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FAWN Interactive Landscape Irrigation Tool

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A new interactive irrigation tool has been developed 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 around the state of Florida. The tool combines user input, simple water balance calculations, and real-time FAWN data to provide the user with information on either how much excess water the lawn received—as a combination of irrigation and rainfall—or how many days the lawn experienced water stress, i.e., too little water. All results of the tool are provided to the user via a weekly email, with results based on calculations from the previous week. This interactive tool as well as other FAWN data and tools are organized and available free of charge on the FAWN web site (http://fawn.ifas.ufl.edu).

The Florida Automated Weather Network (FAWN) was established in 1998 in response to the discontinuation of the National Weather Service (NWS) agricultural weather forecast products. What began as a network of 11 Cooperative Extension Service sites in Lake and Orange counties is now a statewide system of 36 sites located from Homestead to Jay, near Pensacola. Data are collected from each site every 15 min, and along with several calculated products and weather-related tools, are delivered to the public by way of the Internet. Data can also be retrieved via telephone voice message system. FAWN's mission is to "provide timely and accurate weather data to a wide variety of users," develop effective management tools to assist resource managers and those involved with protecting life and property; and subsequently generate a substantial positive financial impact on numerous economic segments of Florida.

Tool Background and Function

In an effort to provide homeowners and landscape managers with the ability to maximize irrigation efficiency, FAWN recently deployed the FAWN Interactive Irrigation Tool. The purpose of this tool is to provide users with the ability to evaluate different ways of scheduling irrigation for their lawn (or turf) without the cost or aesthetic repercussions of physically doing it. By trying new technologies such as smart irrigation soil moisture sensors or evapotranspiration (ET) controllers in a virtual environment, users can determine which system would work best for their lawn, as well as implement practices that will result in water conservation, a healthier lawn, and lower water costs. Students can use this tool to learn irrigation management, property owners to improve their irrigation efficiency and reduce water costs, and irrigation professionals to assist their clients in determining how to best manage home and business irrigation.

The tool combines a simple weekly water balance, based on rainfall, infiltration, runoff, percolation, evapotranspiration, irrigation, and soil water content, with user input and real-time FAWN data to provide users with information on either how much excess water the lawn received—as a combination of irrigation and rainfall—or how many days the lawn experienced water stress, i.e., too little water. All results of the tool are provided to the user via a weekly email, with results based on calculations from the previous week.

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User Input

The tool can be accessed from the FAWN website homepage, located at http://fawn.ifas.ufl.edu. Because the tool is built on Google technology, an active Google account is required. Once signed in, the user is directed to the system input web page where irrigation system specifications and landscaped area can be customized.

Users begin setting up the tool by selecting a preferred unit system, English or Metric (Fig. 1). Then, soil characteristics and irrigated area are required (Fig. 2), with rooting depth referring to the depth of the roots of the lawn turf, and irrigated area the size of the area that is receiving irrigation. For soil type, one of the following options must be selected from a drop-down menu: sand, sandy loam, loam, silty loam, clay loam, or clay. Since all

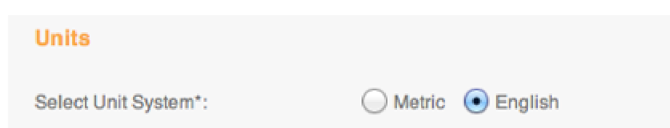

Fig. 1. Screenshot of Units input section.

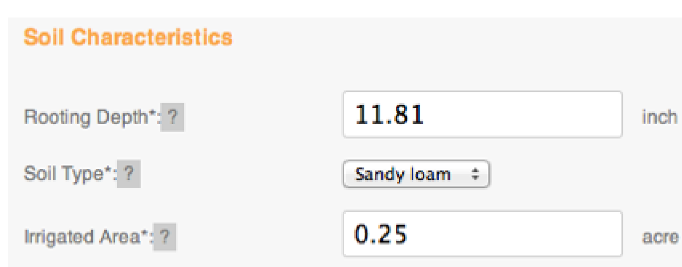

Fig. 2. Screenshot of Soil Characteristics input section.

soil types may not fit into these categories, the soil type that is most similar in terms of water holding capacity should be selected.

Next, the user selects an irrigation technology (Fig. 3). The choices are Time-Based Scheduler, Time-Based plus Rain Sensor, Time-Based plus Soil Moisture Sensor, or ET Controller. Time-Based plus Rain Sensor (Fig. 4) refers to a Time-Based Scheduler with an attached rain sensor to bypass irrigation if the rain sensor signals rain has occurred. If this option is selected, a rain sensor setting must be submitted in inches or the default value can be used. Figure 5 shows an example of a rain sensor. Time-Based plus Soil Moisture Sensor (Fig. 6) indicates a Time-Based Controller is being used with a soil moisture sensor. The soil moisture sensor acts as a switch and bypasses irrigation if the soil moisture is greater than a set threshold. The default setting is 0.7 (which corresponds to soil that is at 70% of its water holding capacity), but can be adjusted by the user. Figure 7 shows an example of this type of controller. If ET Controller is selected (Fig. 8), the irrigation will be determined based on ET as estimated using FAWN data and crop coefficients for Florida. Figure 9 shows an example of a ET controller.

The Irrigation Schedule (Fig. 10) section begins with submitting a ZIP code, which is used to determine which FAWN weather station will be used in the water balance calculations. The user must also enter specific irrigation days (i.e., Sunday, Monday, Tuesday, Wednesday, Thursday, and Friday) by checking applicable boxes. If a Miami–Dade County ZIP code is entered, then a street number must be submitted also because Miami–Dade County is restricted to watering 2 d per week depending on the street number; even-numbered addresses irrigate Sunday and Thursday, while odd-numbered addresses irrigate on Wednesday and Saturday.

Fig. 3. Screenshot of Irrigation Technology Used input section.

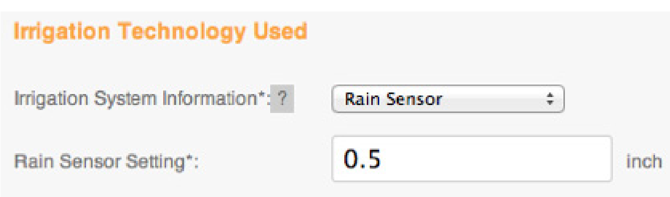

Fig. 4. Screenshot of Irrigation Technology Used input section showing selection of Time-Based plus Rain Sensor option and default sensor setting.

Fig. 5. Example of rain sensor. Credit: Nicole A. Dobbs, UF/IFAS.

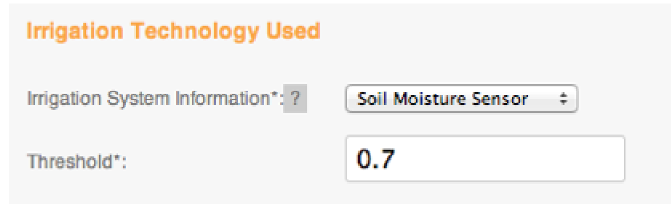

Fig. 6. Screenshot of Irrigation Technology Used showing selection of Time-Based plus Soil Moisture Sensor and default soil moisture value.

Fig. 7. Example of a time-based controller with a soil moisture sensor. Credit: Salomon M. Gutiérrez, UF/IFAS.

Fig. 8. Screenshot of Irrigation Technology Used showing selection of ET Controller.

Fig. 9. Example of an ET Controller. Credit: Nicole Dobbs, UF/IFAS.

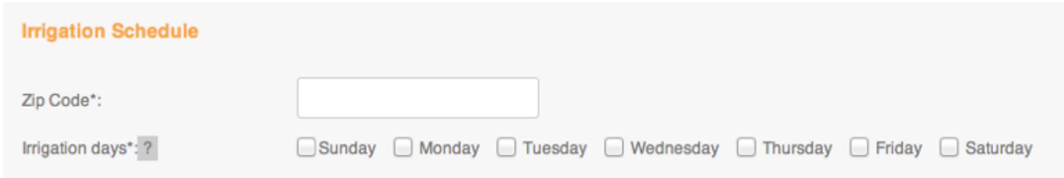

Fig. 10. Screenshot of Irrigation Schedule showing ZIP code and Irrigation Days input.

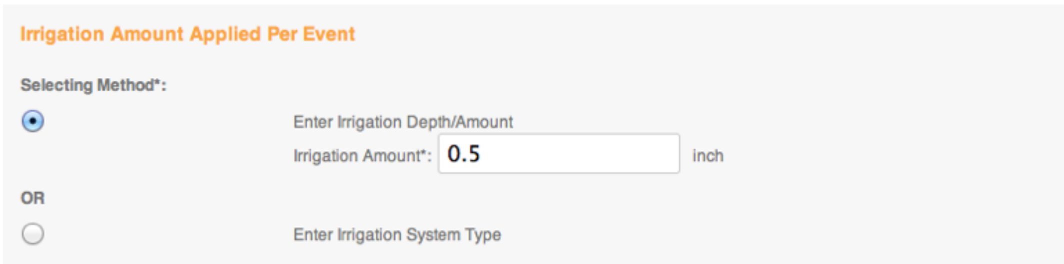

Fig. 11. Screenshot of Irrigation Amount Applied Per Event input section showing the default Irrigation Amount.

If a technology other than ET Controller is selected in Irrigation Technology Used, then an Irrigation Amount Applied Per Event must be submitted. This is accomplished in one of two ways. The user can input an Irrigation Depth/Amount (Fig. 11) or can select an Irrigation System Type and input the length of time the system runs per irrigation event (Fig. 12). The options for Irrigation System Type are Micro Irrigation Head (delivering 0.5 inch/h), Fixed Irrigation Head (delivering 1.5 inches/h), Gear Driven Irrigation Head (delivering 0.5 inch/h), and Impact Irrigation Head (delivering 0.5 inch/h).

Finally, to complete the input process users must agree to accept a weekly email, which includes the results of the calculations. Delivery of the email can be cancelled at any time.

Weekly Report

Each week, the tool evaluates lawn water usage based on the submitted information and FAWN data from the previous week, and sends the evaluation via email (Fig. 13). If the lawn receives too much water, this is reported in terms of gallons of water and the percentage of overwatering that occurred. If too little was received, then the number of days the lawn did not receive enough water is displayed. The email includes web links to relevant EDIS documents and IFAS programs, and the user also receives a water efficiency score on a 1 to 5 scale, with 1 being the most efficient, and 5 being the least efficient.

Limitations

A major limitation to this tool is that rainfall can be highly variable spatially and the FAWN stations can be located some distance away from the user's location. With this in mind, the email displays the distance between the user's ZIP code and the FAWN station. Plans are to investigate alternate sources of rainfall data that could be integrated into the calculations, and the ability for users to submit their own rainfall measurements. Another limitation is that the tool does not address trees, shrubs, annuals, or other ornamental plants.

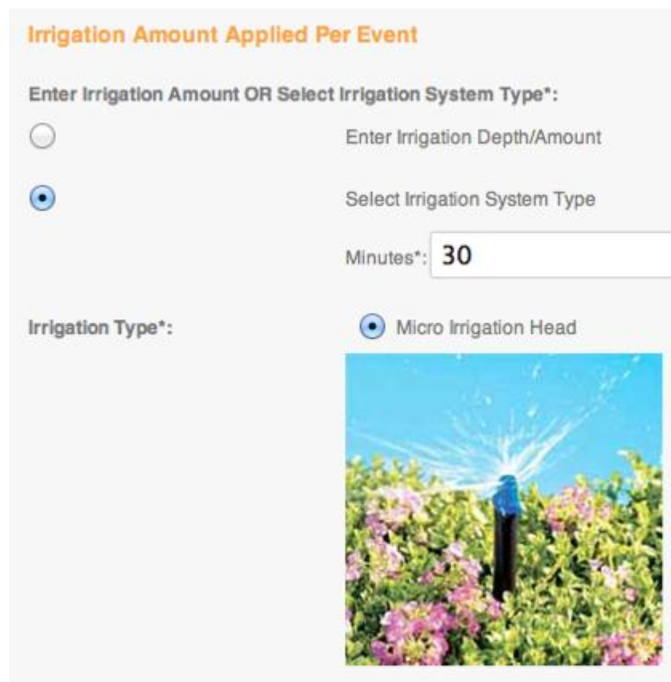

Fig. 12. Partial screenshot of Irrigation Amount Applied Per Event input section showing selection of Micro Irrigation Head and the runtime of 30 min.

Conclusion

In an effort to assist a variety of irrigation managers, FAWN created a tool with which users can evaluate current irrigation regimes as well as test new technology and programs in a virtual environment. Using real-time calculations and data from FAWN stations, the tool provides multiple ways to maximize water use and minimize water costs.

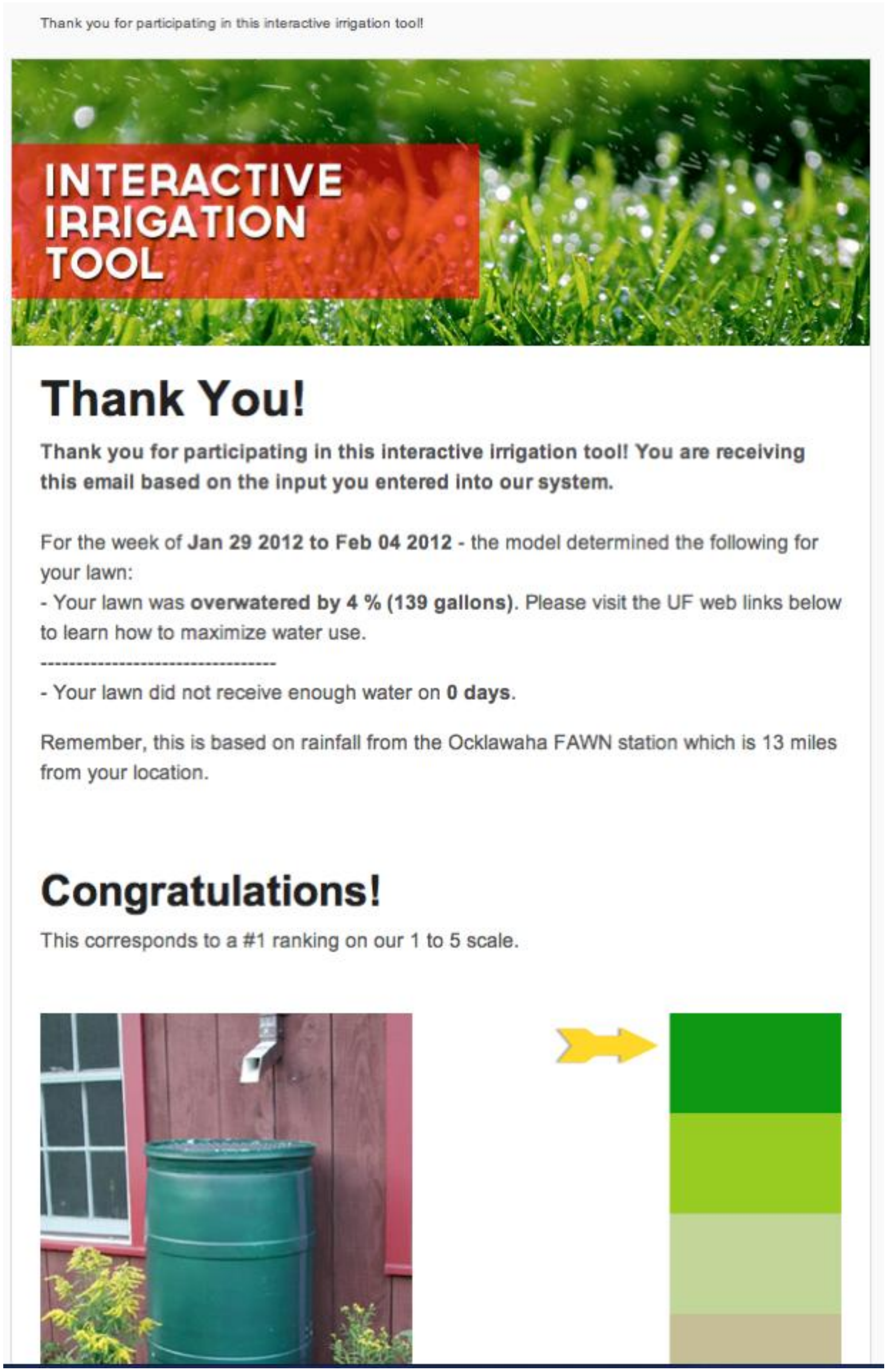

Fig. 13. Screenshot of weekly email report.

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