Semi-arid Cropping System Agronomy

Resilient Soil & Water Solutions for Texas Producers

TEXAS A&M AGRILIFE
RESEARCH AND EXTENSION CENTER AT LUBBOCK

Innovating for resilience in the Texas high plains

Dr. Joseph Burke leads the Semi-Arid Cropping Systems Agronomy Program in Lubbock, Texas, where his research is focused on enhancing agricultural resiliency across the Texas High Plains. His work centers on developing and evaluating innovative management practices that address the region's unique environmental challenges, particularly those related to water scarcity, soil health, and crop productivity.

A major area of investigation involves the use of treated produced water for irrigation, with studies examining its effects on soil properties and plant performance. Complementing this, Dr. Burke's team monitors soil water dynamics within conservation cropping systems to better understand water retention and movement under semi-arid conditions. The program also develops predictive models to assess the risk of soil salinization following produced water applications and evaluates remediation strategies to mitigate salinity and restore soil function.

Nutrient management is another key focus, with research testing nitrogen and phosphorus fertigation strategies in subsurface drip-irrigated cotton systems. These studies aim to optimize nutrient delivery while maintaining yield and economic viability. In addition, the program explores how prescriptive water and nutrient stress influence cotton root morphology, lint yield, and overall system economics.

Dr. Burke's research also includes evaluating cotton-sorghum rotations to determine their impact on soil health, nutrient cycling, crop yields, and profitability. Finally, the program monitors how different system management practices affect carbon sequestration and long-term soil health, contributing to broader sustainability goals.

Through this comprehensive approach, Dr. Burke's program supports the development of resilient, efficient, and sustainable cropping systems tailored to the semi-arid landscapes of the Texas High Plains.

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BIO

Dr. Joseph A. Burke is a soil and water scientist whose research and Extension program is dedicated to enhancing agricultural resiliency in semi-arid regions. He earned his B.S. in Interdisciplinary Agriculture with teacher certification from Texas Tech University in 2015, followed by an M.S. in Plant and Soil Science from Texas Tech in 2018, and a Ph.D. in Soil Science from Texas A&M University in 2022.
Dr. Burke's work focuses on sustainable soil and water conservation and management, using a systems-based approach that integrates field experimentation, laboratory analysis, and advanced technologies. His research delivers prescriptive best management practices tailored to the unique challenges of the Southern High Plains, helping agricultural producers improve productivity and sustainability in water-limited environments.