



**Project Plan from
FY2015
(Fiscal Years 2016-2017)**

Research Priority Area: 2015 Sub-Objective 1

1. Title: Adoption Assessment and Feature Enhancement of Web-based KanSched3 and Mobile-friendly KanSched4

2. Investigators:

Principal Investigator: Jonathan Aguilar (K-State, Garden City)

Co-Investigator(s): Danny H. Rogers (K-State, Manhattan), L. Kent Shaw (K-State, Garden City), and Dana Porter (Texas A&M AgriLife, Lubbock)

Research Location: Kansas State University, Manhattan, KS

3. Summary:

Climatic or ET-based irrigation scheduling has been promoted as an approved irrigation management practice for many years. Starting from manual pen and paper calculation, ET based irrigation scheduling has eventually evolved into spreadsheets, compiled programs and web-based programs now called KanSched. In every upgrade and technology update, the major thrust was always to improve ease of use and expand feature options. KanSched remains the most commonly used ET-based irrigation scheduling program in use in Kansas and is used by other individuals throughout the US and the world. The objective of this project will be to assess the adoption and add features to web-based KanSched3 with a focus on adding a comment section into the daily budget that can be used to record important crop production input information and water information needed for water use reporting. Particularly for the mobile-friendly KanSched4, a feature option to allow automated entry of ET_r information from a weather station network directly into the field budget will be developed. These enhancements of the program with additional features and convenience/user friendliness for users will allow more irrigators to use KanSched and thus conserve water through proper irrigation scheduling.

4. Project Narrative:

4.1. Objectives: Climatic or ET-based irrigation scheduling continues to be a recommended best management practice for irrigators. This is a time- and research-proven strategy of conserving water by knowing when and how much water to apply on a daily time-step. Every day that an irrigator could delay irrigation with confidence, easily translates to a percent reduction in water use which fittingly addresses the first objective of OAP. The web-based version of KanSched was developed and released for public use in early 2013 to facilitate such management practice. The OAP have long recognized KanSched's importance by supporting incremental updates on this program. A current

OAP project is nearing completion to add several features including an improved producer/consultant log-in procedure. However additional features can continue to be added to expand the program's capabilities. The objectives of this project will be to assess the adoption and add features to KanSched3 with a focus on adding a comment section into the daily budget that can be used to record important crop production input information and water information needed for water use reporting. In addition, a feature option to allow automated entry of ETr information from a weather station network directly into the field budget will be developed. The updates would be installed into both the web-based and smart-phone based systems. Requests for a metric version of KanSched have also continued, so a metric option is being proposed for this version. All these objectives address the need to further develop and evaluate proven water management strategies and mature technologies that could immediately reduce water withdrawals for irrigation which is Objective 1 of OAP this year.

4.2. Rationale: Agricultural crop water use has been extensively studied and documented (Rogers et. al, 2015) and can vary widely in the High Plains (Kisekka et. al, 2015). To help irrigation producers manage their irrigation water applications, ET based irrigation scheduling has been promoted as an approved irrigation management practice for many years. Early ET based programs utilized radio reports and newspaper releases to provide reference ET values to farmers. Extension bulletins (Rogers, 1995b and 1995b) provided worksheets for farmers to enter the reference ET value and then hand calculate the actual crop ET and root zone soil water balance. As personal computers and weather station data became more readily available, ET based irrigation scheduling spreadsheets were developed and distributed, eventually evolving into compiled programs and web-based programs, now called KanSched, to improve ease of use and expand feature options (Rogers, 2012; Rogers and Alam, 2008; Rogers et. al., 2006; and Rogers et. al., 2001).

KanSched remains the most commonly used ET-based irrigation scheduling program in use in Kansas and is used by other individuals throughout the US and world. Although limited or deficit irrigation production is becoming more common due to well yields being impacted by the decline of the Ogallala water levels, irrigation scheduling still remains an important management tool (Lamm and Rogers, 2015). To maintain KanSched's preferential use base, enhancement of the program with additional features and convenience/user friendliness for users is critical. Irrigated agriculture is the largest water demand on the Ogallala. Irrigation scheduling is a best management practice for irrigation and also allows producers to preserve an accepted historical documentation record of a seasonal water use for a field.

4.3. Approach and Research Procedures: Although the current versions of KanSched are well adapted or relatively easily to adapt for any irrigated region where reference ET is available, additional features can still be added to improve the program utility and improve the ease of use and convenience for irrigation scheduling. As a daily program, the program could be expanded to allow input of information on various production practice inputs, ranging from planting information to insect scouting observations.

While the current versions of KanSched allow fields to be grouped together to allow all fields in the group to be updated with ETr information when any field is updated, producers

are requesting the option of automatic ETr entry, directly from the weather station. This feature will be developed for the KanSched3 (web-based) version.

4.4. Schedule and Timeline: The programming process will begin with notification of funding as a programmer is currently hired. An electronic evaluation form will be sent out immediately to all the current users to request their feedback on the program. Testing and pilot farmer testing program will be conducted and coordinated by Kent Shaw after the beta version has been developed. The intent is to have features developed and tested prior to the 2017 summer cropping season.

4.5. Expected Outcomes: This project will enhance the capability and acceptability of irrigation scheduling tools, particularly KanSched, encouraging more irrigators to adopt this management practice. The improvements in the features especially in using KanSched in mobile-friendly devices will ease the burden of data entry and decision-making while in the field. Results of the adoption assessment will be useful in improving irrigation scheduling tools and in making necessary adjustments to the current versions of KanSched.

With the new features, water conservation through irrigation scheduling will be actively promoted in county meetings, field days, extension programs, radio programs, and field visits with individual farmers. Relevant information will also be presented at professional conferences including one poster presentation at the annual OAP workshop.

5. Relevant Publications

Kisekka, I., J. Aguilar, and D.H. Rogers. 2015. **Year to Year Variations in Crop Water Use Functions.** In: Proc. 27th annual Central Plains Irrigation Conference, Feb. 17-8, 2015, Colby, KS. Available from CPIA, 760 N. Thompson, Colby, KS. pp. 44-49.

Rogers, D.H. 2012. **Introducing the Web-based Version of KanSched: An ET-based Irrigation Scheduling Tool.** In: Proc. 24th annual Central Plains Irrigation Conference, Colby, Kansas, Feb. 21-22, 2012. Available from CPIA, 760 N. Thompson, Colby, KS. pp. 230-236.

Rogers, D.H. and M. Alam. 2008. **KanSched2: An ET-based Irrigation Scheduling Tool.** Kansas State Research and Extension. Electronic Only Publication. EP-129 revised.

Rogers, D. H., G. A. Clark, M. Alam, and L.K. Shaw. 2006. **Kansas Progress in ET Based Scheduling: Improvements in KanSched.** In proceedings of Irrigation Association International Irrigation Technical Conference, IA06-1512, November 5-7, 2006. San Antonio, Texas. Pp 208-212.

7. References:

Kisekka, I., J. Aguilar, and D.H. Rogers. 2015. **Year to Year Variations in Crop Water Use Functions**. In: Proc. 27th annual Central Plains Irrigation Conference, Feb. 17-8, 2015, Colby, KS. Available from CPIA, 760 N. Thompson, Colby, KS. pp. 44-49.

Lamm, F. R. and D. H. Rogers. 2015. **The importance of irrigation scheduling for marginal capacity systems growing corn**. Applied Engineering in Agric. 31(2): 261-265.

Rogers, D.H. 2012. **Introducing the Web-based Version of KanSched: An ET-based Irrigation Scheduling Tool**. In: Proc. 24th annual Central Plains Irrigation Conference, Colby, Kansas, Feb. 21-22, 2012. Available from CPIA, 760 N. Thompson, Colby, KS. pp. 230-236.

Rogers, D.H., J. Aguilar, I. Kisekka, P.L. Barnes, and F.R. Lamm. 2015. **Agricultural Crop Water Use**. In: Proc. 27th annual Central Plains Irrigation Conference, Feb. 17-8, 2015, Colby, KS. Available from CPIA, 760 N. Thompson, Colby, KS. pp. 1-18.

Rogers, D.H. and M. Alam. 2008. **KanSched2: An ET-based Irrigation Scheduling Tool**. Kansas State Research and Extension. Electronic Only Publication. EP-129 revised.

Rogers, D. H., G. A. Clark, M. Alam, and L.K. Shaw. 2006. **Kansas Progress in ET Based Scheduling: Improvements in KanSched**. In proceedings of Irrigation Association International Irrigation Technical Conference, IA06-1512, November 5-7, 2006. San Antonio, Texas. Pp 208-212.

Rogers, D., G. Clark, D. Fjell, B. Stratton, and M. Alam. 2001. **KanSched - An ET Based Irrigation Scheduling Tool**. K-State Research & Extension. MF-2550.

Rogers, D.H. 1995a. **Using Evapotranspiration Reports for Furrow Irrigation Scheduling**. Kansas State University Cooperative Extension Service. Irrigation Management Series. L-914.

Rogers, D.H. 1995b. **Using Evapotranspiration Reports for Center Pivot Irrigation Scheduling**. Irrigation Management Series. Kansas State University Cooperative Extension Service. L-915.