

BAHIAGRASS: THE FOUNDATION OF COW-CALF NUTRITION IN FLORIDA

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INTRODUCTION

Bahiagrass (*Paspalum notatum* Flugge.) a warm-season perennial, is grown throughout Florida and in the Coastal Plain and Gulf Coast regions of the southern states. In Florida, bahiagrass is used on more land area than any other single pasture species, covering an estimated 2.5 million acres. Most of this acreage is used for grazing with some hay, sod, and seed harvested from pastures.

Bahiagrass is adapted to climatic conditions throughout the state. It can be grown on upland well-drained sands as well as the moist, poorly-drained flatwoods soils of peninsular Florida.

It is a warm-season grass that produces more grazing in the summer than winter. Forage growth is more evenly distributed throughout the year in south Florida than in north Florida, due to the longer growing season. In south Florida, growth of bahiagrass pastures slows down in October and many pastures are completely used up by mid-December. Bahiagrass starts growing again in early March. In north Florida, bahiagrass pastures are productive from April to November. On selected sites the grazing season can be extended by over seeding cool-season legumes and grasses on the bahiagrass pastures. These cool-season forages provide additional late winter and early spring grazing.

Bahiagrass is popular with Florida ranchers because (1) it tolerates a wider range of soil conditions than other improved grasses, (2) it is resistant to encroachment of weeds, (3) it is relatively free from damaging insects (except for mole crickets) and diseases, (4) it has a unique ability to produce moderate yields on soils of

very low fertility, (5) it withstands close grazing, and (6) it is established from seed.

Of the important perennial pasture grasses cultivated in Florida, bahiagrass is the only one propagated by seed. It is a heavy seed producer, and begins putting up seed heads in early summer. Animals may graze bahiagrass seed heads and carry seed to new areas where it can become a problem, because it will germinate after passing through cattle. In some instances less competitive grasses such as coastal bermudagrass and the digitgrasses (Pangola) may eventually be crowded out by bahiagrass. Fortunately a new herbicide, Alley®, is available that will remove Pensacola bahiagrass from bermudagrass hay fields.

CULTIVARS

Bahiagrasses are native to South America and are widely distributed in Argentina, Uruguay, Paraguay, and Brazil. Several different types have been introduced into the U.S.

Common bahiagrass was the first cultivar tried in Florida. It was introduced into the U.S. in 1913 by the Florida Agricultural Experiment Station. It has short, broad leaves that are somewhat hairy. It is slow to establish, low in productivity and sensitive to cold. It is no longer a recommended cultivar.

Pensacola is the most widely grown cultivar. It was found growing in Pensacola, Florida in 1935 by Escambia County Extension Agent, Ed Finlayson. The Pensacola types have long, narrow leaves and taller seed stalks than other cultivars. Like other bahiagrasses, it has a fibrous root-system capable of growing to a depth of seven feet or more. Pensacola has some

cold tolerance, but top growth is killed by moderate frosts. In north Florida, more early-season and late-season production can be obtained from the Pensacola types than from other bahiagrass cultivars.

Tifton-9 Pensacola is the newest cultivar. It was developed through a bahiagrass breeding program by Dr. Glen Burton. Compared with the Pensacola cultivar from which it was bred, Tifton 9 has much greater vigor in the seedling stage and develops longer leaves. It is 30 percent higher yielding than Pensacola, but quality is the same.

Argentine is a selection that was introduced from Argentina in 1944. It has wider leaves and is considered by some to be more palatable than Pensacola. It is not as cold tolerant as the Pensacola types and does not make growth as early in the spring. Ergot can develop on the seed of this cultivar. It is popular in the sod trade because it puts up fewer seedheads than Pensacola.

Paraguay and **Paraguay 22** are two separate and distinct cultivars of bahiagrass. Paraguay is thought to have come from the country Paraguay but its origin is somewhat obscure. It has short, narrow, tough, hairy leaves. It has been used to some extent as a general purpose turfgrass, but has little value as a forage plant. This grass is sometimes called Texas bahia.

Paraguay 22 was introduced from Paraguay in 1947. It is similar to Argentine in growth habit and cold tolerance, but unlike Argentine its seeds are not affected by ergot.

Wilmington is a cold-hardy type. It has narrow leaves of medium size. It is less productive than Pensacola and is a poor seed producer.

Hybrid bahiagrasses Tifhi-1, and Tifhi-2 have been developed but due to difficulty and expense of seed production they are not available for commercial use.

PLANTING

Bahiagrass should be planted on a well

prepared seedbed. The optimum temperature range for bahiagrass seed germination is 85 to 95F. Summer planting may be, in terms of optimum temperatures and moisture, the ideal time to plant but weed competition may be more severe. Spring plantings may result in a more rapid establishment of a sod if an April or May drought is avoided. In south Florida, however, it may be planted any time soil moisture is sufficient for germination and seedling establishment. Seed should be broadcast at 12 to 15 pounds per acre, and covered with 1/2 inch of soil. Higher seeding rates up to 40 pounds per acre can be used to obtain quicker establishment. Using a rolling device after broadcasting the seed usually gives all the soil coverage necessary and it produces a firm, smooth seed bed which conserves moisture. Precision planters such as a cultipacker type seeder or drill may be used when available for more precise seed placement. Less seed should be required to obtain comparable stands when these types of planters are used. Mixing seed with fertilizer and spreading both in one application is a popular method with many producers. If this method is used do not let the mixture set for more than one day before spreading. Also be aware of the possibility of losing the nitrogen and potassium to leaching since there is no root system to absorb these nutrients when they are applied. This may not be as much of a problem for spring plantings as it is for summer plantings that are made during the time of excessive rainfall.

Bahiagrass seedlings are small and cannot compete with weeds. Therefore, weed control is very important during the first few months in the life of a new planting of bahiagrass. Also, the small seedlings are sensitive to phenoxy herbicides and thus mowing must be used to control weeds until the plants are 5 to 6 inches tall and well established at which time a phenoxy herbicide can be used to control broadleaf weeds. Cattle should not be placed on the new planting for three months or until the stand is thick enough that you cannot see bare ground. On the

other hand, if a "nurse crop" such as Japanese millet is seeded with the bahia then the millet should be grazed enough to prevent it from shading the bahiagrass seedlings. At seeding rates used for pastures it may take two growing seasons to get a stand well established. Once established, bahiagrass has an aggressive growth habit and forms a dense sod which is relatively easy to maintain. Peak sod density usually occurs in the third year after seeding. For commercial sod production the use of higher seeding rate and scarified seed may allow you to obtain peak sod density quicker.

LIMING AND FERTILIZATION

Bahiagrass will persist under low fertility, but if it is expected to produce a significant amount of forage, an adequate liming and fertilization program should be followed. Soil testing should be used as a guide for applying lime, phosphorus (P), and potassium (K). The amount of nitrogen (N) used should be based on the need for forage. The amount of P and K used depends on the soil test and the amount of N being applied.

A mineral soil where bahiagrass is grown should be limed to a pH of 5.5. Recommendations based on soil tests may call for 1 to 2 tons of limestone or dolomite to raise the pH to 5.5. Bahiagrass pastures where cool-season clover or ryegrass are not being grown may not need to be limed again for many years. If white clover or other cool-season legumes are over seeded on a bahiagrass pasture, then the pH should be raised to 6.5 prior to overseeding. A pH of 6 is needed for warm-season legumes and ryegrass.

For new plantings of bahiagrass, apply 30 lb N/A, all of the P_2O_5 , and 50% of the K_2O recommended by the soil test lab as soon as plants have emerged. Apply the remaining K_2O and 70 lb N/A 30 to 50 days later if a good stand of seedlings is present. Magnesium should be applied according to the soil test recommendation. Sulfur can be added during

establishment without additional cost by using ammonium sulfate as the N source. Calcium will be sufficient when the pH is raised to the proper level. Micro-nutrient deficiencies are rare and under typical production situations they are not limiting growth.

For established stands of bahiagrass, three fertilization options are recommended by IFAS. Detailed below, these are also printed out as part of the soil test report from the Extension Soil Testing Laboratory. Choose the option which most closely fits your fertilizer budget, management objectives, and land capability. The P and K recommended on the soil test report should be modified according to the option chosen, that is the P and K recommendation is dependent not only on the soil test results but also the amount of N used.

Low-nitrogen option (for grazed pastures only): Apply around 50 lb N/A. At this level, nitrogen will still be the nutrient that limits forage yield even when the soil test level for P and K is low. Therefore, do not apply the recommended P or K. If you follow this practice of applying only N to your pasture for more than one year, apply the P and K recommended by soil test every third or fourth year to avoid excessive depletion of those nutrients. Do not use this option if you cut hay since nutrient removal by hay is much greater than by grazing animals.

Medium-nitrogen option: Apply around 100 lb N/A this year. At that level of N fertilization, P and K may be limiting if your soil tested low in these nutrients. Apply 25 lb P_2O_5 /A if your soil tested low in P and none if it tested medium. Apply 50 lb K_2O /A if your soil tested low in K and none if it tested medium. Re-test your soil every second or third year to verify P and K levels. If you plan to make a late-season cutting of hay, apply around 80 lb N/A between August 1 and 15 (about 6 weeks before the growing season ends).

High-nitrogen option: Apply 160 lb N/A and the soil-test-based recommended rates of

P₂O₅ and K₂O for each of your pastures. The fertilization rates suggested in this option are high enough to allow bahiagrass pasture to achieve well above average production. Management and environmental factors will determine how much of the potential production is achieved and how much of the forage is utilized.

If a good stand of legume (white clover, etc.) exists in the pasture, N fertilizer may be reduced or eliminated altogether. Phosphorus and K recommendations for the particular legume should be followed.

For established stands of bahiagrass, apply all of the fertilizer in the early spring (February-March) to maximize much-needed spring growth. Bahiagrass is a very efficient forager and recovers nutrients from deeper in the soil profile than other popular forage grasses so danger of leaching losses is low.

Bahiagrass has a somewhat unique trait of accumulating nutrients in its stolons. It has been estimated that the stolons in a fully established mature stand of bahiagrass that is well fertilized may contain a reserve of nutrients that will last 2 to 3 years.

PASTURE USE AND MANAGEMENT

Bahiagrass is used mainly for beef cattle pastures. If it is fertilized and rotationally grazed, it will carry one to two animal units per acre from approximately mid-March to mid-November (on south Florida flatwoods). Carrying capacity will be less on upland sands and for a shorter period in north Florida. The quality of bahiagrass forage is adequate for mature beef cattle, but weaned calves or stocker yearlings make relatively low daily gains, especially in July and August due to the low quality of the grass at that time. Table 1 presents some data on yield and quality of Pensacola bahiagrass across spring, summer, and fall. Summer yields are higher than spring yields, but protein and digestibility are lower. This is due to higher temperatures and favorable soil moisture conditions which promote more rapid

growth and maturity. Within any season, the older the grass the lower the protein and digestibility. Under a grazing situation where spot grazing develops, those areas that are not grazed and where forage accumulates will have quality characteristics similar to regrowth that is 12 weeks old or older.

Over the years, bahiagrass has been compared with many other grasses at several locations in the state for both yields of dry matter and animal response. The other improved grasses tend to out-yield the older cultivars of bahiagrass especially at locations where they are best adapted. No direct comparisons of other species with Tifton-9 are available. Pensacola tends to out-yield Argentine at northern locations primarily due to its superior frost tolerance. Tifton-9 will produce 30% more forage than Pensacola in both north and south Florida.

Animal response data are available for different locations within the state. In trials conducted at Belle Glade on organic soils, Argentine produced more animal gain per acre than Pensacola; both produced more than Pangola, and all produced less than St. Augustine. Ona Agricultural Research and Education Center trials indicated little difference between Pensacola, Argentine and Paraguay 22 bahia. Stargrasses have produced higher average daily gains and greater animal gain per acre than Pensacola bahia. At Gainesville, Pensacola bahia and Coastal bermuda produced similar animal gains. Pensacola compared with Floralta limpograss produced average daily gains that were similar, but carrying capacity and total animal gain per acre were greater for limpograss. Work in west Florida at the Jay Agricultural Research Center indicates in that area Pensacola produces slightly more animal gain than Argentine. At this time, no animal response data are available for Pensacola Tifton-9, but average daily gains would be expected to be similar to those of other bahiagrasses with total animal gain per acre being 10 to 20 percent greater.

OTHER USES

Seed Production Bahiagrass seed production is another source of income on some ranches. Yields of 200 to 500 pounds of clean seed per acre can be expected when good production and harvesting practices are used. If a producer plans to harvest seed from a particular pasture or field of bahiagrass, field preparations should begin early in the year.

In January or February, if there is enough accumulated dead grass to supply fuel for burning, it should be burned. Burn after a rain when the tops have dried but while the soil surface is still moist. Fertilize using the high nitrogen option, but split the N applying the first application with P and K in February or March and the second application of N alone in May after seed stalks have started to emerge and cattle have been removed. During the spring keep the grass grazed as short as possible. Never let the top growth accumulate to the point where it lodges and completely shades the stolons. Not all seeds mature at the same time but ripen throughout the summer. Seeds are mature and ready for harvest if they will strip off when pulled through partially closed fingers. If a custom seed harvester is used, contacts and arrangements should be made well in advance of the expected harvest date. After the seed is harvested the remaining forage can be grazed or harvested for hay. The hay will be low in quality, and thus would be a good candidate for ammoniation.

Hay Fertilized bahiagrass, cut at the prehead stage of growth, makes good quality hay. However, it is difficult to cut and save because of its low-growing, dense growth. Surplus pasture growth accounts for most of the bahiagrass hay saved. Much of it is low in quality because it is cut after the plants head out and, in some cases, after heads are combined for seed.

Sod The commercial sod business in Florida is very important. Ranches may have an additional source of income from lifting bahiagrass sod from suitable pastures. Argentine bahiagrass is the favored cultivar in the seed

trade because it produces fewer seed heads than Pensacola. See Bulletin No. 260, "Basic Guidelines for Sod Production in Florida" for additional information.

Lawns Bahias are used extensively as a lawn grass in Florida in situations where low maintenance is desired and quality is not important. The deep root system allows them to survive under dry conditions, yet they grow well on poorly drained soils. They form a coarse turf that looks good from a distance. The greatest disadvantage of bahiagrass for lawns is the tall seed spikes that are produced during the summer. Bahiagrass also is used for soil stabilization and landscaping on medians and shoulders of the state's highways.

PEST CONTROL

Weeds The best defense against weeds is to maintain a healthy sod that covers the ground. When needed, certain herbicides are available to control specific weeds. Banvel®, 2,4-D or a combination of the two will control most broadleaf weeds. Velpar® is available for use on smutgrass, and Crossbow® and Remedy® on brush and briars. See SS-AGR-8 "Weed Control in Pastures and Rangelands-1991" for detailed information on use of these herbicides.

Insects Mole crickets and army worms are two important pests of bahiagrass. Loss of pasture growth to army worms is not prevalent but can occur especially during periods of summer or fall drought. Army worms can be controlled by timely treatment with insecticides. To prevent extensive damage treatment must be made when worms are small.

Bahiagrass is a favored host for mole crickets. Mole cricket damage to bahia pastures has continued to increase. Damage is indicated by thinning of stand and, in some instances, small areas of grass may be completely killed. Toxic baits can be applied in the summer and early fall to control mole crickets. Biological control agents are being developed and will likely be available for commercial use in the near future.

SUMMARY

Bahiagrass is a good general use pasture grass. Once established it can withstand heavier grazing pressure than the other pasture grasses in common use. Cattle are less able to destroy a stand of bahiagrass when pastures are overstocked and grass production is inadequate to meet the needs of the livestock. Bahias have the ability to withstand drought and to maintain sod at extremely low fertility levels.

Under minimum fertility bahiagrass is not very productive, but it will stay in the pasture whereas other improved grasses under such conditions might be taken over by weeds and eventually lost. Bahiagrass has the ability to build up and store a supply of mineral nutrients as well as carbohydrate reserves in its stolons and roots.

It also has the ability to continuously cycle nutrients and thus keep them in the top four inches of soil.

Bahiagrass is not as productive as some grasses, and its quality is often low during July, August, and September. When mature, all of the bahias are extremely fibrous, unpalatable, and low in feeding value. Not much can be done in regard to its productivity relative to that of other grasses, but the quality of feed available in the pasture can be improved by overseeding some of the pastures with summer legumes.

Altogether, bahia is a good general-use pasture grass that responds to moderate fertilization and is easier to manage than other improved pasture grasses.

Table 1. Yield, Protein and Digestibility of Pensacola Bahiagrass by Season.

SPRING

Weeks of regrowth	2	4	6	8	10	12	14	17
Date	4/3	4/17	5/1	5/15	5/29	6/12	6/26	7/18
Yield (lbs dm ^a /acre)	240	430	810	1190	2190	2460	3120	3810
Crude Protein (%)	21.7	16.1	13.1	9.3	6.7	4.5	4.4	4.6
IVOMD ^b (%)	67.6	66.5	63.2	63.6	58.0	54.5	52.5	49.9

SUMMER

Weeks of regrowth	2	4	6	8	10	12	(15)	--
Date	6/6	6/9	7/3	7/17	7/31	8/15	9/4	--
Yield (lbs dm/acre)	440	1420	2280	2960	3690	4240	5550	--
Crude Protein (%)	12.5	10.3	8.6	6.8	7.0	5.1	5.5	--
IVOMD (%)	60.1	61.3	59.0	52.6	52.5	49.8	48.1	--

FALL

Weeks of regrowth	2	4	6	--	--	--	--	--
Date	8/28	9/12	9/25	--	--	--	--	--
Yield (lbs dm/acre)	500	900	1030	--	--	--	--	--
Crude Protein (%)	18.2	14.9	11.5	--	--	--	--	--
IVOMD (%)	59.6	54.5	53.8	--	--	--	--	--

^a dm = dry matter

^b IVOMD = In vitro organic matter digestion (an index of digestibility)

Fertilization = 65 lb. N/A 2 weeks prior to first harvest for each season.

50 lb. P₂O₅ & 100 lb K₂O/A applied in early spring.

Location = Ona AREC

Source = Brown & Mislevy, 1988. Beef Cattle Res. Report.