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

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Summary

Blends of nitrogen (N), phosphorus (P), potassium (K), and magnesium (Mg) were made with urea-ammonium nitrate (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 flush of Coastal bermudagrass growth 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 as a broadcast spray, surface dribble banded, and subsurface dribble banded. Coastal bermudagrass dry matter production generally increased due to P fertilization the second year on the Lilbert soil site. Potassium began to provide significant yield increases the third year on the Gallime soil site. Surface dribble banding these solutions increased yields the second year on the Lilbert soil and the first year on the Gallime soil. In most years, method of application had no significant effect on forage production on these acid, sandy soils.

KEYWORDS: Fluid fertilization/fluid blends/Coastal bermudagrass/acid soils/sandy soils.

Introduction

Urea-ammonium nitrate solutions, as with solid fertilizers, can be combined into blends with phosphorus (P), potassium (K), magnesium (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 forage response to methods of application of the blends of N, P, K, and Mg.

Procedure

Fluid blends 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 percent Mg). Pounds of nutrients applied as N-P_2O_5-K_2O-Mg/A for each flush of grass growth were 80-0-0, 80-22-0, 80-0-60, 80-22-60, and 80-22-60-12. Each treatment was applied spray broadcast, or surface dribble banded, or subsurface dribble banded. Spacings between dribble bands were 14 inches. These solutions were applied to 10- X 20-ft plots. Harvests were made after first trimming 1 ft off the end of each plot with a Hege 211B forage plot harvester. A 4.9-ft center swath was harvested from 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

Yields were not increased at either site by fertilization with P, K, or Mg the first year of the study (Table 1). The blend of N and P significantly increased dry matter yield on the Lilbert soil the second year. A trend indicates that P and K blended with N increased yields on the Gallime soil, but a significant yield increase occurred when Mg was added with the N, P, and K. The combination of N, P, and K significantly increased dry matter production on the Lilbert soil the third year. Any nutrient combination that included K significantly increased forage production the third year on the Gallime soil. Both research sites were previously in poorly fertilized hay meadow-pasture situations prior to initiation of this study. There was apparently sufficient nutrient recycling occurring to provide a small reserve of soil P, K, and Mg for 1 or 2 years of intensive forage production.

Surface dribble band application of these nutrient solutions improved dry matter yield compared to subsurface dribble banding on the Lilbert soil the second year, and slightly increased yield compared to the spray broadcast application. Dribble banding on the Gallime soil significantly improved dry matter production compared to spray broadcast application the first year. It is noteworthy that banding fluid blends 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.

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

Nutrient Blend[2]	Dry Matter Yield[1]					
	Lilbert Soil			Gallime Soil		
N-P_2-O_5-K_2O-Mg	1984	1985	1986	1984	1985	1986
lbs/A	Tons/Acre					
80- 0- 0- 0	3.9a	3.8a	4.9a	6.3c	6.1a	4.8a
80-22- 0- 0	3.9a	5.0c	6.2bc	6.1bc	6.6ab	5.4a
80- 0-60- 0	3.4a	4.2ab	5.5ab	5.3a	6.5ab	6.8b
80-22-60- 0	3.8a	4.9bc	7.0d	5.7ab	6.9ab	7.7b
80-22-60-12	3.9a	4.9bc	6.7cd	6.1bc	7.6b	7.5b
Applic. Method						
Spray broadcast	3.7a	4.5ab	5.9a	5.5a	6.6a	6.5a
Surf. Drib. Bd.	3.8a	4.9b	6.3a	6.0b	7.0a	6.6a
Subsurf. " "	3.8a	4.3a	6.0a	6.2b	6.8a	6.2a

[1]Dry matter yields within an individual year and site, by solution blends or by method of application, followed by a similar letter are not significantly different at $p<.05$ level of probability by Newman-Keuls mean comparisons.
[2]Actual rates of N, P_2O_5, K_2O, and Mg at each application.