Virginia Tech
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# Influence of Bolster® Plant Biostimulant on Bermudagrass Under Saline Stress

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## OBJECTIVES:

This experiment was conducted to examine the influence of Bolster® on saline stress tolerance in Bermudagrass.

## MATERIALS AND METHODS:

The mature bermudagrass was treated with Bolster® at a level of 0, 1, and 2 gallon/acre on June 2, 1995. Two weeks after treatment, the plugs (4") were taken from the treated plots in the field and transferred to the 1 L metal cans which contain 10 lbs. Soil plus 0, 13.6, or 26.3 g of salt/can, respectively.

The bermudagrass plugs were put in the greenhouse and irrigated with salt water (1721.4 g salt to 6968 cc water) twice a week or when needed. The grass was permitted to grow for 5 weeks before being examined. Water stress level (WSL), plant height, clippings, and root development via the root vertical lift technique were measured. The fresh clippings were dried for 24 hrs. at 60 C to obtain dry weights.

## RESULTS:

1. Water relation - The leaf water content decreased significantly in terms of WSL, as salt level increased (Table 1). Application of Bolster® improved water status of leaves significantly under both high and low salt levels, when compared to the control.
2. Shoot growth - Saline stress reduced plant height and clipping weight significantly (Table 1). However, fresh clipping weight of bermudagrass with application of Bolster® at a rate of 1 or 2 gallon/acre subjected to the highest salinity increased 45.0% and 84.3%, respectively, when compared to the control. Similarly, dry clipping weight of bermudagrass treated with Bolster® at 1 or 2 gallon/acre increased 54.6% and 86.1%, respectively, when compared to the control.
3. Root development - Root growth was also suppressed under saline stress. However, Bolster® treated turf exhibited better root growth under high level of saline stress (Table 2). Root development was measured with the vertical lift technique, showed that bermudagrass grown under high salinity and treated with Bolster® at 1 or 2 gallon/acre increased root mass 49.6% and 63.9%, respectively, over the control.

## SUMMARY:

In summary, saline stress at both 3800 and 7600 ppm levels suppressed shoot and root growth of bermudagrass. However, foliar application of a Bolster® enhanced the plant growth and improved water statue of bermudagrass under the higher level of saline stress in this study, although no significance difference was observed under 0 and 3800 ppm salt levels. This result suggested that an application of Bolster® was most beneficial to enhance growth of this moderately salt-tolerant grass under a high salt level. Further study is needed to examine growth response of bermudagrass under higher level of saline stress and adjusted Bolster® rates.

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**Table 1.** Shoot growth of bermudagrass as influenced by Bolster® under saline stress.

| Salt level (ppm) | Bolster® rate (gal./A) | WSL | Plant ht. (cm) | Clipping wt. Fresh(g) | Dry |
|---|---|---|---|---|---|
| 0 | 0 | 180.4 c | 14.0 a | 8.756 ab | 2.739 ab |
| | 1 | 169.0 c | 13.2 a | 7.420 ab | 2.610 ab |
| | 2 | 172.0 c | 13.6 a | 10.202 a | 3.226 a |
| 3800 | 0 | 229.0 b | 13.0 a | 5.878 bcd | 2.106 bc |
| | 1 | 188.0 c | 13.6 a | 6.702 bc | 2.418 abc |
| | 2 | 190.0 c | 13.3 a | 5.570 bcd | 1.980 bc |
| 7600 | 0 | 268.0 a | 10.18 a | 3.128 d | 1.162 d |
| | 1 | 245.0 b | 11.8 a | 4.550 cd | 1.796 cd |
| | 2 | 233.4 b | 10.7 a | 5.772 bcd | 2.162 bc |

Within columns for each measurement, means followed by a different letter are significantly different from each other based on LSD at alpha = 0.1.

**Table 2.** Root Strength (pulling) of bermudagrass as influenced by Bolster® under saline stress.

| Salt level (ppm) | Bolster Rate (gallon/acre) | Root Strength (pulling) |
|---|---|---|
| 0 | 0 | 15.36 a |
| | 1 | 15.20 ab |
| | 2 | 15.28 a |
| 3800 | 0 | 12.70 ab |
| | 1 | 12.80 ab |
| | 2 | 12.30 ab |
| 7600 | 0 | 7.10 c |
| | 1 | 10.62 b |
| | 2 | 11.64 b |

Within columns, means followed by a different letter are significantly different from each other based on LSD at alpha = 0.1.