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EFFECT OF ALFALFA ROW SPACING IN COASTAL BERMUDAGRASS ON YIELD

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Background. Soils in the order Ultisol occupy a large percentage of the Coastal Plain. They are sandy, acid, infertile, and highly leached. 'Coastal' and other hybrid bermudagrasses are the dominant perennial, warm-season forages grown on these soils. Coastal bermudagrass requires application of up to 60 lb of nitrogen (N)/acre several times during the grazing season to produce quality forage for livestock. Bermudagrass tolerates moderately acid soils.

Introduction of alfalfa as a companion forage with the bermudagrass has the potential to provide a higher quality forage for livestock. Alfalfa production on Ultisols has been limited by soil acidity, nutrient deficiencies, and wet soils in East Texas. Alfalfa is adapted to deep, well-drained, neutral to alkaline soils. Acid soils must be limed to approximately pH 7 for alfalfa production. In 1990, 'Alfagraze' alfalfa was overseeded into Coastal bermudagrass on a Darco loamy sand that had been limed to pH 7. Row spacings of alfalfa were 9, 18, 27, and 36 inches. Objectives were to determine the feasibility of growing the two forages together, determine production levels of each forage, and to evaluate quality of each forage.

On 14 Mar. 1994, Furadan at 2 pints/ac was applied for alfalfa weevil control. Pursuit at 6 oz./ac was applied for broadleaf weed control. Molybdenum at 38 g/ac, as ammonium molybdate, was applied to prevent a possible deficiency of this plant nutrient. In early June 1994, 550 lb of a 0-13-27 blend containing magnesium, sulfur, boron, copper, and zinc was applied. Nitrogen rates of 0, 25, 50, 75, and 100 lb/acre were applied to subplots across row-spacing treatments for each cutting of bermudagrass, or five times. Treatments were similar in 1995.

Research Findings. Response of alfalfa and bermudagrass to alfalfa row spacing is shown in Table 1 for 1994. Alfalfa response to row spacings and N rates in 1995 followed similar trends, but yields were reduced by one-half due to drought (data not shown). Six cuttings of alfalfa and five of bermudagrass were made at intervals approximating 30 days through Sept. 14, in 1994. Yield of alfalfa declined in August and September due to drought. Season total alfalfa yield approached 6 tons of dry forage/ac at the 9-inch row spacing in 1994. At the first two harvests, alfalfa in 9-inch rows yielded significantly higher than at the 27-inch spacing. In the last four harvests in 1994, distance between alfalfa rows had no significant effect on alfalfa yield. Bermudagrass production, though less than 1 t/acre for the season, increased as alfalfa row spacing increased both years.

Alfalfa dry matter yield was increased by increasing N rates in the final four cuttings in

1994 (data not shown). First cutting, yield of alfalfa was increased by residual N from the previous season. Application of 500 lb of N/ac improved yield of alfalfa dry matter by 0.89 t/ac. Fertilization of alfalfa with N is not economical. Nitrogen fertilizer had little effect on bermudagrass yield because of competition from alfalfa.

Application. Alfagraze alfalfa interseeded into a stand of Coastal bermudagrass and managed as a hay crop, has remained productive through five seasons on this well-drained, limed, Darco soil. Initial plantings are being made on several producer fields to determine the potential for successful production of alfalfa on larger acreages.

Production of 5.5 tons of alfalfa hay, valued at \$80/ton, and one ton of bermudagrass hay valued at \$40/ton, amounts to \$480/acre. This is double the gross value of 6 tons of bermudagrass hay/ac. Start-up costs for alfalfa are high, primarily due to seed cost and to extra limestone required to raise the soil pH to approximately 7.0. Cost of limestone may be prorated over at least four years. After four years of alfalfa production, soil pH in all row spacing plots that received zero N remained above 7.2. Annual fertilizer costs for alfalfa will be lower than for Coastal bermudagrass hay because N fertilization is not needed.

Table 1. Effect of alfalfa row spacings on yield of Alfagraze alfalfa and Coastal bermudagrass on a sandy, acid, Darco loamy sand (Ultisol).

Row spacing inches	Harvest date						Season total t/ac
	4/7/94	5/3/94	6/6/94	7/6/94	8/9/94	9/14/94	
Alfalfa							
9	2525 a ¹	1931 a	2348	2083	1631	980	5.75
18	2361 ab	1766 ab	2152	1806	1457	972	5.26
27	2090 b	1635 b	2067	1763	1505	1014	5.04
36	2188 ab	1664 b	2129	1916	1614	926	5.22
Bermudagrass							
9		0 b	5	47 b	27 b	163 b	0.12 b
18		24 ab	91	242 ab	270 a	614 a	0.62 a
27		40 a	152	463 a	405 a	817 a	0.94 a
36		40 a	120	279 ab	329 a	800 a	0.78 a

¹Values followed by similar letters within a column are not different statistically at the 95% confidence level.