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EXTENSION

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Bahiagrass¹

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Bahiagrass (*Paspalum notatum* Flugge.), a warm-season perennial, is grown throughout Florida and in the Coastal Plain and Gulf Coast regions of the southern United States. Bahiagrass is adapted to climatic conditions throughout Florida and can be grown on upland well-drained sands as well as the moist, poorly-drained flatwoods soils of peninsular Florida. 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 a warm-season grass that produces more grazing in the summer than winter. Due to the longer growing season, forage growth is more evenly distributed throughout the year in southern Florida than in northern Florida. In southern Florida, growth of bahiagrass pastures slows in October, and many pastures have very little forage after mid-December until the grass starts growing again in early March. In northern Florida, bahiagrass pastures are productive from April to November. On selected sites, the grazing season can be extended by overseeding 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 it: 1) tolerates a wider range of soil conditions than other improved grasses; 2) has the ability to produce moderate yields on soils of very low fertility; 3) is easily established from seed; 4) withstands close grazing; and 5) is relatively free from damaging insects (except for mole crickets) and diseases.

Of the major perennial pasture grasses grown in Florida, bahiagrass is one of two propagated by seed. It is a heavy seed producer and begins sending up seed heads in early summer. Animals may graze bahiagrass seed heads and carry seed to new areas where it can become established, as the seed will germinate after passing through the digestive tract of cattle. In some instances, less competitive grasses such as Coastal Bermudagrass and the digitgrasses (Pangola) may eventually be crowded out by bahiagrass. Fortunately, a herbicide, Ally, is available that will remove Pensacola bahiagrass from bermudagrass hay fields.

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CULTIVARS

Bahigrasses 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 Bahigrass

Common was the first bahigrass used 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 recommended.

Pensacola

Pensacola is the most widely grown cultivar. It was found growing in Pensacola, Florida in 1935 by Escambia County Extension Agent, Ed Finlayson. Pensacola has long, narrow leaves, taller seed stalks, and it flowers earlier than other cultivars. Like other bahigrasses, it has a fibrous root-system capable of growing to a depth of 7 feet or more. Pensacola has some cold tolerance, but top growth is killed by moderate frosts. In northern Florida more early-season and late-season production can be obtained from the Pensacola types than from other bahigrass cultivars.

Tifton-9 Pensacola

Tifton-9 Pensacola was released in 1987. It was developed through a bahigrass breeding program by Dr. Glen Burton, USDA, Tifton, Georgia. 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% higher yielding than Pensacola, but quality is the same.

Argentine

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

Paraguay

Paraguay and Paraguay 22 are two separate and distinct cultivars of bahigrass. Paraguay is thought to have come from the country of 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 bahigrass. Seed are not available.

Paraguay 22

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

Wilmington

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.

PRODUCTION AND MANAGEMENT

Planting

Bahigrass should be planted on a well-prepared seedbed. The optimum temperature range for bahigrass seed germination is 85 to 95° F. Summer may be the ideal time to plant in terms of optimum temperatures and moisture, 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 southern Florida, however, it may be planted any time soil moisture is sufficient for germination and seedling establishment. Seed should be broadcast at a minimum of 12 to 15 lb/A, and covered with 1/2 inch of soil. Higher seeding rates up to 40 lb/A can be used to obtain quicker establishment. Most producers use 20 lb/A. Using a rolling device after broadcasting the seed usually gives all the soil coverage necessary, and it produces a firm, smooth seedbed which conserves moisture. Precision planters, such as a cultipacker-type seeder or drill, may be used for more precise seed placement. Less seed should be required to obtain comparable stands when these types of planters are used. One of the best seeding methods is to firm the seedbed with a land roller, plant the seed with a drill, followed by the

land roller. 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.

Bahagrass seedlings are small and do not compete well with weeds. Therefore, weed control is very important during the first few months in the life of a new planting of bahagrass. 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" tall and well-established. At that time, a phenoxy herbicide can be used to control broadleaf weeds. Cattle should not be placed on the new planting for 3 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 bahagrass, the millet should be grazed enough to prevent it from shading the bahagrass seedlings. At seeding rates used for pastures, it may take two growing seasons to get a stand well-established. Once established, bahagrass 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 a higher seeding rate may allow you to obtain peak sod density more quickly.

Fertilization and liming

Establishment Fertilization

For new plantings of bahagrass, apply 30 lb/A N, all of the P_2O_5 , and half of the K_2O recommended on your soil test report as soon as plants have emerged. Apply the remaining K_2O and 50 to 70 lb/A N 30 to 50 days later. In southern Florida or if a soil test report is not available, apply 25 lb/A of P_2O_5 and 25 lb/A of K_2O with the N as soon as plants have emerged and apply an additional 25 lb/A of K_2O later with the second application of N. If manure or biosolids are used as the main source of nutrients, apply the entire annual application once the plants are

large enough to withstand physical damage from the application. Magnesium is usually sufficient, but can be applied with the initial fertilizer if a soil test indicates that it is low. Low magnesium is usually remedied by using dolomitic limestone when the soil is limed. Sulfur may or may not be needed but can be added during establishment by using ammonium sulfate as the N source. Calcium will be sufficient when the pH is raised to the proper level. Micronutrient deficiencies are rare and under typical production situations do not limit growth.

Production Fertilization

From approximately Orlando south, recent soil fertility studies on established, grazed bahagrass pastures have shown very little if any yield response to the application of P or K even though the soil may have tested low in these nutrients. This result may be explained by the fact that only the top 6 inches of soil is sampled for a soil test and roots of bahagrass plants can absorb nutrients from much deeper in the soil profile. It is presently believed that soil testing for P and K in this southern region will not indicate whether a bahagrass pasture will respond to an application of P or K. Therefore, in peninsular Florida south of an east-west line that runs through Orlando, no P or K is recommended for use on established grazed bahagrass pastures, and soil testing for P and K will not be needed. The suggested fertility program for grazed established bahagrass pastures south of Orlando is to apply 50 lb-60 lb of N alone in the spring. Phosphorous and potassium may need to be added to these pastures in the future if a pasture begins to perform poorly. From approximately Orlando north, soil testing and fertilization recommendations will continue as in the past.

In northern Florida, three fertilization options are recommended for established stands of bahagrass. Detailed below, these are also printed 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, because the P and K recommendation is dependent not only on the soil test results but also the amount of N used.

Low-N Option (for grazed pastures only) - Apply around 50 lb/A N. At this level, N 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 P or K. Do not use this option if you cut hay because nutrient removal by hay is much greater than by grazing animals.

Medium-N Option - Apply around 100 lb/A N. At this level of N fertilization, P and K may be limiting if your soil tested low in these nutrients. Apply 25 lb/A P_2O_5 if your soil tested low in P and none if it tested medium. Apply 50 lb/A K_2O if your soil tested low in K and none if it tested medium. Retest 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/A N between August 1 and 15 (about 6 weeks before the growing season ends).

High-N Option - Apply 160 lb/A N and the recommended rates of P_2O_5 and K_2O for each of your pastures. Split the N into two applications of 80 lb N/A each, applying in early spring and early summer. The fertilization rates suggested in this option are high enough to allow bahiagrass pasture to achieve 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. A single cutting of hay can be made without need for additional fertilization.

For established stands of bahiagrass, apply fertilizer in the early spring (February - March) to maximize much-needed spring growth. Bahia grass 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. Bahia grass 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.

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

Liming

Soil testing should be used as a guide for applying lime. In southern Florida, lime to a pH of 5; in northern Florida, lime to a pH of 5.5. Bahia grass pastures, once limed to the target pH, may not need to be limed again for several years unless they are overseeded with a cool-season clover or ryegrass. If white clover or other cool-season legumes are overseeded on a bahiagrass pasture, the pH should be raised to 6.5 prior to overseeding. A pH of 6.0 is needed for warm-season legumes and ryegrass.

When establishing bahiagrass on new land that is very acid, try to apply and incorporate the lime 6 to 12 months before planting the bahiagrass so that the lime will have had sufficient time to neutralize the soil acidity.

PASTURE USE

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 southern Florida flatwoods). Carrying capacity will be less on upland sands and for a shorter period in northern Florida. The quality of bahiagrass forage is adequate for mature beef cattle, but weaned calves or stocker yearlings make relatively low daily gains, especially from July through September.

Over the years, bahiagrass has been compared with many other grasses at several locations in the state for both yield 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 northern and southern Florida.

Animal response data is 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. Augustinegrass. Range Cattle Research and

Education Center trials indicated little difference between Pensacola, Argentine, and Paraguay 22. Stargrasses have produced higher average daily gains and greater animal gain per acre than Pensacola bahiagrass. At Gainesville, Pensacola bahiagrass and Coastal bermudagrass 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 at the West Florida Research and Education Center indicates that Pensacola produces slightly more animal gain than Argentine. At this time, no animal response data is available for Tifton-9 Pensacola, 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% greater.

Ryegrass and various legumes can be successfully grown with bahiagrass if soil moisture is sufficient and if competition from the bahiagrass is reduced before seeding. Competition from the bahiagrass can be reduced by grazing off the top growth and disking or chopping the pasture just prior to or at seeding. Soil moisture is critical, especially for ryegrass and white clover; therefore, only select sites should be overseeded with these cool season species. Irrigated pastures in central and southern Florida, moist flatwoods in northeastern Florida, and clay soils in western Florida are suitable sites for overseeding these forages. The summer legumes, aeschynomene, Florida carpon desmodium, stylo, and phasey bean are adapted to the moist flatwoods soils in central and southern Florida. Other legumes, such as crimson clover, red clover, arrowleaf clover, alyceclover, hairy indigo, perennial peanut, and stylo have been used on sites that have good soil moisture but do not flood. Legumes should be used with bahiagrass where adapted. They not only improve pasture quality and all aspects of animal performance, but also reduce the use of N fertilizer.

OTHER USES

Seed Production

Bahiagrass seed production is another source of income on some ranches. Yields range from 50 to 150 lb and occasionally up to 350 lb of clean seed per

acre. 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 N option, but split the N by applying the first application with P and K in February or March and the second application of N alone in May or June 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, 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 bale because the grass is dense and low-growing. Surplus pasture growth accounts for most of the bahiagrass hay. 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. If hay is harvested from a grazed pasture in the late summer, it is suggested that additional N (60 to 80 lb/A) be applied to grow the hay crop. Also, apply P and K if these nutrients were not applied in the spring. Apply the fertilizer no later than 6 weeks prior to the end of the growing season which occurs around October 1. When a field of bahiagrass is used only for hay production, with multiple cuts, use the same fertility program as would be used for Coastal bermudagrass or other hay type grasses.

Sod

The commercial sod business in Florida is a large industry, and ranches may have an additional source of income from selling bahiagrass sod from suitable pastures. Argentine bahiagrass is the favored cultivar in the sod trade because it produces fewer seed heads than Pensacola. See Florida Cooperative Extension Service Bulletin 260, *Sod Production in Florida*, for additional information.

Lawns

Bahiagrasses are used extensively for lawns in Florida 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 highways.

Crop Rotation

Bahiagrass is used in rotation with peanuts, soybeans, tobacco, and some vegetable crops grown on sand land. After 2 to 3 years growth of bahiagrass, the population level of certain nematodes and other pests is reduced. Also, a slight increase in organic matter and an improvement in soil tilth may result. Tifton-9 Pensacola, with its more rapid seedling growth and quicker establishment, has been suggested for use in certain crop rotation systems.

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 fact sheet SS-AGR-08, *Weed Control in Pastures and Rangelands*, for detailed information on use of these herbicides.

Insects

Mole crickets and armyworms are two important pests of bahiagrass. Loss of pasture growth to armyworms is not prevalent but can occur especially during periods of summer or fall drought. Armyworms 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 bahiagrass pastures has continued to increase. Damage is indicated by thinning of stand and, in some instances, small areas of grass may be completely killed. A biological control agent (a nematode) is now commercially available to help control mole crickets in bahiagrass pastures. Other biological control agents are being developed and will likely be available for use in the future. Sometimes toxic baits are available, which can be applied in the summer and early fall for temporary control mole crickets. See the current IFAS *Insect Control Guide* for control recommendations.

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 likely to destroy a stand of bahiagrass when pastures are overstocked and grass production is inadequate to meet the needs of the livestock. Bahiagrasses 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 persist as a 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 4 to 6 inches of soil.

Bahiagrass is not as productive as some grasses, and its quality is often low from July into winter. 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 the pastures with summer legumes.

Bahiagrass is a good general-use pasture grass that responds to moderate fertilization, tolerates unfavorable conditions, and is easier to manage than other improved pasture grasses.