Benefiting The World:

COTTON SUSTAINABILITY RESEARCH BEGINS IN THE U.S.

A Sample of Sustainability-Focused Research Across the U.S. Cotton Belt

Leading Cotton into a Sustainable Future

Cotton Incorporated is the research and promotion company for cotton. Established in 1970 as a not-for-profit company, its mission is to increase the demand for and profitability of cotton through research and promotion. Cotton Incorporated funds hundreds of research projects across the U.S. Cotton Belt every year. Research findings are freely shared around the world to benefit cotton growers, manufacturers, and consumers in the local and global community.

This booklet is only a sample of the climate-smart sustainability research that Cotton Incorporated funds. The research projects presented are organized alphabetically by state, covering all 17 states of the U.S. Cotton Belt. Each project outlines the objective, research partner, and location. Most importantly, each project is designed to help growers achieve the U.S. cotton industry's sustainability goals as well as the U.N. Sustainable Development Goals.

Much of the research funded by Cotton Incorporated can be found on https://cottoncultivated.cottoninc.com/, a grower-centered website where hundreds of innovative tools, decision aids and research reports have been developed to share broadly outside of the U.S.

Learn more about Cotton Incorporated's sustainability efforts:

www.cottonworks.com/sustainability

https://cottontoday.cottoninc.com/

Precision Conservation for Working Lands

Cooperator: Brent Rudolph, Quail Forever Inc.

Location: Alabama, Texas

Objective: To improve the profitability and sustainability on working farms in the southern United States with a focus on landscapes supporting bobwhite quail, monarchs, and cotton production.

Over the last 10 years, the use of precision agriculture technology for input efficiency and the analysis of data to create spatially explicit management zones has expanded significantly. But utilizing these data to identify precision conservation zones is rarely implemented within traditional agronomy, agriculture equipment and commodity industry.

This project seeks to integrate these sectors for improving farmer profitability and sustainability on working farms in Texas and Alabama with a focus on conservation and biodiversity habitat improvement.

10-Year Sustainability Goals:
Primary: Increasing Soil Carbon, Decreasing Soil Loss, Increase Land Use Efficiency, Reducing GHG Emissions, Decreasing Water Use, Decreasing Energy Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land

Designing & Evaluating Sustainable Cotton Systems

Cooperator: Dr. Peter Ellsworth, University of Arizona

Location: Arizona

Objective: Over nearly 30 years, insecticide use has declined dramatically and the cost of insect control has stabilized. There is increasing interest in the sustainable source and production processes of food and fiber supply chains. This both challenges and potentially rewards growers financially. Demonstrating sustainability will rely on rigorous, credible verification of the safety and sustainability of these production systems.

This project aims to demonstrate and verify that the gains made in arthropod integrated pest management (IPM) are in fact linked with significant reductions in risks and hazards to human health and the environment, and further reduce remaining risks to human health and the environment including non-target arthropods needed for conserving in-field biological control agents.

10-Year Sustainability Goals:
Primary: Land Use
Secondary: Reducing GHG Emissions, Decreasing Energy Use, Water Efficiency

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

Nitrogen Fertilizer Management for Newer Cotton Cultivars Under Overhead Sprinkler Irrigation

Cooperator: Dr. Kevin Bronson, USDA-ARS

Location: Arizona + Regional

Objective: Develop nitrogen management systems that maximize nitrogen use efficiency and lower nitrous oxide emissions.

This study examines the use of crop sensors to better determine the rate and timing of nitrogen applications to cotton. It also considers the impact of different irrigation methods on nitrogen use by the plant, as well as measuring the amount of nitrous oxide emitted when different approaches are used.

10-Year Sustainability Goals:
Primary: Reducing GHG Emissions
Secondary: Decreasing Energy Use, Water Efficiency

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life on Land

Breeding Cotton for Yield, Host Plant Resistance, and Fiber Quality

Cooperator: Dr. Fred Bourland, University of Arkansas

Location: Arkansas

Objective: To evaluate and make changes to techniques employed by the University of Arkansas Cotton Breeding Program that will enhance the development of better adapted, improved cotton lines.

By maintaining a well-developed cotton breeding program, the availability of strong, well-adapted cultivars is ensured. About 10 years is required from an initial cross to the release of a new line. The primary focus of the University of Arkansas Cotton Breeding Program has been to develop new cotton germplasm types that meet cotton production needs of Arkansas and the mid-south region of the U.S. New lines express various combinations of enhanced specific host plant resistance traits, improved fiber quality, and/or increased yield.

10-Year Sustainability Goals:
Primary: Land Use
Secondary: Reducing GHG Emissions, Decreasing Energy Use, Water Use Efficiency

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

Conservation Practices for Reducing Water Quality Impairment, Yield Losses, and Global Warming Potentials in Cotton Production

Cooperator: Dr. Arlene Adviento-Borbe, USDA-Agricultural Research Service

Location: Arkansas

Objective: Explore the long-term environmental and agronomic impacts of conservation practices in irrigated and non-irrigated cotton production.

The study will provide: Baseline datasets in the current greenhouse gas (GHG) emission levels under improved conservation management systems; Evidence whether cotton production is a source or sink of GHG emissions; Science-based information about the benefits and challenges of adopting conservation practices on selected farms, and data for farmers to improve their current conservation practices to sustain economic yield while protecting the environment.

10-Year Sustainability Goals:
Primary: Increasing Soil Carbon, Decreasing Soil Loss, Increase Land Use Efficiency, Reducing GHG Emissions, Decreasing Water Use, Decreasing Energy Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land

Optimizing Integrated Pest Management Tactics for Cotton Production Systems that Incorporate Soil & Water Conservation Practices

Cooperators: Drs. Tina G. Teague, Arkansas State University, Michele Reba, & Arlene Adviento-Borbe, both USDA-Agricultural Research Service

Location: Arkansas + Mid-South Region

Objective: Increase understanding and document the progress of modern U.S. cotton production systems that integrate soil and water conservation practices and IPM approaches to improve efficiency, sustain profitability, and lessen negative environmental impacts of production.

The research will include studies to refine management recommendations for IPM tactics in conservation systems which incorporate nutrient management practices such as reduced tillage, cover crops, and optimal fertility management. The study includes practical field-testing of the Agronomic Trial Data Collection Tool to support research efforts with PDI and the AgCROS network.

10-Year Sustainability Goals:
Primary: Land Use, Water, Decreasing Energy Use, Soil Carbon, Reducing Soil Erosion

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

The Regional Breeder Testing Network (RBTN) Trial in California

Cooperators: Dr. Robert Hutmacher, University of California, Davis; Dr. Ted Wallace, Mississippi State University, Project Coordinator

Location: California + National

Objective: Provide public sector cotton breeders an opportunity to evaluate their germplasm in a wide variety of environments.

More than 90% of U.S. cotton is the same species, commonly called Upland Cotton. Within the Upland species, plant breeders have crossed different types of plants to create varieties of cotton and often these varieties are adapted to the climate they were developed in.

This project allows breeders to take some of their material and grow it in several different states in the Cotton Belt. This allows them to identify what regions will be best for their varieties. This specific project is an example of a test in California–an important location as it is at the western edge of where U.S. cotton is grown and is an arid, hot environment.

10-Year Sustainability Goals:
Primary: Land Use
Secondary: Reducing GHG Emissions, Decreasing Energy Use, Water Efficiency

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production

Impact and Management of Target Spot in Cotton

Cooperator: Dr. Ian Small, University of Florida

Location: Florida

Objective: Develop integrated management strategies to minimize yield loss from target spot.

A fungal disease called target spot can cause damage to cotton plants. This project is focused on identifying varieties that are naturally resistant to the disease and determining when and if a fungicide is needed.

Preventing yield loss improves land use efficiency. If fungicide applications are avoided, this improves energy efficiency and reduces greenhouse gas (GHG) emissions.

10-Year Sustainability Goals:
Primary: Land Use
Secondary: Reducing GHG Emissions, Decreasing Energy Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

Breeding to Improve Yield and Quality

Cooperator: Dr. Peng Chee, University of Georgia

Location: Georgia + National

Objective: To improve the yield and quality of U.S. cotton by developing improved germplasm and varieties.

A driving force behind many of U.S. cotton's sustainability gains has been traditional plant breeding (i.e., the same methods used by Mendel in the 1800s). By selecting improved varieties, cotton's fiber quality and yield have improved without requiring additional inputs.

This project has developed varieties that are used by cotton producers, as well as plant material for commercial seed companies to include in their breeding programs. As some varieties only perform well in certain climates, it is important to develop varieties in different locations. This project focuses on varieties adapted for the southeastern United States.

10-Year Sustainability Goals:
Primary: Land Use
Secondary: Reducing GHG Emissions, Decreasing Energy Use, Decreasing Water Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life on Land

Establishment of a Long-Term Sustainability Program for Cotton Production in Georgia, Utilizing the Field to Market Fieldprint® Calculator

Cooperator: Dr. Wes Porter, University of Georgia

Location: Georgia

Objective: To establish trends for sustainability metrics and promote continual improvement in Georgia cotton using the Field to Market: The Alliance for Sustainable Agriculture's Fieldprint® Calculator.

This project has established a network of 50 cotton growers in Georgia using the Fieldprint Calculator over a five-year period. The growers involved represent the spectrum of small, medium, and large cotton farming operations. These cotton growers are interviewed, and their data are used to populate the Fieldprint Calculator to measure the environmental impacts of their farming operation. The results are calculated for each of these fields and the growers in order to highlight continual improvement opportunities for their operations and to provide benchmarks to both state and national averages.

10-Year Sustainability Goals:
Primary: Land Use, Soil Erosion Reduction, Water Efficiency, GHG Reduction

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

Economics of Whole-Farm Swarm-Bots for Cotton Production in the U.S.

Cooperators: Drs. Terry Griffin and Gregg Ibendahl, Kansas State University

Location: Kansas + National

Objective: Conduct economic analysis of existing/ supporting projects on autonomous and robotic cotton machinery.

Rapid advances in machine vision and autonomous technologies have led to the possibility of robotic systems performing on-farm tasks. For some applications, such as weed control and crop scouting, commercial robotic systems are now becoming available. The real question now is "When will these technologies be economically viable on cotton farms?"

This project is developing an economic model to compare traditional farm practices, particularly cotton harvesting, to robotic approaches.

10-Year Sustainability Goals:
Primary: Reducing GHG Emissions, Decreasing Energy Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production

cotton®

SUSTAINABLE DEVELOPMENT GOALS

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Weed Management Utilizing Cereal Rye and Herbicides

Cooperator: Daniel Stephenson, Louisiana State University

Location: Louisiana

Objective: This project has two objectives; to investigate the feasibility of a cereal rye cover crop to suppress summer annual weeds in cotton, and; to evaluate the effect of cereal rye, fall residual herbicide application, and spring burndown alternatives for control of glyphosate resistant Italian ryegrass prior to planting cotton.

This research supports responsible production by identifying the most efficient crop production systems and increasing land use. Optimizing cotton yield and fiber quality with good weed management increases production efficiencies on a per acre basis. Cover crops help decrease soil losses, aid in soil carbon, decrease GHG emissions through nutrient cycling, and decrease energy use through no-till practices. In addition, cover crops increase water infiltration into the soil, which decreases field runoff and increases crop use of water.

10-Year Sustainability Goals:
Primary: Soil Erosion Reduction
Secondary: Increasing Soil Carbon, Increase Land Use Efficiency, Reduce GHG Emissions, Decrease Energy Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land

Evaluation of Innovative Methods of Groundwater Recharge through On-Farm Reservoirs and Wells

Cooperator: Dr. Michele Reba, USDA-ARS

Location: Mississippi

Objective: To quantify groundwater recharge from on-farm storage reservoirs and wells.

Farm ponds are an excellent way to capture winter rainfall and store it for use to irrigate cotton in the summer. In this study, "leaky" farm ponds are used to see if they will allow creation of a shallow water table to increase the effective capacity of the pond.

10-Year Sustainability Goals:
Primary: Land Use, Water Efficiency

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

Sustainable Management Systems to Stabilize and Improve Cotton Yield in Dry Land Agriculture in Mississippi

Cooperator: Dr. Ardeshir Adeli, USDA-ARS

Location: Mississippi

Objective: Identify soil-specific management options that stabilize cotton yield, save production costs, and significantly increase overall economic returns.

A large number of soil management practices were being tested, including deep rooted cover crops and poultry litter. Measurements of soil loss, soil water content, and erosion are being recorded to determine which combination of practices result in the best outcome.

10-Year Sustainability Goals:
Primary: Soil Erosion, Soil Carbon, Water Efficiency

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production

Sustainable Production Systems to Improve Water Quality in Cotton in the Mid-South

Cooperator: Dr Drew Gholson, Mississippi Sate University

Location: Mississippi

Objective: Evaluate tillage and cover crop conservation management practices on lint yield, profitability, irrigation water use efficiency, rainfall capture, tailwater runoff, consumptive water use, runoff water quality, and soil health.

A joint project with the USDA-ARS National Sedimentation Laboratory and Mississippi State Univ. was established at the Delta Research and Extension Center in Stoneville, MS to quantify the effects of conservation practices on erosion, runoff, and agrochemical transport. Study results will be disseminated through extension and outreach efforts, promoting the adoption of a successful conservation system in the Mid-South.

10-Year Sustainability Goals:
Primary: Increasing Soil Carbon, Decreasing Soil Loss, Increase Land Use Efficiency, Reducing GHG Emissions, Decreasing Water Use, Decreasing Energy Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land

Evaluating Low Cost Sensor-Based Irrigation Strategies for Cotton Production in Missouri

Cooperator: Dr. Calvin Meeks, University of Missouri

Location: Missouri

Objective: To provide growers with sensor-based irrigation triggers that allow them to schedule irrigation efficiently.

Three irrigation treatments are utilized to create a range of plant water stress. Two different types of soil moisture sensors monitor water conditions and then the data are used to determine the specific sensor reading that corresponds to yield, reducing water stress for the cotton plant. This will allow farmers to use these sensors to determine exactly when they should irrigate.

10-Year Sustainability Goals:
Primary: Water Efficiency

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

Breeding Cotton for Resistance to Fusarium Wilt Race 4

Cooperator: Dr. Jinfa Zhang, New Mexico State University

Location: New Mexico

Objective: To identify sources of resistance for FOV4 into U.S. upland cotton through the utilization of greenhouse and field screening strategies.

Fusarium wilt caused by Fusarium oxysporum f.sp. vasinfectum race 4 (FOV4) is the primary target of Southwestern cotton breeding efforts due to its virulence, persistence in the soil, and impacts on yield. An essential component of effective FOV4 management is the integration of resistant cotton cultivars adapted to production in the Southwest U.S. through the plains of Texas, thereby reducing dependence upon the development of chemical control strategies.

The New Mexico State University breeding program's focus is to develop FOV4 resistant Upland varieties adapted to these areas with high yield potential and enhanced fiber and seed quality traits.

10-Year Sustainability Goals:
Primary: Increase Land Use Efficiency
Secondary: Decreasing Energy Use, Reducing GHG

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life on Land

Nitrogen and Potassium Application Timing in Cotton

Cooperator: Dr. Keith Edmisten, N.C. State University

Location: North Carolina

Objective: To determine the optimal time to apply nitrogen and potassium fertilizers to cotton.

Nitrogen is highly mobile in the Coastal Plain soils of North Carolina. Currently, many growers split-apply nitrogen to avoid leaching losses. Potassium is not as mobile as nitrogen, but it is mobile, especially in deep, sandy soils.

This study is focused on finding the best time to apply these fertilizers to ensure that they are used by the plant and not lost to the environment.

10-Year Sustainability Goals:
Primary: Reducing GHG Emissions, Decreasing Energy Use, Land Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

Sustainability of Irrigated Cotton in Southwest Oklahoma

Cooperator: Dr. Saleh Taghvaeian, Oklahoma State University

Location: Oklahoma

Objective: To demonstrate technologies that will contribute to the long-term sustainability of irrigated cotton production in southwest Oklahoma.

This project is in collaboration with Oklahoma cotton farmers to demonstrate the latest technologies on their farms where field days are held to educate other farmers in the area. The recent focus has been to demonstrate the use of soil moisture sensors to determine when to irrigate, and the use of subsurface drip irrigation to maximize water application efficiency.

10-Year Sustainability Goals:
Primary: Water Efficiency, Reducing GHG Emissions, Decreasing Energy Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production

Evaluation of “Directed Prescription” Method for Variable Rate Nitrogen Prescription in Cotton

Cooperator: Dr. Kendall Kirk, Clemson University

Location: South Carolina

Objective: To use on-farm testing to develop an extremely precise nitrogen fertilizer rate.

Different nitrogen rates are applied to strips in a farmer's field that include different soil types. The strips are harvested using a yield monitor so that the differences in yield by nitrogen rate and soil type are recorded. These data are then used to determine a nitrogen rate specific to that farm and soil type for the next year.

10-Year Sustainability Goals:
Primary: Reducing GHG Emissions, Decreasing Energy Use, Land Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

Cover Crop Development for Improved Weed Control

Cooperator: Dr. Larry Steckel, University of Tennessee Institute of Agriculture

Location: Tennessee + Regional

Objective: Develop best management practices to integrate cover crops as part of a weed management program for cotton production.

Cover crops can reduce erosion and help stabilize soil organic matter. Spring termination of the cover crop can provide a mulch that suppresses weed emergence. Development of best management practices for cover crop adoption in U.S. cotton can help reduce pesticide and fertilizer inputs, improve crop resilience to drought, and improve overall cotton production efficiency.

10-Year Sustainability Goals:
Primary: Soil Carbon Increase, Soil Erosion Reduction
Secondary: Reducing GHG Emissions, Decreasing Energy Use, Water Efficiency

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

U.S. Cotton Trust Protocol & Better Cotton Demonstration Plots at Agricenter International

Cooperator: Dr. Bill Robertson,University of Arkansas

Location: Tennessee

Objective: Implement and provide educational opportunities for extension/researchers, producers/consultants, and all segments of the supply chain to better understand educational programs and assist in their adoption.

This project established a split field plot that compares conventional production practices with more sustainable approaches on two side by side demonstration fields in Memphis, Tennessee. The "more sustainable" fields are both enrolled in the U.S. Cotton Trust Protocol and Better Cotton programs.

The project also will evaluate operating expenses to determine if improved grower profitability is also associated with the more sustainable cotton fields. Sustainability metrics are being evaluated using the Fieldprint® Calculator.

10-Year Sustainability Goals:
Primary: Increasing Soil Carbon, Decreasing Soil Loss, Increase Land Use Efficiency, Reducing GHG Emissions, Decreasing Water Use, Decreasing Energy Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land

Determining Optimum Irrigation Termination Periods for Cotton Production in the Texas High Plains using the DSSAT Cropping System Model

Cooperator: Dr. Srinivasulu Ale, Texas A&M University

Location: Texas

Objective: To assess the effects of irrigation termination date on cotton water use efficiency and yield under full and deficit irrigation conditions.

The DSSAT CROPGRO-Cotton simulation model was calibrated for west Texas conditions to accurately predict crop response to irrigation termination using data from field experiments in Halfway, Texas. The effect of irrigation termination dates on cotton yield under different water limitations is simulated over a 40-year period of weather records. This will help producers decide when they can stop irrigating at the end of the year without decreasing yields by ending too early or wasting water by ending too late.

10-Year Sustainability Goals:
Primary: Water Efficiency, Land Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

Monitoring Electrical Energy Consumption in Commercial Cotton Gins

Cooperators: Dr. Paul Funk, USDA-ARS; Dr. Robert Hardin, Texas A&M University

Location: Texas

Objective: Reduce electrical energy consumed at the gin per bale of cotton produced.

Instrumentation was added to several commercial cotton gins around the country to automatically monitor electricity use of all motors in the gin. These data are used to find the highest energy operations at each gin and identify practices that reduce energy use. The results are reported at gin schools conducted by the ginning industry and through a Cotton Incorporated 'Focus on Cotton' webinar.

10-Year Sustainability Goals:
Primary: Reducing GHG Emissions, Decreasing Energy Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production

Soil Carbon Assessment Across Texas

Cooperator: Katie Lewis, Texas A&M University

Location: Texas

Objective: Soil organic carbon (SOC) is the fundamental building block of soil physical, chemical, and biological processes. There is a dearth of information on soil organic carbon in Texas cropping systems. SOC is extremely dynamic in nature, easily influenced by inherent soil characteristics, environmental conditions, farming practices, and crop selection. SOC can vary drastically among farms and even individual fields.

This research will establish soil organic carbon baselines in the Texas High Plains, Rolling Plains, Blackland Prairies, and Gulf Coast across traditional and conservation cropping systems. The study will then collect management information and agronomic data to model potential increases in carbon capture and storage.

10-Year Sustainability Goals:
Primary: Increasing Soil Carbon

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land

Texas A&M Cotton Soil Health and GHG Modeling Project

Cooperator: Nithya Rajan, Texas A&M University

Location: Texas

Objective: Investigate the effects of conventional, conservation, and organic production practices on soil health, GHG emissions, cotton yield and overall sustainability via simulation modeling. Analyze the trade-offs and benefits associated with conventional, conservation and organic practices on improving the sustainability of Texas cotton production.

10-Year Sustainability Goals:
Primary: Decreasing Soil Loss, Reducing GHG Emissions

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land

Texas A&M IPM Internships

Cooperator: Dr. David Kerns, Texas A&M University

Location: Texas

Objective: Provide training and experience in scouting, evaluating plant growth and development, use of economic thresholds, implementing integrated pest management (IPM) principles, and developing skills in observation and interpretation of insect management needs in field situations.

The focus and resource direction at universities is increasing in the areas of genetic, molecular and biochemical studies. While IPM education is still available, the resources and emphasis for delivery of IPM education at many universities are not what they once were. Farmers' and other citizens' need for intelligent, integrated management systems for managing pests has not diminished. Without well trained professionals, agriculture is increasingly vulnerable to pest resistance, exotic pests and emergence of damaging pests from insects already present.

10-Year Sustainability Goals:
Primary: Land Use
Secondary: Reducing GHG Emissions, Decreasing Energy Use, Decreasing Water Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

Understanding the Benefits of Crop Residues and No-Till for Increasing Soil Health on the Southern High Plains of Texas

Cooperator: Dr. John Zak, Texas Tech University

Location: Texas

Objective: To evaluate the benefits of no-till and stubble management approaches for cotton production that can improve soil health, increase carbon storage, and increase precipitation capture on the Texas Southern High Plains.

Commercial cotton fields that use different tillage systems and cover crops are monitored. Data on a wide range of soil conditions are collected throughout the season to determine the impact of the different management systems on soil health. Measurements include soil moisture and temperature, soil microbial biomass, and soil nitrogen status.

10-Year Sustainability Goals:
Primary: Soil Carbon, Soil Erosion, Water Efficiency

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

The Regional Breeder Testing Network (RBTN) Trial in Virginia

Cooperators: Dr. William 'Hunter' Frame, Virginia Tech University; Dr. Ted Wallace, Mississippi State University, Project Coordinator

Location: Virginia + National

Objective: To provide public sector cotton breeders an opportunity to evaluate their germplasm in a wide variety of environments.

More than 90% of U.S. cotton is the same species, commonly called Upland Cotton. Within the Upland species, plant breeders have crossed different types of plants to create varieties of cotton, and often these varieties are adapted to the climate where they were developed. This project allows breeders to take some of their material and grow it in several different states in the Cotton Belt. This allows them to identify which regions will be best for their varieties. This specific project is an example of a test in Virginia – an important location, as it is located at the far northeastern corner of the country where U.S. cotton is grown.

10-Year Sustainability Goals:
Primary: Land Use
Secondary: Reducing GHG Emissions, Decreasing Energy Use, Water Efficiency

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production

U.S. Regenerative Cotton Fund Support

Cooperator: Dr. Wayne Honeycutt, Soil Health Institute

Location: Texas, Georgia, Mississippi, Arkansas, Alabama, North Carolina, Missouri, California, Oklahoma

Objective: The goal of the U.S. Regenerative Cotton Fund, an initiative of the Soil Health Institute, is to help cotton farmers adopt regenerative soil health systems aimed at eliminating 1 million metric tons of carbon dioxide equivalent (CO_2e) from the atmosphere by 2026.

The project will support and empower growers and their advisors in nine U.S. states that represent 85% of U.S. cotton production with resources, networks, tools, and information to foster adoption of regenerative soil health systems.

10-Year Sustainability Goals:
Primary: Increasing Soil Carbon, Decreasing Soil Loss, Increase Land Use Efficiency, Reducing GHG Emissions, Decreasing Water Use, Decreasing Energy Use

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land

Enhanced Soil Carbon Farming as a Climate Solution

Cooperator: Dr. Rattan Lal, OSU
Location: Cotton Belt-Wide

Objective: The project will measure how much organic and inorganic carbon gets sequestered in the soil under different farming practices in key regions across the western hemisphere. The project will identify farm sites having adopted innovative conservation approaches and quantify soil carbon stocks and other soil health properties from conservation uses (conventional cropping, conservation cropping, grassland management, and woodlands) on similar soil types.

The project will establish associations between soil carbon stock and soil health indicators relevant to ecosystem services, including plant production, water capture and storage in soil, water quality, GHG exchange, and soil microbial biodiversity. The project will explore factors limiting the adoption of carbon farming practices and assess extension roles to partner with on-farm sites to increase the adoption of best management practices.

10-Year Sustainability Goals:
Primary: Soil Carbon

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land

SmartIrrigation App for Cotton

Cooperator: Dr. George Vellidis, University of Georgia

Location: National

Objective: Develop an irrigation scheduling application for smart phones that will work across the entire U.S. Cotton Belt.

The SmartIrrigation Cotton App for scheduling irrigation in cotton was first released to the public during April 2014 for use in Georgia and Florida. In 2017, a version of the app was tested that used NOAA weather databases to extend the ability of the app to work in other regions.

The current focus is to evaluate the accuracy of the app in other states through tests in Arizona, Texas, Tennessee, Missouri, and North Carolina to help drive water use efficiency.

10-Year Sustainability Goals:
Primary: Water Efficiency, Soil Erosion Reduction

UN Sustainable Development Goals Applicability:
Responsible Consumption and Production, Life Below Water, Life on Land

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