AE265

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IFAS EXTENSION

Turf Irrigation With a Hose and Sprinkler[1]

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Irrigating with a hose and sprinkler can be equally or more efficient than irrigating with a professionally designed irrigation system. All it requires is some understanding of how an irrigation system works, and committing the time and effort needed to make good use of a sprinkler and hose.

How do sprinklers work?

Although in Florida we receive enough rainfall to meet turfgrass water needs, only a small fraction of it is effective. Its distribution over time and the low capacity of our soils to hold water result in most of rainfall being lost to runoff or percolation. Sprinklers are a tool to supplement water during periods in which not enough rainfall occurs.

A sprinkler system, regardless of its type, attempts to apply water over the irrigated area in a uniform way. Most commercially available sprinklers apply water on a pattern that decreases from the center of the irrigated circle to its edge (Figure 1a.) Although the ideal linear application rate is difficult to achieve, many commercial sprinklers are available that produce a near-linear distribution.

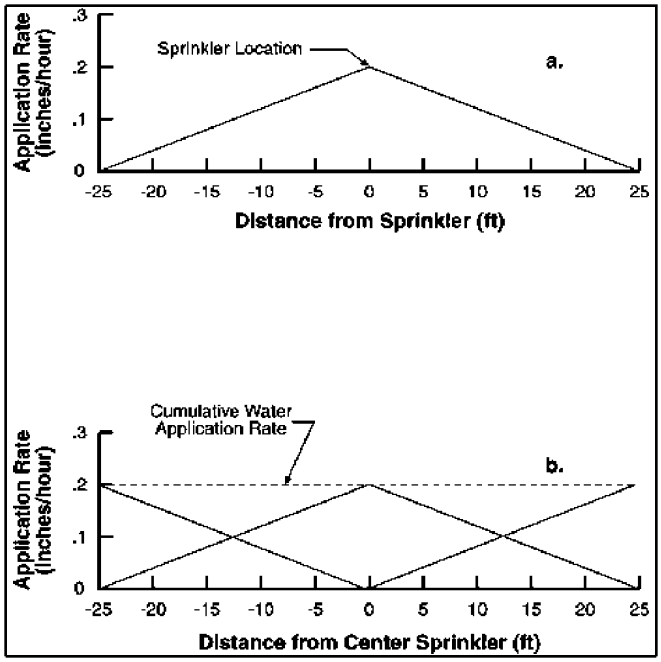

Figure 1. Application pattern of an idealized sprinkler.

To achieve a uniform coverage, sprinklers are placed in such a way that their application pattern overlaps with other sprinklers (Figure 1b.)

Spacing of the sprinklers is critical for effective and efficient irrigation. This applies equally to hose-and-sprinkler or permanent systems. Unless otherwise indicated by the manufacturer, sprinklers

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should be spaced no more than 50% to 60% of the wetted diameter of the sprinkler. In addition, they must be operated at the manufacturer's recommended operating pressure. Excessive pressure will cause to much water to be deposited in the vicinity of the sprinkler, while an under-pressurized system will tend to deposit water in a "doughnut" pattern. Also, the breakup pin in the sprinkler must be adjusted to a reach a distance within the manufacturer's recommendations.

Sprinkler placement

In a turfgrass that is irrigated using a hose and sprinkler, the sprinkler is moved to different locations to apply water. The sprinkler locations at which the sprinkler is placed are very important. Two basic rules need to be followed in determining the locations:

1. Sprinkler locations are spaced at 50% to 60% of the sprinkled diameter.
2. Sprinkler locations include edges and corners of the irrigated area.

Figure 2 shows an example sprinkler distribution for a rectangular area.

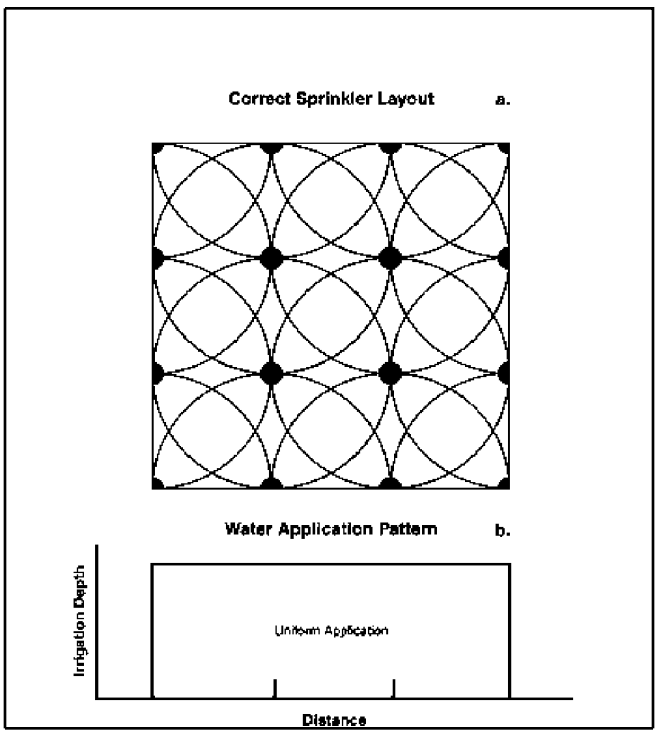

Figure 2. Sprinkler layout.

Note how sprinklers are spaced at 50% of the sprinkled diameter. The overlapping patterns result in the uniform application of water shown in Figure 2b.

When do I Irrigate?

Irrigate when the turfgrass shows visible signs of stress. St. Augustinegrass will change from a bright green color to a dull greenish blue, the leaves will fold along the longitudinal axis, and loss of turgor can be seen as footprints that linger on the turfgrass surface.

Apply water when about 50% of the turf area is affected. Delay irrigation if rainfall is forecasted in the next 2 days (summer) or 4-5 days (during any other time.)

How much water do I apply?

The amount of water to apply depends on several factors. A general rule-of-thumb for a typical Florida soil is to apply 500 to 600 gallons per 1000 sqft of turfgrass area. Note that corner sprinklers and side sprinklers will apply water over a fraction of a circle and that the water volume they deliver is proportional to the area they irrigate. Use the procedure below to calculate the required water volume per sprinkler location.

Calculating the water volume required per sprinkler position

To calculate the volume of water that must be applied at each sprinkler irrigation position use Table 1. The layout in Figure 2 is used for the example in Table 1.

Table 1 shows an irrigated area of 3000 sqft in cell C1. Multiplying cell C1 by 0.5 results in 1800 Gallons (C3) needed to irrigate the complete area.

Cells B6, B7 and B8 show the number of sprinkler positions that require the sprinkler to be set to a quarter, half and full circle, respectively. The values in cells C6, C7 and C8 are obtained by multiplying the fraction of the circle times the

number of sprinklers for each circle fraction. Column C9 shows the sum of the three cells above it.

Finally, the volume for a full circle sprinkler is calculated by dividing C3 by C9. In this example the result is that each full sprinkler position should deliver 200 Gallons. Note that a half circle should deliver 100 Gallons and a quarter circle 50 Gallons.

To do your own calculations follow the steps below.

1. Draw a diagram of your sprinkler position layout (similar to Figure 2.)
2. Measure the irrigated area in sqft and enter the value into cell E1.
3. Multiply E1 by 0.5 and enter the result in cell E3.
4. Count the number of positions in which a quarter circle sprinkler is needed, enter the value in cell D6.
5. Count the number of positions in which a half circle sprinkler is needed, enter the value in cell D7.
6. Count the number of positions in which a full circle sprinkler is needed, enter the value in cell D8.
7. Multiply D6 times 1/4 and write the result in E6.
8. Multiply D7 times 1/2 and write the result in E7.
9. Write the value in D8 in E9.
10. Add E6, E7 and E8 and write the result in E9.
11. Divide E3 by D9 and write the result in E11, this will be the volume of water that needs to be applied to a full circle position.

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How do I apply water?

Move the sprinkler from location to location and apply the calculated volume of water. Use a flow measurement and control device (Figure 3) to insure that you do not accidentally irrigate an excessive amount of time. These are available at hardware stores, are generally very inexpensive and will result in major water savings if used consistently and correctly.

Figure 3. Volume control device.

If you are using several sprinklers connected by hoses, do not mix sprinkler positions requiring different circle fractions. For example, if you have two sprinklers running at the same time along the same hose, make sure that you don't mix a 1/4 circle position with a full circle position. If you run mixed circle positions at the same time, make sure that each has its own hose and control device.

Dealing with hotspots

Hostspots are locations where consistently the turfgrass goes into stress before any other location. This can be due to many reasons. For example, turfgrass on a median or near a sidewalk, a different kind of soil (generally occurs when backfill is used), and usually, low uniformity in the application of water.

Make sure that the sprinklers are properly spaced and operated at the pressure and distance (the radius of the wetted circle) recommended by the manufacturer. The volume of water collected by placing cans at equal distances from the center of the

sprinkler, to the outside of the sprinkled circle, should fall roughly along a straight line. If there is a problem, take appropriate corrective actions for spacing, pressure and/or distance.

Make sure that the volume of water applied when the sprinkler is on a full or partial circle is proportional to the arch, i.e. A full circle position delivers 4 times the volume as a 1/4 circle position.

If the problem still persists, irrigate the hotspot manually. Allow some stress to encourage deep root growth.

Table 1. Example calculation of the irrigation volume per sprinkler.

	A	B	C	D	E	F
1	Irrigated Area (sqft)		3000			
2		X	06	X	0.6	
3		VOLUME =	1800			Gallons Needed per Irrigation
4						
5	Circle Fraction	Number of positions	Col (2) X Col (3)			
6	Quarter 1/4	4	1			
7	Half 1/2	8	4			
8	Full 1	4	4			
9		TOTAL	9			Full circle sprinklers
11	Volume per full-circle sprinkler	VOLUME / TOTAL	200			Gallons per full-circle