q&a By Dr. Grady Miller, Environmental Horticulture Dept., University of Florida

Changing your spots

I maintain a couple of school athletic fields with sandy soils in North Florida. This spring I noticed the Bermudagrass on one is not greening up very uniformly. We still have some pretty big brown spots on the field. I fertilized it and think I did a good job of distributing the nutrients. It seems to be doing better now that the nighttime temperatures have warmed up a bit. My extension agent told me it looks like either nematodes or perhaps an irrigation issue. The agent took some soil samples to test for nutrient deficiencies and nematodes. What should I do to rule out irrigation?

This is an interesting question since so many different things can cause "spots." After visiting with you I would tend to agree with the assessment from the extension agent. Your area has had a very dry spring, you have sandy soils, and the spots are very large. It was a good idea to go ahead and rule out nutrition and nematodes. If the problem were nutritional it would be easy and cheap to correct. If the problem turned out to be nematodes, then the primary approach on athletic fields is to try to promote healthy roots with cultural practices since we don't have much in the way of nematicides labeled for athletic fields. [Curfew does have a Florida label for sports turf, but must be applied by an authorized custom applicator, requires a 100-foot barrier to buildings, and has a 24-hour reentry restriction.]

During spring green-up of warm-season turfgrass such as bermudagrass it is important to have uniform temperature and wetting of the soil. The grass comes out of dormancy due to a response in temperature and day length in the presence of moisture. Any time that irrigation is the sole source of moisture, there is potential for influence in turf growth if it is not distributed uniformly.

The more uniform a water application, the less operating time an irrigation system needs to make up for poor coverage. Uniformity from a design perspective is based on the nozzling and spacing of individual sprinklers. Depending on its radius of throw, each sprinkler applies a specific amount of water over a specific area in a specific amount of time. This is the precipitation rate, and it is usually measured in inches per hour. If the precipitation rate varies significantly over the area being irrigated, uniformity is poor; a precipitation rate that is nearly equal throughout the area provides good uniformity.

To eliminate your irrigation system as the culprit of your spots, you should conduct an irrigation audit. You could hire an auditor certified by the Irrigation Association (IA) or you can do a basic audit yourself. A comprehensive irrigation audit can reveal inefficiencies such as 1) quantity of water exceeding the plant needs, 2) non-uniformity of water application, 3) precipitation rate exceeding soil infiltration rate, 4) incorrect heads/nozzles, 5) improper application pressure, and 6) malfunctioning and/or misdirected sprinklers.

It should not take a very extensive audit to determine if the irrigation system is the cause of your brown spots. The first step is to run the system and check for any heads that do not turn or that are not level. These should be fixed or replaced before proceeding with distribution tests. Catch-container tests are most often used to determine delivery uniformity. This test compares the average of the lowest 25 percent of the readings in catch-containers to the overall average. A value of 100 percent is perfect, but not attainable.

Distribution Uniformity Calculation
Distribution uniformity is typically calculated as the *Low Quarter Distribution Uniformity* or DU.

$$DU = \frac{Avg\ LQ}{V_{avg}} X100$$

Where: DU = Lower Quarter Distribution
Avg. LQ = Average volume of lower 25% of sample
V_{avg} = Average catch can volume

To evaluate your system distribution, use a series of collection containers spaced uniformly in a specified area. Spacing of about 30 feet on center is sufficient for an athletic field. If container number is limited, you can pour out and re-use the same containers as you test zone by zone. Another method sometimes used is to place a container at each head and halfway between heads. This is a simple placement pattern that requires a minimum number of containers. When placing catch-containers at each head, make sure the cans are far enough away form the heads so as not to interfere with the spray pattern. Each irrigation zone should be run for 10-30 minutes during a period of minimum wind (less than 10 mph). A suggested minimum depth in the collection container is 0.5 inches. The run time should allow for five to ten rotations of a geared rotor or impact sprinkler head. Running the system longer will lead to more accurate results. If possible use a pressure gauge to check and record the water pressure at each sprinkler head while the system is running. Volume in each collection container can then be measured and recorded.

As you record the amounts in each container, note containers that are empty or have much lower amounts than most. It often helps to record or map the volumes on a coach's tablet that has a picture of a field so that you can go back and located problem areas. Compare the areas of low irrigation volumes to locations of your brown spots. Do they match?

To carry the audit one more step, summarize your catch container values into one value using the distribution uniformity equation. To do this, divide the average volume of the lower 25 percent of samples by the average volume of all the containers, and then multiply by 100 to get a percentage. The IA suggests that a "very good" system should have a value of 70 percent or above, whereas a value of 50 or below is considered "poor." If the audit indicates poor distribution, with a little work, you can change those brown spots to green. **ST**

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