Bahiagrass in Alabama

► This perennial warm-season grass is well-adapted to low soil fertility and input systems that can be used in Alabama. Achieving stand longevity requires use of the proper cultivar along with suitable establishment and management practices.

Bahiagrass (*Paspalum notatum* Fluggé) is native to South America and widely used in the southeastern United States. In Alabama, it occupies approximately 1 million acres and is used for hay, grazing, and seed production.

Bahiagrass is established by seeds and can tolerate drought, sporadic flooding, low soil fertility, and close grazing. Most forage production occurs from April through September. Stands can be overseeded with cool-season annuals in the fall to extend the grazing season.

Characteristics of Bahiagrass

A dense, prostrate grass, bahiagrass has shallow and horizontal stems (rhizomes) that form a thick mat (sod), crow-shaped leaves, and two-branched racemes ("Y-shaped") (figures 1 to 3). It is adapted to sandy loam soils (optimal pH is 5.5) and can grow 12 to 25 inches tall.

Bahiagrass has low to medium nutritive value and generally goes dormant in late fall/winter, when pastures can be overseeded with cool-season forage species. In the southernmost counties of Alabama, it also can be grown in a mixture with annual warm-season legumes or rhizoma peanut (perennial legume *Arachis glabrata* B.); this can increase nutritive value and animal performance, while reducing nitrogen fertilizer inputs into forage systems.

Forage Cultivars

The choice of cultivar should be based on site and climate conditions as well as forage system goals. Several bahiagrass cultivars are available. They differ in forage production, growth habit, germination, tolerance to cold, drought, and sporadic flooding, and ploidy level (i.e., number of sets of chromosomes). Diploids ('Pensacola' types, including 'Tifton 9', 'TifQuik', and 'UF-Riata') are more tolerant to cold and regrow in early spring, while tetraploids ('Argentine' types) have higher production concentrated in fewer months of the year.

Figure 1. Bahiagrass sheath and leaves. Photo courtesy of Charles Peacock.

Figure 2. Bahiagrass seedhead. Photo courtesy of Charles Peacock.

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Figure 3. Bahiagrass rhizome. Photo courtesy of Charles Peacock.

Figure 4. Stands of bahiagrass in monoculture. Photo courtesy of Marcelo Wallau.

The following are the most common bahiagrass cultivars:

'Common' was introduced in Florida in 1913. It has short, broad leaves with thick rhizomes. It is slow to establish and is more sensitive to colder temperatures. 'Common' is no longer planted but can be found in older pasture fields.

'Pensacola' was introduced in the late 1930s through ballast discarded from ships at the Pensacola port in Florida. It has long, narrow leaves and taller seed stalks, and it produces seeds earlier than other cultivars. It is the most widely planted cultivar in the United States. It regrows early in spring and can be used under low fertility and management input.

'Argentine' was introduced from Argentina in 1944. It is characterized by wider, darker leaves. It has better tolerance to poorly drained soils but is less cold tolerant than other cultivars. Forage production starts later in spring and is more concentrated in late summer and early fall compared to 'Pensacola'. 'Argentine' is highly susceptible to ergot (*Claviceps purpurea* [Fr.] Tul.) infections.

'AU Sand Mountain' was developed and released by Auburn University. The material was selected from 'Pensacola' stands planted in the early 1960s in the area that later became the Sand Mountain Research and Extension Center in Crossville, Alabama. This cultivar has higher cold tolerance than others and good yield production and persistence.

'Tifton 9' is a selection from 'Pensacola' released in 1987. Compared to 'Pensacola', it has greater seedling vigor and higher yields in early spring and late fall, and is more upright; however, it is less tolerant to close grazing and does not produce as dense a sod.

'TifQuik' was developed from 'Tifton 9'. It has greater seedling vigor and faster stand formation but yields similarly to 'Tifton 9'. 'TifQuik' has earlier spring growth than 'Tifton 9' and 'Pensacola'.

'UF Riata' was developed from 'Pensacola' and released in 2007. It has the longest growing season among cultivars, growing from early spring to late fall, although it lacks a consistent peak of forage production. This cultivar has similar forage yields as 'Tifton 9' and 'TifQuik' but is not as tolerant of close grazing as other varieties.

Table 1. Characteristics of Bahiagrass Cultivars

Cultivar	Establishment Rate*	Tolerance		Seed Production	Alabama Region**	
		Cold	Drought		North	South
'Pensacola'	G	G	G	G	N	Y
'Tifton 9'	E	G	G	E	N	Y
'TifQuik'	E	E	G	E	Y	Y
'UF Riata'	G	G	G	E	N	Y
'Argentine'	G	P	G	F	N	Y
'AU Sand Mountain'	G	E	G	G	Y	Y

*E = excellent; G = good; F = fair; P = poor

** Y = yes; N = no

Figure 5. Stands of bahiagrass mixed with rhizoma peanuts. Photo courtesy of Jose Dubeux)

Pasture Establishment and Renovation

In Alabama, the best time to establish bahiagrass is in early spring on upland soils and in late spring on low, moist soils. Late summer planting can slow stand establishment due to weed competition and dry weather periods.

Bahiagrass is established by seeds and requires proper soil preparation and weed control to guarantee optimal conditions for establishment. Seed origin is particularly important in order to avoid weeds, especially Brunswickgrass (*Paspalum nicorae* Parodi), and it must be of good quality and certified.

Prior to planting, choose a cultivar adapted to your soil and site conditions, and perform a soil test and apply amendments if necessary. Find information on how to take a soil sample and interpret soil results from the Soil and Forage Testing Laboratory at Auburn University, https://ssl.acesag.auburn.edu/anr/soillab/forms/.

Bahiagrass does not tolerate most herbicides until plants are 6 inches tall. It is therefore essential that the seed bank is properly controlled; otherwise, shading slows bahiagrass growth.

When using conventional land preparation, the area should be tilled, disked, and cultipacked to guarantee a firm seedbed and prevent seeds from being placed too deeply. Seeding rate varies with the cultivar, ranging between 15 and 20 pounds pure live seed per acre. Seeds can be either broadcast or drilled to ¼ to ½ inch depth. If not drilled, then seeds should be rolled after planting to optimize soil-seed contact. In areas where there is risk of soil erosion, no-till establishment should be considered, but it requires proper control of existing vegetation through nonselective herbicide applications and use of a higher seeding rate.

Seven to 10 days after seedling emergence, the stand should be fertilized using 35 to 50 pounds nitrogen per acre. After 30 to 50 days, application of 50 to 75 pounds nitrogen per acre is recommended. A new stand should be established within 90 days, at which time a light defoliation event (grazing or mowing) should be conducted. Cost of establishment may vary, averaging around $300 per acre.

Renovation of bahiagrass stands is a possibility but depends on the condition of pastures. For partial renovation, recommendations are to reduce grazing pressure and conduct herbicide applications to kill weeds to favor bahiagrass growth during the warm season. If a complete renovation is required, preparation should start the previous fall season by killing the current stand and weeds and then preparing the soil for spring planting. If using a new cultivar, farmers should consider planting an annual crop for one summer to eliminate seed bank of current cultivar on site.

Fertilization Management

Proper fertilization management improves forage quality, which reflects in livestock performance and stand persistence. Bahiagrass generally is considered a low-maintenance grass, but it is highly responsive to nitrogen fertilization. While bahiagrass tolerates a wide range of soil pH (5.5 to 6.5), periodic lime application is important for stand maintenance and health. Nitrogen (N) is essential to sustain forage production and quality (crude protein), but its fertilization rate and frequency of application will be determined based on management strategies used. Phosphorus (P) and potassium (K) also are required to maintain productivity and persistence, and their levels should be determined yearly through soil testing. The following are general fertilization recommendations depending on the system used:

- **Grazing.** Apply 75 to 150 pounds nitrogen per acre per year split between early spring and summer applications to optimize use efficiency. Also apply potassium and phosphorus in late spring or early summer according to soil test results.
- **Hayfields.** Apply 50 to 75 pounds of nitrogen per acre and potassium and phosphorus in early spring according to soil test report. Then apply an additional 40 pounds of nitrogen per acre after each additional cutting of hay.

Figure 6. Lack of lime along with potassium and phosphorus input associated with bahiagrass pasture decline in Florida. Photo courtesy of Lynn E. Sollenberger.

Grazing management can be a tool to distribute nutrients more uniformly through manure spreading, which may be of interest in low input systems. Fertilization issues represent losses in potential forage production and, consequently, animal performance. In recent years in Florida, farmers reported a decline in 10-year or older bahiagrass stands (figure 6). After on-farm studies were conducted, this condition was associated with lack of proper lime application, along with little to no potassium and phosphorus fertilizer amendment input over decades; this led to recommendations of more frequent soil testing.

Forage Production and Grazing Management

Potential forage yields range from 3,000 to 10,000 pounds of dry matter (DM) per acre per year. Forage yield is affected by several factors, including cultivar, fertilization, defoliation management, climate, and site conditions. Crude protein generally ranges from 7 to 12 percent and digestibility from 43 to 60 percent.

Bahiagrass remains dormant from late fall through winter. Low rainfall in early spring can slow regrowth, while prolonged droughts in summer may reduce yields.

For grazing management in rotational systems, the general recommendation is to maintain a 3- to 4-inch stubble height; for continuous grazing it is 5 to 6 inches. Due to its nutritive value range, bahiagrass alone does not meet the nutritional requirements of high-maintenance livestock, such as growing and lactating animals, for which diet adjustments should be properly addressed (estimated average daily gain is up to 1 pound per day on bahiagrass alone).

At some sites, a common practice is to stockpile bahiagrass to extend the grazing season through late fall; nutritive value declines quickly, however, as it matures. Bahiagrass can withstand relatively close grazing due to protected growing points located close to the soil surface. Continuous grazing to very close stubble heights, however, can compromise stand longevity and consequently lead to weed invasion and soil degradation.

Table 2. Herbage Accumulation, Crude Protein, and *In vitro* Digestible Organic Matter (IVDOM) of Four Bahiagrass Cultivars

Cultivar*	Forage Yield (lb/ac)		Crude Protein (%)	IVDOM (%)
	2010	2011		
'Argentine'	5,710	3,836	13.2	53.8
'Pensacola'	5,264	3,033	12.9	54.1
'Tifton-9'	6,156	3,301	12.4	55.3
'UF Riata'	6,245	3,569	12.0	55.1

*Fertilization rate of 54 lb N/acre/yr and managed under grazing (2- or 4-wk frequencies)

Data adapted from a 2-year study at Florida (Vendramini et al., 2013)

Bahiagrass stands can be overseeded in late fall with cool-season annual forages (primarily annual ryegrass, clovers, and small grains). If necessary, suppression of bahiagrass growth can be done by close grazing or mowing and use of herbicide before drilling seeds; however, this might interfere with stand response in the following year.

During late spring, close grazing or mowing to remove residual cool-season annuals should be conducted to guarantee proper bahiagrass regrowth, since late-season species, such as annual ryegrass, could delay bahiagrass regrowth. A growing practice in southern Alabama is to strip-plant rhizoma peanuts to improve nutritive value and animal performance and decrease nitrogen input (figure 7).

Figure 7. Bahiagrass pasture with rhizoma peanut planted in strips during establishment (left) and later managed under grazing. Photos courtesy of Jose Dubeux, left, and Liza Garcia, right.

Weed Management

The best strategy for weed control is to have a healthy, well-established stand. This requires planting on a clean seedbed since bahiagrass seedlings are susceptible to most herbicides until they reach a height of 6 inches.

A combination of tillage and a nonselective herbicide, such as glyphosate (Roundup), applied to emerged weeds immediately prior to planting ensures that both annual and perennial weed species are delayed long enough for bahiagrass seed germination and emergence. Until the bahiagrass stand is established, mowing is the sole option for weed control. It is recommended that mowing heights be kept as high as possible to ensure that bahiagrass roots are undisturbed while adjacent weed competition is reduced. Removing no more than the top one-third of the bahiagrass plant will stimulate horizontal spread and tiller elongation.

Once the stand is established, sulfosulfuron (Outrider) is one of the few products labeled for use in bahiagrass with any level of grass weed activity, johnsongrass (*Sorghum halepense*), specifically. For most broadleaf weeds, dicamba, 2-4-D, aminopyralid, or a combination of both can be used on established stands. For smutgrass control, hexazinone (Velpar) can be used, but it must not be sprayed close to desirable trees.

A well-managed bahiagrass pasture growing under optimal conditions generally is competitive with weeds; however, the actual scenario is that most systems containing bahiagrass tend to be low input and overgrazed. Contact your local Extension agent or specialist for help with specific weed infestations.

Brunswickgrass (*Paspalum nicorae* Parodi) has become an increasing issue in bahiagrass and bermudagrass pastures in the southern United States. It is well adapted to moderately acidic, sandy soils, but it also can grow well in sandy loam and well-drained, light-to-medium clay-based soils. It is competitive with bahiagrass and bermudagrass (*Cynodon dactylon* [L.] Pers.).

When Brunswickgrass is young, cattle consume it but tend to avoid the grass as it nears maturity and palatability declines. This avoidance allows for seed maturity, thus furthering the spread. There is no herbicide currently available that selectively kills brunswickgrass that is invading pastures, but there is ongoing research. Find more information in *Brunswickgrass: A Weed in Southern Pastures and Bahiagrass Seed Fields* (Extension publication ANR-2537). Also contact your local Extension agent or specialist for help with specific weed infestations.

Pests and Diseases

Compared to bermudagrass (*Cynodon dactylon* L.), relatively few problems generally exist related to diseases and pests in bahiagrass stands once established. Following are potential pests and disease problems to scout for in bahiagrass systems.

Mole Crickets

Mole crickets are distinguished by their large front legs that are modified for digging. They live their entire lives in the soil and cause damage by creating tunnels that mechanically damage the root system and may cause the plant to desiccate. In the southern United States, two species are commonly found: the southern mole cricket, *Neocapteriscus borelli* Giglio-Tos, and the tawny mole cricket, *Neocapteriscus vicinus* Scudder. Bahiagrass is one of the most severely damaged by them in addition to bermudagrass.

Generally, more widespread tunneling occurs in sandy soils as compared to clay soils, and the most extensive

damage occurs in late summer and early fall as the nymphs actively forage for food. Earlier damage may be noted as isolated patches of thinning stands; this can lead to complete death in entire areas if left unchecked.

A mole cricket infestation can be confirmed by the presence of multiple small mounds throughout the field. A soap water flush can be applied to bring both nymphs and adults to the surface.

Options for mole cricket control in pastures are limited. Some biological control options, such as entomopathogenic nematodes and parasitic flies, are available. Chemical control methods are limited and include toxic baits applied in the late summer when nymphs are present.

Bahiagrass Billbug

Bahiagrass billbugs (*Sphenophorus coesifrons*) are long-snouted beetles as adults and legless beetle grubs as larvae (figure 8). The adult billbug does not fly, but it crawls along paved areas and can be transported in infested materials.

Damage in bahiagrass stands usually begins as small, dead patches of grass (figure 9) that can coalesce over time to kill large portions of it. Adults can cause some feeding damage, but the most damaging life stage is the larvae.

Adults emerge in the soil in May and will feed on bahiagrass tillers. Females lay eggs in feeding holes of grass stems; as larvae hatch, they begin to feed. Larval feeding occurs in late summer through fall and can lead to plant death over time. Once the larvae are fully grown, they will pupate in the soil and emerge as an adult in the following spring. Damage typically is noticed in spring when damaged plants fail to regrow.

To control billbugs, pitfall traps can be used in May to sample for crawling adults. When needed, an approved insecticide, such as a Pyrethroid or Carbaryl, can be used (an additional application may be necessary).

Figure 8. Billbug larvae on soil surface

Figure 9. Billbug larvae damage in bahiagrass stand

Fall Armyworms

Fall armyworms can cause severe damage quickly if not detected. During summer and fall, fields should be scouted weekly and forage harvested if infestation is detected. If harvesting is not possible, the use of insecticides is recommended. Pyrethroids are labeled for use in pastures, but it is important to consider costs and residual time. When armyworm size is uniform, a cheap pyrethroid with a short residual time will work (i.e., Mustang Maxx, Tombstone). If dealing with multiple generations of armyworms, use a product with longer residual effect (i.e., Prevathan, Dimilin, Intrepid).

Dollar spot

Dollar spot (*Scleroinia homoeocarpa*) affects seed and forage yield. Control is expensive and requires a withdrawal period that generally prohibits use of fungicides.

Ergot

Ergot (*Claviceps paspali*) occurs during summer due to high moisture and causes reproductive and behavior issues in livestock. Since it occurs only in seed heads, it can be managed by mowing pastures.

Summary

Bahiagrass is a perennial warm-season grass well adapted to low soil fertility and input systems that can be used in Alabama. It has low to medium crude protein and digestibility, and most forage production occurs in summer. To guarantee stand longevity, it is important to select the proper cultivar and perform adequate establishment and management practices.

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