PERENNIAL COOL-SEASON GRASSES FOR THE WARM TEMPERATE LOUISIANA COASTAL PLAIN

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ABSTRACT
Despite a mild climate and relatively uniform distribution of rainfall, cool-season pastures in the Coastal Plain of the southeastern U.S. have been limited primarily to annual grasses and legumes. Preliminary evaluations indicated promise for the recently released cultivar, 'Georgia-5' tall fescue (*Festuca arundinacea* Schreb.), and an experimental Texas bluegrass (*Poa arachnifera* Torr.). Commercially available seed supplies allowed evaluation of the tall fescue at multiple sites, while the Texas bluegrass evaluation was limited by seed availability to a single small-plot experiment. Both site and management affected survival of the tall fescue sown into stands of warm-season grasses. Density of the warm-season grass sod at planting and competition from the warm-season grass during the initial summer appeared to be critical aspects of tall fescue stand establishment. Texas bluegrass seedlings transplanted on a 10-cm spacing formed a dense sod during the second growing season, while stands from a 30-cm spacing were apparently affected by earliness of transplanting.

KEYWORDS
Tall fescue, Texas bluegrass, adaptation, persistence

INTRODUCTION
Permanent pastures in the Louisiana Coastal Plain consist of warm-season perennial grasses. Cool-season annual grasses and legumes are often interplanted in autumn when the warm-season grasses are dormant. The widespread use of annual ryegrass (*Lolium multiflorum* Lam.) illustrates the suitability of the climatic conditions for production of cool-season forage, but annual replanting can be expensive. An adapted, cool-season perennial forage species could greatly reduce the cost and management requirements for cool-season pasture. An acceptable cool-season perennial grass must be able to survive competitive warm-season grass and weed growth during the summer period. Georgia-5 tall fescue, a recently released cultivar (Bouton et al., 1993), and an experimental line of Texas bluegrass (Walker et al., 1991) survived the summer in preliminary evaluations at the Rosepine Research Station. These grasses were evaluated for stand survival and competitiveness in subsequent replicated field plot evaluations.

MATERIALS AND METHODS
Georgia-5 tall fescue. Two seeding rates, 20 and 40 kg ha^{-1}, were evaluated at three sites in randomized complete block design experiments. The sites were a Ruston fine sandy loam with a mixed stand of common bermudagrass [C*ynodon dactylon* (L.) Pers.] and bahiagrass (*Paspalum notatum* Flugge), a Sawyer fine sandy loam sloping down to an Eastwood fine sandy loam with a heterogeneous mixture of warm-season grasses, and a Caddo silt loam with a dense stand of bermudagrass. Each plot was 6 m by 15 m with three replications of each treatment. Seed was drilled into closely grazed sod on Nov. 9 and 10, 1994. Plans were to fertilize according to results of soil tests with nitrogen application only during the cool-season. Periodic grazing was planned as forage growth permitted. However, the Caddo silt loam site, which had high initial soil fertility, was inadvertently managed with the adjoining area for bermudagrass hay production during the spring and summer following planting. Data collection consisted of visual stand ratings for proportion of each plot containing tall fescue in January, 1995, April, 1995, and January, 1996 on a scale of 0 for no tall fescue to 3 for a complete stand.

Texas bluegrass. The experimental line evaluated was a synthetic population from the breeding program of Dr. James Read at the Texas A & M University Research and Extension Center at Dallas, Texas. Plants included in the synthetic population were originally collected in the north-central Texas area. Stratified seed were planted in peat pellets in the autumn of 1994. Germination was not uniform, and some plants were not sufficiently developed for transplanting until late February. Thus, the first two blocks were transplanted into a prepared seedbed in late December and early January, with the third block transplanted in late February 1995. Two plant spacings, 10 cm and 30 cm, were evaluated in a randomized complete block design with three replications. Due to limited numbers of seedlings, plots at the 10-cm spacing were 1 m by 12 m. To provide sufficient numbers of seedlings for evaluation, plots at the 30-cm spacing were 3 m by 12 m. Evaluation of treatments consisted of frequent monitoring of plots and periodic visual rating of the proportion of plot area colonized by Texas bluegrass.

RESULTS AND DISCUSSION
Initial differences in Georgia-5 tall fescue stands among sites (Table 1) appeared to be associated with density of warm-season grass sod and soil fertility. Essentially complete stands were obtained in the spring of 1995 on the fertile Caddo silt loam site, which had an open sod. The poorest initial stands were obtained at the Sawyer-Eastwood fine sandy loam site, which had a particularly dense warm-season grass sod. Stands similar to those obtained by the end of the initial growing season (May) for this cool-season grass were present at two sites in early autumn of the second cool season following planting. At the third site, however, competition from a dense bermudagrass hay crop combined with close cutting at hay harvest completely eliminated fescue plants at the site which had the best initial stands. Thus, the importance of management during the summer for survival of tall fescue in this environment must be recognized. Grazing to prevent excessive competition from warm-season grasses balanced with control of grazing pressure to prevent excessively close defoliation of the tall fescue appears to be critical for optimal survival under hot summer conditions by this grass.

The higher seeding rate produced better tall fescue stands (Table 1) in some instances during the initial growing season. However, by the second growing season, stands at each site were similar for the two seeding rates. The currently recommended seeding rate for mixed plantings of about 20 kg/ha appears to be sufficient even though less-than-complete stands often result due to other factors.

Initial plant populations of Texas bluegrass ranging from one plant every 10 cm to one plant every 30 cm had a substantial effect on stands present at the end of the second growing season. The closer plant spacing provided an almost complete Texas bluegrass sod with a uniform stand rating across plots of 95%. The 30-cm plant spacing produced an average stand rating of 55% Texas bluegrass. The initial two blocks at the 30-cm spacing transplanted earlier in the first year had stand ratings indicating 75% coverage. The third block, which was transplanted six to eight weeks later, had only about 15% coverage of the plot by Texas bluegrass. This distinct block effect

probably reflects a need for sufficient seedling development before onset of summer temperatures and aggressive warm-season grass competition. Even though seedlings were transplanted into a clean seedbed, by late May a dense stand of volunteer crabgrass [*Digitaria sanguinalis* (L.) Scop.] provided competition in all plots. Apparently, the longer period of cool-season growth provided sufficient development for the Texas bluegrass to survive the summer competition in the two earlier planted blocks. Greater density of Texas bluegrass plants at the 10-cm spacing produced a less dense crabgrass canopy and apparently enhanced ability of even the later transplanted seedlings to survive. Thus, both initial stand density and earliness of emergence could be important in establishment of Texas bluegrass stands.

In summary, both Georgia-5 tall fescue and an experimental line of Texas bluegrass were able to provide perennial growth in short-term evaluations on Louisiana Coastal Plain sites. Survival of the initial warm season following planting appears to be a critical aspect in developing stands of these grasses. Both vigor of the cool-season grass seedlings and some limitation of competing warm-season plants appear to be important. At least for the Texas bluegrass, both extent of seedling development and stand density may be critical for survival under dense warm-season grass competition in the establishment year.

REFERENCES

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Table 1

Stand ratings of Georgia-5 tall fescue during the establishment period at three sites and two seeding rates on the Louisiana Coastal Plain

Seeding rate	Stand rating[1] date		
	January 1995	April 1995	January 1996
kg/ha			
	Ruston fine sandy loam site		
20	2.1 a	0.9 a	1.8 a
40	2.7 b	1.0 a	1.9 a
	Sawyer-Eastwood fine sandy loam site		
20	0.8 a	1.3 a	1.0 a
40	1.1 a	2.2 b	1.0 a
	Caddo silt loam site		
20	3.0 a	3.0 a	0.0 a
40	3.0 a	3.0 a	0.0 a

[1]Stand ratings were on a scale of 0 for no plants to 3 for a complete stand of tall fescue. Differences ($P<0.05$) among sites were obtained at each rating date, and seeding rates differed ($P<0.05$) within site and stand rating date where means are not followed by a common letter.