RESEARCH UPDATE

Creeping Bentgrass

Improved Summer Stress Tolerance, Chlorophyll Content and Reduced Dollar Spot

The Ocean Organics Program in Creeping Bentgrass Statistically:

- **Improved Turf Quality during Summer Stress**
- **Reduced Dollar Spot**
- **Improved NDVI** (Normalized Difference Vegetation Index)

The Ocean Organics' program (products shown to the right) improved turf quality, NDVI (indicative of higher chlorophyll content) and reduced dollar spot as compared to untreated plots. Picture taken 7/13/16.

Location/Scientists

Michigan State University Hancock Turfgrass Research Center, East Lansing, MI

Investigators: Kevin Laskowski and Emily Merewitz, Ph.D.

Study Director: Sarah Williams, Ph.D., Ocean Organics

Methods (Abbreviated)

Turf plots of 'Penn A-4' creeping bentgrass (5 x 4 ft) were used for the experiment. Plots were mowed 3 times weekly to maintain a 0.130 in. canopy height. All plots had background fertility applied at 0.10 lbs N/1000 ft^2 each week to maintain adequate nutrition. All treatments were applied to four individual plots (four replications of each treatment) and the treatments were completely randomized within the putting green. The trial was designed as a randomized complete block design and all data were analyzed using t-test procedures and means were separated with Fisher's LSD (least significant differences).

Treatment Description

The first application occurred on 6-3-16 and the last application on 10-31-16. The following products were applied using a program approach:

Spring phase, May through June 15:

- XP at 6 oz/1000 sq ft every 2 weeks
- NuRelease 32 oz/acre (¾ oz per 1000 sq ft) every 2 weeks
- Seablend 12-4-5 at 4.2 lbs/1000 sq ft 1x/month (end of May and end of June)

According to the MSU report,

> *"The Ocean Organics treatment program significantly increased turf quality and NDVI (Normalized Difference Vegetation Index), while reducing the incidence of Dollar Spot during the summer of 2016."*

Summer Phase, June 15 through Labor Day:

- XP at 6 oz/1000 sq ft every 2 weeks
- NuRelease at ¾ oz per 1000 sq ft every 2 weeks
- Stress Rx at 3 oz/1000 sq ft every 2 weeks

Fall Phase (After Labor Day)

- XP at 6 oz/1000 sq ft every 2 weeks
- Stress Rx 6 oz/1000 sq ft every 2 weeks
- Seablend 12-0-12 at 4.2 lbs/1000 sq ft 1x/month (beginning of Sept., Oct., and Nov.)

Similar results were found in Annual Bluegrass research. Please see separate flyer.

Results

Normalized Difference Vegetation Index (NDVI). Treatments had significant effects on chlorophyll contents on 14 of 16 sampling dates (Figure 1).

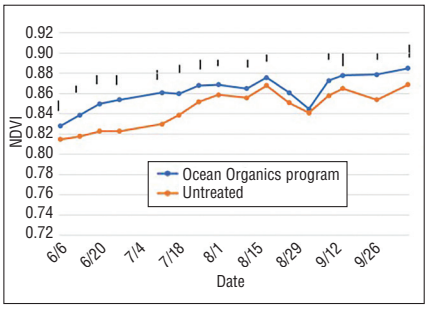


Figure 1. Normalized difference vegetation index rating means for plot treatments during the summer of 2016. Least significant difference (LSD) bars represent significant differences (P ≤ 0.05) on a given day of treatment.

The Ocean Organics treatment program had greater NDVI values when compared to the untreated control on all dates. Higher NDVI indicates a larger density of green leaves and higher chlorophyll content. Chlorophyll absorbs visible light for use in photosynthesis and is critical for energy production.

Results continued

Turf Quality (TQ). Significant differences were found on 13 of 15 rating dates for visual turf quality. The Ocean Organics treatment program had greater turfgrass quality when compared to an untreated control (Figure 2).

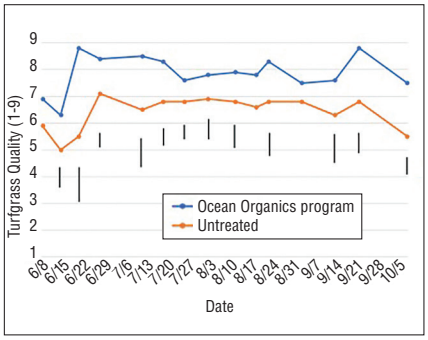


Figure 2. Turfgrass visual quality rating means (1-9) for plot treatments during the summer of 2016. Letter assignments represent significant differences. Least significant difference (LSD) bars represent significant differences (P ≤ 0.05) on a given day of treatment.

Dollar Spot (DS). Significant differences were found on 2 of 4 dates DS was present in experimental plots. On those two dates, the Ocean Organics treatment program had fewer DS infection centers than the untreated control (Figure 3). Dollar spot disease counts were taken when disease was active and symptoms occurred by counting the number of individual infection centers per plot. Spots greater than 3 cm in diameter were counted as one infection center. Larger, coalescing spots were broken down into smaller spots when rating and considered to be multiple infection centers.

Dark Green Color Index (DGCI).

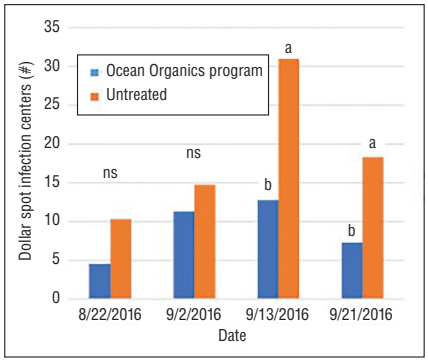
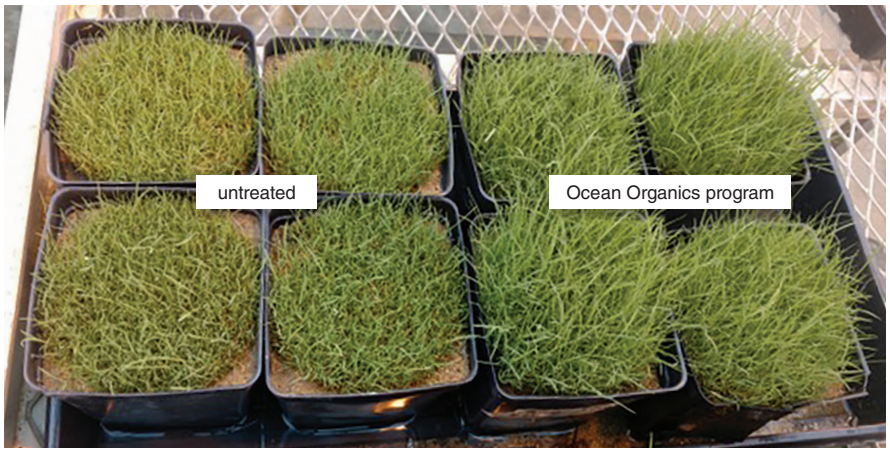


Figure 3. Dollar spot disease incidence means for plot treatments during the summer of 2016. Ratings with the same letter should not be considered significantly different (P ≤ 0.05, LSD). NS indicates not significant on that particular date.



Treated and untreated plugs that were frozen for 60 days and then subject to a period of regrowth.

Digital Image Analysis showed the Ocean Organics treatment program did not have a significant effect on DGCI during the summer of 2016 on creeping bentgrass (Figure 4). However, there was a numerical trend of higher DGCI on several summer sampling points.

Cold Temperature Growth Chamber

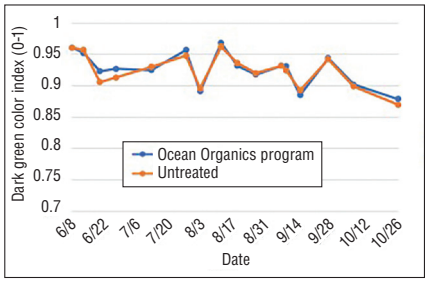


Figure 4. Dark green color index means measured by digital image analysis for plot treatments during the summer of 2016. Least significant difference (LSD) bars represent significant differences (P ≤ 0.05) on a given day of treatment.

Regrowth Assay. After 20, 40 and 60 days at -4°C, the Ocean Organics treatment program did not statistically impact re-growth when compared to the untreated control (Figure 5), **however, the treated plots did show a numerical and visual trend for better re-growth after 40 and 60 days.** Following acclimation to fall temperatures, cup cutter plugs (4.0 in in diameter) were removed from each plot and transferred to a low temperature growth chamber (-4°C) and frozen. After 20, 40, and 60 days samples were removed from the growth chamber and allowed for regrowth to occur. Percent recovery was then evaluated after a 20 day period of regrowth by visually inspecting each turfgrass plug for the number of living plants compared to the number of non-living plants.

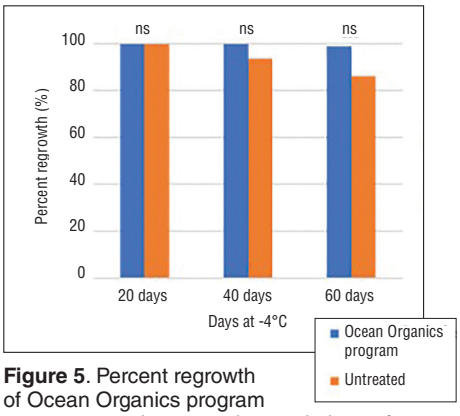


Figure 5. Percent regrowth of Ocean Organics program treatments and untreated control plugs after 20, 40, and 60 days in the low temperature growth chamber at -4°C. Ratings with the same letter should not be considered significantly different (P ≤ 0.05, LSD). NS indicates not significant on that particular date.

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