OgallalaWater.org
OPTIMIZING WATER USE TO SUSTAIN FOOD SYSTEMS

Ogallala Water CAP Resource Guide Series

Irrigation Scheduling Tools

Allan Andales
Colorado State University
Allan.Andales@colostate.edu

Jim Bordovsky
Texas A&M University
jbordovs@ag.tamu.edu

Isaya Kisekka
University of California - Davis
ikisekka@ucdavis.edu

Danny Rogers
Jonathan Aguilar
Kansas State University
jaguilar@k-state.edu

OGALLALA WATER PARTNERS

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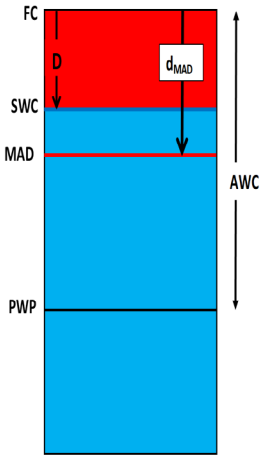
Four irrigation scheduling tools created by Ogallala Water CAP university researchers are available online and free of charge:

1. DIEM 2. WISE 3. KanSched 4. iCrop

How do these four irrigation scheduling tools work?
These tools are powerful software programs that allow a grower to input their farm's unique parameters and connect to local weather and evapotranspiration (ET) data.

Evapotranspiration is the sum of how much water is evaporated and transpired from soil and plants to the atmosphere, also known as crop water use. ET data is used to gauge how much water is currently being held in the crop root zone and generate recommendations on when and how much to water.



Irrigation scheduling tools set a management allowed depletion (MAD) that determine the next irrigation event well before the soil reaches permanent wilting point (PWP). At PWP, soil is dry enough that plants are unable to extract any remaining water in sufficient amounts to meet their moisture needs.

For grain crops, MAD is typically set at the soil moisture level that is halfway between "full" (field capacity) and "empty" (permanent wilting point).

Figure 1. Conceptual "bucket" of plant available water
FC = field capacity
D = soil water deficit
MAD = management allowed depletion
d_{mad} = equivalent depth of water at MAD
SWC = soil water content
PWP = permanent wilting point
AWC = available water capacity

Why use these tools?
These four free tools are similar to subscription-based tools. Each tool can help producers:

- reduce risk of overwatering and underwatering,
- manage cost-effectively and conveniently,
- increase water conservation,
- hit target yield goals, and
- improve the bottom line.

Photo: Colorado State University

1. Dashboard for Irrigation Efficiency Management (DIEM) - Texas A&M University

diem.tamu.edu

Contact: Jim Bordovsky Email: jbordovs@ag.tamu.edu

DIEM was developed for Texas High Plains cotton. Additional crops are being added. The DIEM tool can:

- forecast season-long, field-specific irrigation schedules optimized for projected rainfall and irrigation availability;
- provide automatic access to local, near real-time weather data;
- account for differences in evaporation and available soil water due to the irrigation method used; and
- evaluate "what-if" scenarios using historic weather, irrigation capacity, and/or other management parameters.

"With the current rate of water table decline, all producers need to learn how to use tools like this."
Cotton producer, High Plains, TX

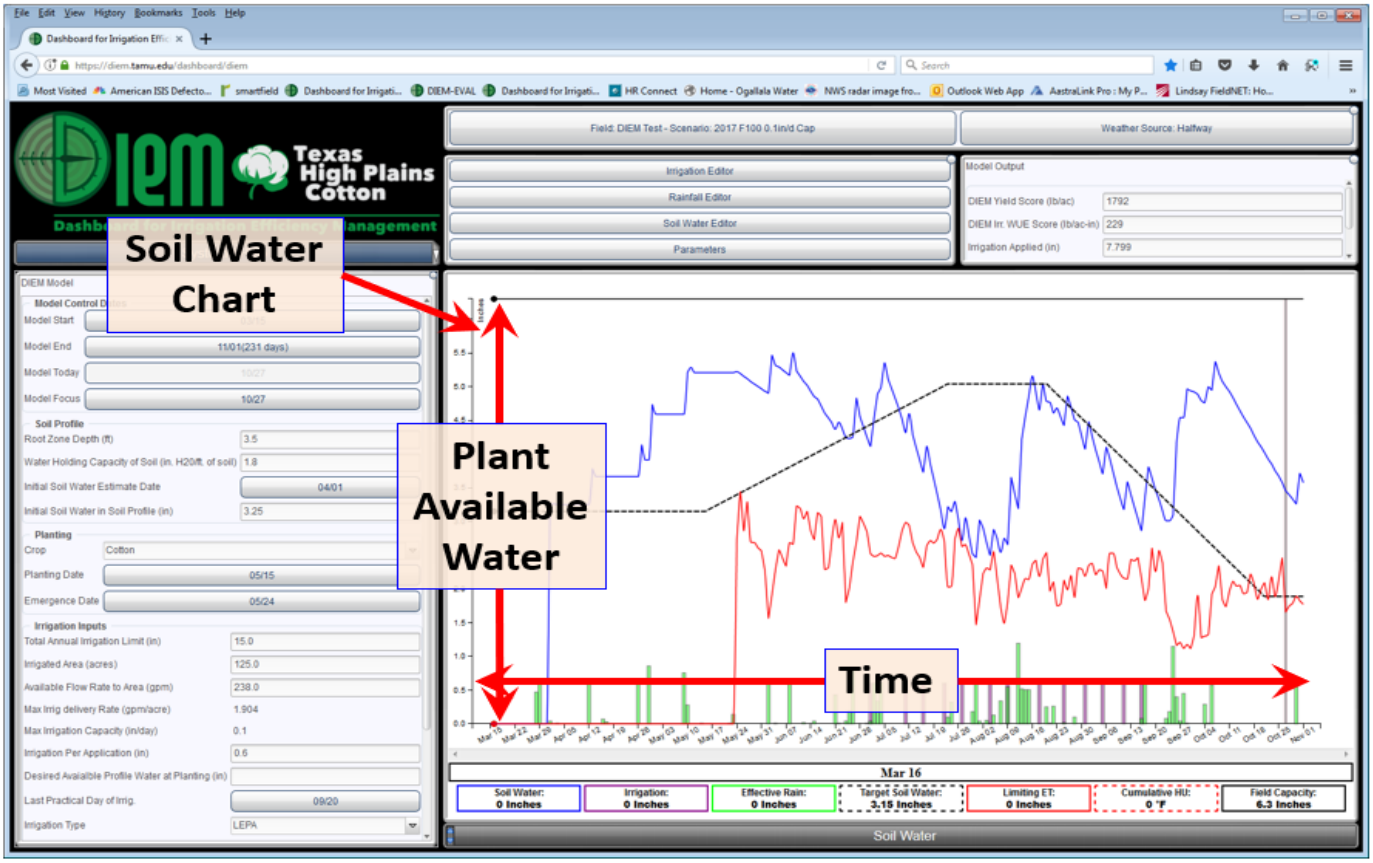


Figure 2. DIEM produces a soil water chart that displays plant available water (y-axis) over time (x-axis). The time output evaluates the entire growing season by using actual weather data up to the current day and using historic data to forecast and project irrigation needs for the remainder of the growing season.

2. Water Irrigation Scheduler for Efficient Application (WISE) - Colorado State University

WISE Irrigation Scheduler

wise.colostate.edu

Contact: Allan Andales Email: Allan.Andales@colostate.edu

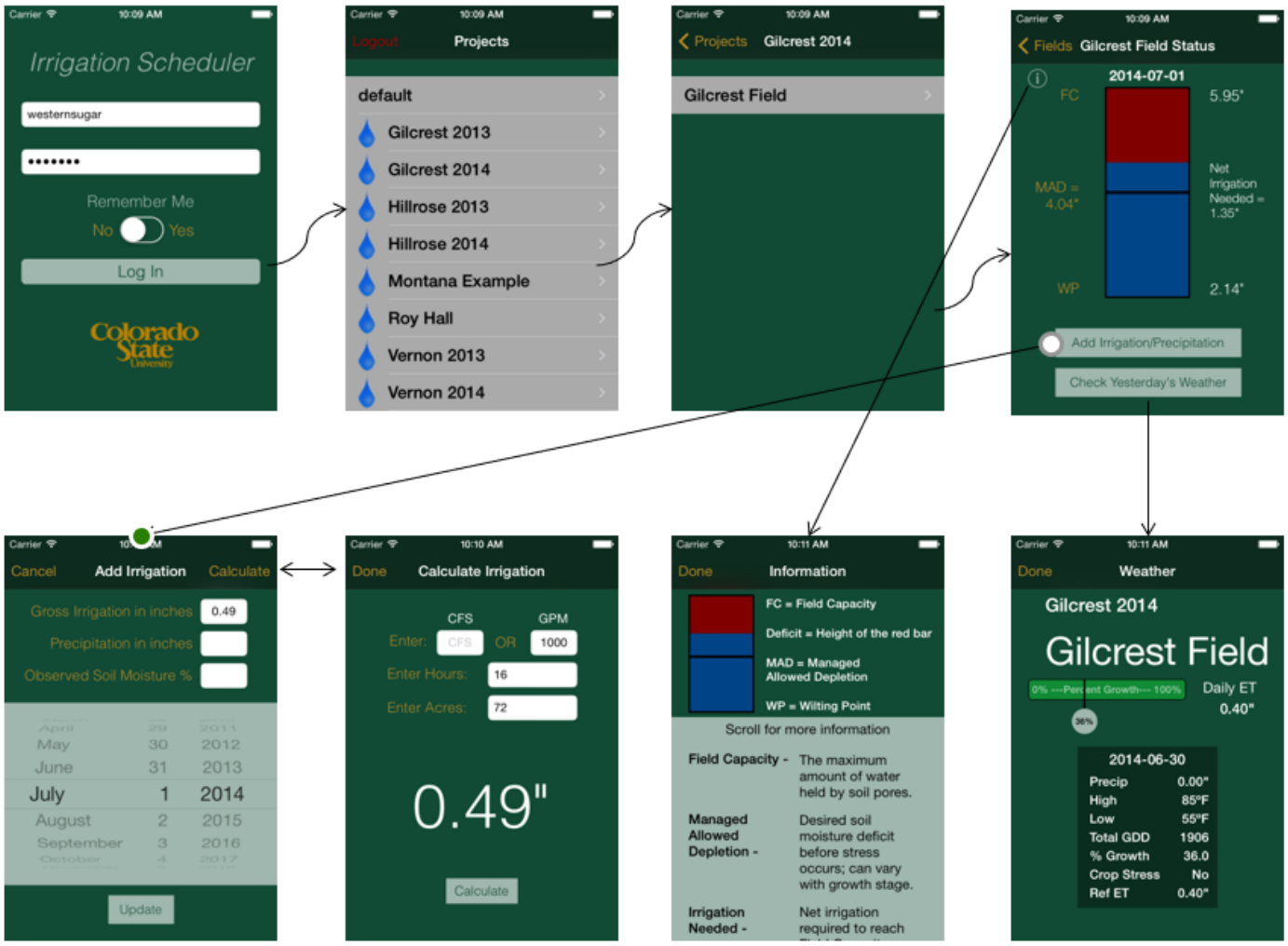


Figure 3. The WISE app is available for both iPhone and Android platforms. The output displays the soil water status relative to a management allowed depletion (MAD) soil water level where crops will experience stress. The app also allows the grower to enter applied irrigation amounts that will update the soil water balance to enable accurate future irrigation scheduling.

WISE was developed for Colorado crops with access to online weather data through Colorado Agricultural Meteorological Network (CoAgMet) and Northern Water. The WISE tool can:

- easily map fields, download soil properties from the NRCS database, and access weather data from nearby weather stations; input crop and irrigation system characteristics and irrigation events throughout the season;
- schedule irrigation using daily soil water balance, calculated evapotranspiration (ET), and weather data;
- track irrigation requirements using a mobile app; and
- keep irrigation records with a variety of reporting functions.

"WISE allows me to see what stage growth the corn is in and how much water it should be using for the next two or three days so I can appropriately decide whether I can get by with shutting the sprinkler off or keep it running."
Corn producer, Yuma, CO

3. iCrop - University of California - Davis

erams.com/icrop
Contact: Isaya Kisekka Email: ikisekka@ucdavis.edu

iCrop is currently optimized to work in Kansas and California for corn, sorghum, alfalfa, wheat, cotton, tomatoes, trees, and vines, and could be applied to other regions. The iCrop tool:

- takes a systems approach to crop water management by evaluating the interactions between genetics, environment, and management using powerful crop simulation models;
- knows what has been done and learns from it as the season progresses to help provide in-season yield predictions, so the grower can adjust irrigation schedules to optimize production goals;
- allows for site-specific management, and
- can be linked to public and private soil and weather databases.

"I like iCrop because I can use it to predict yield during the growing season as I make irrigation management decisions." Wheat producer, Western Kansas

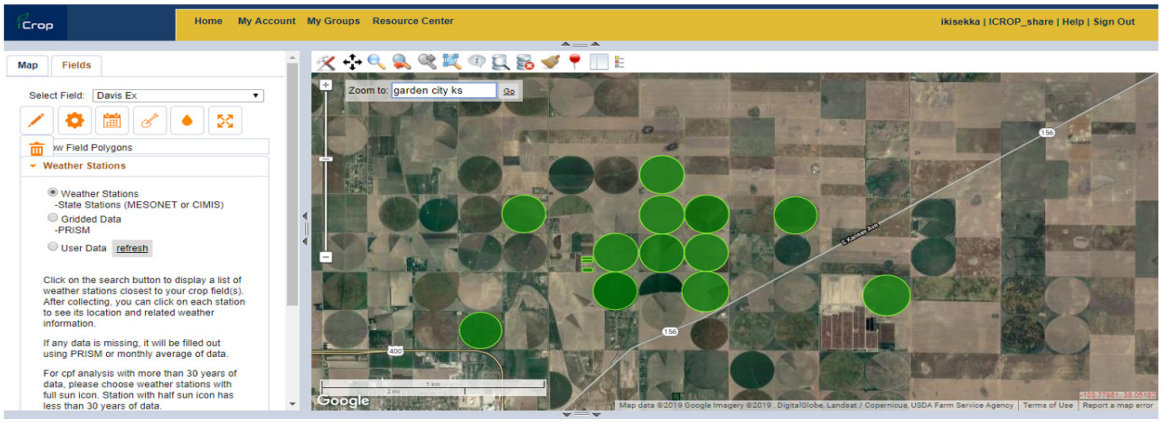


Figure 5. This iCrop output displays an example of a farming operation near Garden City, KS.

4. KanSched - Kansas State University

kansched3.engg.ksu.edu
Contact: Jonathan Aguilar Email: jaguilar@k-state.edu

KanSched was developed for the Kansas region and crops with broad application to other regions and crops. The KanSched tool includes:

- ET-based water balance irrigation scheduling, and
- capability to easily enter crop and growth stage information, soil layer and root information, integrate soil sensor measurements, maximum allowed deficit, irrigation system efficiency, and NRCS rainfall discount.

"I have used KanSched for over 20 years. I find it a good tool to monitor and manage irrigation applications and to model crop water use using the checkbook method. Being able to vary crop coefficients, modify crop growth stages, and discount light irrigations is a good foundation for irrigation water management." Ag engineering consultant, Kansas

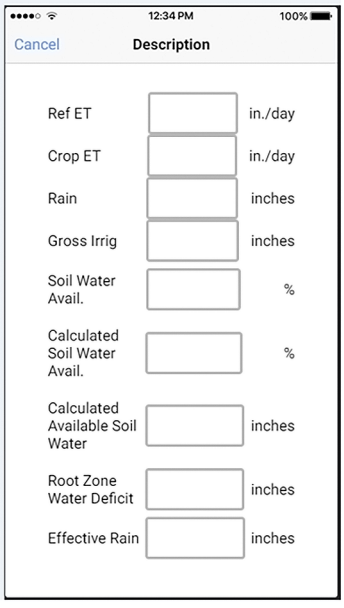


Figure 5. The KanSched app uses evapotranspiration (ET) data, rain, and gross irrigation to calculate available soil water.

Conclusion

Irrigation scheduling tools can help you better determine when and how much to irrigate, improving your potential to hit target yield goals, save money, and conserve water.

Have you been curious about using irrigation scheduling tools but unsure about how to get started? Try touring any of the irrigation tools highlighted in this fact sheet that apply to your operation.

Each of these university-funded tools is free of charge, and your information is not collected, stored, or used for other purposes. The tools are based on similar concepts available through subscription-based services, providing a no-cost opportunity to test out how irrigation scheduling can support your water use decisions.

Questions? Need support? Visit the tool's website or email the listed contact.

Acknowledgement

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Graphic design: Amy Kremen, Project Manager, Ogallala Water Coordinated Agriculture Project

Content coordinator: Diane DeJong, Extension Specialist, Colorado State University

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