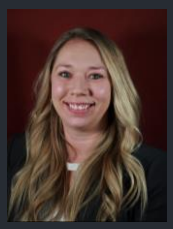
TEXAS A&M AGRILIFE RESEARCH

Soil Chemistry and Fertility

Texas A&M AgriLife Research at Lubbock

About the Lab



Principal Investigator – *Katie L. Lewis, Ph.D.*

Funding acquisition – *$28,492, 593 (total)*
$4,369,107 (to program)

Output – 30 *peer reviewed articles; 159 scientific abstracts, 15 agency pub.*

What We Can Do

Our lab and field program are fully equipped to strategically evaluate agroecosystems for soil C and nutrients, track soil and environmental health, and communicate results to agricultural producers, policy makers, and stakeholders.

Assessment specialties:

- Soil carbon pools & stocks
- Cropping systems
- Agronomic performance
- Greenhouse gas emissions
- Soil microbial communities
- Nutrient cycling
- Soil quality/health

Our Lab

National Leaders in Soil Science

Since 2014, the Lewis Soil Chemistry and Fertility Lab in Lubbock, TX has determined more practical soil fertilization and management strategies that ***maintain or enhance the value and quality of soils***, ***prioritize environmental sustainability***, and ***optimize nutrient use efficiency*** all while ensuring the longevity of farming operations on the Texas High Plains. Effective outreach and graduate training are major components of the research and education within this program.

The overall research objectives of this program are to:

- Evaluate cropping systems to determine management strategies to enhance soil health and quality
- Demonstrate and quantify the impact of conservation practices on carbon capture, greenhouse gas emissions, soil properties, and water availability
- Assess cotton yield, quality, and plant growth response to soil nutrients
- Determine the feasibility of utilization of new fertilizer formulations and soil products

Key Findings and Innovations -

Cropping system management

- Cotton-wheat rotations provide greater economic return compared to continuous cotton systems where nematodes are endemic
- Semi-arid soils can serve as a sink for nitrous oxide, a powerful greenhouse gas

Impact of conservation practices

- Conservation practices significant increased nutrient cycling potential compared to native grasslands in sandy soil
- Soil organic C stocks increase with long-term adoption of conservation management practices

Cotton response to soil nutrients

- Modern cotton varieties demand greater nutrient uptake earlier in the growing season compared to historical varieties
- Single applications of P and multiple, smaller applications of N increased yield in subsurface drip irrigation

Feasibility of new fertilizers and soil products

- Liquid sources of P can serve as a viable option for meeting crop demands with subsurface drip irrigation in alkaline soils

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Current Research in Soil Chemistry and Fertility

Regenerative agriculture intensification in semi-arid cropping systems

USDA-NIFA Sustainable Agricultural Systems funded project to intensify agricultural production in an environmentally sustainable manner that enhances agronomic, economic, and community resiliency in the Southern Great Plains. We will achieve this by successfully demonstrating the benefits of integration of regenerative agricultural practices and providing training on emerging technologies to increase C sequestration, reduce greenhouse gas emissions, mitigate climate change impacts, diversify producer income, conserve scarce water, and enhance rural economies. Project collaborators include: TWRI, AgriLife Research and Extension, TAMU, OSU, TTU, WTAMU, and KSU.

Soil carbon assessment across Texas

Texas Corn Producers Board, Texas Sorghum Producers Board, and Cotton Incorporated funded project to understand how cropping system management practices can influence soil organic C potentials in corn, sorghum, and cotton production. This project will establish soil organic C baselines in the Texas High Plains, Rolling Plains, Blackland Prairies, and Gulf Coast regions.

Refinement of nutrient use in cotton

Fluid Fertilizer Foundation, The Fertilizer Institute, and Cotton Incorporated funded projects to evaluate nitrogen and phosphorus availability in subsurface drip irrigation, nitrogen stewardship in cotton, greenhouse gas emission mitigation strategies, and macronutrient demands of modern cotton varieties.

Soil health dynamics in Texas cotton production

USDA-NRCS, Soil Health Institute, and Cotton Incorporated funded projects to evaluate chemical, biological, and physical properties of soil health and their responsiveness in traditional and conservation cotton agroecosystems.

Organic cotton and peanut production

USDA-NIFA and Southern SARE funded projects to evaluate agronomic production, weed pressure, greenhouse gas emissions, and soil and water dynamics in organic cotton and peanut cropping systems.

Benefits and consequences of cover crops in semi-arid agroecoregions

USDA-NRCS and Cotton Incorporated funded projects to evaluate the impact of cover crop use on soil properties, water dynamics, cotton production, and nutrient cycling in combination with conservation tillage across the Texas High Plains.

Collaboration with industry stakeholders

Industry funded collaborative research to determine the feasibility of utilization of new fertilizer formations and soil products.

Funding Sources -

NIFA · The Fertilizer Institute · Cotton Incorporated · Sorghum Checkoff · Wilbur-Ellis · Helena · Bayer · Southern SARE Sustainable Agriculture Research & Education · NRCS · Fluid Fertilizer Foundation · Texas Corn Producers Board · Soil Health Institute · Corteva agriscience · CHS