SFMA SPORTS FIELD MANAGEMENT ASSOCIATION

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Irrigation basics

FOR THE
#GATORGOOD

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Water is Gold

Outline

- Irrigation Systems
- Terminology
- Sensors

Characteristics of a good irrigation system

Uniform distribution

Individual sprinkler control

(Many) More and smaller sprinklers

Proper spacing

Flexible programming capability

Accurate function

Reliable

Parts easily procured

High output (narrow watering window)

Syringing capacity

Capable of providing near wall to wall coverage

Big pipes (slower water speed)

Plenty of isolation valves

Looped piping for good flow and even pressure

Accurate map of system

Plenty of quick coupler valves

Irrigation Audit

Determine amount of water per irrigation cycle

Determine irrigation distribution / efficiency (DU)
http://aces.nmsu.edu/pubs/_h/H510.pdf

DU should be greater >0.7

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Distribution Uniformity

DU is a measure of how evenly water is delivered to the landscape

It is the average of measurements of water applied to the low quarter (25% of the area receiving the least water) divided by the overall average.

IRRIGATION EFFICIENCY

Type	Radius of throw (ft)	PR (in/h)	DU (%)
Geared rotor	20–100	0.1–1.5	70–80
Impact rotor	30–150	0.1–1.5	60–70
Fixed spray	3–15	1.0–2.5	40–80

- Mecham (2004): Summary of uniformity data from over 6800 irrigation audits (Utah, Nevada, Colorado, Arizona, Texas, Oregon, and Florida)
- Average DU of 0.5

WATER USE (RATE)

- The total amount of water used by a turfgrass plant or sward through evaporation, transpiration, and for growth (per unit time). Because amount used for growth is small, it is usually referred to as evapotranspiration (ET) in inches or mm per day, week, or month.

DEFICIT IRRIGATION

- Irrigating turf with some fraction of water that is less than the estimated reference ET.

Weather Station Networks

(www.cimis.water.ca.org)

ET_o calculated from

- Solar radiation
- Temperature
- Humidity
- Wind speed

$$ET_o = \frac{0.408\Delta(R_n - G) + \gamma \frac{900}{T+273} u_2 (e_s - e_a)}{\Delta + \gamma(1 + 0.34u_2)}$$

CROP COEFFICIENTS (KC)

Table A.4. Monthly crop coefficients (K_c) for turfgrasses developed in Irvine, California and Tucson, Arizona .

Month	Irvine K_c[z]		Tucson K_c[y]
	Cool-season turfgrass	Warm-season turfgrass	Fairway quality bermudagrass overseeded in winter
January	0.61	0.55	0.78
February	0.64	0.54	0.79
March	0.75	0.76	0.86
April	1.04	0.72	0.90
May	0.95	0.79	0.85
June	0.88	0.68	0.78
July	0.94	0.71	0.78
August	0.86	0.71	0.82
September	0.74	0.62	0.83
October	0.75	0.54	–
November	0.69	0.58	0.82
December	0.60	0.55	0.79

Green (2005)

COOL (C3) VS. WARM(C4) GRASSES RELATIVE TO C3, C4 GRASSES:

- generally, have fewer stomata and lose less water while CO_2 is being fixed, therefore exhibiting high water use efficiency
- have 10-25% lower ET rates
- have both carbon pathways
- have bundle sheath cells that concentrate CO_2
- tolerate higher temperatures for photosynthesis
- have roots that improve over summer
- revive rapidly from drought stress

Soil Moisture Sensors (stationary)

(Toro TurfGuard; TDR)

(Decagon; 5TE & Theros 12; capacitance)

Soil Moisture Sensors (portable)

(Spectrum FieldScout)

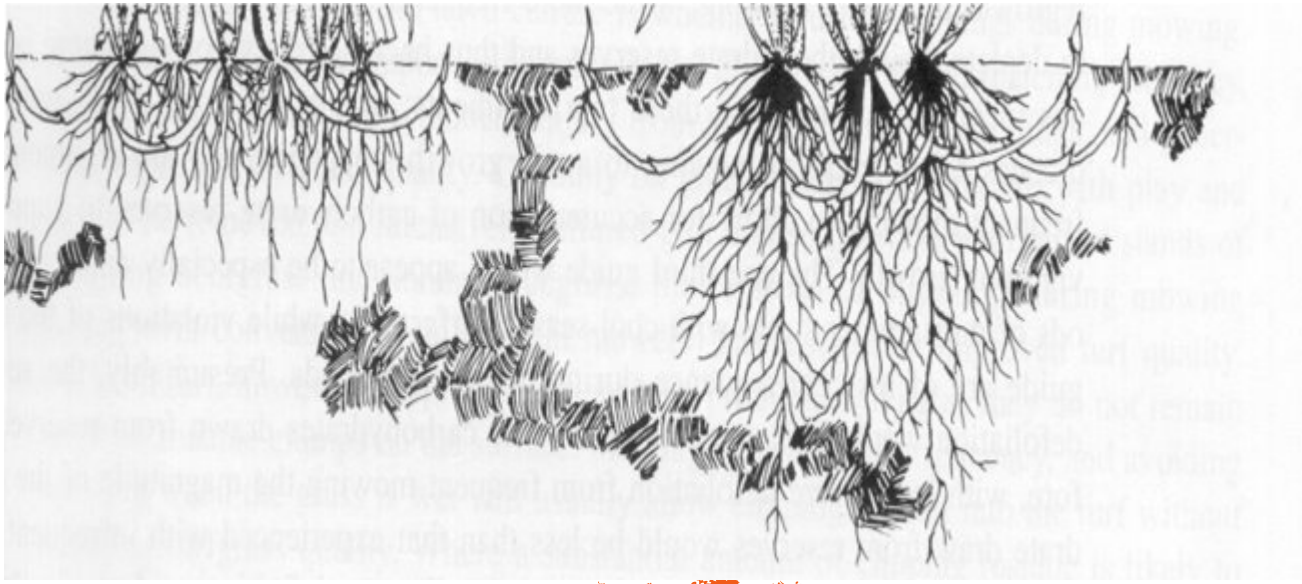
(POGO)

Soil Moisture Sensors

- Factors such as soil texture, organic matter, and even the shape of the soil particles will affect the probe's calibration. Nevertheless, a TDR moisture probe doesn't need to be accurate to be useful; it just needs to be repeatable. (Kreuser, 2016)
- Know the minimum soil moisture required to prevent wilt. This number will vary depending on factors such as turf age, soil composition, and management. Different greens on may have different minimum on the same course. (Kreuser, 2016)

Short, frequent irrigations

Longer, less frequent irrigations



OVERWATERING

- Increased disease issues
- Root rot and stunting
- Weak turf stand
- Increased weeds

SUMMARY

- Check your irrigation system frequently
- Know your grass needs
- Know your soil
- Use sensors if properly calibrated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THANK YOU!