RESEARCH UPDATE

Annual Bluegrass (Poa Annua)

Improved Summer Stress Tolerance, Dollar Spot Reduction, Color, Chlorophyll Content and Cold Temperature Recovery

The Ocean Organics Program in Annual Bluegrass Statistically:

- **Improved Turf Quality during Summer Stress**
- **Reduced Dollar Spot**
- **Improved Color** (DGCI - Dark Green Color Index)
- **Increased NDVI** (Normalized Difference Vegetation Index)
- **Improved Cold Temperature Recovery**

Location/Scientists

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

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

Methods (Abbreviated)

Turf plots of annual bluegrass (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 with four replications and all data was 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)

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

Summer Phase, June 15 through Labor Day:

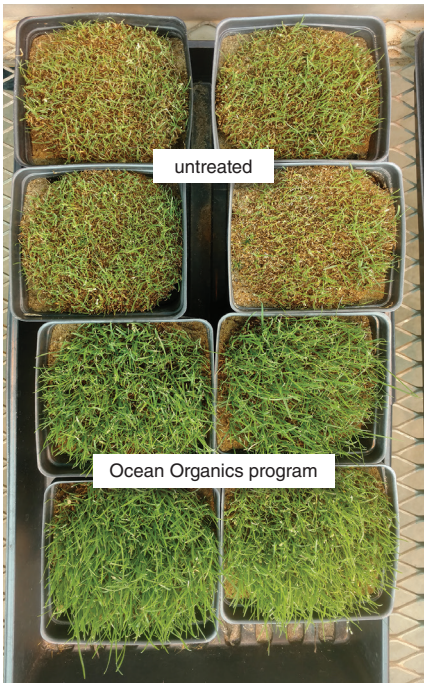
- XP at 6 oz/1000 sq ft every 2 weeks
- NuRelease at ¾ oz per 1000 sq ft every 2 weeks
- Stress Rx at 3 oz/1000 sq ft every 2 weeks

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.)

According to the MSU report,

"The Ocean Organics treatment program significantly increased turf quality, DGCI (Dark Green Color Index), and NDVI (Normalized Difference Vegetation Index) while reducing the incidence of dollar spot during the summer of 2016. The Ocean Organics treatment program also had greater percent regrowth after 20, 40, and 60 days at -4°C when compared to the untreated control treatments."



After 20, 40 and 60 days of being frozen, the plugs treated with the Ocean Organics program had significantly more regrowth when compared to the untreated control. This picture shows 60-day plugs.

Similar results were found in Creeping Bentgrass research. Please see separate flyer.

Results

Normalized Difference Vegetation Index (NDVI). Treatments had significant effects on chlorophyll contents on fourteen of sixteen sampling dates. The Ocean Organics treatment program had greater NDVI values when compared to the untreated control on all dates (Figure 1). 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.

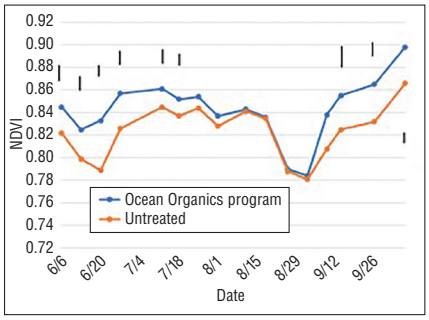


Figure 1. Normalized difference vegetation index means of Ocean Organics program treatments and untreated control plots during the summer of 2016. Least significant difference (LSD) bars represent significant differences (P ≤ 0.05) on a given day of treatment.

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

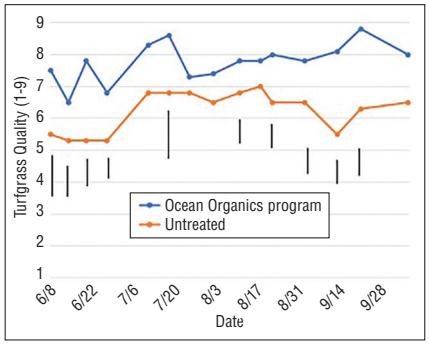


Figure 2. Visual turfgrass quality means of Ocean Organics program treatments and untreated control plots during the summer of 2016. Least significant difference (LSD) bars represent significant differences (P ≤ 0.05) on a given day of treatment.

Dollar Spot (DS). On three dates, the Ocean Organics treatment program had significantly fewer DS infection centers than the untreated control. On all other dates, there were fewer DS infection centers but these were not considered significantly different (Figure 3).

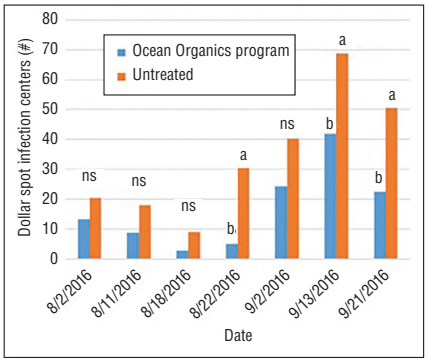


Figure 3. Dollar spot disease incidence means of Ocean Organics program treatments and untreated control plots during the summer of 2016. Ratings with the same letter should not be considered significantly different (P ≤ 0.05, LSD). NS indicates not significant on that particular date.

Note: 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). Digital Image Analysis showed the Ocean Organics treatment program **had significantly greater DGCI on four of 16 dates** when compared to the untreated control plots during the summer of 2016 (Figure 4).

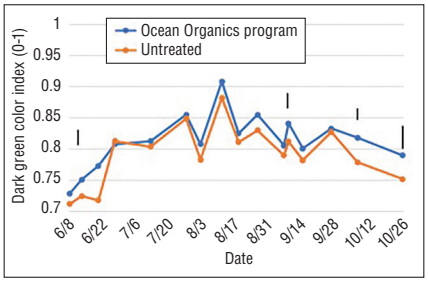


Figure 4. Dark green color index means measured by digital image analysis of Ocean Organics program treatments and untreated control plots during the summer of 2016. Least significant difference (LSD) bars represent significant differences (P ≤ 0.05) on a given day of treatment.

Cold Temperature Growth Chamber Regrowth Assay. After 20, 40 and 60 days at -4°C, the Ocean Organics treatment program had significantly more regrowth when compared to the untreated control (Figure 5).

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.

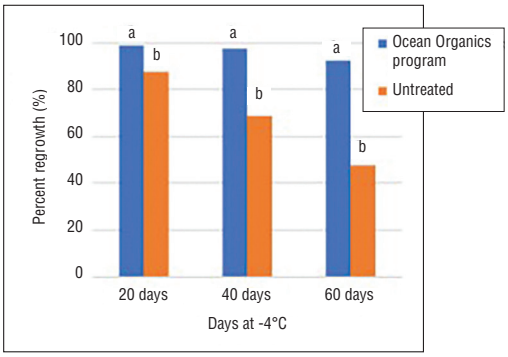


Figure 5. Percent regrowth of Ocean Organics program treatments and untreated control plugs after 20, 40, and 60 days in the low temperature growth chamber at -4°C. Ratings with the same letter should not be considered significantly different (P ≤ 0.05, LSD). NS indicates not significant on that particular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

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