Introduction
A UF/IFAS team has developed a virtual irrigation tool for homeowners, irrigation professionals, and others for investigating different irrigation schemes using site-specific irrigation system specifications and real-time data from the Florida Automated Weather Network (FAWN) stations located throughout the state of Florida. This interactive tool as well as other FAWN data and tools are organized and available on the FAWN website (http://fawn.ifas.ufl.edu). The new tool is located under Your Virtual Lawn Tool, which is located in the FAWN Tools menu under the Irrigation option (http://irrigationtool.appspot.com).

Purpose of the Interactive Irrigation Tool
The purpose of this tool is to provide users with the ability to test different ways of scheduling irrigation for their lawn (or turf) without having to purchase different controllers and with the ability to simulate the use of lower water amounts without causing over- or under-irrigation to their turf. The tool allows the user to simulate the performance of new technologies such as smart-irrigation soil moisture sensor (SMS) controllers or evapotranspiration (ET) controllers in a virtual environment. Using the tool, users can determine which system would be best for their lawn and implement practices that could potentially result in water conservation, a healthier lawn, and lower water bills. The interactive irrigation tool is designed for turf and not for ornamental plants such as trees or shrubs. It has limitations because of the differences among site conditions, unaccounted-for site characteristics, distances between weather stations and sites, and assumptions made by the model. The tool should only be used for comparative purposes and as a learning tool. UF/IFAS and the authors are not advocating a particular technology or providing any lawn-quality guarantees associated with this tool.

Students can use this tool to learn how to correctly operate irrigation scheduling systems. Property owners can assess various ways to improve their irrigation efficiency by using less water and to reduce their water bills. Irrigation professionals can use the tool to assist their clients in determining how to best manage home and business irrigation.

How the Tool Works
The tool is based on an hourly water balance method, which is reported to the user weekly, and considers rainfall, infiltration, runoff, percolation, ET, irrigation, and soil water content. The tool combines user input, the simple water balance calculations, and real-time FAWN data to provide the information on either how much excess irrigation water the lawn received or how many days the lawn experienced water stress (i.e., too little water to support grass growth). The results of the tool are provided to the
How to Get Started Using the Tool

The tool can be found at the FAWN website. Select the FAWN Tools menu, then select Irrigation, and you will find the Your Virtual Lawn Tool link (http://irrigationtool.appspot.com). This link will take you to the application. Once you sign in, you will be directed to the system welcome web page.

The welcome page contains information on the four different irrigation technologies available in the tool: time-based irrigation, time-based with a rain sensor, time-based with a soil moisture sensor (SMS), and evapotranspiration (ET) controllers. There is a navigation menu to guide you through the site.

Introduction material is also provided and can be easily viewed using the introduction menu tab. The navigation menu is also used to input site specific information into the tool (i.e., Step 1, Step 2, and Step 3).

Step 1

In this step, you must enter your ZIP code and select a unit system of either English or Metric (Figure 1). The ZIP code is used to determine from which FAWN weather station rainfall and ET data will be used in the water-balance calculations. The selected unit system determines the measurement units used in later steps.

Step 2

In this step (Figure 2), define the rooting depth, soil type, and irrigated area. Rooting depth refers to the depth of the roots of the lawn turf. The rooting depth can be estimated by digging small areas of turf and observing roots, or the default value can be used. For soil type, one of the following options must be selected from the drop-down menu: Sand, Sandy Loam, Loam, Silty Loam, Clay Loam, or Clay. For soil texture information in your area, call your local Natural Resources Conservation Service (NRCS) office or visit the USDA soil survey website (http://websoilsurvey.nrcs.usda.gov). The default soil type is Sand. Since all soil types may not fit into the categories provided, the soil type that is most similar in terms of water-holding ability should be selected. Also, you must input the irrigated area, which is the size of the area receiving irrigation.

Step 3

Several options are provided in this step. First, the irrigation systems to be modeled must be selected. The choices are Time-Based, Time-Based with Rain Sensor, Time-Based with Soil Moisture Sensor, and/or ET Controller (Figure 3). Users may select as many options as they like.

- Time-Based refers to a controller that is set to irrigate on certain days at certain times.

- Time-Based with Rain Sensor refers to a Time-Based system with a rain sensor to bypass irrigation if the rain sensor signals that sufficient rain has occurred. If this option is selected, a rain sensor setting must be submitted, or the default value can be used. Figure 4 shows an example of a rain sensor.
Time-Based with a SMS indicates a Time-Based system is being used with a SMS. The SMS acts as a switch and bypasses irrigation if the soil moisture is over a set threshold. The threshold is a percentage of the amount of water the soil can hold, and the default setting is 0.6, which corresponds to soil that is at 60% of its water-holding capacity, but can be adjusted by the user. Figure 5 shows an example of this type of controller.

ET Controller indicates the irrigation schedule will be determined based on ET estimates using FAWN data and crop coefficients for Florida. ET is an estimate of water use by plants and evaporation. Crop coefficients are values that adjust the ET calculation using weather information to estimate water use by grass. Figure 6 shows an example of an ET controller.

If a rain sensor irrigation technology is selected, an additional field is required to describe the rain sensor setting (Figure 7).

Likewise, if a soil moisture sensor irrigation technology is selected, the user must designate a threshold for triggering irrigation bypass (Figure 8).
Irrigation Amount Applied Per Event

If any technology other than the ET Controller is selected in the Irrigation Technology section, then an Irrigation Depth or an Irrigation System must be identified. Users can enter an Irrigation Depth/Amount (Figure 9) or select an Irrigation System Type, and enter the length of time the system operates per irrigation event (Figure 10). The options for Irrigation System Type are Micro Irrigation Head (delivering 0.25 in./hr.), Fixed Irrigation Head (delivering 1.5 in./hr.), Gear Driven Irrigation Head (delivering 0.5 in./hr.), and Impact Irrigation Head (delivering 0.5 in./hr.).

Correspondence

If you subscribe, you will receive the resulting irrigation schedules calculated by the tool in a weekly e-mail (Figure 12). In this section, you will need to accept the subscription to receive the weekly e-mail. Users can cancel delivery of the e-mail at any time.

Limitations

A major limitation of this tool is that rainfall can be highly variable, and the FAWN stations can be located some distance from the user’s location. With this in mind, the e-mail displays the FAWN station used and the amount of rainfall received for the period. There are plans to investigate alternate sources of rainfall data that could be integrated into the calculations. Another limitation is that the tool does not address trees, shrubs, annuals, or other ornamental plants.
Further Questions
This tool was developed through a collaborative effort between FAWN and UF/IFAS faculty. To help ensure questions are answered in a timely manner, please send questions or comments to Dr. Kati Migliaccio at klwhite@ufl.edu. You can also contact your county Extension service office for questions related to irrigation and plant health.

References

