

# Evaluation of plant growth enhancer (GABA – gamma aminobutyric acid) for Establishment of *Agrostis palustris* Huds.

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<http://www.hort.iastate.edu/facultystaff/meetfaculty/minner/turfrpt/2004>

## Introduction

Gamma aminobutyric acid (GABA) is a plant growth enhancer based on a non-protein amino acid. It enhances nutrient uptake by roots and leaves so that plant nutrient levels are higher than those achieved by using nutrients alone. When plants are stressed and nutrient uptake is limiting, it is believed that this product facilitates nutrient utilization, thereby enhancing growth during stress.

This study was conducted to evaluate the efficacy of GABA for establishment of Creeping bentgrass (*Agrostis palustris* Huds.)

## Materials and Methods

This study was conducted for 10 weeks at the Iowa State University Horticulture Research Station in Ames, Iowa. The trial was conducted using a randomized complete block design. Each treatment was replicated three times with plots being 5\*5 ft. Creeping bentgrass was seeded to plots at July 30, 2003. Plots received 0.3 inches of water per day for 30 days. Watering occurred every hour for 10 minutes, six times per day, for 30 days. As the seedlings matured, turf was watered less frequently but never allowing wilt. Treatment description appears in Table 1. Treatment 1 was an untreated control. Treatment 2 was treated only one time as a soil drench right after seeding. Treatments 3-7 were applied weekly for 6 weeks after 50% of the plot area was showing germinated seedlings.



Table 1. List of treatments

Treatment #	Treatment list
TRT 1	Control – No treatment
TRT 2	300 ppm GABA applied as soil drench right after seeding
TRT 3	150 ppm GABA applied to the seedling emerged & weekly for 6 weeks after emergence
TRT 4	300 ppm GABA applied to the seedling emerged & weekly for 6 weeks after emergence
TRT 5	Foliar fertilizer with 150 ppm GABA applied to the seedling emerged & weekly for 6 weeks after emergence
TRT 6	Foliar fertilizer with 300 ppm GABA applied to the seedling emerged & weekly for 6 weeks after emergence
TRT 7	Foliar fertilizer only weekly for 6 weeks after emergence

Observations began two weeks after germination. Turf color and percent turf cover were visually rated. Turf height was measured every 3 weeks. Grass clippings were taken from two cores per each plot at the end of the study. The clippings were oven-dried at a temperature of 67 °C for 24 h and weighed. At the end of the study, rooting depth was also evaluated from two cores per each plot. Visual observation was used for rooting depth.

Data were subjected to analysis of variance by using the Analysis of Variance (ANOVA) procedure, and mean separation was performed by the least significant difference (LSD) method with the Statistical Analysis System (SAS).

## Results and Discussion

On August 20, 2003, (two and three weeks after treatment application of Trt 3 and Trt 2), plots treated by GABA with fertilizer (Trt 5 and 6) produced 7-35% more turf coverage than plots treated by GABA without fertilizer (Trt. 3 and 4)(Fig. 1)(Pic. 1). This trend seemed to increase with time. Plots treated by GABA with fertilizer created 27-63% more turf coverage than plots treated by GABA without fertilizer on Oct. 10 (8 and 9 weeks after TRT 3 and TRT 2 were started). However, no differences were found between GABA rates within treatments with fertilizer or without fertilizer. Turf coverage was affected by fertilizer but was not influenced by the addition of GABA.

There was a significant difference in turf color that was observed on three of the four observations dates (Fig. 2). Once again there was an increase in turf color as a result of fertilizer, but no color enhancement from GABA addition.

Turf height was significantly different on two of the four measurement dates (Fig. 3). On the final observation date, GABA+fertilizer (TRT 5 and 6 ) produced taller grass than fertilizer applied alone. However, this increase in height did not cause an increase in the clipping dry weight sampled at the termination of the study (Fig. 4)

Visual observation was used to measure rooting depth(Pic. 2). Trts 5 to 7 created more roots than Trts 1 to 4. No differences were found between GABA rates with fertilizer and between GABA rates without fertilizer.

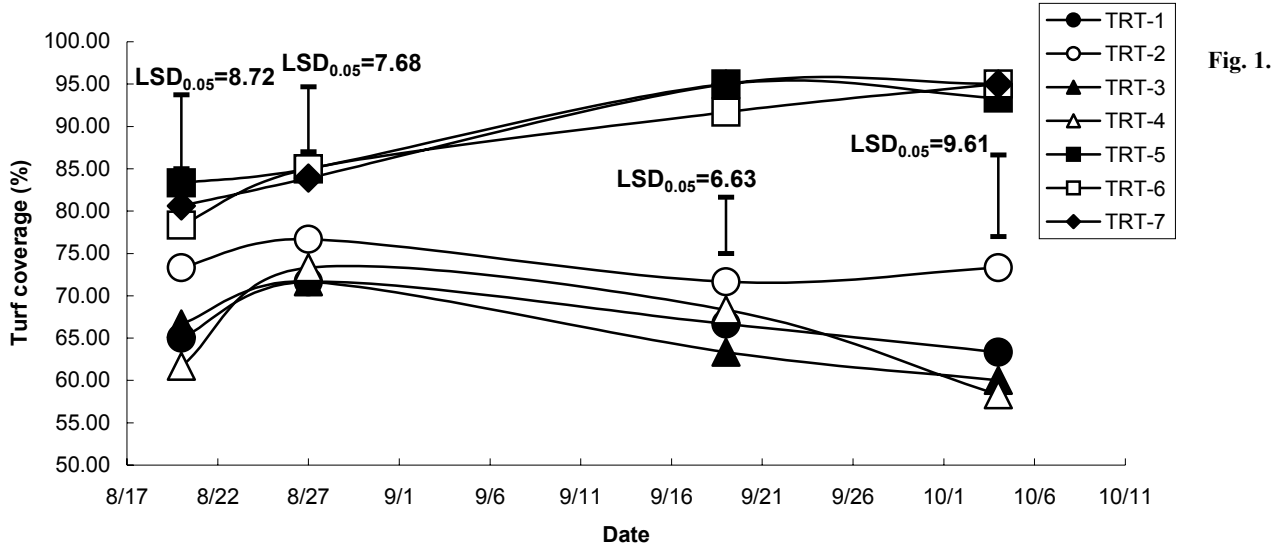


Fig. 1.

Percent turf cover of *Agrostis palustris* Huds. by gamma aminobutyric acid (GABA) and foliar fertilizer. Values are means of three replicates. Vertical bars represent the least significant difference (LSD) at p-value 0.05 probability level. The LSD is not significant if the 'NS' is indicated instead of vertical bar and significant if the vertical bar is followed with LSD value.

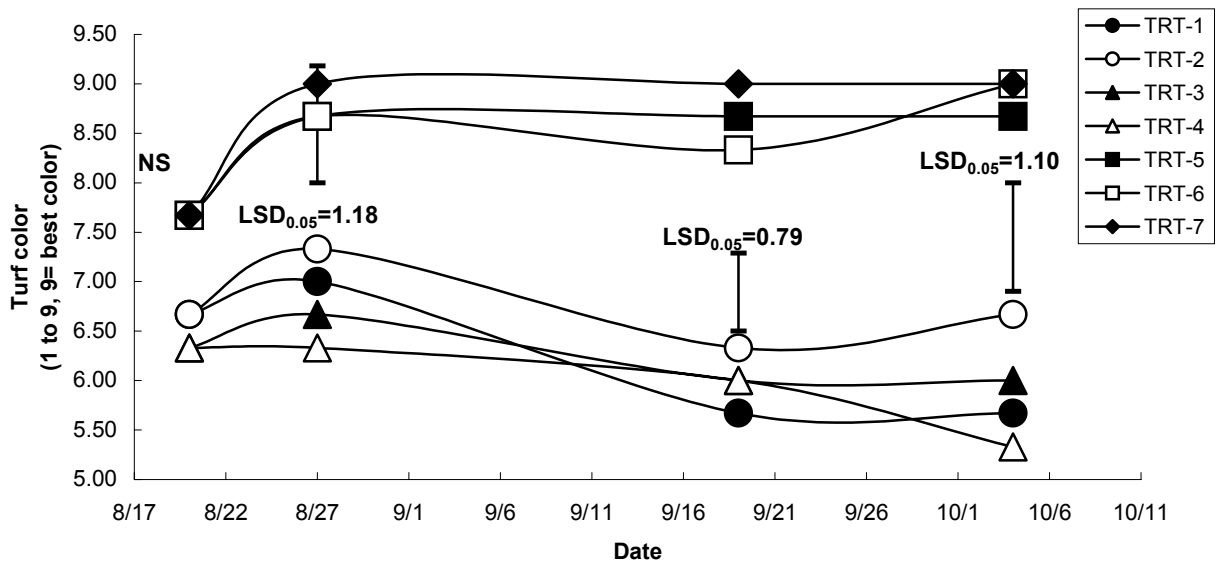
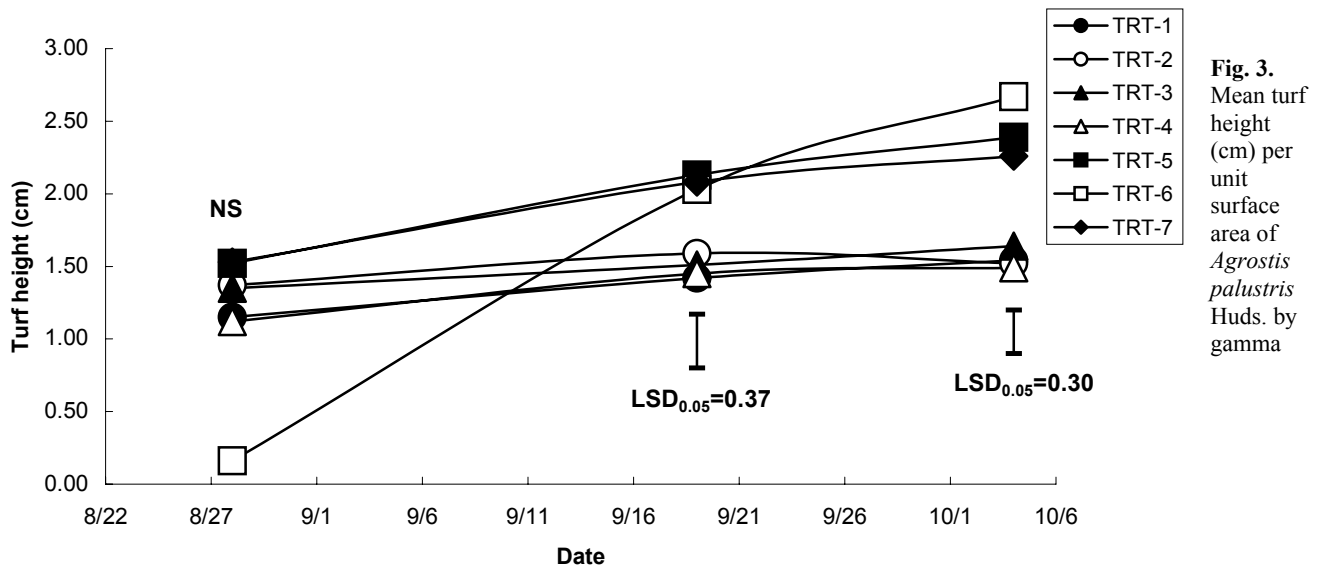
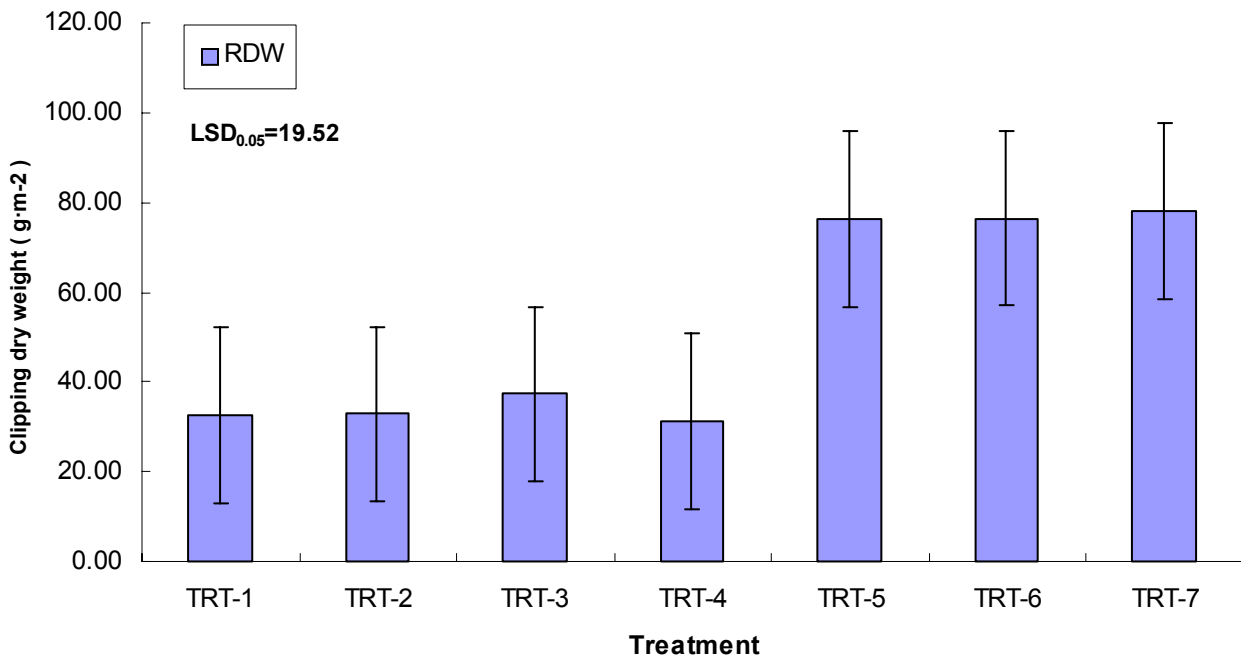


Fig. 2.

Mean turf color (visual evaluation 1 to 9. '6' is the lowest acceptable value. Larger numbers mean better color) per unit surface area of *Agrostis palustris* Huds. by gamma aminobutyric acid (GABA) and foliar fertilizer. Values are means of three replicates. Vertical bars represent the least significant difference (LSD) at p-value 0.05 probability level. The LSD is not significant if the 'NS' is indicated instead of vertical bar and significant if the vertical bar is followed with LSD value.



aminobutyric acid (GABA) and foliar fertilizer. Values are means of three replicates. Vertical bars represent the least significant difference (LSD) at p-value 0.05 probability level. The LSD is not significant if the 'NS' is indicated instead of vertical bar and significant if the vertical bar is followed with LSD value.



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**Pic. 1.** Pictures of plots taken in Sep. 19 ( 5 and 6 weeks after treatment for TRT 3-7 and TRT 2 )



**< Control and GABA treatments without fertilizer >**



**< GABA treatments with fertilizer and fertilizer only >**

Pic. 2. Visual observation of rooting depth.

