

Grower-owned weather stations and smartphone apps for improved water management

By Kelly Morgan

Since 1998, the Florida Automated Weather Network (FAWN) mission has been to provide timely and accurate weather data for improved agricultural production. FAWN weather stations provide weather data from 41 locations around the state. While the current network provides much-needed information to a large number of Florida growers, state agencies and citizens, higher resolution data can only enhance this resource.

If soil moisture sensors are not used in each citrus block to schedule irrigation, the use of weather data to estimate water requirements can be used. Estimation of citrus water use or evapotranspiration from nearby weather stations has proven effective in accurate management of citrus irrigation. However, weather measurements can vary significantly over larger distances, and some even over a short distance. The use of evapotranspiration

estimates and real-time monitoring of air and wet bulb temperatures is critical in evaluating when and how long irrigation should be run.

FAWN and the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS) have developed a variety of weather-related tools that can aid citrus growers in making irrigation and cold protection decisions. The FAWN irrigation scheduling tools have assisted many citrus growers in estimating proper irrigation timing and duration based on real-time weather data. These irrigation scheduling tools have been proven very useful in helping growers save both water and dollars. However, some farms can be many miles from a FAWN site; such a distant FAWN site may not provide the level of specificity needed to ensure growers are operating their irrigation systems during optimal times. Differences in measurements between a farm and the closest FAWN site can cause growers to provide irrigation at amounts other than what is needed by the crop, which can lead to fertilizer leaching.

MY FLORIDA FARM WEATHER

In 2013, FAWN worked with the Florida Department of Agriculture and Consumer Services' (FDACS) Office of Agricultural Water Policy to deploy a high-resolution, farm-based basic weather station network called My Florida Farm Weather. The goal was to provide growers with site-specific weather data that can be used to maximize water use for irrigation and cold protection. Site-specific data from the network of grower-owned and maintained weather stations can maximize irrigation efficiency and substantially reduce the amount of water and fuel or electricity used for irrigation.

FDACS established a cost-share program to reimburse participants in best management practices programs up to 75 percent of the cost of weather stations. Priority was given to applicants who intended to use the weather station primarily for freeze protection; however, irrigation scheduling is also included.

Data from the weather stations are collected every 15 minutes and stored on FAWN servers. FAWN displays data from the farm-based stations, FAWN stations and other

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Farm-based weather stations can provide coverage on a scale that will allow growers to better and more efficiently schedule their irrigation applications.

applicable sources (e.g., Meteorological Assimilation Data Ingest System, the National Oceanic and Atmospheric Administration data clearinghouse) on an interactive Google Map found at the FAWN website (<http://fawn.ifas.ufl.edu>). Users can select a station to view all available data as well as graphs of past temperatures and rainfall.

SMARTPHONE APPS

Mobile smart devices (e.g., smart phones, tablets) have become popular because of their convenience and ease of use, making them ideal for disseminating information on a regular basis with real-time data. Tools developed for use on mobile smart devices are typically called “apps” and are available for a variety of functions. Due to the increasing popularity of smartphones and apps, FAWN developed an app for the iPhone and Android platforms that allows users to view the weather station data on their smartphones in much the same way that the data can be viewed on the webpage. When a user activates the app, a map

appears and the app uses the phone’s location services to display the closest station or stations to the user’s location. As the system is further developed, growers will have the capability to use their data in FAWN irrigation and freeze protection tools.

Another project of UF/IFAS has been the development of smartphone apps for crop irrigation scheduling using FAWN weather data. Our goal is to provide users with an easy-to-use mobile app to access information that would improve irrigation scheduling for a wide range of crops, including citrus. By using the app instead of a set time-based schedule for irrigation, more accurate irrigation is provided.

Using the apps to modify the irrigation schedule has the potential of reducing water and fertilizer use, resulting in reduced irrigation and fertilizer costs and the potential of further reducing nutrient leaching. The FAWN and irrigation scheduling apps are available to download in the App Store and Play Store.

CONCLUSIONS

A collaborative FDACS/IFAS/FAWN system called My Florida Farm Weather will cost share a weather station and allow citrus growers to view data from weather stations within their groves as well as in neighboring groves. Farm-based weather stations can provide coverage on a scale that will allow growers to better and more efficiently schedule their irrigation applications. Additionally, the use of smartphone apps will allow for the evaluation of highly variable weather measurements to estimate citrus water use and schedule irrigation while in the grove. Use of these data sources and scheduling tools will make citrus irrigation more effective and reduce water use and costs, potentially reducing leaching of fertilizers out of the root zone.

Kelly Morgan is a University of Florida-IFAS associate professor at the Southwest Florida Research and Education Center in Immokalee.

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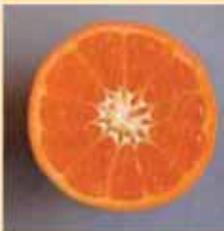
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