Creeping Bluestem (Andropogon stolonifer (Nash) Hitchc.)¹

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Highlight

Creeping bluestem (Andropogon stolonifer (Nash) Hitchc.) is an important perennial native bluestem widely distributed on ranges and grazeable woodlands in Florida and southeast Georgia. Major growth occurs from January to September in south Florida. Successful management and maximum production of creeping bluestem depends on how closely range management practices are coordinated with growth characteristics. Controlling saw palmetto (Serenoa repens (Bartr.) Small) by mechanical means followed by good management practices increases the production of creeping bluestem. Good and excellent condition ranges composed of creeping bluestem are invaluable to ranching operations. Greater flexibility in ranching operations are possible when creeping bluestem is the major grass on good and excellent condition ranges.

Creeping bluestem (Andropogon stolonifer (Nash) Hitchc.) is one of approximately 26 native species of the genus growing in Florida (Fig. 1). Creeping bluestem also occurs to a limited extent, in adjacent states. Observations and experience are proving creeping bluestem to be one of the most important native forage grasses in range and woodland grazing programs.

Small (1903) first described creeping bluestem in his "Flora of the Southeastern United States" as

Schizachyrium stoloniferum Nash based on the type specimens collected in western Florida. The common name of creeping bluestem was listed by Kelsey and Dayton (1942). Later, Hitchcock (1950) identified the species as A. stolonifer (Nash) Hitchc. still based on the type specimen. Spikelet and raceme characteristics of the type specimens are similar to those of all of the recent collections made by the authors in various parts of Florida. There is considerable variation in a few vegetative characteristics, especially the length of blades and sheaths. Halls et al. (1952, 1956,

1957) listed and recognized creeping bluestem as a component of the understory herbage of longleafslash pine forests of the lower coastal plain of Georgia. In 1959, Williams described the species as having slender, creeping scaly rhizomes and forming colonies due to the extension of the underground stems. In addition, Williams recognized that the quality of range forage was higher when creeping bluestem made up a substantial part of the composition. Yarlett (1963) described many of the vegetative and growth characteristics of creeping bluestem in addition to its production and associated species on central and south Florida ranges. Because of its response to grazing, creeping bluestem was classified as a "decreaser" on all sites that had been grazed yearlong by cattle.

Halls et al. (1964) listed creeping bluestem as a principal grass from Alabama eastward through south Georgia and as abundant on moist to dry sandy soils. New shoots and leaves from slender underground stems were described as readily grazed in summer. The authors of this paper concluded that creeping bluestem withstood moderate grazing but declined if heavily grazed. The practical use of creeping bluestem as a native forage in a coordinated program of livestock man-

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FIG. 1. Creeping bluestem showing vegetative growth attained by August.

agement and improved pastures was reported by Yarlett (1962). A comprehensive description and the site adaptation, associated species, forage value, and management of creeping bluestem was reported by Yarlett (1965). Controlling saw palmetto (Serenoa repens (Bartr.) Small) by mechanical means followed by good range conservation practices increased the production of creeping bluestem from 300 pounds green weight to 6,000 pounds per acre in south Florida (Yarlett 1965, 1966).

Description

Creeping bluestem is a warm season perennial, forming dense colonies from extensively creeping rhizomes. Leaf blades are 1/4 to 3/8 inches wide, often 24 inches long, "V" shaped or flat, and tapered abruptly at the tip (Fig. 2). The original collection and type specimen in the herbarium of the New York Botanical Garden has leaf blades 5 to 8 inches long. The majority of samples collected by the authors have strongly flattened basal sheaths, often with a slight purplish tinge near the base. Upper sheaths are more or less rounded. These specimens and those in the



FIG. 2. Vegetative characteristics peculiar to creeping bluestem useful in field identification.

herbarium at the University of Florida are slightly villous on the upper part of the sheath, base of blade, and collar. Culms are 2 to 6 feet tall, single or only a few to a colony. Inflorescence are frequently 2 feet long, much branched with racemes $1-1\frac{1}{2}$ inches long, slightly drooping at maturity.

Distribution

The distribution of creeping bluestem generally follows the major land resource areas in Florida, Georgia, Alabama and South Carolina. These include Southern Florida Flatwoods, South-Central Florida Ridge, Atlantic Coast Flatwoods, Southern Coastal plains, and Gulf Coast Flatwoods (Austin,



FIG. 3. Distribution of creeping bluestem.



FIG. 4. Rhizomes of creeping bluestem. 18-inch ruler indicates the extent to which these underground stems elongate in a single season.

1965). Based on numerous herbarium records and field observations by the authors, the center of distribution is peninsular Florida and southeast Georgia (Fig. 3).

Two irregularities in the general pattern of distribution are noteworthy. Collections and records of herbarium specimens indicate a scarce occurrence in southwest Georgia and extending into northcentral Florida. This irregularity appears to be consistent with other species of plants currently being investigated by researchers of the Botany Department, University of Florida. Many plants occurring in west Florida skip a one- or twocounty area and appear again in northeast and southern Florida. The reason for this is still largely unanswered. The second deviation from a uniform distribution is the scarcity of the species in the major portions of three large counties in extreme south Florida. This may be attributed to the plant-soil moisture relations in the Florida Everglades and Big Cypress Swamp and adjacent areas.

Search of literature reveals that creeping bluestem is not recorded as occurring in Puerto Rico, West Indies, Cuba, or on the Yucatan peninsula.

Growth Characteristics

Rhizomes send up new shoots during the first week of January in south Florida. These rhizomes may elongate as much as 8 to 12 inches in a single growing season (Fig. 4). New growth starts by early March in southern Georgia; leaf blades may reach as much as 8 inches long by mid-April. By late July, major growth has been attained and seed stalks are in the formative stage. This is the period midway in the rainy season. Field observations indicate that the initial formation of inflorescence is linked closely to the rise of the water table during late July and August. Culms emerge from the boot in mid-August. Bloom occurs in late August or September and seed matures in October. In south Florida, foliage remains green throughout the winter months; leaf blades are often 17 months of age before dying.

Grass species vary in the number of short basal nodes and also in the number of fruiting stems to vegetative stems. Branson (1953) found that the number of short basal nodes influences how soon the growing stem is thrust above the ground, and within reach of the grazing animal. Creeping bluestem has about 7 to 10 short basal nodes, most of which are below ground level and within a space of $1\frac{1}{2}$ inches.

The natural ratio of vegetative stems to fruiting stems may be indicative of tolerance to grazing. Work by Branson indicated a 6:1 ratio of vegetative to fruiting stems very tolerant and 1:2 very intolerant. Creeping bluestem has an approximate ratio of 5 vegetative stems to 1 fruiting stem. This ratio was observed on ranges without influence of fire or grazing, and also in rod row plantings at the Florida Soil Conservation Service Plant Materials Center.

Young plants of creeping bluestem produce two or three robust seed stalks at the end of the first growing season. Plants low in vigor, due to excessive grazing, likewise produce large and conspicuous seed stalks the first growing season after grazing pressures are lifted. Each succeeding year as plant vigor is renewed, seed stalks become fewer and the natural ratio of 5 vegetative stems to 1 fruiting stem is restored.

Low temperatures of 25 to 30 F have done little damage to current season basal growth. Average minimum temperatures, usually of 2 to 3 days duration, range from 10 to 15 F in the northern limits of distribution. Stands have been established vegetatively at the SCS Plant Materials Center, Coffeeville, Mississippi and Americus, Georgia to further test the range of adaptation. The Coffeeville Plant Materials Center is the northern-most location which is being studied for site adaptation. The stands at Coffeeville have survived temperatures as low as -9 F.

Forage is produced efficiently under a 25 to 30 percent crown canopy of pine forests. Greater shade sharply reduces production but does not curtail the photosynthetic process enough to eliminate the species from the composition. This is emphasized by the occurrence of creeping bluestem



FIG. 5. Dense stand of saw palmetto. Creeping bluestem occurs within this brush cover but restricted from normal growth.

under dense canopies of saw palmetto, gallberry (*Ilex glabra* (L.) A. Gray), and fetterbush (*Lyonia fruticosa* (Michx.) G. S. Torr.) (Fig. 5).

Evidence of ecotypic variation in creeping bluestem is apparent within its natural range of distribution. One type collected in central Florida has wider and conspicuously glaucous blades. Clones of this type have been established in the Soil Conservation Service Plant Materials Center at Brooksville, Florida. Observation indicate that new shoot growth begins at least 2 to 3 weeks earlier than the common form. Rhizome growth appears more vigorous. Early observations indicate greater yields of air dry material and greater resistance to cold damage. Collections have also been made near Tallahassee, Florida under the canopy of longleaf pine.

A collection of creeping bluestem from near Tifton, Georgia, exhibits narrow blades. Both sheaths and blades are densely hirsute. Rhizomes appear to be thin compared to the two previously described forms.

Site Adaptation

Creeping bluestem is adapted to a wide variety of soils in most of the major land resource areas of Florida, southern Georgia, and Alabama. The majority of the flatwood soils on which creeping blue-

stem grows have low organic content. Its greatest adaptation is to the sweet flatwood site of central and southern Florida. Soils of this site are nearly level, slightly acid to neutral, somewhat poorly drained, deep sands. Underlying materials are predominantly clay, marl, or limestone. The acid flatwood site extends over a greater area. The soils are nearly level and strongly A characteristic organicacid. stained pan occurs at a depth of about 2 feet. A seasonally high water table, particularly from July through November, is a major feature of flatwoods site.

In the northern and western area of distribution, in addition to the flatwoods, creeping bluestem is adapted to soils of the loamy sand uplands. These sites are predominantly sloping or rolling. The soils are acid, well-drained, deep, and have less than 30 inches of a sandy surface over clayey subsoils. Plantsoil moisture relations are generally better than on flatwood soils. Available moisture holding capacities are moderate to high with low to moderate organic matter and natural fertility.



FIG. 6. A new shoot of creeping bluestem emerges from a semidormant rhizome. The palmetto fronds resulting from brush control operations form a protective soil mulch.



FIG. 7. A south Florida range on which 60 percent of the composition by weight is creeping bluestem.

Reaction to Grazing and Management

Creeping bluestem is readily grazed by cattle yearlong. The majority of the grasses occurring with creeping bluestem are equally palatable during spring months. By late May and June, sharp differences develop, primarily between pineland threeawn (Aristida stricta Michx.) or Florida threeawn (A.rhizomophora Swallen) and creeping bluestem. Cattle continue to select bluestem forage during the remainder of the growing season, leaving threeawns and other unpalatable grasses to complete their growth requirements. Continued heavy grazing on creeping bluestem prohibits enough food storage in the root systems to maintain vigorous growth. If grazing management is not favorable to bluestem, a plant composition results that is less productive than the potential for sites on either rangeland or grazeable woodland. When brushy species are not a problem, scheduled full growing season deferments materially increase the percentage of bluestem.

Forage production is low on palmetto infested ranges which usually are in poor condition. Bluestem yields are as low as 150 to 400 pounds air dry per acre. A maximum of 3,800 pounds has been obtained by landowners who have controlled palmetto and practiced deferred grazing and proper use for 2 years (Figs. 6 and 7). The immediate response of creeping bluestem to palmetto control and one full growing season deferment from grazing is illustrated in Table 1.

Production in natural stands of grazeable woodland ranges from a low of 150 pounds per acre to a high of approximately 2,000 pounds air dry. Variation in yield depends on past grazing management, site characteristics plus crown canopy, age of stand, basal area, and needle fall. Understory herbage in stands of planted pine may or may not have creeping bluestem as a major component. Methods of site preparation before planting determines the ultimate composition. Observations indicate that the greater the disturbance of soil, the less bluestem will occur. Heavy chopping followed by either disking or bedding materially eradicates creeping bluestem. A single treatment with a tandem roller chopper is most favorable to the control of undesirable palmetto and natural establishment of bluestem.

Successful management and maximum production of creeping bluestem depends on how closely range and herd management practices are coordinated with the growth characteristics (Fig. 8). Brush control is applied usually during dormancy when root storage of carbohydrates is the highest. This is followed by a period of deferment from spring through fall which is the grand growth period. Utilization of forage in the first and second years is roughage grazing during winter months using approximately 50 to 60 percent by weight of the current season's growth. In succeeding years management becomes more flexible with alternatives but still recognizing growth characteristics and requirements.

The forage produced by creeping bluestem is invaluable to a ranching operation. Roughage is provided for brood cows when supplemented with protein. This is usually during a 3- to 4-month period between late fall or winter

Table 1. Immediate response (lb/acre, air dry) of creeping bluestem before and after palmetto control and one full growing season deferment from grazing (From random plots by Soil Conservation Service).

Grasses	Before treatment (Dec. 1964)	After treatment (Nov. 1965)
Creeping bluestem (Andropogon stolonifer)	136	3,620
Brazil satintail (Imperata brasiliensis)	19	192
Pineland threeawn (Aristida stricta)	27	114
Low panicums (Panicum spp.)	47	114
Broomsedge (Andropogon virginicus)	29	112
Lopsided indiangrass (Sorghastrum secundum	e) 5	66
Saltmarsh chloris (Chloris glauca)	1	



FIG. 8. Growth characteristics of creeping bluestem and management following brush control on flatwood sites in south and central Florida.

calving and the first grazing of improved pastures in the early spring. A 6-week spring grazing season during which only 800 to 1,000 pounds of forage is produced is normal for ranges and grazeable woodlands in poor and fair condition. Composition is primarily pineland threeawn, low panicums, saw palmetto, and annuals. Good and excellent condition ranges with creeping bluestem as the major grass will extend the grazing season to at least 6 months with production as indicated previously. Greater flexibility for herd management is the result of a longer growing season and increased grass production on high condition ranges.

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