

Project Narrative

Project Name: Innovative Technology for Economic and Environmental Nitrogen Management

Is This a New Project or Request for Continuation?: New

Geographic Area of the Project: State-wide

Name of Principal Investigator(s): Mark L. McFarland, Robert G. Lemon and Frank M. Hons

County(s) and/or University Department(s), TAEX, or Unit: Soil and Crop Sciences

Mailing Address(es): 348 Heep Center, College Station, Texas 77843-2474

Phone: 979-845-5366

Fax: 979-845-0604

E-mail: ml-mcfarland@tamu.edu

Amount of Funding Requested: \$10,000

Project Need, Description and Expected Outcomes

Nitrogen (N) is the primary fertilizer input in most agricultural production systems from both quantity and economic perspectives. The amount of fertilizer N added to crops often is based on grower experience and yield goal, but quantity of fertilizer N actually needed is affected by climate, crop rotation, cultural practices, past fertilization and other factors. Both deficiencies and excesses of N decrease profitability, but excess N also may pollute both surface and ground waters.

Greater regulatory emphasis is being placed on nitrogen management in agriculture due to concerns related to contamination of precious ground water supplies needed for human consumption and surface water issues such as hypoxia. In addition, increasing costs for N fertilizer are impacting production economics and the potential for growers to implement companion conservation strategies such as buffer zones and conservation tillage.

The soil test method most commonly used to make fertilizer N recommendations is based on nitrate in soil prior to the growing season. Soil nitrate, however, is only a point-in-time estimate of available N because it is very susceptible to loss and does not account for additional N that will be released (mineralized) from soil organic matter during the growing season. Mineralized N is the principal source of plant available N in some production systems. For these reasons, residual soil nitrate has not been an effective indicator of crop N requirements in many regions of Texas.

An innovative soil test has been developed at Texas A&M University that is rapid, simple, inexpensive to conduct, and has accurately predicted quantities of mineralized soil N in preliminary testing. Field applied research/demonstrations conducted on several crops have shown strong potential for this test to enable more accurate prediction of crop N requirements. Further evaluation and field demonstration is needed to verify the accuracy of test, facilitate its

incorporation into routine soil testing procedures, and to educate producers about the economic and environmental benefits of proper N management.

This project will involve the installation of field applied research/demonstration studies in 8 counties (Brazos, Williamson, Wharton, Calhoun, San Patricio, Lubbock, Hidalgo, and Ellis) in cooperation with local Extension Agents, Area Agronomists and producer cooperators. Targeted crops will include primarily cotton, but also may include corn, grain sorghum and forage grasses. Requested funds will be used to provide partial support for an existing Extension Associate position responsible for field project installation and management. These studies will be used to obtain calibration data for implementing the new method as a part of routine soil testing. Multi-county educational programs and/or field tours will be held in conjunction with each site to educate producers regarding the new test and best management practices for nutrient and water quality management. In addition, individual county reports and a state-wide summary addressing project results and impacts will be developed and distributed.

Specific Soil and Water Conservation Issues Addressed

This project specifically addresses program concerns related to soil management, soil quality and health, and conservation practice economics. Nutrient management is an important economic and environmental issue which affects both soil and crop quality. Proper plant nutrition is essential to ensure optimum crop growth and vegetative cover to protect the soil resource. In addition, improper rates, timing and application of fertilizer nutrients can contribute to water quality impairment. The regulatory focus on nonpoint source nutrient pollution is increasing. New requirements for development and implementation of NRCS Nutrient Management Plans (NMPs) by farmers receiving federal cost-share assistance are being enacted, and producers must take proactive steps to reduce the need for increased regulatory oversight. This project will provide important information to facilitate validation and adoption of a new technology for managing fertilizer N, and at the same time, support direct delivery of educational programs targeting the fundamental aspects of soil and water resource conservation and management.

Collaboration

This project will be conducted as a joint effort between the Texas Agricultural Extension Service and the Texas Agricultural Experiment Station, in cooperation with County Extension Agents and selected agricultural producers across the state. TAEX will provide personnel for field project installation and management and for delivery of education programs. TAES personnel will provide laboratory services and technical support. In addition, portions of the project will be conducted in cooperation with industry (Cotton Incorporated), which will provide partial funding support.

A total of eight field locations will be established including the Stiles Farm, IMPACT Center and six cooperating producer fields in Wharton, Calhoun, San Patricio, Lubbock, Hidalgo, and Ellis Counties.

Cooperating TAMU Personnel:

Rick Jahn, CEA Wharton County
Rodger Havlak, CEA Calhoun County
Jeff Stapper, CEA San Patricio

Leo Espinosa, Extension Associate, Hildago County
John Sloan, Ellis County
Randy Boman, Specialist, Lubbock County