

# Evaluation of Creeping Bentgrass (*Agrostis stolonifera* L.) Responses to Root Mass 20/20 and Stimulate

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## Abstract

Root production of turfgrass is often used as an indicator of overall plant health as well as a predictor of how the plant will stand up to drought and heat stress. Plants that exhibit a higher amount of rooting are able to tolerate more stress and require fewer resources to maintain. The objective of this research was to evaluate root production of 'Tye' creeping bentgrass (*Agrostis stolonifera* L.) treated with Root Mass 20/20, a biostimulant and Stimulate, a plant growth promoter. Creeping bentgrass plugs were transplanted into custom made root tubes and allowed to re-establish in a greenhouse before being treated. Treatments included Root Mass 20/20 at 1.18 and 2.32 L ha<sup>-1</sup>, Stimulate at 0.29 to 0.57 L ha<sup>-1</sup>, and Root Mass 20/20 plus Stimulate at 0.29 to 0.57 L ha<sup>-1</sup>. After 56 days of establishment plant parts were harvested, dried, and ashed in a muffle furnace to evaluate rooting production. At 2.32 L ha<sup>-1</sup>, Root Mass 20/20 increased rooting production 16.3% compared to the untreated control. Plants treated with Stimulate at a rate of 0.57 L ha<sup>-1</sup> exhibited a 9.1% increase of rooting compared to the untreated control. A combination rate of 0.29 L ha<sup>-1</sup> each of Root Mass 20/20 and Stimulate resulted in 11.3% more root production than the untreated control. All other combination rates however resulted in a decrease in rooting production from the untreated control, indicating an inhibitory effect. Creeping bentgrass treated with Root Mass 20/20 and Stimulate can result in increased root production, but the response is rate dependent.

## Materials & Methods

- Completely randomized design with 5 replications
- Creeping bentgrass plugs grown in a greenhouse using custom made root tubes.
- Treatments included 2 independent rates of each product, as well as 4 different combination rates of the two.
- Tubes were set up to lean at a 45° angle
- Supplemental radiation was provided when day-time irradiance dropped below 200 μmol m<sup>-2</sup> s<sup>-1</sup> to ensure a consistency of 16 hours of light per day, and ranged from 350 to 385 μmol m<sup>-2</sup> s<sup>-1</sup>.
- Air temperature ranged from 22.3 to 23.6°C
- Relative Humidity ranged from 24.3 to 44.7%
- Initial watering of 10 mL per tube 2 times daily was slowly shifted to 20 mL per tube on alternating days, Watering was stopped 7 days following the final treatment to induce drought stress.
- Roots were harvested 56 days after initial treatments, polyethylene inserts were removed with a razor blade and root-zones were rinsed before being allowed to dry overnight.
- Root materials were placed in a muffle burner furnace overnight to get the dry root weight of each sample.

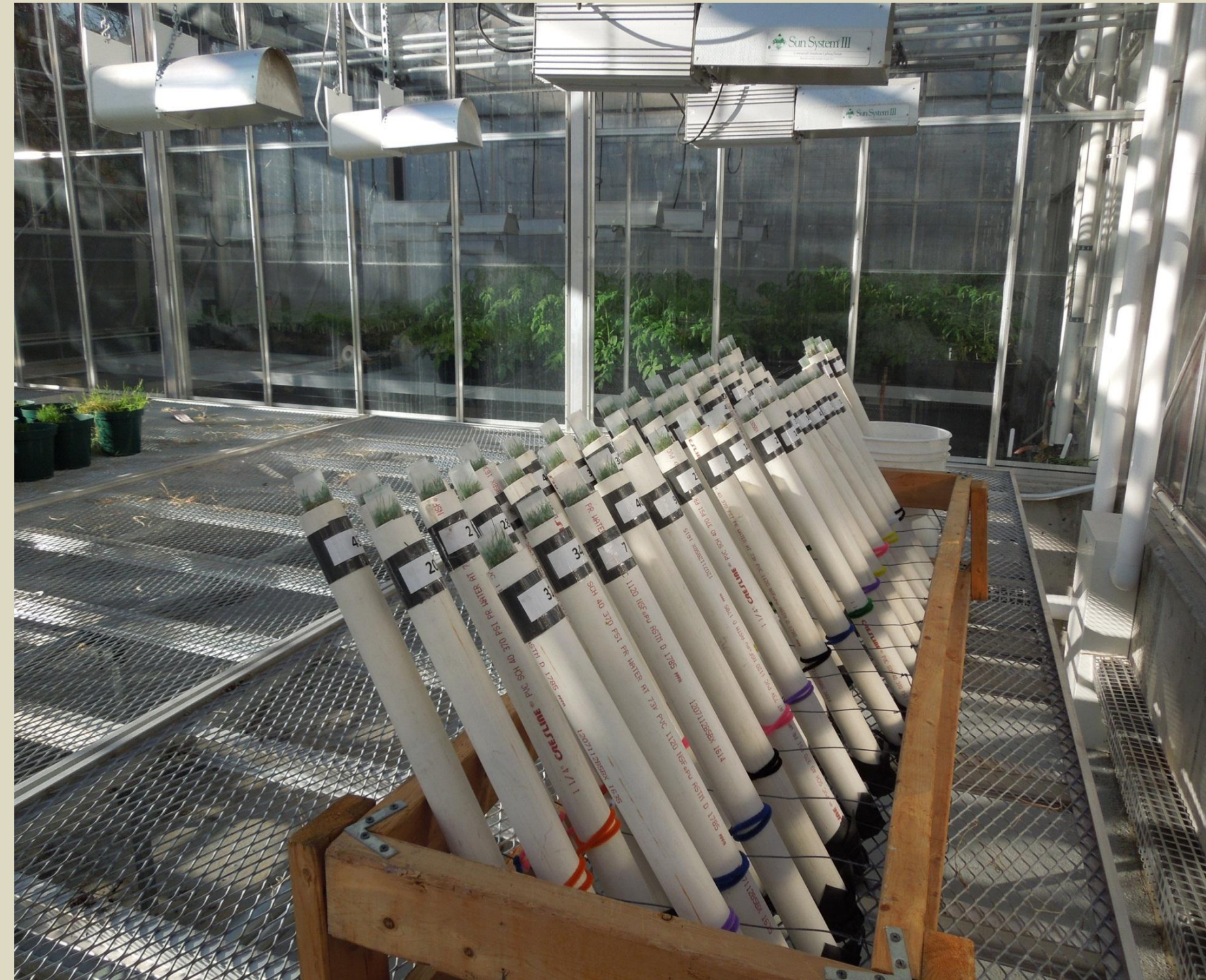
## Treatment List

Treatment	Product(s)	Rate (L/ha)	# of Applications	Application Interval (Days)
1	Untreated Control	-	-	-
2	Root Mass 20/20 <sup>x</sup>	1.18	3	14
3	Root Mass 20/20	2.32	3	14
4	Stimulate <sup>y</sup>	0.29	2	28
5	Stimulate	0.57	2	28
6	Root Mass 20/20 Stimulate	0.29 0.29	2	28
7	Root Mass 20/20 Stimulate	0.29 0.57	2	28
8	Root Mass 20/20 Stimulate	0.57 0.29	2	28
9	Root Mass 20/20 Stimulate	0.57 0.57	2	28

<sup>x</sup> Root Mass 20/20 is a 2-0-3 with 5% humic acid.

<sup>y</sup> Stimulate contains cytokinin, auxin, and gibberellic acid in a 2:1:1 ratio.

These products are manufactured by Stoller Enterprises Inc., Houston, Texas.



(Top): Rooting tubes resting at a 45° angle in the greenhouse, this set-up allowed easy collection and quantification of plant roots. (Middle-Left): At the completion of the study polyethylene inserts were removed and cut down the seam to reveal plant roots. (Middle-Right): Root-zone media was removed from plant roots by placing materials on a mesh screen and rinsing with water. (Bottom-Left): Experimental units of each treatment 1-9 (1 on the left, 9 on the right) were placed next to each other for visual comparisons. (Bottom-Right): A muffle burner furnace that was used to ash plant roots, this allowed a more accurate quantification of root weights.

## Results/Conclusions

The untreated control produced a total root mass of 0.134 grams (Table 1). Treatments of Root Mass 20/20 or Stimulate produced total root masses that ranged from 0.135 to 0.155 grams. When applied at 2.32 L ha<sup>-1</sup>, Root Mass 20/20 increased creeping bentgrass root production by 16.3% compared to the untreated control (P = 0.05). Rooting effects from combination rates of the two were rate dependent. Stimulate applied with Root Mass 20/20 each at 0.29 L ha<sup>-1</sup> showed a positive trend whereas root growth was inhibited when those rates were doubled to 0.58 L ha<sup>-1</sup>. Above-ground tissue height varied by treatment (P= 0.05), with the combination rate of both products at 0.29 L ha<sup>-1</sup> resulting in a 21% decrease in tissue height compared to the untreated control. When the rates of the two products were doubled to 0.58 L ha<sup>-1</sup>, the tissue height was reduced by 34% (Table 2).

Treatment	Ash Root Weight (g)		% Change vs Control
1	0.134	abc	-
2	0.135	abc	0.7
3	0.155	a	16.3
4	0.137	ab	2.4
5	0.146	ab	9.1
6	0.149	ab	11.3
7	0.111	c	-16.7
8	0.129	bc	-3.4
9	0.123	bc	-7.6
Prob > F 0.0528			

TABLE-1: Ash root weight of 'Tye' creeping bentgrass receiving Root Mass 20/20, Stimulate, and combinations of the two.

Treatment	Tissue Length (cm)		% Change vs Control
1	6.33	a	-
2	6.25	ab	-1.3
3	5.83	ab	-7.8
4	5.42	abc	-14.4
5	6.17	ab	-2.6
6	5.0	bc	-21
7	5.58	ab	-11.8
8	5.33	abc	-15.7
9	4.17	c	-34.2
Prob > F 0.0532			

TABLE-2: Plant height of 'Tye' creeping bentgrass receiving Root Mass 20/20, Stimulate, and combinations of the two.

- Our results indicate that biostimulates and plant growth promoters can help initiate new root production while decreasing above-ground tissue growth of creeping bentgrass, and these effects are rate dependent.

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