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Effect of Fluid Fertilization on Coastal Bermudagrass. II. Method of Application of Urea-Ammonium Nitrate

V. A. Haby, J. V. Davis, and A. T. Leonard

Summary

Urea-ammonium nitrate (UAN), a 32 percent nitrogen (N) solution, was spray broadcast, surface dribble banded at 14-inch band spacings, or subsurface dribble banded at 14-inch band spacings onto 10- X 20-ft Coastal bermudagrass plots. Rates of applied N were 40, 80, and 120 lbs/A prior to each growth of grass. Data from individual years indicated that dry matter yields were equal for all application methods. Nitrogen rates significantly increased dry matter yield on the Lilbert and Gallime sandy, acid soils.

KEYWORDS: Urea-ammonium nitrate/method of application/Coastal bermudagrass/acid soils/sandy soils.

Introduction

Urea-ammonium nitrate (UAN) is normally most efficiently applied as a band application to crops on the majority of soils. Broadcast spray application to the soil surface without incorporation is usually the least efficient method of application. On some perennial forage crops such as Coastal bermudagrass, it is not possible to incorporate spray broadcast N. This experiment was designed to evaluate the effect of spray broadcast, surface, and subsurface banded applications of UAN on Coastal bermudagrass yield and quality.

Procedure

Fluid UAN at rates of 40, 80, and 120 lbs/A was spray broadcast, dribble banded on the surface at 14-inch band spacings, or dribble banded subsurface at the 14-inch band spacing on Coastal bermudagrass prior to each flush of growth. Three N applications and harvests were made in 1984, four in 1985, and five in 1986. The N rates and methods of application were applied in a randomized complete block experimental design. All treatments were replicated three times at two research locations. One was on a Gallime fine sandy loam (fine-loamy, siliceous, thermic Glossic Paleudalf). The other was on a Lilbert loamy fine sand (loamy, siliceous, thermic Arenic Plinthic Paleudult). Initially, all plots received 100 lbs P_2O_5 and 160 lbs of K_2O/A, followed by 200 lbs K_2O/A in early October 1984. In mid-April, 1985, 200 lbs K_2O and 100 lbs P_2O_5/A were applied to all plots. In January 1986, 200 lbs K_2O/A were applied to all plots. This same rate of K_2O was reapplied along with 100 lbs P_2O_5/A in early April. Harvests were made by cutting 4.9 ft from the middle of each plot with a harvested plot length of about 18 ft. A dry matter sample was collected from each plot for moisture and chemical analysis.

Results and Discussion

Response of Coastal bermudagrass to methods of application of UAN on both soils each year is presented in Table 1. Yields indicated that methods of application had no differential effect on Coastal bermudagrass production. This appears to be contrary to published data, but may be due to the acidity level of these soils. Both soils have a pH near 5.0, and at this acidity level less loss of N is expected from ammonia volatilization.

Attempts to dribble band the UAN below the soil surface were relatively ineffective due to the dense sod and root system of the Coastal bermudagrass growing in these sandy, acid soils. The coulters could not be forced deeper than about two inches at the existing weight of the applicator. An additional 150 lbs per coulter would be needed to force the coulter to cut deep enough into the sod to place the UAN at the proper depth.

The subsurface attempts at dribble banding sometimes placed the UAN just below the soil surface, but most of this treatment was mixed with the loose soil exposed by the coulter and back- swept applicator knife. This placed most of the fluid in direct contact with soil moisture and could cause more rapid hydrolysis and possibly NH_3 volatilization of the urea component of the UAN.

Increasing the N rate to 120 lbs/A significantly increased grass dry matter yields on the Lilbert soil the first 2 years. In 1986, the 120 lbs/A N rate was not significantly different than the 80 lbs/A rate. By the third year on the Gallime soil, there were no significant yield differences due to N rate. At least two factors could have caused this declining effectiveness of the higher N rates. Residual N could have been built up to a level that nullified differences due to N rates. A more likely explanation may be that the high rates of N increased the level of soil acidity to the point that dry matter yield of Coastal bermudagrass was decreased. This generally occurs below pH 4.8. Data are not shown but the 120 lbs N/A rate produced significantly less grass than the 80 lbs/A N rate the fifth cutting in 1986.

TABLE 1. RESPONSE OF COASTAL BERMUDAGRASS TO UAN APPLIED AT NITROGEN RATES OF 40, 80, AND 120 LBS/A AS SPRAY BROADCAST, SURFACE DRIBBLE, AND SUBSURFACE DRIBBLE BAND TREATMENTS

Application Method	Dry Matter Yield[1]					
	Lilbert Soil			Gallime Soil		
	1984	1985	1986	1984	1985	1986
	Tons/Acre					
Spray Broadcast	4.2a	5.8a	6.4a	5.9a	8.1a	7.0a
Surf. Dribble Band	4.0a	5.4a	6.3a	6.3a	8.8a	7.5a
Sub-Surf. Dribble Band	4.0a	5.6a	6.4a	6.0a	8.3a	6.8a
Nitrogen Rates						
lbs/A						
40	3.6a	4.2a	5.6a	4.6a	6.8a	6.7a
80	4.0a	5.8a	6.5a	6.4b	8.8b	7.3a
120	4.6b	6.9c	7.0a	7.1c	8.6b	7.3a

[1]Dry matter yields within individual sets of data by site, year, method of application, or nitrogen rate, followed by the same letter are not significantly different at $p<.05$ by Newman-Keuls mean comparisons.