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FIELD-SCALE ALFALFA PRODUCTION IN SOUTHERN REGION USDA-SARE PROGRAM RESEARCH IN EAST TEXAS

V. Haby, A. Leonard, and L. Redmon

Background. Studies were initiated in the late 1980s to determine the factors that restricted alfalfa production on the Coastal Plain soils in East Texas. These soils, primarily in the Ultisol and Alfisol orders, are naturally acidic and require limestone application to elevate the soil pH into the range of 6.8 to 7.0 needed for alfalfa production. Plant accessible soil B, already at low levels for legume production in these soils, becomes increasingly unavailable to clovers and alfalfa in limed acid soils. Even though the surface soil can be limed to the correct pH for alfalfa, aluminum levels in acid subsoil can be toxic to alfalfa roots. Subsoil acidity can be ameliorated by application of gypsum or limestone, but the desired effect of these treatments occurs over an extensively long time. Soils in the Ultisol and Alfisol orders are highly leached and many are poorly drained. Poorly drained soils are excessively wet for alfalfa during extended periods of high rainfall. These factors necessitate that sites be carefully selected for alfalfa production that are well-drained and have a pH above 5.5 from the limed surface layer into the four foot depth. These were the major criteria used to select sites for alfalfa production on five ranches in Rusk and counties surrounding The Texas A&M University Agricultural Research and Extension Center at Overton. Selected sites were disked to remove bermudagrass and treated with limestone to raise soil pH near 7.0. Two sites also were sprayed with Roundup to eliminate the bermudagrass. Each site was fertilized with phosphorus, potash, magnesium, sulfur, and boron according to recommendations based on soil tests. Soils were smoothed by rolling to pack and firm it for planting alfalfa. Thirty-one acres of alfalfa were planted in the early December 1999 when rainfall at the end of November provided adequate soil moisture to successfully establish alfalfa. Each site was sprayed with pesticides as needed for control of alfalfa weevil (Sevin XLR Plus), broadleaf weeds (Pursuit) and grasses (Poast). Yield estimates were clipped from four randomly selected, one-meter square areas of forage immediately before each harvest. Yield estimate samples were oven-dried and a portion was ground and analyzed for total nitrogen content to determine crude protein. Alfalfa was fertilized in late winter each year with a fertilizer blend containing phosphorus, potassium, magnesium, sulfur, and boron, the plant nutrients found to increase alfalfa production in earlier research trials. The phosphorus rate applied was 80 or more pounds per acre. Potash was applied again after the second and forth cuttings with the annual application exceeding 300 pounds per acre. Additional sulfur and magnesium were applied after the fourth cutting for total application rates of 150 and 75 pounds per acre.

Research Findings. A drought starting in July limited harvests to a maximum of four in 2000. The Amerigraze 702 variety produced 5 tons of 12% moisture hay with a four-cutting average crude protein content of 18.3% at one site. The GrazeKing variety yielded 500 lb/acre less hay with 18.4% crude protein on the same site. Yields at all sites ranged from 4 tons/acre to slightly above 5 tons/acre. In 2001, second year yields ranged from about 4.25 to 5.5 tons of hay per acre on the four most productive sites. One site produced a maximum of 2.55 tons/acre in three harvests in the second year, after which the alfalfa was terminated by disking because the stand was declining due to invading common bermudagrass and wet soil conditions.

Application. Total yields on these five ranches ranged from almost 7.0 to more than 10 tons of hay/acre during two years. Both varieties produced nearly equal yields on all sites except the Taylor Ranch where Amerigraze 702 yielded more than 1 ton/acre above the GrazeKing variety. Ten tons of 12% moisture hay containing an average of 20% crude protein indicates that alfalfa contained about 575 lb of nitrogen/acre in the harvested vegetation, primarily from N fixation, in two years of growth. Guidelines for production of alfalfa on East Texas soils are on an Internet site found at "http://soils.tamu.edu" (without quotation marks). Click on Publications.

Table 1. Alfalfa yield on 5-plus acre fields on SARE cooperators' ranches in East Texas.

	Griffin		Riley		Taylor		Young		Prud'homme	
	Lb/ac	Cuts	Lb/ac	Cuts	Lb/ac	Cuts	Lb/ac	Cuts	Lb/ac	Cuts
Year 2000		4		3		3		4		4
Amerigraze 702	10,311		7,690		8,169		8,997		9,671	
CP†, %	18.3		17.1		16.5		19.2		18.3	
GrazeKing	9,732		8,412		8,020		8,921		9,529	
CP, %	18.5		17.5		18.8		19.4		19.9	
Year 2001		6		5		5		3		5
Amerigraze 702	10,731		9,313		11,017		4,404		9,692	
CP, %	21.4		19.1		22.1		23.7		19.6	
GrazeKing	10,615		9,105		8,646		5,094		9,681	
CP,%	22.2		19.6		21.4		22.8		21.2	
2 Yr Total	T/ac		T/ac		T/ac		T/ac		T/ac	
Amerigraze 702	10.52		8.50		9.59		6.70		9.68	
GrazeKing	10.17		8.76		8.33		7.01		9.61	

† Crude protein