, University of Arkansas

GS18-186 Development of Native Pollinator Habitat within Livestock Pasture, $11,324, University of Arkansas

On-Farm Research Grant

OS19-124 The Impact of Estimated Breeding Values on Parasite Resistance and Reduced Parasitism in Sheep, $15,000, USDA-ARS

OS18-116 Cover Crop Effect on Nematode Activity in the Soil, $15,000, University of Arkansas

Producer Grant

FS19-320 Implementation of Biointensive Organic Production Principles in Agro-forestry Systems: An examination of efficacious cultivated berry and vegetable production in temperate forests through alley cropping and companion planting, $8,695, Russellville, AR

Professional Development Program

ES20-154 Demystifying Regenerative Grazing and Soil Health, $79,866 , National Center for Appropriate Technology

ES20-155 Utilizing Insect and Irrigation Monitoring to Enhance Sustainable Vegetable Production: Extension Educator Training for Arkansas, $69,328 , University of Arkansas

FLORIDA

Grafting Can Help Control Diseases in Organic High Tunnel Tomatoes

GAINESVILLE, Florida – Grafting can help control diseases in organically grown high tunnel tomatoes, according to the results of a University of Florida study.

In the study, funded by a Southern Sustainable Agriculture Research & Education (SSARE) On-Farm Research Grant, specialty tomatoes grafted onto two disease-resistant rootstocks effectively managed Fusarium wilt and improved the overall health of the plants compared to the non-grafted controls.

Researcher Xin Zhao collaborated with Frog Song Organics, a farm in Hawthorne, FL, for the study, using four indeterminate specialty tomato cultivars: 'Sun Gold', 'Supersweet 100', 'Black Cherry', and 'Green Zebra'. The cultivars were grafted to 'Multifort' and 'Estamino', respectively, two tomato hybrid rootstocks known for their robustness and resistance to a variety of diseases, including Fusarium wilt, Fusarium crown and root rot, Verticillium wilt, root-knot nematodes, and corky root. The project took place in an organically managed high tunnel.

Grafting involves joining the upper part of a plant, called the scion, to the lower part of another plant, called the rootstock, in an effort to combine the genetic strengths of both plants, from disease and pest resistance and tolerance, to abiotic stresses, to more vigorous performance and improved yields.

"The trial was designed to help the grower overcome the soil-borne disease problem in his high tunnel tomato system under organic production. In particular, 'Black Cherry' is highly susceptible to Fusarium wilt based on its performance in the previous season before the on-farm study," said Zhao. "The lack of disease resistance in many of the heirloom and specialty tomato cultivars is a constant challenge for growers. Grafting was introduced to the farmer in this study as a potential solution while he was searching for new management tools to improve his current production system."

In the study (OS13-083), "Grafting Heirloom Tomatoes for Organic High Tunnel Production to Improve Season Extension, Disease Control and Fruit Yield: A partnership with local growers for technology transfer," eight grafting combinations were compared with four non-grafted tomato cultivars.

Researchers found that disease severity of Fusarium wilt was significantly lower in grafted plants of 'Black Cherry' and 'Green Zebra' than non-grafted controls by 21 percent to 71 percent. Leaf mold was mainly observed on 'Sun Gold' and 'Supersweet 100', while grafted plants also showed less severe symptoms of leaf mold compared to non-grafted plants, with reductions ranging from 25 percent to 31 percent.

"Visually, grafted plants demonstrated markedly greater vigor than non-grafted controls after the final harvest," said Zhao. "A significant increase of 125 percent on average in aboveground biomass was observed in grafted plants as compared to non-grafted controls at the end of the season across different tomato scion cultivars."

Photo credit: University of Florida

In addition, researchers found that fruit yield increased in the grafted plants, anywhere from 139 percent to 485 percent depending on the scion cultivar.

From an economic standpoint, Zhao recognizes that grafting can be costly, with the cost of some grafted transplants as high as six times that of non-grafted transplants. "However, the revenue of grafted tomatoes can be as high as 4.5 times that of non-grafted tomatoes," said Zhao. "For the grower in the study, who received a price premium from local markets, the results further intensified the effect of yield increase of grafted tomatoes on farming profitability, resulting in much higher revenue from grafted tomato production in contrast to the use of non-grafted plants."

Zhao emphasized that although grafted tomatoes come at a higher production cost, they are more profitable than non-grafted tomatoes because of their higher productivity. She noted that even if the tomato selling price was cut in half, grafted tomatoes would still result in higher net profit than non-grafted tomatoes.

Results from this study may be useful for organic growers seeking non-chemical Integrated Pest Management (IPM) tools for their production systems, and specifically address challenges growers face in managing diseases and pests in high tunnels.

OS13-083 Grafting heirloom tomatoes for organic high tunnel production to improve season extension, disease control, and fruit yield: A partnership with local growers for technology transfer

FLORIDA PROJECTS CONTINUED

Research and Education Grant

LS20-334 Optimizing Nutrient and Water Management for Organic Mixed Vegetable Production Systems, $299,116 , University of Florida

LS20-342 Enhancing Hedgerow Systems in Fruit Tree Production to Improve Beneficial Insect Diversity and Abundance, $311,118 , University of Florida and University of Georgia

LS19-315 Enhancing Seed Production of Regionally Adapted Crops in the Southeastern Farmer Seed System, $310,537, University of Florida

LS19-308 Harnessing Microbes for Sustainable Food Production, $44,468, University of Florida

LS18-302 Educational Materials for Cover Crop Adoption and Use in the Subtropics and Tropics, $46,999, University of Florida

LS18-297 Shade and Ground Cover Growing Systems for Tea Production in Florida, $200,000, University of Florida

LS18-291 Managing Plant-parasitic Nematodes and Promoting Beneficial Soil Organisms through Sod-based Crop Rotation, $198,669, University of Florida

Graduate Student Grant

GS20-234 Development of Push-pull System for Ambrosia Beetles, Vectors of Laurel Wilt Disease in Florida Avocado, $11,564 , University of Florida

GS20-231 Evaluating Local Food Hubs as Alternative Food Systems to Preserve Specialty Crop Producers and Build Resilient Communities in North Central Florida, $14,028 , Univeristy of Florida

GS20-225 Deploying Oak Mulch to Contain and Suppress HLB Disease in Citrus, $12,347 , University of Florida

GS20-224 Determining How the Ubiquitous Fungi Mortierella Regulates Belowground N Dynamics Under Different Crop Rotation Systems, $16,144 , University of Florida

GS20-223 Intercropping for Pest Control in Organic Kale in Northern Florida, $16,279 , Florida State University

GS20-222 Agroecological Intensification of Warm-season Pastures for Improved Productivity and Quality and Ecosystem Services, $16,173 , University of Florida

GS20-221 Assessing Anaerobic Soil Disinfestation for Improving Weed and Soilborne Disease Management in High-tunnel and Open-field Salad Green Production, $16,499 , University of Florida

GS20-219 Translating Grazing: Calculating Nitrogen Credits from Cool-Season Integrated Crop Livestock Systems, $16,493 , University of Florida

GS19-210 Toward the Development of a Push-Pull Strategy to Control Whiteflies in Florida Vegetables, $9,308, University of Florida

GS19-206 Developing Efficient Probiotics for Microbiota of Diarrhea-Resistant Livestock, $16,266, University of Florida

GS19-203 Evaluation of Cladosporium cladosporioides and Its Extracts for the Management of Pathogenic Bipolaris Species, $14,332, University of Florida

GS19-199 Sustaianable Strategies to Combat the Papaya Ringspot Virus, $16,495, University of Florida

GS18-195 Elucidating the Effects of Organic vs. Conventional Cropping Practice and Rhizobia Inoculation on Peanut Yield and Rhizosphere Microbial Diversity, $16,496, University of Florida

GS18-191 Developing Attract and Reward Strategy to Control Thrips and Whiteflies in Florida Tomato, $10,316, University of Florida

GS18-181 Integrated Weed Management for Long-term Nutsedge Control and its Economic Impact in Florida Vegetable Production, $15,361, University of Florida

GS17-178 Overcoming Microclimate Challenges to Improve Organic Spinach Production in Florida, $16,495, University of Florida

GS17-170 Companion Planting of Native Insectary Plants to Benefit Crop Plants: The promotion of beneficial insects in agricultural commodities via tropic resource enhancement, $10,332, Florida International University

On-Farm Research Grant

OS20-137 Combining Non-crop Habitat and Semiochemical Lures to Increase Natural Enemy Recruitment and Retention in Florida Vegetable Crops, $18,164 , University of Florida

OS20-135 On-farm Evaluation of an Innovative Anaerobic Soil Disinfestation Practice for Improving Organic Carrot Production in North Florida, $19,995 , University of Florida

OS20-132 Fertilizer Mismanagement Impacts on Pasture Health, $19,828 , University of Florida

Producer Grant

FS20-323 Evaluating Mobile Slaughter Access for Producers and Local Partners, $10,700 , Red Boot Goat Farm

FS19-319 Sweet Potatoes and Their Vines: A nutritional and sustainable alternative for food and livestock feed, $9,926, Hastings, FL

FS19-317 Analysis of the Antioxidant Qualities of Flowers and Fruits of Several Commercial Varieties of Sambucus nigra ssp. Canadensis (The North American Black Elderberry) in Florida, $9,971, Williston, FL

FS19-314 Season Extension and Increased Economic Sustainability for South Florida Growers: Using high tunnels to extend tomato production, $9,665, North Miami, FL

GEORGIA

More Targeted Use of Horticultural Oils in Peach Trees Better Manages San Jose Scale, UGA Researchers Find

ATHENS, Georgia – Using horticultural oil sprays as an Integrated Pest Management (IPM) strategy to control San Jose scale in peach trees can be an effective alternative to chemical applications, and University of Georgia researchers have found that the best control comes after trees have been pruned, allowing for lower application rates than previously recommended.

Photo credit: University of Georgia

Through a Southern Sustainable Agriculture Research and Education (SSARE) On-Farm Research Grant, entomologist Brett Blaauw applied a 1.5 percent horticultural oil solution at three different volumes: 100 gallons per acre, 200 gallons per acre and 400 gallons per acre to peach trees both at pre-pruning and post-pruning stages to determine how well the oil covered the trees to manage San Jose scale. San Jose scale is an important sucking pest which damages fruit and can eventually kill a tree by injecting toxins into the plant.

"The recommendations for San Jose scale management in Southeastern peach production is applying 200 gallons per acre of 1.5 percent horticultural oil solution at delayed-dormant," said Blaauw. Horticultural oil is also referred to as dormant oil due to the timing of the application. The oil suffocates insect eggs or overwintering adult insects. The better the coverage, the more effective the product.

"The purpose of the study was to determine the best application and timing rates to help growers not only better manage San Jose scale, but also to save time and money in terms of application," said Blaauw. In the study (OS17-102), "Scale Management to Promote Sustainable Southeastern Peach Production," researchers collaborated with two commercial Georgia growers to evaluate the amount of coverage of horticultural oil between pre-pruned trees and post-pruned trees, and monitored the abundance and activity of San Jose scale on a weekly basis until harvest.

An example of a post-pruned peach tree with water sensitive cards to evaluate horticultural oil coverage. Photo credit: Brett Blaauw, University of Georgia

They found that, overall, applying horticultural oil at 100 gallons per acre to post-pruned trees (which is done to elicit fruit production), significantly reduced the number of San Jose scale pests compared to the application to pre-pruned trees.

"The application of 100 gallons per acre of 1.5 percent horticultural oil to pre-pruned trees had the lowest percent coverage, which in turn, also had the highest abundance of San Jose scale," said Blaauw.

When applying 100 gallons per acre of horticultural oil on post-pruned trees, the coverage increased 25 percent. When the spray volume doubled to 200 gallons per acre, the coverage increased by nearly 30 percent over the pre-pruned applications. There were no significant differences in application at 400 gallons per acre.

The important takeaway from the study, said Blaauw, was that 100 gallons per acre of horticultural oil applied to post-pruned trees appears to be sufficient in providing ample coverage to manage San Jose scale.

"We determined that if growers are able to apply their delayed-dormant oil spray after they have pruned their trees, 100 gallons per acre may result in sufficient coverage to be effective at suppressing San Jose scale," he said. "On the other hand, if the oil sprays are applied prior to pruning, volumes nearing 200 gallons per acre are needed to sufficiently cover the trees and effectively manage San Jose scale. Applying volumes upward of 400 gallons per acre does not seem to significantly improve management of San Jose scale and is, thus, not recommended in the Southeast."

In addition, the researchers found that the application of the horticultural oil did not impact natural enemy populations. Researchers collected parasitoids, which made up the bulk of the beneficial predators identified, in addition to minute pirate bugs, long-legged flies, spiders and lady beetles.

OS17-102 Scale Management to Promote Sustainable Southeastern Peach Production

Research and Education Grant

LS20-340 Pecan Hedge-pruning: A Sustainable Management Option for the Southeastern US, $299,894 University of Georgia , USDA- Agriculture Research Service

LS20-339 Exploring Agritourism to Increase Agricultural Sustainability and Resilience in the Municipality of Utuado, Puerto Rico, $300,000 , Troy University; University of Puerto Rico; Arizona State University

LS20-328 Preventing Heirs Property and Increasing Agricultural Sustainability: A Training for Extension Agents and Limited Resource Farmers in Rural Georgia, $50,000 , Georgia Heir Property Law Center, Inc

LS20-322 HABESHA Agriculture Leadership Opportunity (HALO Program), $28,440 , HABESHA, Inc.

LS19-318 A Working Group to Address the Challenge of Food Deserts Through Urban Agriculture, $50,000, Savannah State University

LS19-309 Evaluating the Impact of Biostimulants on Blueberry Growth and Soil Biological Health, $297,119, University of Georgia

LS18-301 Expanding Marketing Opportunities for Dried Nutraceutical Sericea Lespedeza Products for Small-scale Farmers, $290,000, Fort Valley State University

LS18-299 Sustainable Management Options for Whitefly-transmitted Viruses in Cucurbit Production, $290,000, University of Georgia

LS18-298 Biocontrol with Benefits: Enhancing Sustainability by Adding Value, $260,000, USDA-ARS

LS17-281 Increasing Practice of Sustainable Forestry Among Minority and Limited-Resource Forest Landowners in Georgia, $260,888 , University of Georgia

LS17-278 Developing Sustainable Eastern Oyster (Crassostrea virginica) Farming in Georgia Through Evaluation of Grow-out Methodology, Distribution, and Marketing, $268,000 , University of Georgia

Graduate Student Grant

GS20-233 Effect of Ground Cover Management on Predators and Predation of Halyomorpha halys in Georgia Peach Orchards, $16,111 , University of Georgia

GS19-217 Evaluating Stakeholder Perceptions on Palmer Amaranth Management in Georgia, $14,797, University of Georgia

GS19-216 Assessing the Conditions Informing Direct-to-Consumer Access for Hispanic Immigrant Farmers in South Florida, $16,380, University of Georgia

GS19-197 Aphid Parasitism: A Sustainable Biocontrol Option Against Aphid Pests of Pecans in the Southeastern U.S., $14,740, University of Georgia

On-Farm Research Grant

OS19-126 Off-season Plant-parasitic Nematode Management for Vegetables Through Biomfumigant Cover Crops, $15,000, University of Georgia

Producer Research Grant

FS20-328 Testing Methods to Develop a Soil Food Web in Clay Soils, $14,860 , Ecosystem Farm

Agroforestry an Alternative for Farmers Transitioning Away from Tobacco Production

BEREA, Kentucky- A Kentucky farmer, exploring alternatives for tobacco production, has found that elements of an agroforestry system may prove viable to increasing farm profitability and providing environmental benefits.

Through a Southern Sustainable Agriculture Research and Education (SSARE) Producer Grant, Matthew Wilson of Rindlewood Farm studied the feasibility of incorporating sweet sorghum and pasture poultry with orchard production. He found that raising broilers on pasture was a challenge and not a particularly profitable strategy due to feed costs. However, Wilson was successful in growing sweet sorghum between orchard trees (a method known as alley cropping), and producing syrup as a profitable value-added product. In addition, cover crops grown as feed for the broilers, coupled with the sorghum, produced a mulching system that allowed successful establishment and growth of pear and apple trees.

Alleycropping sorghum with fruit trees. Photo credit: Matthew Wilson

"In our region of Kentucky, many growers have been seeking alternatives for growing tobacco. Agroforestry is one option, but farmers need income while trees become established," said Wilson. "I was interested in growing a crop between the trees to provide early cash flow, as well as exploring raising livestock to generate early returns, improve soil fertility and help control pests."

Wilson said that sweet sorghum was chosen because of community tradition of syrup-making and its modest demand as a value-added product. Poultry was chosen as livestock because many producers are returning broilers to pasture to improve animal welfare, meat quality and environmental benefits. However, most of the feed, even in a pasture system, is purchased off-farm. The aim of incorporating poultry into an agroforestry system is to reduce feed costs, which can account for as much as 65 percent of the production process.

During the two-year project (FS18-311), "Evaluating Sweet Sorghum and Poultry Alley Cropping in Agroforestry as an Economical and Sustainable Alternative to Tobacco Crops," Wilson conducted three treatments: Production of sweet sorghum followed by a winter grain cover crop planted after sorghum harvest in the fall; Planting of a summer cover crop grain mix, with a rye cover crop in the fall; and poultry rotated daily in both cropping scenarios. Summer cover crops included sunflower, millet and buckwheat. Winter cover crops included Austrian winter pea, winter wheat, winter barley and triticale.

Wilson faced challenges establishing the summer cover crop mix. Sunflowers shaded out the buckwheat and millet so not enough feed was available when the broilers were put to pasture. In addition, wild birds predated the sunflower seeds before the poultry could utilize the crop. To compensate, a spring cover crop mix of oats and peas was planted to ensure the broilers had enough feed.

Wilson said that while the broilers did well in the field, showing good signs of foraging, the cover crop treatments did not seem to increase feed use efficiency. Calculating the economics of feed costs, labor, and the amount of feed consumed per pound of chicken, Wilson indicated that to break even, he'd have to charge $6/lb for whole birds, which is more than the local market can bear.

"Integrating cover crops into the poultry operation likely contributed to improved soil health, while also providing useful pollinator and wildlife habitat," said Wilson. "But it does not appear to be a viable strategy for reducing feed costs."

Wilson did see success with the sorghum crop, holding field days to educate farmers on growing, cutting, pressing and cooking the crop for syrup. He yielded an average of 100 gallons of syrup per acre over the course of the study. Wilson also found that the mulch generated from the sorghum residues and the cover crops helped to successfully establish the orchard.

"We were able to successfully establish a small orchard using the residue from the sorghum and cover crops as organic weed control," said Wilson. "Additional benefits of the mulch were improved moisture retention and likely improved soil quality as the mulch breaks down."

Wilson also demonstrated that some equipment used in tobacco production could be modified to accommodate the agroforestry system. Float beds traditionally used in growing tobacco plants were used to raise sorghum seedlings and a tobacco setter was attached to the back of a tractor as a transplanter.

FS18-311 Evaluating Sweet Sorghum and Poultry Alley Cropping in Agroforestry as an Economical and Sustainable Alternative to Tobacco Crops

Research and Education Grant

LS19-319 Development of Local Small Grain Value Chains for Kentucky and the mid-South, $232,669, University of Kentucky

LS18-300 Extending Roots of Fresh Stop Markets Across the Southeast Region, $267,972, University of Kentucky

Professional Development Program Grant

ES20-158 Helping Agricultural Professionals and Mentoring Farmers to Train Previously Unreached Farmers about Sustainable Agriculture, $80,000 , Kentucky State University; Kentucky Center for Agricultural Development

ES19-148 Experiential High Tunnel Training for Cooperative Extension Service Agents in Kentucky, $64,304, University of Kentucky

Graduate Student Grant

GS19-213 Investigating the Effects of Grass-Legume Winter Cover Crop Mixtures on Soil Nitrogen Supply in Rolling Agricultural Landscapes, $16,447, University of Kentucky

On-Farm Research Grant

OS19-130 Integration of Predator Releases with Insecticidal Soap Sprays for Management of the Sugarcane Aphid, $14,913, University of Kentucky

OS19-127 Bale Grazing: On-farm evaluation in the upper South, $12,252, University of Kentucky

Producer Grant

FS18-311 Evaluating Sweet Sorghum and Poultry Alley Cropping in Agroforestry as an Economical and Sustainable Alternative to Tobacco Crops, $9,436, Paint Lick, KY

LOUISIANA

Graduate Student Grant

GS19-200 Biological Control and Re-curing of Sweet Potato Roots as Alternatives for Managing Rhizopus Soft Rot, $16,120, Louisiana State University

GS18-194 Investigating the Role of Plant Tolerance as Defense Against Rice Water Weevil in Irrigated Drill-seeded Rice in Louisiana, $16,471, Louisiana State University

Producer Grant

FS20-321 Sustainable Sidedress Nitrogen Applications or Early Corn and Cotton Using Unmanned Aerial Systems, $14,961 , Parker Farms Partnership

Photo credit: Southern SARE

MISSISSIPPI

Professional Development Program Grant

ES20-153 Improving Conservation Practices and Soil Health in Sweet Potato through Cover-It-Up , $65,220 Mississippi State University

ES20-156 Meat Chemistry and Cuisine: Using a proven method to train extension agents and other professionals serving small-scale and limited resource producers, $80,805 , Mississippi State University; Tuskegee University; Alcorn State University

ES18-138 Growing Your Local Food System and its Brands, $79,999, Mississippi State University

Graduate Student Grant

GS19-214 Factors Affecting In-field Soil Moisture Variability and Its Effect on Irrigation, $10,845, Mississippi State University

Research and Education

LS20-235 Scaling Up Production and Local Marketing for Minority and Limited Resource Farmers, $49,777 , NCAT Gulf States

Photo credit: Southern SARE

NORTH CAROLINA

Researchers Integrate Renewable Energy into Greenhouses to Make Farms More Sustainable

BOONE, North Carolina- With limited land and shortened growing seasons in the mountains of North Carolina, Ok-Youn Yu, an associate professor and assistant chair of Appalachian State University's Department of Sustainable Technology and the Built Environment, saw potential in using greenhouses to combat hunger while increasing farmers' profits and sustainability.

Through a Southern Sustainable Agriculture Research and Education On-Farm grant (OS18-123), Yu demonstrated that renewable energy and biomass-based greenhouse heating systems can cut farmers' energy bills in half when integrated with a root zone heating system.

These systems were built and tested at two local farms in Watauga county, North Carolina.

Springhouse Farm in Vilas, North Carolina specializes in vegetables and cut flowers. The farm usesva a conventional, high-tunnel style greenhouse to propagate plants in late January through mid-February. To maintain the growing environment, a forced-air propane heater was set to 55 degrees Fahrenheit while the soil was heated from below with electric mats to keep it at proper germination temperature.

In 2017, a Nexus pilot system was installed to manage energy use inside the greenhouse.

An evacuated-tube solar collector was installed which uses the sun's energy to heat water. To increase efficiency, a 50/50 propylene glycol and water mix was used. Once heated, the food-safe mixture is stored in a traditional 40-gallon propane water heater. This system replaced the electric mats by carrying heat through a network of tubes to the root zone of plants.

Photo credit: Appalachian State University

A biochar kiln was installed to serve as a backup heat source.

"Biochar is like a charcoal, made burning organic material from agricultural and forestry waste called biomass like woods chips, crop residue and manure," explained Yu. "To make that, we need a process called slow pyrolysis. That means oxygen-free or low-oxygen conditions, and heat up to about 500 Celsius. That's easily over 1,000 Fahrenheit. Heat it for one to two hours without oxygen, then we can make biochar if all conditions are met."

To capture heat from the pyrolysis process, a heat exchanger was connected to the kiln, which warms the heat exchange fluid and circulates it back to the storage tank for later use.

Heat from the solar collector and kiln raises the heat transfer fluid temperature to around 140 Fahrenheit. When needed, a soil-sensing thermometer activates a pump which circulates the fluid through a series of tubes to the root zone of plants on the germination bench. A valve mixes hot and cold fluid to maintain soil temperatures at 70 Fahrenheit. If the fluid in the storage tank drops below 80 Fahrenheit, a propane heater is activated.

In the summer months, excess heat can be routed to a food dehydrator.

After testing the system in 2017, the propane space heater shifted to supplemental heat. This allowed the pilot system to provide the majority of heat in 2018.

Following the 2018 growing season, the germination bench cover was upgraded and an automated mixing value added to reduce heat loss. This eliminated the need for the propane space heater and in 2019, the greenhouse was heated entirely by the new pilot system.

To measure efficiency throughout this process, propane consumption was monitored and heat degree days calculated by subtracting the average daily temperature from a baseline of 55 degrees to normalize yearly weather variances.

In 2019, with 187 more heat degree days and seven more days below freezing than 2016, propane consumption dropped from 180 gallons to 81 gallons. This shows significant energy savings and a large reduction in fuel use.

Upgraded bench covers were added to the germination benches.
Photo credit: Ok-Youn Yu

Against the Grain Farm had a similar pilot heating system installed as part of the SSARE grant.ATG farm has a passive greenhouse. Without a heating system, the greenhouse is designed to capture the maximum amount of heat possible, store it in a thermal battery and slowly release it to maintain a consistent temperature.

Again, a pilot heating system with solar collectors and a biochar kiln were added along with a food dehydrator and vertical germination racks.

The greenhouse is used heavily from January to April. With no built-in heating source, the biochar kiln provides heat when sunlight is unavailable.

When the biochar kiln is running, the same heat transfer fluid pumped at 3 gallons per minute through a heat exchanger, connecting the 300-gallon thermal battery to the kiln. A temperature-controlled pump circulates the fluid when a 6.5 Celsius difference is detected between the kiln and the thermal battery.

The energy captured from the biochar kiln was monitored over the course of the 2018 growing season. On average, 14.8% of the excess heat energy was captured, providing renewable energy and a useful soil amendment from an unused by-product.

Research like this looks to reinvent the heated greenhouse by using on-farm biomass and solar energy to create year-round growing conditions without the use of fossil fuels.

OS18-123, Demonstration of Root Zone Heating Supported by the Developed Biomass Greenhouse Heating System

NORTH CAROLINA PROJECTS CONTINUED

Research and Education Grant

LS20-321 Small Ruminant Producers Program: A pilot program for small ruminant producers and county agents, $31,895 , North Carolina Agricultural and Technical State University; North Carolina State University

LS20-323 Building Resilient and Successful Farm Businesses in the Southern Appalachians, $50,000 , Organic Growers School

LS20-326 Promoting Southeastern Agriculture Resilience with Carbon Farm Planning, $50,000 , NC Foundation for Soil and Water Conservation; Carbon Cycle Institute

LS 20-333 Development of a Sustainable Cropping System for Industrial Hemp Production by Limited Resource Farmers, $229,933 , North Carolina A&T State University

LS20-336 Navigating Financial and Mental Health Crises, $299,959 , Rural Advancement Foundation International - USA; The Land Loss Prevention Project; The NC AgroMedicine Institute; The National Center for Appropriate Technology

LS19-311 Application of a Banker Trap Plant (BTraP) Concept of Trap Cropping for the Management of the Harlequin Bug, a Pest of Brassicaeae: A new paradigm in small farm IPM, $257,987, NC A&T University

LS19-310 Cool Season Annual Grass, Grass-Forb, and Grass-Legume Forage Systems for Southeastern Beef Cattle Production, $270,708, North Carolina State University

LS18-303 CEFS Long-term Systems Research: Providing the Building Blocks for Resilient Food Production Systems Phase III, $100,000 , North Carolina State University

LS17-285 Growing Local -- Phase III, $300,000, Appalachian Sustainable Agriculture Project

LS17-279 Enhancing System Sustainability by Mitigating the Impact of Three Major Constraints to Efficient Cowpea Production and Use: Pests, pollination and nodulation, $210,000, NC A&T University

Professional Development Program Grant

ES19-146 Effectively Using Permanent and Temporary Electric Fence Technology: Adviser training to support producers implementing adaptive grazing management, $79,954, North Carolina State University

Graduate Student Grant

GS20-230 Investigating Social Networks for Cooperative Management Potential in Agriculture, $8,984 , North Carolina State University

GS19-215 Quantifying the Disease Ecology and Network Connectedness Across Pollinator Communities as a Result of Planted Pollinator Plots, $16,500, North Carolina State University

GS19-212 Rye With or Without Purple Top Turnips for Stocker Calf Grazing Over the Winter Following Corn Harvest as Part of a Southeastern U.S. Integrated Crop-Livestock System, $11,757, North Carolina State University

GS19-205 Optimizing Electrical and Mechanical Palmer Amaranth Control and Reducing Seed Production and Viability, $16,498, North Carolina State University

On-Farm Research Grant

OS19-129 Evaluating Scale-appropriate Technology for Organic No-till Vegetable Production, $14,904, Carolina Farm Stewardship Association

OS19-125 Regenerative Grazing to Mitigate Climate Change, $14,787, Duke University

Producer Grant

FS19-313 Bee Pollen Identification for Increased Sustainability, $9,938, Hudson, NC

OKLAHOMA

Professional Development Program Grant

ES19-145 Southern Region SARE Professional Development Grant -- The Road to Soil Health, $59,442, Noble Research Institute

On-Farm Research Grant

OS18-120 A Comparison of Row Cover Materials for Use in Excluding Major Insect Pests from Cucurbit Crops, $14,933, Oklahoma State University

Research and Education

LS20-338 Researching & Networking Native American & Socially Disadvantaged Farmers Traditional Market Gardening Production System Resiliency, $298,066 , Langston University School of Agriculture and Applied Sciences; College of the Muscogee Nation; Pawnee Nation College; Oklahoma Farmers and Ranchers Association

LS20-344 Developing a Sustainable Meat Goat Production and Marketing System for the Southeastern United States through an 1890 Universities Consortium, $600,000, Langston University; Florida A&M University; Fort Valley State University; Prairie View A&M University; Tennessee State University; Tuskegee University; Virginia State University

PUERTO RICO

Amid Natural Disasters, Pandemic Training Program Helps Small Farmers

ARECIBO, Puerto Rico- On the north side of the island of Puerto Rico, 50 miles west of San Juan, the city of Arecibo and surrounding area is home to some of the world's most fertile soil and diverse farmland.

A series of earthquakes and hurricanes have struck the island in recent years, damaging critical farming infrastructure like buildings, roads, irrigation equipment and high-tunnel greenhouses. Still in the rebuilding process, the pandemic caused massive economic pains for Puerto Rican farmers as the economy was forced to close.

"From a consumer perspective, we only see what is on our plates and in our supermarket isles. Small and medium-sized farmers have taken the biggest hit as large farms have the all the tools and financial support," said Anthony De La Rosa, a private agricultural professional in Puerto Rico.

Through the De La Rosa Company, he educates and supports farmers with hydroponics, agriculture technology and a number of other community outreach programs in Arecibo. After seeing the struggles of farmers around him, De La Rosa set out to develop a program that would educate Puerto Rican farmers as they rebuild and improve their operations.

Forced to adapt his program due to the COVID-19 pandemic, he reached out to the SARE. Through the Southern SARE Sponsorship Program, De La Rosa received funding to pivot a program designed to teach farmers about hydroponics, sustainability practices and good farm business management, into a virtual setting.

"Things have been hectic the last 7 or 8 months. We've tried to focus more on hydroponics and senior farmers. The sponsorship helped me through this by allowing me to host the event. Most if not all of the people we work with are not tech-savvy," said De La Rosa.

To keep participants safe, the program was redesigned. The training program was shifted to a three-day webinar designed to improve farm sustainability on the island and teach producers about the potential of hydroponics for their operations. The on-farm demonstration of the hydroponic system was moved to a location that could safely host the event.

Professional Development Program Grant

ES20-152 Soil Nutrient Management in Tropical Soils, $69,335 , University of Puerto Rico, Mayaguez

ES19-149 Agroforestry Management for Tropical and Subtropical Agroforestry Systems: Management guide and practical workshops, $53,609, University of Puerto Rico-Utuado

Research and Education Grant

LS20-330 Agro-Ecological Education for New Farmers in the Central Western Region of Puerto Rico, $49,992 Plenitud PR

LS20-329 Agroecosystem Sustainable Guides, $41,040 , Eco Servicios & Landscaping

Producer Grant

FS20-324 Building Soil and Plant Health with Compost and Compost Teas, $12,443 , Finca La Jiba

SOUTH CAROLINA

Transforming Existing Forested Land into Silvopasture Systems

GREENVILLE, South Carolina – Livestock producers with patches of established forested land on their farm can turn to agroforestry practices as an option to increase economic stability while enhancing environmental quality.

Researchers at Furman University, through a Southern Sustainable Agriculture Research and Education (SSARE) grant, studied the feasibility of transforming forested land on farms in South Carolina, North Carolina, and Georgia into silvopasture systems. Silvopasture is a sustainable agriculture practice that integrates trees and livestock in a system that combines grazing with environmental benefits, as well as a secondary income stream.

"Agroforestry systems are not widely used in agriculture, in part because of the time required to grow mature stands of trees," said associate professor John Quinn. "We wanted to look at the idea of restoring existing forest patches and developing sustainable grazing practices."

Photo credit: Southern SARE

Quinn and his colleagues, along with collaborating farmers, studied suitable understory forage mixtures specifically for grazing pigs, removed invasive weed plant species to determine how that impacted wildlife nesting and foraging habitat, and analyzed soil quality between managed and unmanaged forested land.

Results of the study (LS16-273), "Improving Silvopasture Systems in the South: Identification of suitable forage crops and enhancement of environmental quality in upland forests," were mixed.

With the forage mixtures of chicory, rye, alfalfa, and crabgrass, drought during one trial year prevented adequate germination and sufficient plant stand. In addition, researchers found that the forage mixtures did not maintain enough growth in the latter stages of production to provide sufficient forage or soil retention. Ryegrass, however, performed the best in shade conditions.

Researchers expanded the field trials to limited greenhouse experiments to better understand the production dynamics. "In a larger greenhouse trial, with greater replication, we found greater biomass in more species-rich plots," said Quinn. "There were significant differences between one and two species and three and four species trials. Thus, though further research is needed, three-species mixtures may be a suitable starting point for future field trials in shade conditions."

Upon removal of invasive plants, researchers noted that bird species richness between the managed and unmanaged forested plots did not differ. However, they found slight variations in bird communities. "We did find that four bird species of conservation concern were present in the silvopasture sites, but not in the control sites," said Quinn. "The small data size collected limits broader inference, but it does suggest potential opportunities for farmers to collaborate with conservation specialists on forest restoration and wildlife management."

In order to measure soil health and overall fertility, researchers extracted soil cores between managed and unmanaged forested sites to determine soil carbon and nitrogen concentrations. They compared the results to rotationally grazed pastures on one farm site participating in the project. Quinn and his colleagues found that variations in soil organic matter were not significantly different between forested land and rotationally grazed

pastures, as well as between managed forests and unmanaged forests. They also highlight these data will allow for comparisons overtime as the grazing systems mature.

"The results suggest that forest soils, like the pastures, are still recovering from degradation caused by intensive tillage cultivation," said Quinn. "Removal of invasive plants and increased rotational grazing combined with cover crops may improve soil quality as measured by carbon and nitrogen content."

Researchers shared the results of the study through on-farm tours, outreach publications, videos and other educational resources.

LS16-273, Improving Silvopasture Systems in the South: Identification of Suitable Forage

Research and Education Grant

LS19-306 Utility of Anaerobic Soil Disinfestation and Organic Herbicides for Weed and Disease Management in Organic Solanaceous Vegetable Systems, $293,470, Clemson University

LS19-305 Incorporating Natural, Non-toxic Arthropod Resistant Tomato Varieties into Southern Production Systems, $299,963, Clemson University

Professional Development Program Grant

ES19-150 Advanced Soil Health Training for South Carolina Agriculture Professionals, $79,847, Clemson University

Graduate Student Grant

GS18-192 Cover Cropping to Improve Soil Moisture Content for the Following Cash Crop, $16,496, Clemson University

On-Farm Research Grant

OS20-133 The Potential of Inter-seeded Cover Crops for Enhancing Soil Health and Soil Moisture Content in a Row Crop Production System, $20,000 , Clemson University

OS18-118 Cover Cropping to Increase the Sustainability of Cropping Systems by Developing Soil Organic Matter, Improving Soil Health, and Suppressing Weed Growth, $15,000, Clemson University

Producer Grant

FS20-326 Summer Cover Crops for Organic No-till Broccoli, $14,820 , Wild Hope Farm

TENNESSEE

Soil Management Course Brings Healthier Soil to Tennessee

NASHVILLE, Tennessee – Healthy soil plays an important role in the economic and environmental sustainability of farms. While awareness for the benefits of healthy soil has increased in recent years, a lack of technical and financial information on some beneficial soil management practices has limited adoption in Tennessee.

To solve this, Jason de Koff at Tennessee State University worked with professionals from the University of Tennessee, the USDA Natural Resources Conservation Service and the Tennessee Association of Conservation Districts to apply for a Professional Development Program Grant through the Southern Sustainable Agriculture Research and Education program.

The two-year grant was funded by the Southern SARE program to provide participants with training and resources including materials from the USDA NRCS, training modules on the economics of soil health and cover crops, a soil health test kit and access to demonstration plots planted in each region of the state to compare management practices.

The soil health test kit allows extension agents to measure soil pH, soil electrical conductivity, soil infiltration rates and soil temperature on farms and ranches. The test kit was integrated into the training to enhance the course.

Photo credit: Southern SARE

The demonstration plots were planted in farmers' fields or research and extension centers across the state. Plots were either left unplanted or planted with a cover crop mix to highlight the beneficial effects of cover crops.

Some plots were planted with only winter wheat and others received only crimson clover. Other plots received a five-way blend of Austrian winter pea, tillage radish, crimson clover, cereal rye and winter wheat. Additional plots were planted in a ten-way blend of Austrian winter pea, tillage radish, crimson clover, cereal rye, winter wheat, spring oat, annual ryegrass, alfalfa, mustard and turnip.

Several groups worked together to construct the curriculum and implement the program. An advisory group of two farmers and one extension agent from each region of the state gathered in a virtual setting to discuss the project.

Based on the work of this group, Tennessee State University researcher Jason de Koff along with David McMillen and Greg Bann of the USDA NRCS, Mike Hubbs with the Tennessee Association of Conservation Districts and Danny Morris from the University of Tennessee developed the curriculum and training manual.

Over the course of the grant project, 32 agriculture professionals were educated. Taking their knowledge and soil health test kits with them, these participants have returned to their communities to help increase awareness and pass along knowledge on soil health. The curriculum and training manual for the Soil SMaRTS program is also available in every county extension office in the state of Tennessee. For more information on the Southern SARE program or the grant project ES18-141, please visit https://southern.sare.org.

ES18-141, Soil SMaRTS (Specific Management and Resources Training for Sustainability) for Soil Health in Tennessee

Research and Education Grant

LS20-335 Cover Crops and Cropping System Sustainability in a Changing Global Climate, $299,995 , Middle Tennessee State University; University of Kentucky; Auburn University

LS18-287 Cover Crops in Woody Ornamental Production: Impact on Plant Growth, Arthropod Pests, Soil-borne Pathogens and Weeds, $284,869, Tennessee State University

Graduate Student Grant

GS20-228 Sustainable Management of Phytophthora Cinnamomi and Ambrosia Beetles Under Stress Conditions, $16,335 , Tennessee State University

Producer Grant

FS19-315 A Study of the Effects of Black Woven Polypropylene on Soil Biota, $9,670, Lascassas, TN

TEXAS

Texas Farmers Learn to Build Soil Health Through No-till and Cover

VERNON, Texas – It's a hot, dry, windy summer day on the plains of North Texas, and a group of farmers are standing in the middle of a field to learn how techniques to build soil health benefit their cash crops in Texas' harsh environmental conditions.

"This is what no-till looks like in the first year," said Nathan Haile, a soil health specialist with the Natural Resources Conservation Service (NRCS). Ripped in October 2017 and planted with cover crops, the field was sparse and weedy. "You need to start with a good year, and this was not that," said Haile, indicating that the region had only received four inches of rain since May. The historical average is 25 inches.

But the advantages to no-till and cover crops is what is happening underneath the top soil — breaking up that compaction, building soil microbial communities and capturing/retaining much needed moisture. "The first three to four years of no-till may not be pretty, but if you stick it out, you can get through the challenges," said Haile. "We have farmers that have been in no-till and cover crops for 10 years, 15 years, or more and the soil health benefits are evident."

The stop in Iowa Park, TX was part of a larger Rolling Plains Field Tour on August 29 to show farmers how the soil structure changes from a conventional tillage system to a no-till system and how soil health improves under such techniques as crop rotation, residue management, cover crop mixes, biomass production for grazing, and double cropping for water management.

Mungbean is one plant being studied in double crop research at Texas A&M University to help improve wheat yields and preserve soil moisture. Photo credit: Southern SARE

The field tour, "Practices to Improve Soil Health and Soil/Water Conservation," was hosted by Texas A&M AgriLife Extension, Texas NRCS, and the Southern Sustainable Agriculture Research & Education (SSARE) program – based on SSARE research project (LS16-271), "Intensifying Cropping Systems in Semi-arid Environments to Enhance Soil Health and Profitability."

On another stop along the tour in Electra, TX, farmers had the opportunity to see the results of Texas A&M research on using cover crops and double crops for building soil health in a wheat field that has been in no-till for 15 years. Mixed species cover crops are most commonly recommended in the region.

"Can double cropping produce the same benefits as a cover crop mix and can farmers make a profit on their cash crop?" said Paul De Laune, Texas A&M soil scientist. The researchers studied the following double crop options: mungbeans, cowpeas, pigeon peas and guar, and saw improved wheat yields in one year out of the three years of study. In addition, double crops did provide some stored soil moisture at the time of wheat planting.

"When you have the right double crop, you can see the advantages in wheat yields," said De Laune.

Another advantage of cover crops is the biomass multiple species can produce. De Laune indicated that

anywhere from 3,000 to 6,000 pounds of biomass was produced on the research site. “Some legume monoculture cover crops, such as the newly released Ace forage cowpea, can produce similar biomass as mixed species while accumulating over 100 pounds of nitrogen per acre,” he said.

Other stops on the tour included visits to farms in Elliot and Holliday, TX to view research on residue management and the optimal time to terminate cover crops, as well as the grazing potential of cover crops compared to wheat.

“Cover crops are a way for farmers to transition into a healthy soil system. It’s time to start treating a cover crop as a real crop and not as a step-child crop,” said Haile.

LS16-271 Intensifying Cropping Systems in Semi-arid Environments to Enhance Soil Health and Profitability

Research and Education Grant

LS20-343 Toward Culturally Responsive Disaster Management for Limited Resource Producers: The Role of Person, Place and Professional Agencies, $300,000 , Prairie View A&M University; North Carolina A&T State University (NCA&T)- 1890 Partner Institution; Tennessee State University (TSU)- 1890 Partner Institution; University of Arkansas Pine Bluff (UAPB)- 1890 Partner Institution; Florida A&M University (FAMU)- 1890 Partner Institution; Tuskegee University (TU)- 1890 Partner Institution; University of South Carolina

LS20-341 Assessing Water Use Efficiency, Soil Health, and Pollinators within a Transition from Irrigation to Dryland Management in the Texas High Plains, $299,208 , Texas Tech University; United States Department of Agriculture- Agricultural Research Service (USDA-ARS)

LS19-313 Organic and Conventional Agriculture: Learning from Each Other to Promote Soil Health and Economic Viability in West Texas, $299,667, Texas A&M University

LS19-312 Regional Food Transportation for Texas Farmers, $299,311, The University of Texas at Arlington

LS18-288 A Southern Regional Water Conference to Improve Producer Adoption of Sustainable Water Management Practices, $48,000, Texas A&M University

LS17-286 Long-term Agroecosystems Research and Adoption in the Texas Southern High Plains -- Phase III, $300,000, Texas Tech University

Professional Development Program Grant

ES20-151 Beekeeping Curriculum and Training for Texas Agricultural Extension Agents and 4-H Youth Leaders, $79,516 , AgriLogic Consulting, LLC; Texas Beekeepers Association; Texas Apiary Inspection Services; Texas AgriLife Extension Service; Mentor Farmers

ES19-147 Training Texas County Extension Agents and Mentor Ranchers to Improve Small Ruminant Health and Productivity Through Natural Genetic Selection Strategies, $76,996, Texas A&M University

ES18-142 Promotion and Adoption of Sustainable Agriculture Practices in Texas: Training the trainers, $80,000, Texas A&M University

Graduate Student Grant

GS20-229 Cannabis sativa L. as a Feed Source in Backyard Rabbit Production, $16,419 , Tarleton State University

GS20-227 Texas Little Bluestem (Schizachyrium scoparium) Phenotypic Attribute Correlations to Collection Site Environment Characteristics, $11,889 , Tarleton State University

GS20-226 Comparing the Effects of Forage Mix and Nutrient Management on Soil Greenhouse Gas Flux in Semi-arid Improved Pastures, $16,450 , Texas Tech University

GS19-211 Roadblocks to Success: Needs assessment of small producers in Texas, $10,132, Texas State University

GS19-209 Improving Resilience, Sustainability and Nutritional Properties of Specialty Crops Using Composted Spent Coffee Grounds, $16,044, Texas A&M University

GS19-198 The Success of Organic and Other Sustainable Dual-Purpose Wheat Systems Depend on Access to Adapted Varieties, $16,500, Texas A&M University

On-Farm Research Grant

OS20-139 Incorporating Native Plants in Insectary Strips to Promote Insect Diversity and Belowground Beneficial Microbes, $20,000 , University of Texas Rio Grande Valley

OS20-138 Strategic Management of Legume Cover-forage Crops to Optimize Utility in a Challenging Environment, $20,000 , Texas A&M AgriLife Extension

OS19-131 Advancing the Frontier of Legume Cover Crops and Building Integrated System Resilience in Semi-arid West Texas, $15,000, Texas A&M University

OS19-128 Sustainable Pasture Management in Texas: Optimizing forage production and nutrient use in various environments and soils, $14,298, USDA-ARS

OS18-121 Integrating Cover Crops as Potential Weed and Pest Management Strategy in Organic Vegetable Farms in South Texas, $15,000, University of Texas-Rio Grande Valley

OS18-119 Supporting Alternative Crop Options Through Improved Fertility Recommendations for Canola in Central and South Texas, $14,811, Texas A&M University

Producer Grant

FS19-312 Tagasaste: A new feed source for West Texas, $9,670, Marfa, TX

U.S. VIRGIN ISLANDS

Producer Grant

FS20-327 Testing Vegetable Varieties in Tropical Conditions on St. Croix, USVI for Farm to School Crop Production, $12,480 , Virgin Islands Farmers Alliance

FS19-316 Lemon Grass (Cymbopogon citratus) of the Two Main Strands East Indian Lemon Grass (Cymbopogon flexuosus) or West Indian Lemon Grass (Cymbopogon citratus): Which one yields the greatest amount of essential oil, $8,609, St. Thomas, VI

Professional Development Program

ES20-157 Advancing Professional Development in the U.S. Virgin Islands About the Cooperative Business Model: A Training and Mentorship Program, $87,833 , University of the Virgin Islands; The Federation of Southern Cooperatives; The West Georgia Farmers Cooperative

VIRGINIA

Researchers Recommend New Strategies to Suppress Southern Potato Blight

PAINTER, Virginia – Earlier planting dates coupled with disease-tolerant cultivars of potatoes are recommended strategies to suppress southern potato blight, according to Virginia Tech researchers.

The fungal disease, caused by the soil born pathogen *Sclerotium rolfsii*, affects the stems of the plants and produces lesions on the tubers, impacting quality and yields.

S. rolfsii infected potato plants
Photo credit: Southern SARE

In a Southern Sustainable Agriculture Research and Education (SSARE) Graduate Student Grant, plant pathologist Steven Rideout and graduate student Jose Garcia Gonzalez, studied 10 commercial cultivars with no known resistance to southern potato blight over four planting dates to determine which planting date and which cultivars provided the best management option for controlling the disease.

"Over the past decade, occurrence of potato southern blight has increased on the Eastern Shore of Virginia and surrounding areas," said Rideout. "There is no known potato cultivar resistant and traditional management relying on fumigants and fungicides has provided inconsistent results."

In the two-year study (GS17-177), "Effect of Cultural Practices in Controlling Southern Blight of Potato in the Mid-Atlantic Region," the researchers arranged field trials in a split-plot design with four replications, inoculated the fields which had no known history of southern potato blight, and studied the disease incidence of the plants over a week to two-week period. They also harvested the tubers, visually inspecting them for disease and calculating marketable yield.

Four planting dates: early March, late March, mid-April and mid-May were chosen. The cultivars studied include 'Superior', 'Red Norland', 'Dark Red Norland', 'Envol', 'Atlantic', 'Snowden', 'Yukon Gold', 'Russet Burbank', 'Adirondack Blue' and 'Accumulator'.

Rideout and Gonzalez found that the earlier the planting date, the less incidence of disease was recorded, along

with higher yields and higher tuber quality.

"In general, less in-field southern potato blight incidence was observed for the earlier planting dates," said Rideout. "Later planting dates resulted in decreased yield and tuber quality and increased percentage of disease tubers."

Cultivars that had the highest tolerance to southern potato blight coupled with earlier planting dates included 'Atlantic', 'Snowden' and 'Accumulator', all chipping potatoes. 'Adirondack Blue', 'Red Norland', and 'Dark Red Norland', cultivars grown for the fresh market, were impacted the greatest by disease and had greater tuber disease issues.

The researchers pointed out that if growers must choose a later planting date, 'Accumulator' would be a good choice, as the cultivar consistently produced the greatest marketable tuber yields and least diseased tubers across all planting dates, and appeared to be more disease-tolerant in later planting dates.

"This information, though limited, provides options for farmers to select cultivars and a planting date to minimize the negative impact on potato yields caused by southern potato blight," said Gonzalez. "This could also help reduce the use of pesticides as a primary option for the management of southern potato blight."

GS17-177 Effect of Cultural Practices in Controlling Southern Blight of Potato in the Mid-Atlantic Region

Research and Education Grant

LS20-337 Development and Evaluation of IPM Systems Components for Insect Pests and Pathogens of Cucurbit Crops in the Southeastern U.S., $299,935 , Virginia Tech Department of Entomology; North Carolina State University; Clemson University

LS20 Silvopasture for Poultry Production with Outdoor Access: Impact on animal welfare, economic, and environmental parameters, $275,079 , Virginia Tech

LS20-327 A Modular Curriculum for Growing Food Grain for the Local Market, $50,004, Common Grain Alliance

LS20-324 Organic Soil Health Education Online Course and Resources for the Southern SARE Region Farmers and Ranchers, $49,882, Organic Farming Research Foundation; Southern Sustainable Agriculture Working Group

Professional Development Program Grant

ES18-144 Sharing the Wealth of Cover Crops: Improved cover crop and soil health knowledge sharing and networking, $79,091, Virginia Tech

Graduate Student Grant

GS20-232 Assessing Suitable Production Techniques for Ramps in Appalachia, $14,660 , Virginia Tech

GS19-204 Production of High Protein Feeds from Brewer's Spent Grain to Replace Fishmeal in Aquaculture Diets, $16,333, Virginia Tech

GS19-202 Cortisol as an Indicator of Stress in Animals Under Different Grazing Systems, $13,500, Virginia Tech

GS19-201 Investing in Tribal Food Security and Agricultural Recovery, $15,740, Virginia State University

On-Farm Research Grant

OS18-122 Sustainable Varroa Mite Management in Honey Bee Queen Production, $14,998, Virginia Tech

Producer Grant

FS20-325 Breeding and Evaluation of Butternut Squash Varieties for Southeast Organic Farms, $19,846 Common Wealth Seed Growers / Twin Oaks Seed Farm

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