Lead Organization Name: Auburn University

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Duration of Project: Three years

Project Title:
Increasing adoption of climate- and water-smart irrigation practices among Tennessee Valley farmers in Alabama and Tennessee

Project in a Sentence:
This project will demonstrate technologies/practices of variable rate irrigation (VRI), sensor-based irrigation scheduling, scheduling using the expert system Irrigator Pro, and deficit irrigation as well as the use of climate forecasts to support water withdrawal as a single suite of climate- and water-smart conservation system.

Project Elevator Pitch:
The demonstration of climate- and water-smart irrigation practices will be carried out at three row crop farms, located in Limestone County and Lawrence County, Alabama. Two additional demonstration sites from members of the Federation of Southern Cooperatives will be in Central Alabama. Two farmers have irrigation ponds which will be use to demonstrate the current Alabama irrigation model (water is withdrawn from creeks, stored in irrigation ponds for later use in the summer). The project objectives are: 1) Demonstrate an approach to rainwater harvesting for irrigation based on ENSO forecasts; 2) Demonstrate water-smart irrigation approaches of variable rate irrigation, soil sensors for irrigation scheduling, and Irrigation Pro; 3) Demonstrate managed deficit irrigation strategies, assisted by soil sensors and weather forecasts, to increase crop water productivity; 4) Demonstrate how water-smart irrigation practices will help to retain nutrients within the soil profile and increase their availability for crops; 5) Evaluate the economic benefits of adopting water-smart irrigation practices in terms of energy costs and water use efficiency; and 6) Establish a network of farmer-managed learning sites to increase adoption of water-smart irrigation practices.
Deliverables:

1. Guidelines on how ENSO forecast can be incorporated into water withdrawal management plans and its benefits. These guidelines can be used by NRCS to update the current 436 practice.

2. Guidelines for sensor based irrigation scheduling to optimize growth stage-based irrigation timing (frequency) and amount. The guidelines will include criteria for integrating soil sensor readings from various soil depths to determine irrigation timing and irrigation. These guidelines can be used by NRCS in the preparation of new conservation practices.

3. Guidelines for irrigation scheduling using Irrigator Pro, outlining the benefits of its use.

4. Information on volume of the water needed based on soil type, crop and crop growth stage.

5. Technical report on the benefits and limitations of implementing VRI systems and sensor-based irrigation scheduling on major Tennessee Valley soils which can be used by NRCS to refine the current NRCS practice standards 449, 442, and 443.

6. Improved knowledge on the nutrient transport processes within the soil profile as a function of water-smart irrigation practices.

7. Report on potential water and energy savings, and associated economic savings, that can result from the adoption of the smart-irrigation practices demonstrated on this project.

8. Two extension publications, such as “Use of soil water tension sensors for irrigation scheduling of crops in Alabama” and “Agronomic, economic, and environmental benefits of water-smart irrigation practices in Alabama.”

9. Increased farmers’ knowledge and skills on irrigation to facilitate implementation of irrigation water management plans

How We Are Innovating in Natural Resource Conservation:

This project is innovative because:

1. It demonstrates a novel approach to harvesting rainwater during the crop non-growing season with subsequent utilization during the crop growing season using ENSO forecast.

2. It will be the first time Variable rate irrigation (VRI), soil sensor-based scheduling (SIS), expert system scheduling - Irrigator Pro (IP), and Deficit irrigation (DI) approaches have been combined into a single demonstration project in Alabama, and perhaps in neighboring states.

3. It provides information on water and energy savings with minimal impact to crop yields.

4. It demonstrates increased nutrient use efficiency as a function of VRI, SIS, IP, and DI.

5. It demonstrates water and climate smart strategies for preventing degradation of water quantity and quality, increasing input use efficiency, and improving soil health.

6. It facilitates first-time learning/training opportunities with stakeholders across the Southeast, demonstrating how a system of climate- and water-smart practices can contribute to food security.