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YIELD ESTIMATES FOR ALFALFA FOLLOWING FOUR YEARS OF ON-FARM PRODUCTION RESEARCH

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Background. In 1999, the USDA Southern Region Sustainable Agriculture Research and Education program provided funding that allowed us to expand our research on alfalfa to include evaluation of field-scale plantings of alfalfa on stakeholder farms. Sites were located on selected farms using criteria determined from previous studies on Coastal Plain soils in the vicinity of the Texas Agricultural Experiment Station at Overton. Selection criteria included (1) a well-drained and aerated soil, (2) subsoil pH above 5.5 or soluble aluminum levels less than 1.5 ppm in the top four feet of surface soil, and (3) a sandy surface soil with yellow to red color in the zone of clay accumulation or B-horizon. Gray colored clay in the B-horizon indicates prolonged wet soil conditions that alfalfa could not tolerate, so those sites were rejected for alfalfa.

Selected sites were treated with limestone to raise soil pH to 7.0 and fertilized with phosphorus, potassium, sulfur, magnesium, and boron according to recommendations based on soil analysis. The limestone was incorporated into the soil by disking, followed by rolling the soil to firm the seedbed. Bermudagrass was eliminated by disking. Regrowth was sprayed with Roundup® where needed. On low-fertility soils, the typical annual fertilizer treatment included 120 lb P_2O_5, 350 lb K_2O, 40 lb S, 20 lb Mg, and 3.5 lb of B/acre. The potassium treatment was split-applied so that ⅓ of the total was applied in late fall or during winter as a blend with the phosphorus, sulfur, magnesium, and boron, ⅓ was applied after the second cutting, and the remaining ⅓ was added using muriate of potash (0-0-62) and K-Mag (0-0-22, 11% Mg, and 22%S) blended to apply additional magnesium and sulfur.) When the soil tested medium in phosphorus, the annual rate of P_2O_5 was decreased to 80 lb/acre. The alfalfa varieties, Amerigraze 702 and GrazeKing were seeded in early Dec. 1999. Seeding this late in fall is not recommended, but we waited for adequate soil moisture to ensure germination and survival of the seedlings. Broadleaf weeds and grasses were controlled as needed using Pursuit and Poast, respectively. Alfalfa weevil was sprayed using Fury 1.5 EC at the threshold level of about 40% of stems on which new leaves showed chewing damage by the weevil larvae. Lady beetles controlled aphids. Alfalfa leafhopper that appears in summer needed control on only a few sites and Sevin XLR Plus or Malathion adequately controlled this insect. Stakeholders harvested the alfalfa usually at 1/10th bloom. Just before each harvest, we collected four yield estimates from each variety by hand clipping all the forage inside a randomly placed meter square quadrant. These samples were oven dried and yield was estimated based on 12% moisture hay.

Research Findings. Alfalfa production evaluations were located on stakeholder sites in Gregg, Cherokee, Anderson, and Smith counties on the Griffin, Taylor (now Threlkeld), Riley, and 7-P Ranches, respectively. Alfalfa established on the Kilgore College Farm succumbed to wet soil the second season. Four-year total yield was highest on the 7-P Ranch where the average was slightly more than 5 tons/acre/year for both varieties (Table 1). Alfalfa yield on the Griffin Ranch followed closely averaging 4.8 tons/acre for Amerigraze 702 and 4.5 tons/acre for GrazeKing. Yield was similar between varieties on the Taylor and Riley Ranches. When averaged over all sites and years shown in Table 1, the total yield for GrazeKing was 17.92 tons/acre and for Amerigraze 702 was 18.19 tons/acre. Amerigraze 702 is dormancy rated 7 and GrazeKing is 5.

Table 1. Four-year total yield of 12% moisture alfalfa hay by variety and ranch, 2000-2003.

	Griffin ranch	*Taylor ranch*	*Seven-P ranch*	*Riley ranch*
Variety	----------Hay, tons/acre at 12% moisture----------			
Amerigraze 702	19.16	17.83	20.70	15.07
GrazeKing	18.09	17.57	20.74	15.29
	----------Stand remaining after four years of production, %----------			
Amerigraze 702	47‡	76†	57‡	54†
GrazeKing	13§	64	53	41

† Taylor and Riley alfalfa was rated as percent coverage of the soil surface in alfalfa near harvest time.
‡ Griffin and 7-P alfalfa was rated as percent of crowns at 20 ft intervals along a tape.
§ GrazeKing was on field area closer to a drainage way and had extensive invasion of bermudagrass.

The major soil series and taxonomic class descriptions on which alfalfa was grown on each ranch are shown in Table 2. The Bowie soil on the Taylor and Seven-P Ranches is an excellent soil for alfalfa production. The Kirvin soil on the Griffin Ranch also produced good yields because the subsoil pH levels were well above 5.5 to 4-ft deep. This Kirvin is a more highly leached soil than is the Trawick. The Trawick is a Hapludalf that is a red soil with higher clay content and base saturation. The Trawick subsoil pH was marginal and this site did not produce alfalfa as well as the other two soils.

Table 2. Major soil series on which alfalfa was grown on each ranch.

Ranch	*Soil series*	*Taxonomic class* (all begin with "fine")
Griffin	Kirvin very fine sandy loam	mixed, semiactive, thermic Typic Hapludults
Taylor	Bowie fine sandy loam	loamy, siliceous, semiactive, thermic Plinthic Paleudults
Seven-P	Bowie fine sandy loam	loamy, siliceous, semiactive, thermic Plinthic Paleudults
Riley	Trawick fine sandy loam	mixed, active, thermic Mollic Hapludalfs