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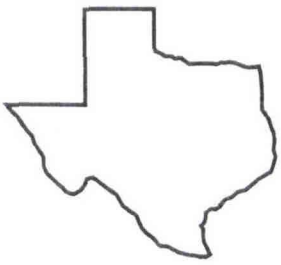

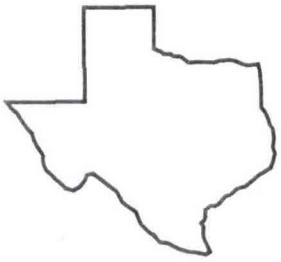

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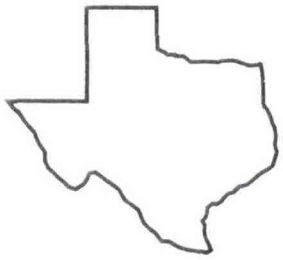

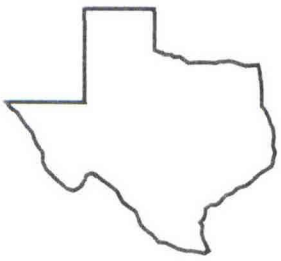

1994 Research Center Technical Report No. 94-1

Texas Agricultural Experiment Station • Edward A. Hiler, Director
The Texas A&M University System • College Station, Texas

ALFALFA INTERSEEDED INTO COASTAL BERMUDAGRASS
II. EFFECT OF NITROGEN RATE ON FORAGE PRODUCTION

Vincent Haby, Allen Leonard, and James Davis

Background. Bermudagrasses are the major warm-season forages grown on the sandy, acid, upland Coastal Plains soils in the South. Coastal bermudagrass is tolerant to moderately acid soils and requires high nitrogen (N) fertility to produce good quality forage. Alfalfa is adapted to deep, well-drained, alkaline soils. Acid soils must be limed to pH 7 for alfalfa production. In this study, Alfagraze alfalfa was interseeded in fall 1990 into Coastal bermudagrass sod to evaluate simultaneous growth and forage quality under different N fertilizer regimens. Alfalfa row spacings of 9, 18, 27, and 36 inches were treated with five rates of N. The N rates were 0, 25, 50, 75, and 100 lbs/acre. These N treatments were applied for each regrowth of bermudagrass to keep it competitive with the alfalfa that uses atmospheric N fixed by bacteria in nodules on the roots. Yield data were collected in 1991, 1992, and 1993.

Research Findings. Alfalfa dry matter production in the seedling year ranged from 3.2 to 3.5 tons/acre as the N rate was increased from 0 to 100 lb/ac for each cutting of alfalfa-bermudagrass (Fig. 1). Alfalfa increase due to increasing N rate was 0.3 tons/acre. At the zero N rate, bermudagrass production was 1.3 tons/acre. Yield of bermudagrass increased to 2.6 tons/acre at the 75 lb/acre N rate. Total dry forage production increased from 4.5 to 6 tons/acre.

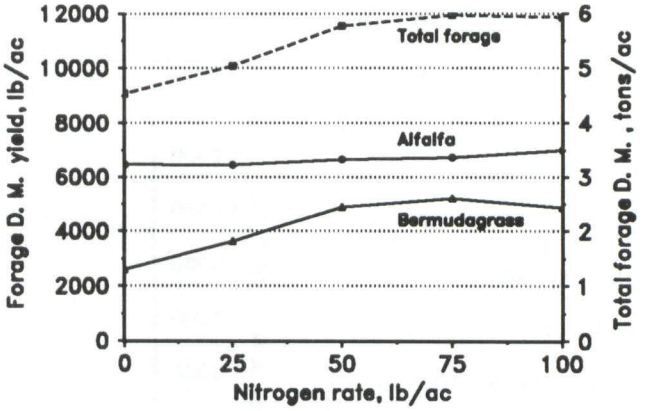

Figure 1. Effect of nitrogen rate on 'Alfagraze' alfalfa and 'Coastal' bermudagrass dry matter yields. (1991)

In 1992, the gap between alfalfa and bermudagrass yields increased. Production of alfalfa exceeded 4 tons/acre with a 0.5 ton/acre increase due to increasing N rates (Fig. 2). The increase in alfalfa production suppressed production of Coastal bermudagrass at all N rates. The optimum N rate for bermudagrass production was 50 lb/acre. The 0.5 ton/acre increase in grass production would not be considered economical when a total of 200 lb N/acre was applied to attain this yield

increase. Total dry alfalfa and bermudagrass forage yield was 5.5 tons/acre.

The 1993 dry matter yields of alfalfa and Coastal bermudagrass followed a pattern similar to that of the alfalfa row spacing study (Fig. 3). Yield of alfalfa dry matter ranged from 4.5 to 5 tons/acre. Yield of Coastal bermudagrass was less than 300 lb/acre at any N rate. Total forage production followed a pattern similar to, but slightly higher than, that of alfalfa. Alfalfa initiated regrowth in late February. Two harvests were completed by the time the bermudagrass commenced regrowth. Even with more than 8 inches of precipitation occurring in June, the alfalfa continued to dominate the use of soil water.

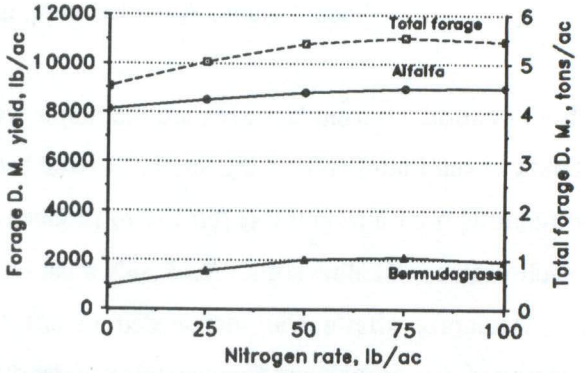

Figure 2. Effect of nitrogen rate on 'Alfagraze' alfalfa and 'Coastal' bermudagrass dry matter yield. (1992)

Application. Applied N had the greatest effect on grass yield the first year of production. Each succeeding year, the effect of applied N on grass yield was lessened until the third year when fertilizer N had essentially no effect on grass yields because there was little grass produced. Apparently, the alfalfa is very efficient at removing available soil water compared to the bermudagrass.

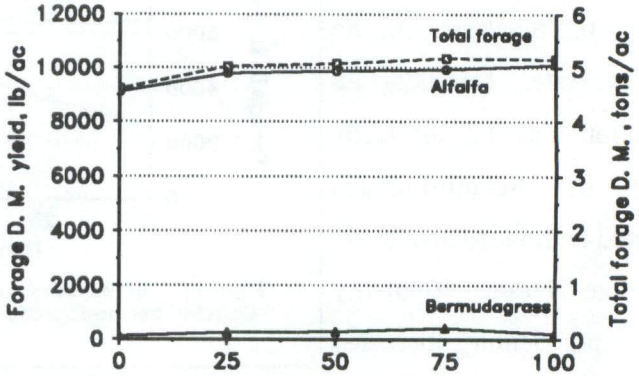

Figure 3. Effect of nitrogen rate on 'Alfagraze' alfalfa and 'Coastal' bermudagrass dry matter yield. (1993)

Research to determine the nutrient requirements of this alfalfa-bermudagrass forage system is continuing. Studies of the phosphorus, lime and boron, potassium, magnesium, and sulfur, and zinc, copper, and molybdenum are being conducted. Field-size demonstrations of this forage system are planned. Guidelines for establishing alfalfa on acid soils are presented in a companion brief entitled, "Alfalfa production on acid, sandy soils", in this technical publication.