Evaluation of 'Tifton 9' Pensacola Bahiagrass with Continuous Grazing

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INTRODUCTION

'Tifton 9' Pensacola bahiagrass (Paspalum notatum Fluegge subsp. saure) was developed cooperatively by the USDA-ARS and the University of Georgia and released in March 1987 (Burton, 1989). Tifton 9 resulted from seed increase of the ninth selection cycle or "generation" of an improved plant breeding technique called restricted recurrent phenotypic selection (RRPS; Burton, 1974; 1982). Individual plants expressing superior forage production traits were identified and intermated in each selection cycle. Selection using RRPS was initiated in 1960 using a base population derived from the cultivar 'Pensacola.'

Compared to Pensacola, Tifton 9 has yielded 47% more forage in small plot clipping trials. Tifton 9 is has longer leaves than Pensacola as well as improved seedling vigor (Burton, 1989). Laboratory evaluation has indicated digestibility of Tifton 9 is equal to Pensacola (Gates and Burton, 1991). RRPS selection has continued beyond cycle 9. A seed increase was also made from cycle 14.

A two-year grazing trial was conducted to evaluate animal performance and plant response of Pensacola, Tifton 9 and RRPS cycle 14 bahiagrasses. Variables of primary interest were individual animal daily gain, carrying capacity, and persistence.

EXPERIMENTAL PROCEDURES

Two 2-acre pastures were each planted with Pensacola, Tifton 9 or RRPS cycle 14 bahiagrass in the spring of 1988 at the Range Grazing Unit near Alapaha, Georgia. Because the summer of 1988 was extremely dry, poor stands resulted in the fall of that year. Because seed supplies were limited and in an effort to preserve existing plants and surviving, non-germinated seed, pastures were overseeded with the same entries that were planted in 1988 using a no-till drill (this is not a recommended planting procedure for Tifton 9). Bahiagrass was planted (20 pounds per acre) on April 24, 1989. Paraquat (1£ pints/acre) was applied immediately after seeding to provide "burn down" of existing vegetation. Pastures were mowed periodically and sprayed with 2,4-D during the year of establishment.

Pastures were burned in February, 1990 and grazing started in April. Fertilization rates were 125 lb/acre of nitrogen provided in 3 applications during 1990 and 2 applications in 1991. Phosphorus and potassium were applied to maintain a 4:1:2 ratio of N:P:K. Summer applications of 2,4-D and triclopyr were made in both years to control broadleaf weeds.

Three yearling heifers (average weight 621 lb) were assigned randomly to pastures. These heifers, designated as "testers," grazed respective pastures continuously during the season. Similar heifers were added and removed from pastures to maintain comparable forage availability. Available forage was estimated every two weeks by cutting all forage within 6 quadrats (1 square foot) in each pasture to ground level. The grazing season began in early April in both years. Grazing was discontinued September 18, 1990 and August 27 in 1991.

Botanical composition of each pasture was monitored using a "paced transect" method in the spring and fall of each year. An observer walked over equally spaced transects, classifying the vegetative cover at each 5-foot interval. A minimum of 300
observations were made in each pasture on each sampling date.

RESULTS

Forage availability, estimated using clipped quadrats, varied with sampling date. Average estimates for sampling date ranged from 885 to 2730 lb/acre. In spite of efforts to equalize forage availability, dry matter presented for grazing was highest for RRPS cycle 14 and lowest for Pensacola (Table 1).

Daily gains were higher in 1990 than in 1991, due in part to wet conditions in the latter year. Daily gains of individual heifers were not influenced by bahiagrass entry (Table 1). This outcome would be expected, since digestibility estimates for these germplasms have been equivalent. Carrying capacity (heifer grazing days provided per acre) was also greater in 1990 than in 1991. In both years Tifton 9 provided more grazing days than Pensacola ($P < .10$; Table 1). RRPS cycle 14 was superior to Pensacola during the first year, but not in 1991. No difference in production per acre could be attributed to bahiagrass entry (Table 1) although higher carrying capacity and equal daily gain tended to support greater production from Tifton 9 and RRPS cycle 14 than from Pensacola.

Application of RRPS to bahiagrass has altered morphology (plant architecture) in addition to forage production potential. High-yielding plants are more upright, have more erect leaves (Werner and Burton, 1991) and produce less of their total weight as stolons (horizontal "stems" which remain at the ground surface). Stolons accumulate storage carbohydrates and because of location are protected from removal by grazing. Therefore, a primary consideration of this experiment was the effect of bahiagrass entry on persistence when exposed to continuous grazing.

Persistence was evaluated using estimates of botanical composition made twice each year (Table 2). Acceptable stands were indicated in April 1990 following a year of establishment and preceding any grazing. Bahiagrass cover was nearly 70% and the major remaining component was bare ground. A decline in bahiagrass cover was apparent for RRPS cycle 14 by the end of the first year of grazing. Good stands of bahiagrass were available for Pensacola and Tifton 9 in the spring of 1991. However, considerable contamination had developed, primarily common bermudagrass. Stands of RRPS cycle 14 were less than 50% bahiagrass. Following the second year of continuous grazing, persistence of Tifton 9 was comparable to Pensacola. RRPS cycle 14 did not exhibit good persistence.

Rapid encroachment of common bermudagrass and other weedy species in this experiment resulted from the planting methods used. During 1988, although bahiagrass did not become well established, weedy species did expand and produce seed and vegetative propagules. Paraquat treatment at planting and spot spraying with glyphosate was not adequate to control weeds. This environment did allow bahiagrass persistence to be evaluated under conditions of extreme competition from aggressive weeds.

CONCLUSIONS

Tifton 9 bahiagrass is higher yielding and equal in forage quality to Pensacola. Daily gains of individual heifers grazing Tifton 9 were comparable to those consuming Pensacola. Tifton 9 supported a greater number of grazing days than Pensacola,
reflecting higher forage production. Persistence of Pensacola and Tifton 9 was comparable when exposed to continuous grazing. RRPS cycle 14 supported animal performance similar to Tifton 9, but stand depletion reduced the potential yield advantage of RRPS cycle 14. Alternatives to continuous grazing will be needed to fully exploit the potential of cycle 14 and subsequent high-yielding bahiagrass germplasms.

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TABLE 1. **Average performance of heifers grazing three bahiagrass entries for two years.**

Item	Bahiagrass Entry		
	Pensacola	Tifton 9	RRPS cycle 14
Forage DM/acre, lb	1270[a]	1490[b]	1790[c]
Tester Daily Gain, lb	0.86	0.84	0.87
Heifer grazing days/acre	438	511	505
Gain/acre, lb	551	689	712

[abc]Means differ (P < 0.05).

TABLE 2. **Stand composition estimates for three bahiagrass entries during 2 years of continuous grazing.**

Date	Bahiagrass Entry		
	Pensacola	Tifton 9	RRPS cycle 14
	-------	bahiagrass (% cover)	-------
04/16/90	60.1	71.7	67.9
11/05/90	60.1[a]	54.5[a]	36.6[b]
06/05/91	71.2[a]	75.3[a]	46.5[b]
10/22/91	61.4[a]	55.2[a]	29.4[b]

[ab]Means differ (P < 0.05).