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Effect of Fluid Fertilization on Coastal Bermudagrass
IV. Urea-Ammonium Nitrate Solutions With Phosphorus, Potassium, and Magnesium

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Summary

Combinations of nitrogen (N), phosphorus (P), potassium (K), and magnesium (Mg) were made with urea-ammonium nitrate (UAN, 32-0-0) ammonium polyphosphate (11-37-0), muriate of potash (0-0-60), and magnesium chloride (0-0-0-8.1 percent Mg). Pounds of nutrients applied per acre for each new growth of grass as individual treatments were 80-0-0, 80-22-0, 80-0-60, 80-22-60, and 80-22-60-12. Each treatment was applied broadcast spray, surface dribble banded, and subsurface dribble banded. Coastal bermudagrass dry matter response to P was obtained the third harvest on both the Sawtown and Gallime soils the first year of the study. This response continued the second year on the Sawtown soil. Potassium and Mg did not increase dry matter production either year. Surface dribble banding these nutrient combinations appeared to slightly improve dry matter production compared to other methods of application.

Introduction

Urea-ammonium nitrate solutions, as with solid fertilizers, can be combined into grades with P, K, Mg, and other soluble fertilizer materials. East Texas soils are generally deficient in P and K, and Mg has increased grass yield in at least one research trial at Overton. This research was designed to evaluate the combinations of UAN with P, K, and Mg applied as broadcast spray, surface dribble bands, and subsurface dribble bands. Treatments were designed to determine Coastal bermudagrass response to these fertilizer nutrients on two soils, and to evaluate grass response to methods of application of the combinations of N, P, K, and Mg.

Procedure

Combinations of N, P, K, and Mg were made with urea-ammonium nitrate (UAN, 32-0-0), ammonium polyphosphate (11-37-0), muriate of potash (0-0-60), and magnesium chloride (0-0-0-8.1% Mg). Pounds of nutrients applied per acre for each new growth of grass as individual treatments were 80-0-0, 80-22-0, 80-0-60, 80-22-60, and 80-22-60-12 Mg. Each treatment was applied spray broadcast, surface dribble banded, and subsurface dribble banded. These solutions were applied to 10 × 20-foot plots which were not previously fertilized.

A 4.9 × 18-foot swath was harvested through the length of each plot and was weighed. A dry matter sample was collected from each plot for moisture and chemical analysis. Yield data were analyzed statistically by MSUSTAT for analysis of variance and Newman-Keuls mean comparisons.

Results and Discussion

Coastal bermudagrass dry matter response to P was obtained by the third harvest on the Sawtown and Gallime soils the first year on the study (data not shown). Apparently, 22 lb P_2O_5/A was not an adequate rate of P to cause a yield increase until the cumulative amount of 66 lb had been applied. Total yields by site and year for each treatment are presented in Table 1. Yields summed over harvests the first year indicated no yield increase from any combination of nutrients with UAN. In fact, yields appeared to decrease slightly when other nutrients were solubilized in UAN and applied to the Gallime soil. During the second year, the solution of UAN with P significantly increased dry matter production on the Sawtown soil, and tended to increase dry matter production on the Gallime soil. The solution of P, K, and Mg were all required with UAN to significantly increase dry matter yield to 7.6 tons/A on the Gallime soil the second year.

KEYWORDS: Coastal bermudagrass/urea-ammonium/nitrate solution/fluid fertilization.

TABLE 1. RESPONSE OF COASTAL BERMUDAGRASS TO COMBINATIONS OF PHOSPHORUS, POTASSIUM, AND MAGNESIUM WITH UAN, AND TO METHODS OF APPLICATION OF THESE SOLUTIONS TO SAWTOWN AND GALLIME SOILS

$N-P_2O_5-K_2O-Mg$ lb/A[2]	Dry Matter Yield[1]			
	Sawtown Soil		Gallime Soil	
	1984	1985	1984	1985
	Tons/Acre			
80- 0- 0- 0	3.9 a	3.8 a	6.3 c	6.1 a
80-22- 0- 0	3.9 a	5.0 c	6.1 bc	6.6 ab
80- 0-60- 0	3.4 a	4.2 ab	5.3 a	6.5 ab
80-22-60- 0	3.8 a	4.9 bc	5.7 ab	6.9 ab
80-22-60-12	3.9 a	4.9 bc	6.1 bc	7.6 b
Method of Application				
Spray broadcast	3.7 a	4.5 ab	5.5 a	6.6 a
Surface dribble band.	3.8 a	4.9 b	6.0 b	7.0 a
Subsurf. dribble band.	3.8 a	4.3 a	6.2 b	6.8 a

[1]Dry matter yields within an individual year and site, by solution combinations or by method of application followed by a similar letter are not significantly different at $p<.05$ level of probability.

[2]Actual rates of N, P_2O_5, K_2O, and Mg at each application.

Surface dribble band application of these nutrient solutions improved dry matter yield compared to subsurface dribble banding on the Sawtown soil the second year and slightly increased yield compared to the spray broadcast application. On the Gallime soil, dribble banding significantly improved dry matter production compared to spray broadcast application the first year, but not the second. It is of interest to note that banding solution combinations of N, P, K, and Mg improved dry matter yield; whereas, banding UAN solution alone did not improve yields compared to the spray broadcast application. It may be possible that concentrating the P in a band limited its contact with the soil, thereby preventing its precipitation as insoluble aluminum phosphates, allowing the P to remain available to the plant.