

# **Cultural Programs on Creeping Bentgrass Putting Green Summer Stress, Disease Susceptibility, and Organic Matter Accumulation**

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Management of creeping bentgrass putting greens during the periods of summer stress remains one of the greatest challenges in golf course management. The primary objective is aimed at assembling a series of cultural practices to help reduce the negative impacts that summer stress has on turfgrass health and playability. Previous research has brought a better understanding of the impacts of each practice individually. The next step and focus will begin on the combined and cumulative effects of an entire cultural program.

## **TREATMENTS**

### **Fertility**

There are four different nitrogen fertilizer programs in place differing only in rate. They total 2, 4, 6, and 8 lbs. N/1,000 ft<sup>2</sup>/year. A combination of foliar (30-0-0) and granular (18-9-18) nitrogen sources are applied throughout the growing season. Foliar treatments are applied twice per month ranging from 0.1 – 0.25 lbs. N/1,000ft<sup>2</sup>. Granular fertilizer is applied three times per year at aerification, ranging from 0.25 – 0.75 lbs. N/1,000ft<sup>2</sup>.

### **Core Aerification**

Four hollow-tine cultivation treatments are being tested in combination with fertility. The first is a control where no cultivation is applied. Another uses 0.25" tines twice per year. The remaining two use 0.38" tines twice and three times per year. All treatments are cored on 2" x 2" spacing to a 3.5" depth. Upon core harvest, the greens are sand topdressed to backfill holes.

### **Soil Moisture**

There are two soil moisture programs administered, distinguished as high and low. The high treatment is irrigated daily roughly equivalent to 80% of a 30 year historic monthly PET. The low treatment moisture content is kept at a value that is at least 5% less than the high treatment. Moisture levels are monitored by Toro Turf Guard Wireless Monitoring Sensors. Both greens are separated into quadrants by a plastic barrier to prevent lateral water movement. The irrigation is zoned into individual quadrants as well.

### **Spiking**

Two spiking treatments are in place, spiked or not spiked. Spiking is done every 15 days starting in mid-June and ending in mid-September. Spikes are spaced 2" x 3" to a 3.5" depth.

## DATA COLLECTED

**Visual Ratings** – taken weekly on a 1-9 scale; 1 = brown color/poor quality, 9 = dark green/good quality

**Normalized Difference Vegetation Index (NDVI)** – taken weekly in the growing months at the same time as visual ratings. Readings are taken by Crop Circle ACS-210.

**Dollar Spot Incidence** – weekly count of number of dollar “spots” present per plot. (Sprayed with curative fungicide when it becomes detrimental to overall turf health.)

**Leaf Chlorophyll Concentration** – clippings are analyzed through a spectrometer three times yearly (spring/summer/fall)

**Infiltration** – uses the falling head method with a double-ring infiltrometer. It is tested three times yearly.

**Organic Matter** – core samples are separated into 2 depths, 0-1” and 1-3” for testing OM content three times yearly (spring/summer/fall).

**Microbial Biomass** – microbial biomass tests conducted three times yearly (spring/summer/fall).

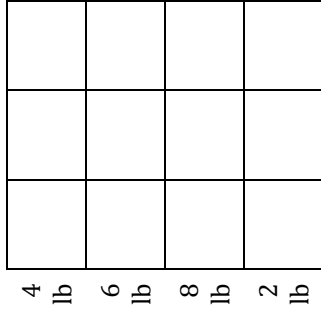
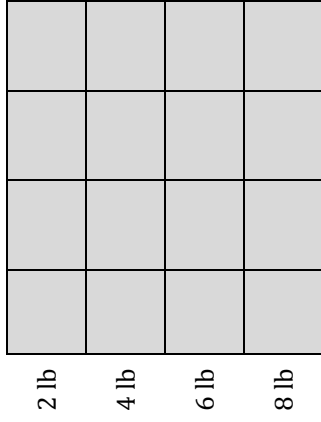
**Soil Oxygen and Carbon Dioxide Concentration** – readings are measured with a portable gas analyzer five times yearly.

## INITIAL OBSERVATIONS

Thus far the project has showed a few apparent results, the most obvious being between fertilizer rates. The 2 lbs. N/year treatment has showed poorer turf quality than the others while the 8 lbs. N/year treatment has shown superior quality than the others. It is not known the long-term consequences of the higher N rate compared to the others. The other obvious observational difference is in the spiking treatment. The quality of the turf that is spiked is poorer than turf that is not spiked.

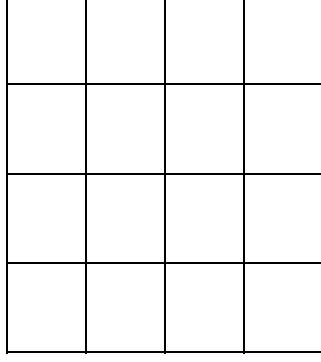
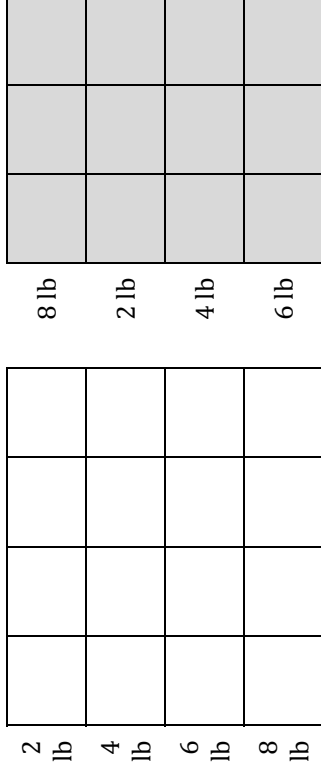
# Plot Map

## West Green

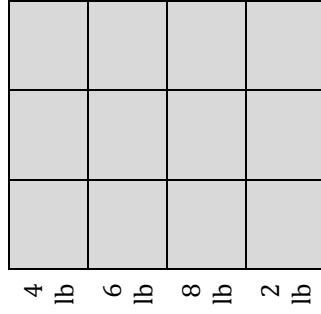
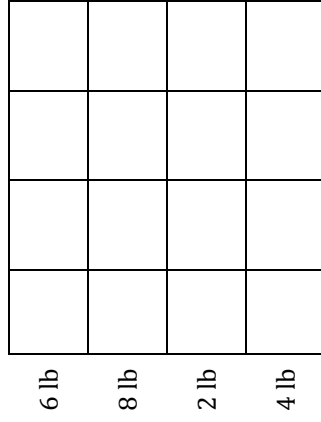


Primo x B*	Primo
B*	Primo
Ctrl	B*
Primo x B*	Ctrl

## East Green



8 lb			
2 lb			
4 lb			
6 lb			



B*	Ctrl
Ctrl	Primo x B*
Primo x B*	Primo
Primo	B*

0.25 2x 0.38 2x 0.38 3x 0.38 3x Contro 1

0.38 2x 0.38 3x 0.25 2x

Dr. Rufty's Study

### Key:

Plot size: 8 x 9 feet

Shaded plots = high soil moisture, Unshaded plots = low soil moisture

N fertilizer (left side) stripped across quadrants East-West

Aerification (bottom) stripped across all plots North-South, Bi-monthly spiking of southern plots (2 reps viewed across soil moisture regime)

B\* = Bayer Crop Science experimental product; Ctrl = contro

The Primo/B\* treatment strip will follow the 4 lb. N/year scedule along with the 2x 0.38" cultivation schedule and will not be spiked