Principles of ET based irrigation

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How to use evapotranspiration (ET) & rainfall (R) for estimating Irrigation needs

- Plant water needs = Irrigation = ET - R
Concept 1: Rainfall and ET characteristics in Florida

- Rainfall and ET have a general pattern
  - ET lower in the winter and greater in the summer
  - Rainfall lower in the winter and greater in the summer
  - ET generally has a more consistent pattern than rainfall

- Rainfall and ET change
Evapotranspiration, rainfall, and irrigation

Rainfall / ET (inches)

- Rainfall
- ET
Concept 2: All rainfall is not useful to plants

- Soil has a limited storage capacity for water
- Once storage is exceeded, water continues to move either as runoff or drainage

Now what?

- How to decide on irrigation?
  - Considering concept one, that R and ET constantly change
  - Some R is not available to plants
- Need something that...
Irrigation tools

- **Hardware tools**
  - Soil moisture sensors
  - ET controllers
  - Rain sensors

- **Software tools**
  - Using FAWN
  - Smartirrigation turf app
Soil moisture sensors

- Allows the user to set a threshold or soil water content level (MAD or Management Allowed Depletion) used to bypass or allow irrigation events
- Operates automatically with the irrigation system
Soil moisture sensor schematic

- Soil water content
- Field capacity
- 50% of FC or lower threshold

Time:
- 1 in rain
- 0.5 in rain
ET controllers

- Measure weather at the site or are sent information (Wi-Fi or cellular signal) to develop an irrigation schedule using rainfall and ET data
ET controller function

- Measures ET and rainfall every day and accumulates until an irrigation day
- Irrigation equals the accumulated ET minus R
- Some also allow the user to set a MAD
- Can operate when MAD is met or on scheduled days
How to use FAWN?

**Urban Irrigation Scheduler**

Enter Your Zip Code: [Enter]

Or Choose Your Region Below

- North
- Central
- South

Depending on your municipality and water management district, day of the week watering restrictions may vary. Check your local restrictions before setting the day of the week or time of day. [Click here for a complete list of Florida’s water management districts.]

If you have any questions regarding the Urban Irrigation Scheduler, email M.D. Dukos at mdukos@ufl.edu. Additional resources can be found [here](#).
Real-time data
Smartirrigation turf

- Smartphone app - android and iOS
- User inputs information about irrigation, soils, site location
- FAWN weather data used to determine ET
- Schedule is based ONLY on ET
  - If not modified by user for R, will over irrigate
  - Notifications are sent by the app to the user alerting of probability of rainfall and rainfall 24 hrs prior to a scheduled event
Getting started

- Register
- Accept push notifications
- Enter site location and other site characteristics
### SPRINKLER TYPE

- **Micro**
  - Low pressure and volume irrigation; water is applied as drops or small streams.

- **Spray**
  - Non-rotating sprinkler.

- **Multi-stream spray**
  - Sprinkler that is gear driven with multiple spray streams.

- **Gear driven rotors**
  - Sprinkler that contains gears that rotates a single irrigation spray.

- **Impact**
  - Sprinkler that rotates using a weighted or spring-loaded arm.

### RATE

- **1.5 in/hr**

### AREA

- **5000 ft²**

### PLANT TYPE

- **Cool Season Turf**
  - Cool-season species do better in the cooler times of the year and thrive in temperatures from 65°F to 75°F. Examples include, but are not limited to, bluegrass, tall fescue, perennial ryegrass, and fine fescues.

- **Warm Season Turf**
  - Warm-season grasses are best adapted to temperatures between 80°F and 95°F. Examples include, but are not limited to, bermudagrass, zoysia, St. Augustine, seashore paspalum and buffalograss.

- **Annual Flowers**
  - Plants grown in a usually formal high visibility area for seasonal display of colorful flowers or attractive foliage.

- **Woody plants and herbaceous perennials - Wet**
  - Trees, shrubs, vines, ground cover, and herbaceous perennials adapted to grow in a wet environment (≥25 in. of annual precipitation). This includes plants from habitats and climates where both soil and atmospheric water deficits are infrequent and irregular. This would include both riparian species (adapted to infrequent soil water deficits) and species growing in high summer rainfall regions (adapted to infrequent...
Input irrigation rate

Select days of week and conservation mode

- WEEK EVENTS
- WATER CONSERVATION MODE

- Normal
  Irrigation replaces 100% of estimated water losses from the soil.

- Seasonal water savings
  Irrigation replaces 75% of estimated water losses from the soil when rainfall exceeds water losses.

- Year-round water savings
  Irrigation replaces 75% of estimated water losses from the soil.
Zone summary

Time to run irrigation

CHARACTERISTICS

Warm Season Turf
Sprinkler type: Spray
Default rate: 1.5 in
Area: 5000 ft²

IRRIGATION SCHEDULE

Irrigation time: 20 minutes

Irrigation amount: 0.42 in per event
Accumulated rain in the last 7 days: 0.8 in
**CURRENT CONDITIONS**

- **Temperature**: 89°F
- **Humidity**: 63%
- **Wind Speed**: 11.5 mph
- **Weather Condition**: Fair

**NEXT HOURS**

<table>
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<th>°C</th>
<th>RH %</th>
<th>Wind Speed</th>
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<td>31°C</td>
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</tr>
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<td>31°C</td>
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</tr>
<tr>
<td>10PM</td>
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<td>27°C</td>
<td>10%</td>
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**NEXT DAYS**

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<th>°C</th>
<th>RH %</th>
<th>%</th>
<th>Wind Speed</th>
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<td>91</td>
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<tr>
<td>Sun</td>
<td>91</td>
<td>32</td>
<td>72</td>
<td>30</td>
<td>5.6</td>
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<td>89</td>
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<td>73</td>
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<td>91</td>
<td>32</td>
<td>71</td>
<td>45</td>
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Zone name
System name

Notifications

07/06/2015
Test

Back
Change irrigation time to 59 minutes.

TREC Plots

Test
Change irrigation time to 59 minutes.

Yearround Savings
Change irrigation time to 1 hour and 28 minutes.

07/05/2015
Test

Front
Change irrigation time to 1 hour and 40 minutes.

Kati House
Should you use an irrigation scheduling method?

- YES
- Why?
  - Reported water savings varies but is on average 30 to 40%
  - Plants are healthier
  - Less nutrient losses
  - Save money!!
How do you decide which method to use?

- Cost
- Time
- Water savings
Comparison of irrigation scheduling tools: money

COST

- $200+  ET controller, Soil moisture sensor
- Free  FAWN, Smartirrigation app

UF/IFAS
UNIVERSITY OF FLORIDA
Comparison of irrigation scheduling tools: time

- **TIME**
  - Must adjust schedule at least every 2 wks
  - Installation

- **FAWN**  
  - Smartirrigation app

- **ET controller**  
  - Soil moisture sensor
Comparison of irrigation scheduling tools: water savings

Savings

- Soil moisture sensor
- ET controller
- Smartirrigation app
- FAWN
Is it time to change your irrigation schedule?

- Try something new
- Do something different
- Learn more

DO SOMETHING TODAY THAT YOUR FUTURE SELF WILL THANK YOU FOR.

@LORNAJANEACTIVE
UF IFAS RESOURCES

- UF IFAS IrriGator BLOG  
  http://ufifasirrigator.blogspot.com/
- IrriGator videos  http://vimeo.com/ufifasirrigators
- UF IFAS EDIS docs  http://edis.ifas.ufl.edu
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