smartirrigationapps

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Project Objectives

- Develop, validate, and execute Smartphone apps for citrus, cotton, strawberry, and urban lawn to provide real-time and forecasting information for more efficient irrigation and water conservation.
- Incorporate stakeholders into the development process through focus group app piloting and regular review.
- Conduct in-service training events, conduct stakeholder training events, develop and maintain dedicated web site, and further advertise the tools through web, email, extension publications, local newsletters.
- Further disseminate the methodology of Smartphone science-based apps to professional audiences through publications and conference presentations and to collegiate audiences through teaching modules designed and incorporated into course syllabi (UGA).

App Details

- Effectiveness of the apps will be evaluated by comparing volumes of water used with conventional scheduling techniques versus volumes used when scheduling with apps.
- Apps will use weather data from the Florida Automated Weather Network (FAWN), the Georgia Automated Environmental Monitoring Network (GAEMN), and the National Weather Service.

Water Balance Calculations

- Use a simplified water balance that considers field capacity, rooting depth, evapotranspiration (ET), rainfall, minimum allowable depletion, and irrigation system characteristics.
- ET, which is a measure of the evaporation and transpiration losses from a crop, varies by production system. This variance is accounted for through a crop coefficient (Kc). Thus, crop ET (ETc) is estimated using crop production system specific Kc values and reference ET (Eto).

$$Kc = \frac{ETc}{ETo}$$

- Some apps will also consider soil water depletion in the ET calculation.
- Growing degree days will be incorporated as appropriate to estimate crop water needs.
- The four apps will use the Penman–Monteith equation to calculate ETo. Meteorological data (daily mean temperature, wind speed, relative humidity, and solar radiation) for these calculations will be obtained from FAWN and GAEMN.

App Programming

- Two mobile operational systems: iOS and Android.
- Apple (xCode/iOS SDK) and Google (Android SDK) allow the developers to build the project, from the programming logic to the user's interface.
- Each platform has specific characteristics and programming languages, (i.e., iOS is Objective C and Android is Java.
- Apps will have the same structure; both will use the Google Maps API to present the stations on a map view and will have access to the database and to calculations through WebServices on AgroClimate's server.

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Prototype

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1. Location Selection

Access information by selecting a location using a list or map. Only locations with weather stations (FAWN or GAEMN) are selectable options.

Weather data from the respective location will be used in the irrigation calculations. In addition, information from the National Weather Service will be used to provide forecasting information for improving irrigation.

2. Tool Selection

Depending on the app, different tools will be listed. This example is for strawberry production and the tool is irrigation schedule. The app also includes user preferences and documents to assist the user. The navigation menu can be used to learn more about irrigation as related to the particular production system.

3. Data Entry

Some information is input to the app by the user. The app uses this information to perform calculations. The information requested is crop specific and is limited to what the user can reasonably answer.

While this prototype is for an iPhone, each app will be developed for a variety of smart phones and potentially the iPad. Changes will be made to the different apps based on stakeholder evaluation and feedback.

4. App Output

App output will provide information on how to schedule irrigation based on real-time weather data and forecast weather data. The outcome is expected to reduce irrigation water that is not used by the crop or increase water use efficiency of the crop.

App output will change daily to reflect daily data and predictions. The apps will be accessible through our project web site for the project life. Post-project, they will be housed with FAWN and AGROCLIMATE.

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