DPI-FG-Hort-1203-UA-2

Benefits of FiberGro as a Wetting Agent in Composted Green Waste[1]

Introduction

FiberGro is an all-natural technology, rich in phytogenic compounds; and when added to soils or composts, provides a beneficial boost to the microbial activity of the media. As well, the natural surfactant capabilities of FiberGro function to enhance moisture and nutrient uptake by plants; thus, promoting more efficient utilization of available water, fertilizer, and minerals. The objective of this research was to evaluate the effects of FiberGro as a wetting agent in composted green waste.

Materials and Methods

Composted green waste (composed primarily of yard clippings) was obtained from a municipal composting facility and used as the substrate to evaluate the effects of FiberGro on water absorption and wetting uniformity, as well as water requirement of impatiens. The pH of the substrate was adjusted to approximately 6.2 by amending with ground calcitic limestone.

For Phase 1 of the experiment, the substrate was treated with 0.0, 0.5, 1.0, 1.5 and 2.0 pounds of FiberGro per cubic yard. Following treatment with FiberGro, the substrate was then dried to 10% moisture (v/v) and packed into 6-cm diameter x 20-cm tall clear PVC tubes fitted with a bottom screen and wrapped with clear cellophane (five replications per treatment). The column height of the substrate in the tubes was 15 cm. The substrate was watered with 300 mL of clear water and allowed to drain until drainage ceased. Both the amount of water drained and water retained was recorded. The process was then repeated twice more for a total of three times. The water retained and drained at each irrigation, and the total amount of water retained and drained (3 irrigations combined) was determined. Additionally, after each irrigation, the visible dry area of the substrate was marked on the clear cellophane, removed, and placed through an area meter to determine the percent dry spot.

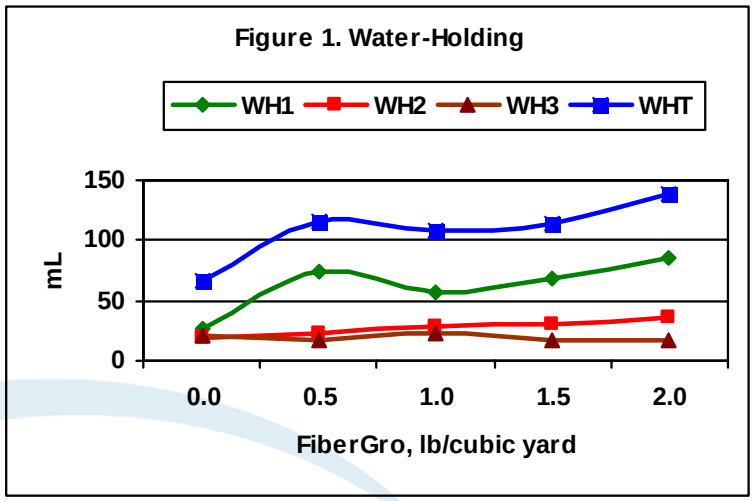
For Phase 2 of the experiment, the substrate was treated with 0 and 1.0 pound of FiberGro per cubic yard. Six-leaf plugs (#273 cell size) of 'Dazzler Lilac' impatiens (*Impatiens walleriana*) were then transplanted into 4.5-inch plastic containers filled with the substrate. Containers with plants were placed in a polycarbonate-glazed greenhouse where drainage trays were located underneath the containers to catch leachate (drainage). The plants were irrigated with 200 mL of fertilizer solution (containing 150 ppm nitrogen using 15-5-15 Cal-Mag fertilizer) when the moisture level of the substrate dropped to 35% (v/v). Temperature was maintained between 65 and 80°F, while light level averaged 400 - 450 $\mu mol \cdot m^{-2} \cdot s^{-1}$ at 12:00 HR (noon) during the study. The total number of irrigations, the average days between irrigations, the total volume of fertilizer solution applied, the total amount of fertilizer solution retained, the total volume of fertilizer solution leaching, the average volume of fertilizer solution retained per irrigation and the average volume of fertilizer solution leaching per irrigation were recorded for 6-weeks.

[1] This experiment was conducted by Dr. M. Evans at the University of Arkansas, Fayetteville, AR 72701, USA.

Results and Discussion

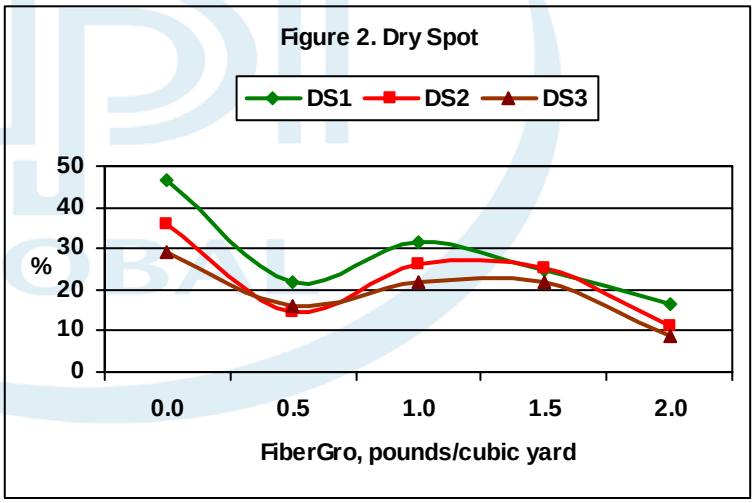
Phase 1

Amount of water retained by a composted green waste treated with various rates of FiberGro is presented in Figure 1. Water-holding one (WH1) is the amount of water retained after the first application of 300 mL of water, while water-holding two (WH2) and water-holding three (WH3) are the amount of water retained after the second and third applications of 300 mL of water, respectively. Water-holding total (WHT) is the combined amount of water retained for the three water applications (total volume of 900 mL).



As indicated by water-holding one, the addition of 0.5 lb of FiberGro per cubic yard increased water-holding capacity by 185%, from 26 to 74 mL. The response in water-holding capacity tended to plateau as the concentration of FiberGro increased up to 1.0 and 1.5 lb per cubic yard of substrate, until the highest level of FiberGro tested (2.0 lb per cubic yard) increased water-holding capacity by 225% (up to 86 mL).

As was expected, the water-holding capacity of the second and third applications was diminished in comparison with the first watering because the substrate was not dried to its initial 10% moisture level. Even so, the addition of FiberGro increased water-holding following the second water application between 22 to 89% in comparison with the Control, with the greatest response being noted in the 2.0 lb FiberGro level. The improvements in WH1 and WH2 due to FiberGro resulted in the substrate being so saturated that water-holding capabilities were maximized during the third application.



Water-holding total followed a similar trend as water-holding one. The addition of 0.5, 1.0, 1.5 and 2.0 lb of FiberGro per cubic yard increased water-holding by 62 to 108% in contrast to the substrate containing no FiberGro; with the 2.0 lb level having the great response.

Percentage of dry spot on the compost substrate treated with various rates of FiberGro is presented in Figure 2. Similar to water-holding, dry spot one (DS1), dry spot two (DS2), and dry spot three (DS3) represent the percentage of dry spot after the first, second, and third applications of 300 mL of water, respectively. The percentage of dry spot closely followed the pattern of water-holding. As the amount of FiberGro mixed in the

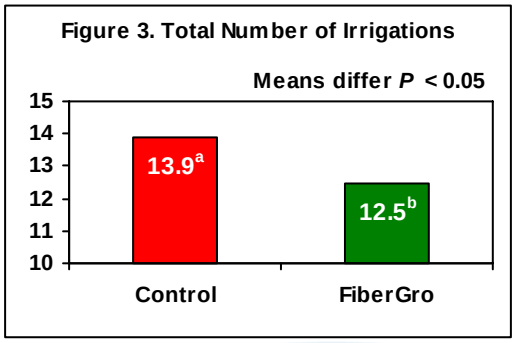
substrate increased, the percentage of dry spot after the first application decreased from 47 to 16% with 2.0 lb of FiberGro per cubic yard. Furthermore, dry spot two and dry spot three indicate that FiberGro was effective at reducing dry spot even further following subsequent watering.

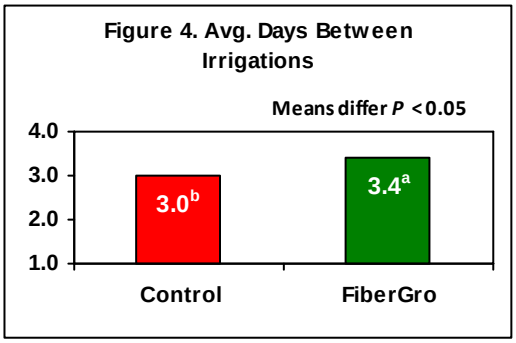
Phase 2

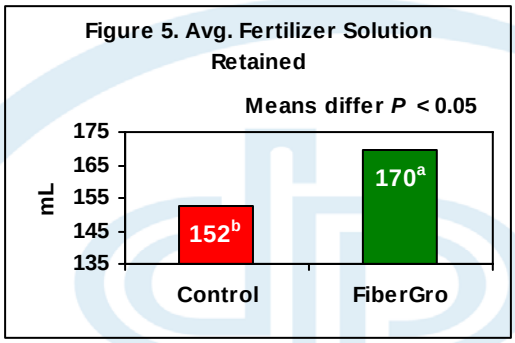
As presented in Figures 3 and 4, the addition of 1.0 pound of FiberGro per cubic yard reduced ($P < 0.05$) the total number (1.4) and frequency (0.4 days) of irrigations required to grow the impatiens crop. This reduction in water use represents a significant savings.

Furthermore, when FiberGro was added to the substrate, less ($P < 0.05$) total fertilizer solution (2,500 vs. 2,780 mL) was applied to growing impatiens. Of most importance is the fact that the efficiency of utilization of the fertilizer solution applied was improved, as 12% more was retained ($P < 0.05$) and less was leached out ($P < 0.05$) of the substrate with FiberGro (Figures 5 and 6).

Although growth measurements were not recorded in this study, a visual of a representative of the impatiens' that were grown is presented in Figure 7. This visual would indicate that improved utilization of water and fertilizer due to FiberGro resulted in better overall growth, foliage health, and bloom count of the impatiens.







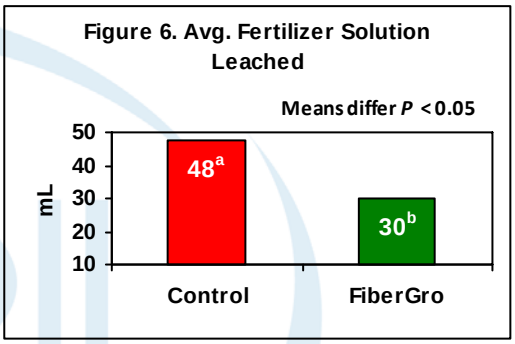
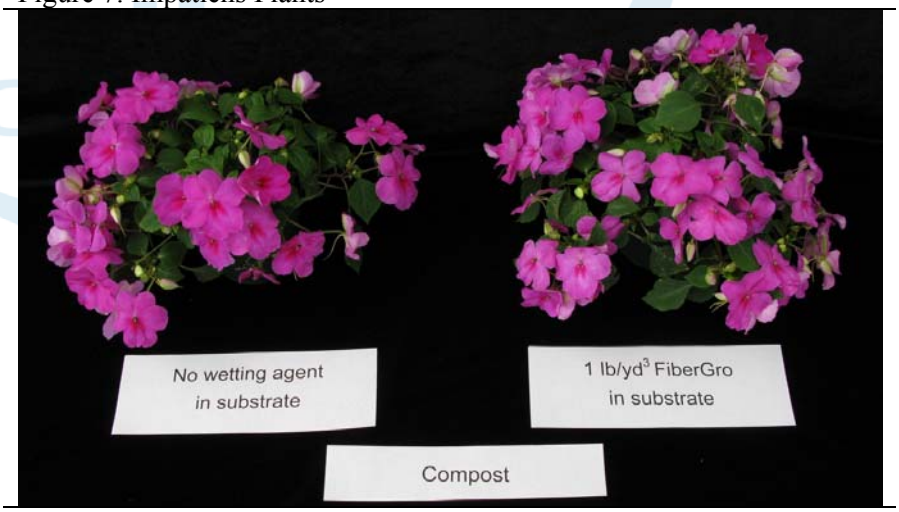


Figure 7. Impatiens Plants



Impatiens plants grown in substrate unamended (Left) or amended (Right) with FiberGro.

Conclusions

- Experimental results prove that FiberGro enhances moisture and nutrient uptake by plants; thus, promoting more efficient utilization of available water, fertilizer, and minerals.
- The greatest response to FiberGro occurred during the first watering as the addition of 1.0 lb of FiberGro per cubic yard doubled the water-holding capacity. Furthermore, 2 lb of Penetrate 50 proved to be the most effective treatment level as water-holding increased by 225%.
- The addition of 0.5, 1.0, and 1.5 lb of FiberGro per cubic yard increased total water-holding 62 to 72% in contrast to the substrate containing no FiberGro; with the 2.0 lb level having the great response (108%).
- As the amount of FiberGro mixed in the substrate increased, the percentage of dry spot decreased from 47 to 22% or less after the third application of water.
- The addition of 1.0 pound of FiberGro per cubic yard reduced ($P < 0.05$) the total number (1.4) and frequency (0.4 days) of irrigations required to grow the impatiens crop. This reduction in water use represents a significant savings to the grower.
- The addition of FiberGro to the growing substrate of impatiens reduced the total fertilizer solution applied (2,500 vs. 2,780 mL; $P < 0.05$), while also improving the efficiency of utilization of the fertilizer solution applied, as 12% more ($P < 0.05$) was retained per irrigation. A visual of the impatiens' that were grown would indicate that improved utilization of water and fertilizer resulted in better overall growth, foliage health, and bloom count of the impatiens.