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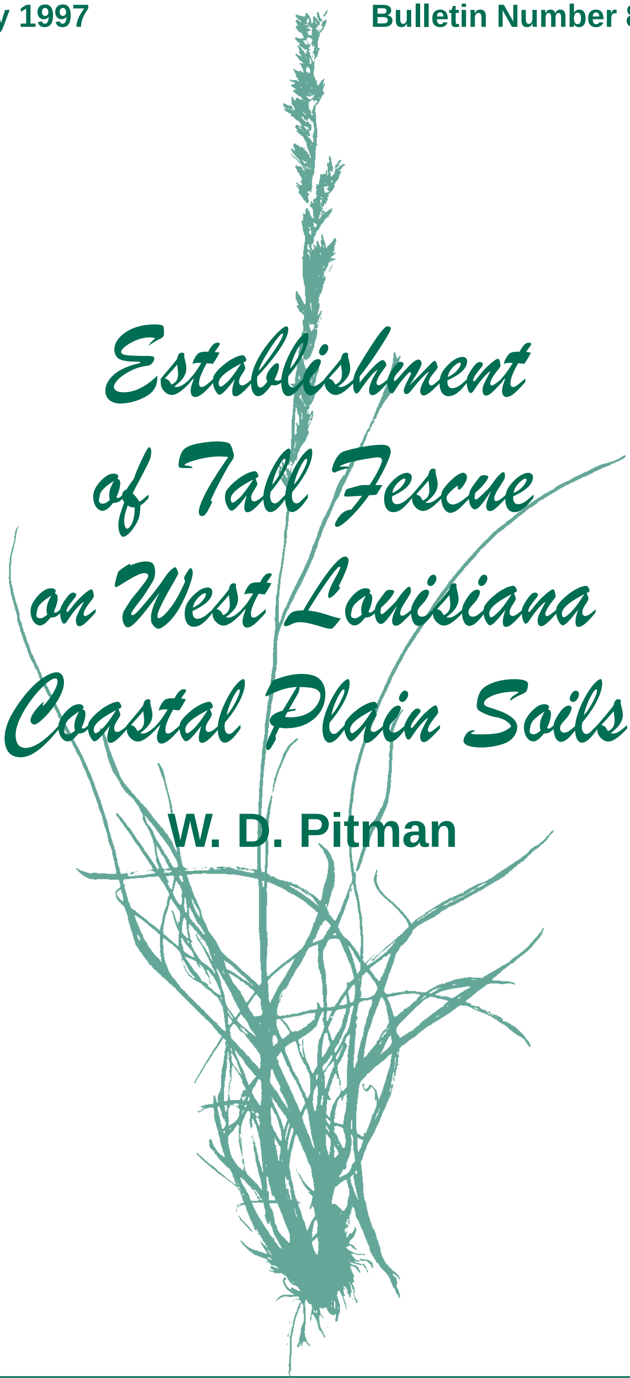

Establishment of Tall Fescue on West Louisiana Coastal Plain Soils

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Fescue

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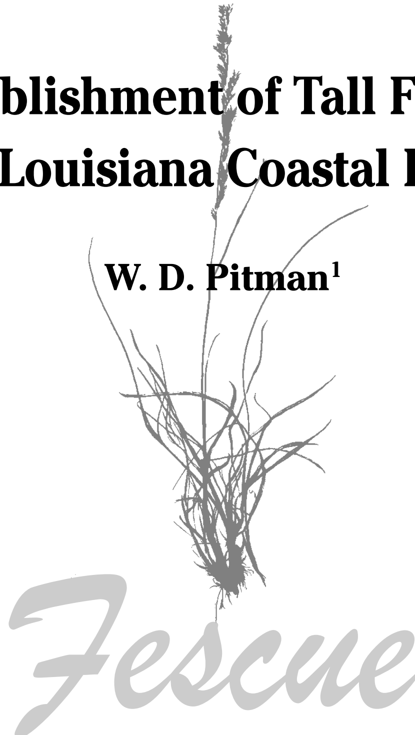
W. D. Pitman[1]



Introduction

Winter feed costs are commonly the greatest expense for cow-calf enterprises on the West Louisiana Coastal Plain. Either ryegrass or hay with supplemental protein and/or energy serves as the primary source of winter feed for most beef cattle herds throughout the region. Both of these feed sources are considerably more expensive than is an established, growing perennial grass pasture. Unfortunately, an adapted cool-season perennial pasture grass has not been available for the Coastal Plain region.

Georgia-5 tall fescue (*Festuca arundinacea Schreb.)* was developed for use as a permanent, cool-season pasture grass on the Coastal Plain (Bouton et al., 1993). This contrasts with previously available tall fescue cultivars, which have failed to survive on the Coastal Plain. The

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suggested range of adaptation of Georgia-5 is from southern Texas to the eastern Carolinas. Georgia-5 has been more persistent than other cultivars of tall fescue on the Macon Ridge of northeastern Louisiana (Alison, 1991). Current information and experiences indicate that some sites in the West Louisiana Coastal Plain are suited to this grass. Along with the restriction to appropriate sites within the region, several management practices appear to be critical for successful stand establishment.

Recent experiments and observations regarding establishment of tall fescue on the West Louisiana Coastal Plain are the specific topic of this publication. However, it must be pointed out that Georgia-5 is an endophyte-infected tall fescue cultivar. The endophyte is a fungus that lives inside the fescue plant. While this fungus can produce toxicities in grazing animals, it also provides stress tolerance to the grass that is necessary for survival of Georgia-5 on the Coastal Plain (Bouton et al., 1993). Although potential toxicities and reduced forage quality are real limitations of endophyte-infected tall fescue, this grass has been widely used as the base forage for beef cattle production in the Upper South for over 40 years. Most of this extensive fescue pasture over the years has been endophyte-infected tall fescue. Appropriate management of this forage has allowed very successful use of the grass. Compatability of Georgia-5 tall fescue with summer perennial grasses indicates that it should be much easier to minimize the adverse effects of this grass in the Lower South than it is farther north. Dilution of tall fescue forage with fall and early spring growth of other pasture plants in mixed stands can greatly reduce the danger of toxicity problems to grazing cattle from fescue pastures. Grazing tall fescue with the appropriate class of livestock can also minimize any adverse effects of the endophyte. This grass is primarily suited for maintenance and production of mature beef cows.Young growing cattle may not perform satisfactorily on tall fescue, and pregnant mares can experience reproductive problems on endophyte-infected tall fescue during the last three months of pregnancy (Ball, undated).

Fescue

Procedures

The results of two field plot experiments and observations from additional small-plot plantings and 40 acres of pasture for grazing experiments at the Rosepine Research Station provide the basis for this discussion of Georgia-5 tall fescue establishment.

Experiment I

The two tall fescue cultivars, Georgia-5 and Kentucky-31, were evaluated at two seeding rates at each of three sites. Seed, at rates of 20 and 40 lb/Ac, was drilled into existing stands of warm-season grasses, which differed at the three sites. The site at the Rosepine Research Station was a Ruston fine sandy loam with a mixture of common bermudagrass and bahiagrass. An additional site in Vernon Parish extended across a slope with a Sawyer fine sandy loam on the upper end and an Eastwood fine sandy loam on the lower end. The grass was a mixture of warm-season grasses including common bermudagrass, bahiagrass, dallisgrass, and carpetgrass. The third site, which was in Beauregard Parish, was a Caddo silt loam with a mixture of Jiggs bermudagrass and common bermudagrass. All plots were planted on Nov. 9 and 10, 1994. Each plot was 20 ft by 50 ft, with three replications of each treatment in a randomized block design. Stands were visually rated for proportion of each plot containing tall fescue on a scale of 0 for no tall fescue to 3 for a complete stand in January 1995, April 1995, and January 1996. Pasture management practices differed among sites. Original plans were to subject the plots to grazing periodically as needed to utilize the forage of either the fescue or warm-season grasses as they grew; however, the Beauregard Parish site was never grazed. Fertilization was planned for only the cool season with 300 lb/Ac of 16-16-16 applied in autumn of each year on two sites and an additional 50 lb/Ac of nitrogen in early spring. At the Beauregard Parish site, P and K were adequate with only nitrogen needed. Nitrogen at a high rate was also inadvertently applied at the Beauregard Parish site during the warm season.

Experiment II

An infertile, acid soil (Waverly fine sandy loam, sandy subsoil variant) was used as a site to evaluate response of Georgia-5 tall fescue seedlings to lime, phosphorus, and potassium. Initial soil pH averaged 5.2 with phosphorus classified as low at 14 ppm and potassium classified as very low at 22 ppm. Eight treatments consisted of an untreated control, finely ground calcitic lime at 2 tons/Ac, 100 lb of P_2O_5/Ac, 100 lb K_2O/Ac, and the various combinations of these soil amendments. Soil amendments were applied on November 14, 1995 and immediately rotovated into the upper 6 inches of soil. Georgia-5 tall fescue seed was broadcast on the soil surface at 50 lb/Ac on November 16, 1995 and cultipacked. Plots were 7 ft by 25 ft, with four replications in a randomized block design. Nitrogen was applied at the rate of 50 lb N/Ac per application on December 4, 1995 and February 15, 1996. Stands were rated for seedling density on a scale of 0 for no plants to 3 for a dense stand on February 8, 1996. Plots were harvested for establishment- year yield on April 11, 1996.

Fescue

Results

Experiment I

Stand ratings during the 14 months following planting were not different for the two cultivars, Georgia-5 and Kentucky-31, at any date. Stand ratings differed ($P<0.01$) among sites at each rating date. At Rosepine, stand ratings decreased during late winter and spring of 1995 as volunteer stands of ryegrass and crimson clover provided unanticipated competition. Periodic grazing failed to provide a competitive advantage to the tall fescue seedlings, as the drill rows of fescue were grazed even closer than were the immediately adjacent ryegrass and clover. At the other Vernon Parish site, stands responded differently down a gradient from a dry upland site to a seepy slope. Adequate early moisture contributed to good stands in the upper block (replication) where the warm-season grass sod was open. The lower two blocks contained dense stands of dormant summer grasses that apparently inhibited emergence and establishment of fescue in the winter and spring of 1995. However, by January 1996 fescue stands were greater in the more moist lower two blocks with substantial stand deterioration in the dry upper block.

The Beauregard Parish site was a highly fertile, moist site that had been heavily fertilized for production of bermudagrass hay. The dormant, closely mowed bermudagrass stubble provided very little early competition, and tall fescue stands were essentially complete. Plants were vigorous with both stand density and plant growth superior to the other sites. Contrary to plans, the tall fescue planting was managed along with the adjacent hay field for bermudagrass hay production in the spring and summer of 1995. In late spring, the dense, heavily fertilized bermudagrass had grown over the tall fescue. Following close cutting of the hay crop, no tall fescue plants could be found. A second hay crop was produced and harvested from the area. No tall fescue plants regenerated during the following autumn, winter, and spring.

Seeding rate affected stand ratings (Table 1) at only some dates for some sites with no effect of seeding rate evident by the final establishment rating in January 1996. The higher seeding rate appeared to provide a benefit primarily during periods when plant competition adversely affected tall fescue seedlings, such as in dense warm-season grass stubble or with dense spring growth of ryegrass and clover.

Table 1. Stand ratings of tall fescue cultivars* during establishment at three sites with two seeding rates on the West Louisiana Coastal Plain from a November, 1994 planting

Seeding	Stand rating date		
rate	January 1995	April 1995	January 1996
lb/Ac.		Rosepine site	
20	2.0 a	0.9 a	1.8 a
40	2.6 b	1.0 a	1.9 a
		Vernon Parish site	
20	0.9 a	1.3 a	1.1 a
40	1.2 a	2.0 b	1.2 a
		Beauregard Parish site	
20	2.9 a	3.0 a	0.0 a
40	3.0 a	3.0 a	0.0 a

*Ratings were on a scale of 0 for no tall fescue plants to 3 for a complete stand. Differences (P<0.05) among sites were obtained at each rating; no differences (P>0.05) were obtained between cultivars; and seeding rates differed (P<0.05) within site and stand rating date where means are not followed by a common letter.

Experiment II

Both the highest stand rating in February and the greatest forage yield in April were obtained with a combination of lime, phosphorus, and potassium (Table 2). However, combinations of either lime and phosphorus or potassium and phosphorus gave similar stand ratings and all treatments that contained phosphorus produced yields similar to the best treatment. Either lime alone or potassium alone failed to enhance stands or forage production during establishment on this infertile site. The magnitude of the phosphorus response illustrates the critical need for adequate soil phosphorus for development of competitive, productive stands of tall fescue on Coastal Plain sites. The substantially, though not statistically, greater yields from the combination of all three amendments versus phosphorus alone may reflect lack of adequate precision in this field experiment to measure differences of this magnitude. Considerable variation among replications was obtained for some treatments. Inadequate time for full effects of the lime treatment may have also been a limitation. As phosphorus deficiencies are overcome, responses to lime and/or potassium may be obtained, although not likely at the magnitude of the phosphorus response.

Table 2. Effect of soil amendments on establishment of Georgia-5 tall fescue planted on November 16, 1995 on an acid, infertile Coastal Plain soil

Amendment	Stand rating February 1996	Forage yield April 1996
		lb/Ac.
Lime, P, and K*	2.9 a**	1770 a
Lime and P	2.6 a	1410 ab
P	2.1 b	1340 ab
P and K	2.8 a	1200 ab
Lime and K	1.5 c	820 bc
Lime	1.1 c	490 c
K	1.3 c	290 c
Untreated control	1.1 c	280 c

*Lime was applied at the rate of 2 tons/Ac.; P (phosphorus) was applied at the rate of 100 lb P_2O_5/Ac.; and K (potassium) was applied at the rate of 100 lb K_2O/Ac.

**Treatment responses within a column differ ($P<0.05$) when not followed by a common letter.

Conclusions

Following are factors to consider for successful establishment of tall fescue on the Coastal Plain.

1. An **appropriate site** is essential for success with tall fescue on the Coastal Plain. Ball (undated) suggested that persistence of Georgia-5, as with other tall fescue cultivars, will be limited on droughty, sandy soils in Alabama. The results at the Vernon Parish site in Experiment I along a moisture gradient concur with this observation. An additional plot planting with Georgia- 5 drilled into dense bahiagrass sod at the Rosepine Research Station also indicated such a relationship. Although only partial stands were obtained initially in the dense bahiagrass sod with a drastic decrease over the first summer, tall fescue plants that survived were distinctly more plentiful along the lower end of a slight slope and moisture gradient. Other stands of tall fescue at the Rosepine Research Station have developed patterns of dense tall fescue in the more moist areas and sparse populations on droughty sites, especially after a year or two of grazing. These observations indicate that seepy slopes and bottomlands likely provide superior sites for tall fescue establishment on the Coastal Plain. Similarly, Hoveland (1994) and Ball (undated) indicated that flatwoods soils and upland soils with good moisture holding capacity are appropriate sites for Georgia-5 tall fescue in south Georgia and Alabama, respectively.

2. Selection of an acceptable **tall fescue cultivar** is essential for a persistent, long-lived stand, even though cultivar differences are not necessarily obtained during stand establishment. At all three sites in Experiment I, conditions suitable for successful establishment of Georgia-5 also permitted comparable establishment of the poorly adapted Kentucky-31. When Kentucky-31 failed to survive the establishment period, which extends through the first summer until initiation of fall regrowth, so did Georgia-5. This agrees with observations by Bouton (1986) that Georgia- 5 and an additional experimental line, Georgia-Jesup, demonstrated superior persistence and yields primarily in later years of evaluation. In addition to Georgia-5 and Georgia-Jesup, other experimental lines of tall fescue are currently being developed and evaluated for use on the Coastal Plain. While only Georgia-5 is currently available as a cultivar developed for the Coastal Plain, additional useful cultivars should be available in the next few years.

3. Restriction of **plant competition** is critical for tall fescue emergence and stand establishment. While a well prepared seedbed can provide the optimal conditions for emergence and early seedling growth, weed competition during early spring can be more severe than in a dormant sod. Also, combination of tall fescue with a warm-season grass provides a longer season of pasture growth and reduces the risk of adverse effects of fescue toxicity. Short, open sods of dormant bermudagrass or mixed warm-season grasses have allowed excellent establishment of tall fescue drilled into the sod in autumn. Dense bahiagrass stands and even patches of dense bahiagrass within mixed grass pastures have effectively restricted establishment of tall fescue drilled into the sod. Hoveland (1994) and Ball (undated) have recommended that thick, tight bahiagrass sods should be disked before seeding. Hoveland (1994) suggested that broadcast seeding of Georgia-5 into an established warm-season grass sod could also be effective but requires thorough disking prior to seeding and cultipacking after sowing the seed.

4. As illustrated by Experiment II, **fertilization** can have a tremendous effect on seedling growth and stand density of tall fescue on infertile Coastal Plain soils. Visually distinct growth responses to nitrogen are typical of most grasses. The dramatic response to phosphorus in Experiment II was greater than anticipated. This response was confirmed in a follow-up greenhouse experiment using the same soil as in the field experiment. In addition, under the greater control of the greenhouse conditions, response to lime was obtained. Only above-ground growth increased in response to phosphorus. Both above-ground growth and root weight increased with lime in the greenhouse experiment. Thus, highly acid soils should be limed to optimize tall fescue establishment on the Coastal Plain. However, more distinct plant growth responses will be evident on highly infertile soils from addition of phosphorus and nitrogen. Nitrogen application for use by tall fescue in warm-season grass sod should be delayed in autumn until the warm-season grass is dormant.

5. As with planting winter annuals in warm-season grass sod, **planting date** can be critical for sod-seeded tall fescue. Usually, close grazing or mowing of a warm-season grass sod after it has essentially ceased growth in autumn can adequately reduce competition from an open sod. As mentioned earlier, disking may be required for a similar effect on dense bahiagrass. Sod-seeding tall fescue before autumn growth of warm-season grasses has greatly diminished subjects the emerging seedlings to excessive competition. At the other extreme, planting later in the autumn or winter can reduce the opportunity for plant development prior to spring growth of competing plants. Georgia-5 drilled into plots with dense bahiagrass sod at the Rosepine Research Station in October 1995 resulted in a sparse tall fescue stand. The sparse stand from the October planting was augmented with additional seed in the following January. Stands were greatly improved by March with a majority of the tall fescue plants contributed by small, new seedlings from the second seed application. Seedlings from the original October planting were distinctly larger and more vigorous. Following the first summer, regrowing tall fescue plants could be found in the patterns observed for the vigorous seedlings from the original planting. Apparently almost none of the weaker seedlings from the later planting were able to survive the summer. Thus, a narrow window of optimal planting time may be available for sowing tall fescue, especially in competitive sods.

6. When other factors affecting establishment are optimized, there appears to be no advantage from a higher **seeding rate** than the currently recommended 20 lb/Ac for mixed plantings. Even short term stand enhancement from higher seeding rates in dense competition did not result in better stands in the second growing season.

Since sparse stands often occur with less than optimal conditions, augmenting partial stands with additional seed may be considered. Monitoring of sparse stands at the Rosepine Research Station, even with considerable bare ground between plants, has revealed very little, if any, increase in fescue stands from establishment of new seedlings. This lack of seedling development was noted despite large amounts of seed production in some situations. Germination tests revealed that freshly matured Georgia-5 seed in early summer had essentially no dormancy and germinated rapidly. Such rapid germination and subsequent seedling death in early summer when heat and competition stresses are high could explain the lack of natural stand enhancement. Drilling additional seed in autumn of subsequent years resulted in excellent new stands through the old sparse plants.

7. Grazing management can be a critical aspect of tall fescue establishment. Immediately before tall fescue is sown into a warm-season grass sod, close grazing of the sod is needed. After emergence of tall fescue, the concern changes to prevention of excessive grazing of fescue seedlings during establishment. Hoveland (1994) and Ball (undated) have recommended that grazing of fescue seedlings should be delayed until plants are 6 to 8 inches tall. Competition from spring growth of other plants may be controlled by grazing, however, close monitoring of the pasture is important. Preferential grazing of tall fescue seedlings has been observed at Rosepine in mixtures with crimson clover, ryegrass, and common bermudagrass. In late spring and summer, management of grazing to utilize the forage produced by warm-season grasses is needed to prevent smothering and excessive competition. At the same time, close grazing of the tall fescue during summer must be avoided. Optimal grazing defoliation during summer can be obtained by stocking pastures heavily enough to utilize growth of warm-season grass with cattle removed before tall fescue plants are heavily grazed. The extreme situation of management for high yields of bermudagrass hay is definitely not compatible with establishment of tall fescue stands. This also suggests that extended growth periods and short grazing periods characteristic of some intensive rotational grazing systems may not be appropriate management during the summer for survival of establishing tall fescue in aggressive warm-season grass stands. Continuous grazing at light stocking rates is equally undesirable as portions of the establishing tall fescue stand are typically kept short and eventually killed by repeated grazing while rank, ungrazed growth of tall fescue and warm-season grasses develops on other portions of the pasture. Planting sparse areas of established tall fescue pastures provides even additional challenges for appropriate grazing management since the newly establishing tall fescue seedlings are typically more readily grazed than are the old established tall fescue plants.

Fescue

Summary

Recently developed tall fescue varieties may provide perennial cool-season pasture grasses for some Louisiana Coastal Plain sites. A number of factors will determine whether successful stands are obtained. A moist site, an adapted cultivar, control of plant competition, appropriate fertilization, timely planting, and careful grazing management can all be critical aspects of successful tall fescue establishment on the Louisiana Coastal Plain. Despite the limitations and specific requirements for establishment, adapted tall fescue (currently limited to the cultivar Georgia-5) holds tremendous potential as an economical source of winter grazing for mature beef cows on the Louisiana Coastal Plain.

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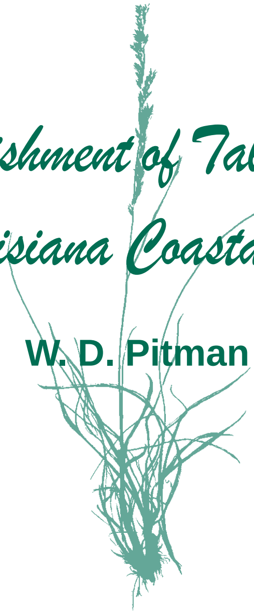

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