Project Plan from FY2016
(Fiscal Years 2017-2019)

Title: Monitoring the Economic Impacts of Mobil Drip Irrigation Technology

Investigators:
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Summary/abstract
As groundwater levels continue to decline in the Ogallala Aquifer, stakeholders, policy makers, and producers often encourage the adoption of new irrigation technology in an attempt to conserve groundwater, extend the economic life of the aquifer, and enhance profitability. One such technology is the Mobile Drip Irrigation technology currently available in the Central Plains area. The objective of this research is to monitor the economic impacts of mobile drip irrigation technology. This proposal is being submitted at the request of, and in cooperation with the Kansas Water Office, the state's water planning, policy, and coordination agency.

Project Narrative
Objectives:
Develop and evaluate water management strategies and technologies that could reduce water withdrawals for irrigation by 20% in 2020 compared to 2012, while maintaining and/or enhancing the economic viability of the agriculture industry and the vitality of the Southern Ogallala Aquifer Region.

Rationale/Literature Review/Conceptual framework:
Economies of many rural communities in the Central Plains rely heavily on irrigated agriculture. However, the Ogallala Aquifer is being depleted beyond the sustainable capacity. To cope with limited water availability, many producers are considering combining soil water conservation practices, efficient irrigation application and deficit irrigation management strategies. The Mobile Drip Irrigation (MDI) technology combines the high irrigation efficiency of Subsurface Drip Irrigation technology with the more conventional Center Pivot (CP) technology (Figure 1).

Figure 1. The Mobile Drip Irrigation technology (MDI) featuring the drip hoses on a center pivot irrigation system. Photos from www.dragonline.net.

The MDI system replaces the existing spray nozzles with drip hoses, which drag behind the center pivot such that water is dribbling directly on the soil surface. This process should theoretically reduce evaporation losses from the system and could translate to increased yield.

A team of agronomists and engineers at the Kansas State University Southwest Research and Extension Center are currently cooperating with the Willis-O-Brate Water Technology Demonstration Farm to install, monitor, and compare MDI and CP technology on several circles of irrigated crop land. Micrometer, chemical, irrigation, and seed companies are contributors to the technology farm. While the Kansas Water Office has taken the lead on this project, the Kansas Division of Water Resources and Groundwater Management District #3 are also participating in the efforts.[1]

The team of agronomists and engineers will collect the following information on each parcel of irrigated crop land (typically a quarter section pivot): 1) materials, labor, other costs and time associated with the conversion; 2) soil moisture content, soil texture, precipitation (rainfall and snow), total irrigation water applied and crop yield; and 3) irrigation scheduling protocol, cropping and irrigation management practices and livestock management protocols. At the present time, there is not an agricultural economist on the team to evaluate the economic impacts of Mobil Drip Irrigation technology. This proposal will provide part of the funding required to fill the need for an agricultural economist to monitor the economic impacts of MDI technology.

How the objective will be met:
This analysis will consider multiple crops and multiple parcels of land over multiple years. The economic comparison will rely on techniques developed by Amosson et al. (2011), Lamm et al. (2016), O'Brien et al. (1998), and Delano et al. (1997). These methods apply net present value (NPV) analysis to assess the economic feasibility of modifications to irrigation technology. The analysis considers operating and ownership cost over a multi-year period. Cost and revenues associated with the initial investment, changes in management protocols, changes in production cost, and changes in yield and revenue are considered. One factor typically not consider in NPV analysis is the value of the conserve water. Methods developed by Golden and Johnson (2013) will be incorporated into this analysis to place a value of the conserve groundwater.

Expected Outcomes:
The proposed methodology is economically sound based on the previous reviews of economic literature and past funded OAP projects. Annual results will include: (1) the expected costs and benefits of MDI technology, (2) the impact on producer income, (3) and an assessment of the value of conserved water. At the end of the project a summary report will be completed. While this project focuses specifically on western Kansas, the results should be applicable to other regions overlying the Ogallala aquifer.

The results of this analysis will be shared through peer-reviewed papers and professional meetings within the scientific community. To ensure that results are disseminated to stakeholder groups, the analysis generated will also be presented in multiple meetings specifically designed to target legislative, regulatory, and producer groups. This research primarily will be used to educate and enlighten stakeholders as to the value of MDI technology.

The overall production conditions prevailing in southwest Kansas are similar to those in the neighboring Ogallala states and other semi-arid regions in the West. This suggests that our results should be informative for policy choices in other states in the High Plains region and somewhat beyond.

[1] Source: http://gmd3.org/Minutes/GMD2016/16-04Minutes.pdf

Literature Cited/References

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