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Common Herbaceous Plants of Southern Forest Range

Harold E. Grelen and Ralph H. Hughes

ACKNOWLEDGEMENT

As this handbook is essentially a revision of the Forest Service Research Paper SO-23, "Common plants of longleaf pine-bluestem ranges," (Grelen and Duvall 1966) and much of that information is repeated here, the authors are indebted to Vinson L. Duvall, U.S. Forest Service, retired, and to all those who helped with the previous book. About a dozen Federal and State biologists and ecologists from selected areas of the South assisted in expanding the list of plants to be included in this book.

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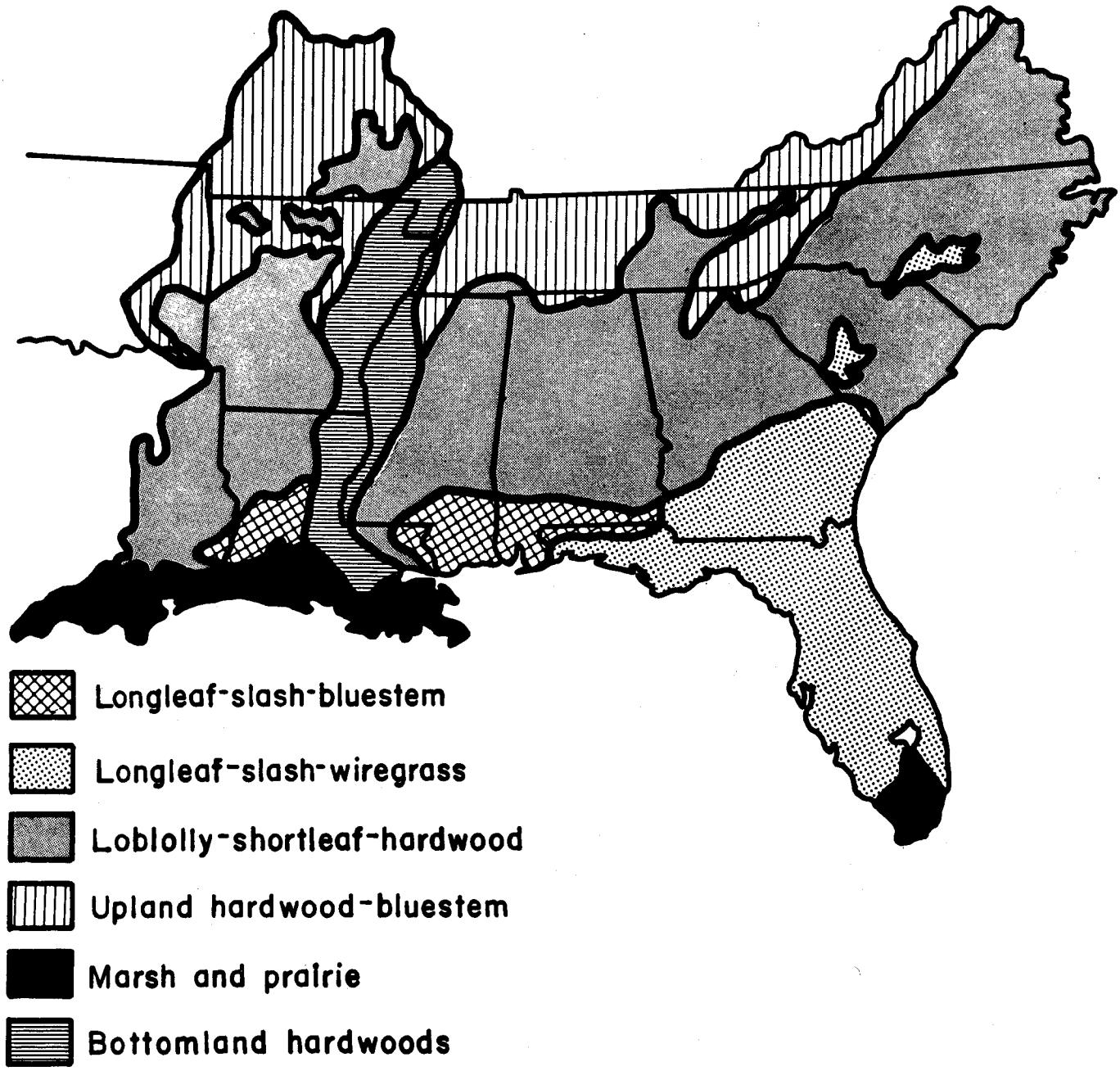

Range Types of the South.

Common Herbaceous Plants of Southern Forest Range

Harold E. Grelen and Ralph H. Hughes

INTRODUCTION

This handbook describes and illustrates selected grasses, grasslike plants, and forbs found on pine or pine-hardwood sites from east Texas to Virginia. Some, like little bluestem, *Schizachyrium scoparium*, are valuable forage plants Southwide. Others, such as Nuttall wildindigo, *Baptisia nuttalliana*, are worthless weeds.

An earlier publication, "Common Plants of Longleaf Pine-Bluestem Range," (Grelen and Duvall 1966), dealt with plants common to the longleaf-slash pine-bluestem range type from east Texas to south Alabama and the northern part of the Florida panhandle. In addition to the herbaceous plants from the previous publication, this book includes plants from the longleaf-slash pine-wiregrass type of Florida, south Georgia, and the Carolinas and the southwide loblolly-shortleaf pine-hardwood type (see map). Many plants are found in all three types. Range types coincide with timber types (USDA 1969) except that the longleaf-slash pine forest type is divided into the longleaf-slash pine-bluestem and the longleaf-slash pine-wiregrass range types. Resources of the range types included in this publication, as well as others indicated on the type maps, are discussed in "Range Resources of the South" (Southern Section SRM 1974). Woody plants were omitted from this revision because there are now several books illustrating and describing southern trees, shrubs, and woody vines, including the wildlife food values of such plants (Dean 1968, Halls 1977, Halls and Ripley 1961, Oefinger and Halls 1974).

Plants are described in general terms with clues for identification and separation from a closely related plant or one with similar appearance, where appropriate. Forage value for livestock and wildlife, a technical description, and geographic range are also given.

Plant nomenclature generally follows that of the "National List of Scientific Plant Names" (USDA 1982). Common names were gleaned from checklists or other publications (Wolff 1954; Gould 1969; Hilmon 1964; Leithead, Yarlett, and Shiflet 1971). "Standardized Plant Names" (Kelsey and Dayton 1942) was also consulted, and at least one name was coined by the authors.

Scientific names following the title of each plant description are those indicated as preferred in the "National List of Scientific Plant Names." Names in parenthesis following the preferred name may be more familiar and most are valid synonyms. Preferred scientific names elsewhere in the text may be followed by a synonym in parenthesis.

Metric measurements are used in the technical section of each species description and in the illustrations. In the general section, intended for the nonbotanist, English measurements are used. The habit silhouettes show both metric and English scales.

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GRASSES

The native grasses of the South vary widely in size, habit, environmental adaptability, and usefulness. Except for the woody bamboos, all species are annual or perennial herbs. Height varies from a few inches to 25 feet. Bunch grasses predominate, but many grasses creep by rhizomes or stolons. Despite these variations, many vegetative characters are relatively constant for all grasses. Stems are typically hollow, though occasionally solid, with prominent joints or nodes. Leaves, arising alternately from the nodes in two ranks, are elongate; although some are not much more than 1 inch long, width is never more than one-third the length. Leaf margins and veins are approximately parallel. The part of the leaf that clasps the stem is the **sheath**, and in most grasses the edges are not fused and the sheath is said to be open. The upper or free portion of the leaf is called the **blade**. The juncture of the sheath and blade on the outer surface is termed the **collar**. Many grasses have a **ligule** (a membranous scale or fringe of hairs) at this juncture on the inner surface. Although these features are usually enough to distinguish grasses from other plants, it is sometimes difficult to differentiate between plants of the grass family, Gramineae, and the closely related sedge and rush families, Cyperaceae and Juncaceae.

Hitchcock (1950) numbered the grasses in the United States, excluding Alaska and Hawaii, at 185 genera and 1,518 species. Fernald (1950) indicated 110 genera with 487 species for the central and northeastern regions of the U.S. Louisiana has 99 genera and 328 species (Allen 1980). Ward (1968) lists 101 genera and 423 species for Florida. Thus, approximately half of the grass genera found in the nation are represented in the South.

Bluestems—*Andropogon* spp., *Schizachyrium* spp., and *Bothriochloa* spp.

The bluestems, known also as "beardgrasses" or "sagegrasses," are the most valuable native forage grasses in the South. They usually furnish more than half the forage for range cattle. All bluestems were included in the single genus *Andropogon* by Hitchcock (1950), although he divided his generic key into sections corresponding to genera of earlier authors. Gould (1967) revised the genus *Andropogon*, recognizing as genera the subgenera *Schizachyrium* and *Bothriochloa* as well as *Andropogon*. Several recent taxonomic manuals (Correll and Johnston 1970, Godfrey and Wooten 1979, Allen 1980) and the "National List of Scientific Plant Names" (USDA 1982) have adopted Gould's revision.

No species of *Bothriochloa* was considered common enough in the South to be included in this book. Silver bluestem, *Bothriochloa saccharoides* (Swartz) Rydb., is found occasionally in Louisiana and as far east as Alabama.

Southern bluestems are mainly bunch grasses. Heights range from about 1 foot in fineleaf bluestem to more than 6 feet in big bluestem. Little bluestem and slender bluestem are the main forage species on most longleaf pine-bluestem sites, and creeping bluestem is important on longleaf pine-wiregrass sites of Florida and Georgia. Bushy bluestem often forms extensive stands on soils too wet for upland species.

Most species do not flower until late summer or fall; hence, identification during much of the year must be from vegetative characters. Culms are solid, while those of most grasses are hollow. Tufts generally spread by tillering, but a few species, e.g., pinehill bluestem and big bluestem, may be rhizomatous.

Inflorescences consist of several to many hairy racemes (spikelike panicle branches); these often protrude from a spathelike sheath at maturity. Fertile spikelets usually terminate in a twisted or bent awn. Old seed stalks, which commonly persist well into the growing season, may aid identification.

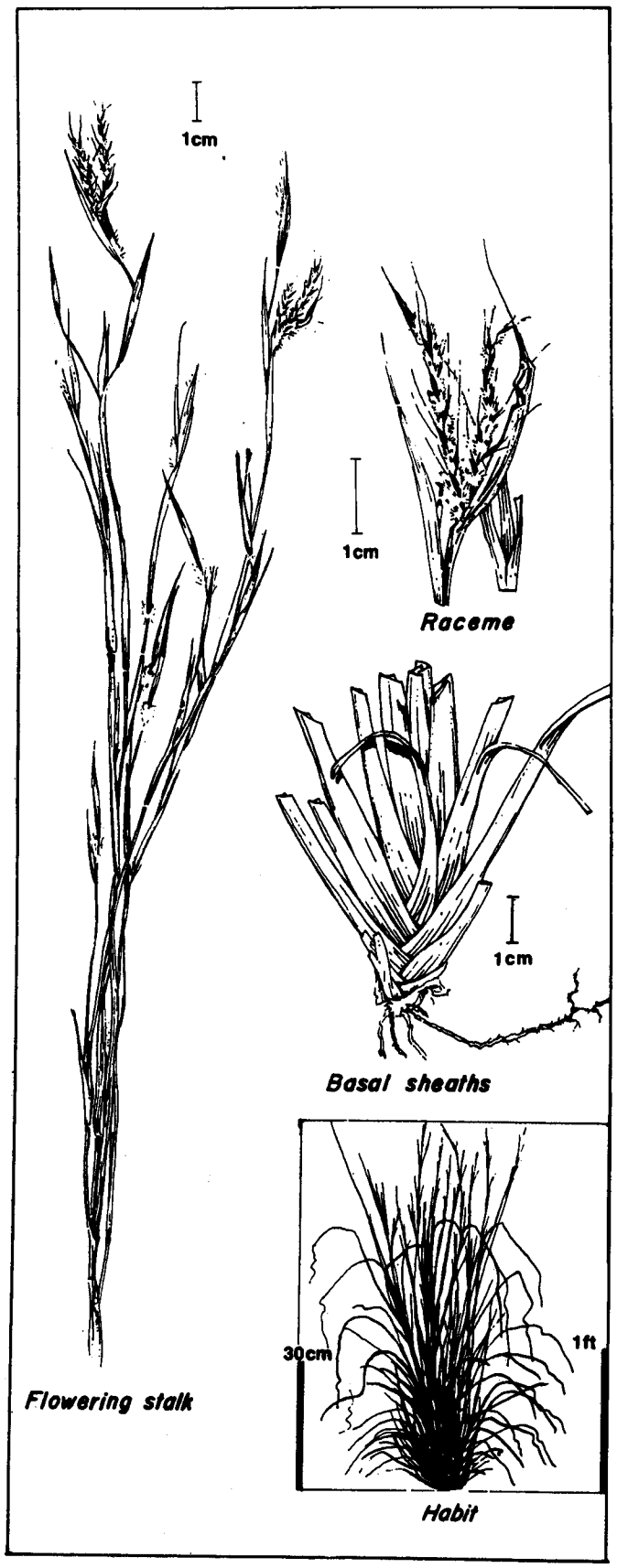
Chalky Bluestem—*Andropogon capillipes* Nash—(*A. virginicus* var. *glaucus* Hack.)

Chalky bluestem is one of the most palatable grasses available to cattle on flatwoods sites in central and south Florida. It grows in small clumps with seed stalks to 3 feet tall. Leaves and seed stalks are conspicuously glaucous (chalky), providing the plant its main distinguishing feature. Its inflorescence is almost identical to that of broomsedge bluestem. Chalky broomsedge, *Andropogon virginicus* var. *glaucopsis* (Ell.) Hitchc., grows throughout the range of chalky bluestem and westward to Louisiana, and both chalky grasses grow best on wetter sites than those usually associated with broomsedge. All three have flattened lower sheaths and nearly identical inflorescences. Taxonomic relationships between these closely related grasses, as indicated in various taxonomic manuals, are not consistent. Radford and others (1968) includes *A. capillipes* with *A. virginicus.* Godfrey and Wooten (1979) list chalky broomsedge as *A. glaucopsis* (Ell.) Nash, indicating in a key that it has a tufted ring of white hairs below each spathe of the inflorescence, which is absent in *A. capillipes.* Fernald (1950) lists chalky bluestem as *A. virginicus* var. *glaucus* Hack.

Flower stalks do not appear until September or October. Stalks and foliage provide excellent roughage for winter grazing.

Range: Florida to southern North Carolina.

Perennial. **Culms** slender, tufted, erect, to 1 m tall, glaucous, glabrous; **sheaths** crowded at base, keeled; **blades** to 60 cm long, 2 – 4 mm wide; **ligule** a ciliate membrane about 0.5 mm long; **inflorescence** narrow but loose; **spathes** purplish, glabrous, dilated, 2.0 – 3.5 cm long; **racemes** two, 1.0 – 2.5 cm long; **sessile spikelet** about 3 mm long, almost equaling pedicel of sterile spikelet, pedicel and rachis copiously long-villous; **awn** of sessile spikelet about 1 cm long.



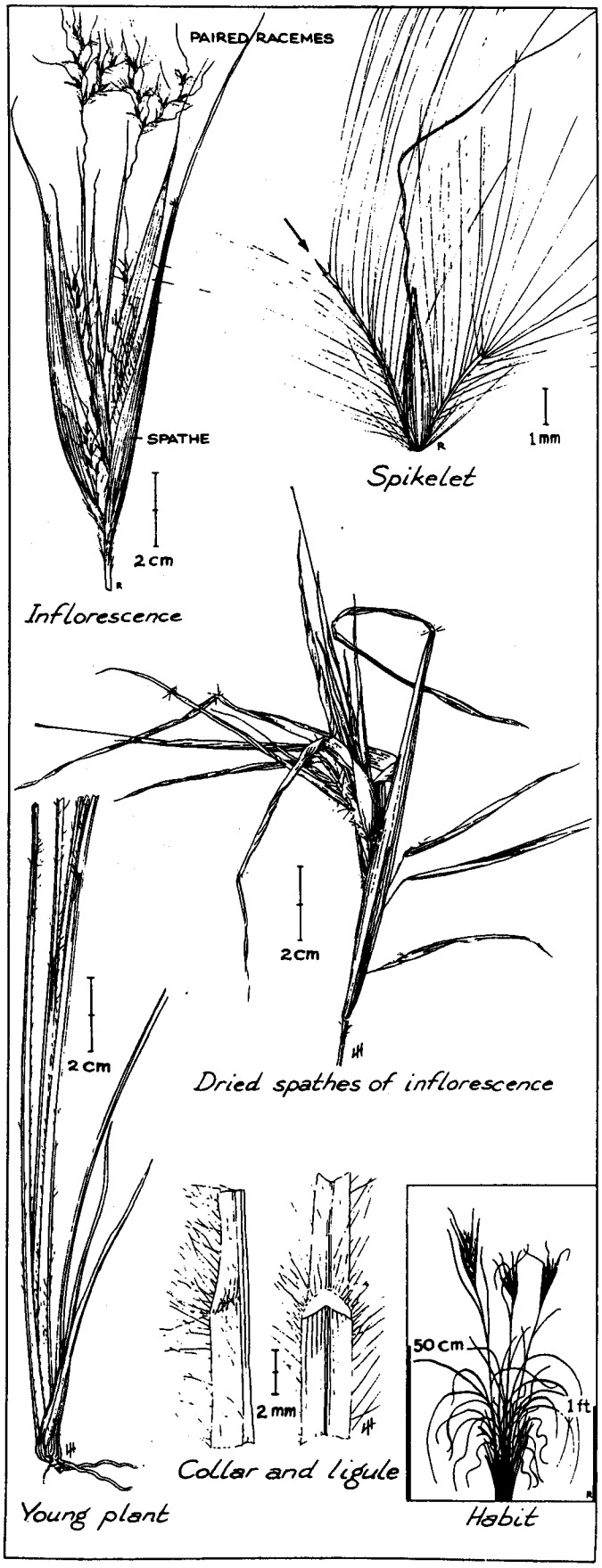
Elliott Bluestem—*Andropogon elliottii* Chapm.

Elliott bluestem, although among the least abundant southern bluestems, is one of the most conspicuous. Toward maturity the large, inflated spathes that sheathe the inflorescence give the plants a top-heavy appearance. Inner surfaces of these spathes are copper colored, smooth, and shining. On old fields and overgrazed range, Elliott bluestem may form almost pure stands, but generally is widely scattered among other grasses. While it tolerates a wide range of sites, it is most common on dry sandy soils. Typical plants are 2 to 3 feet tall with leaves about 12 inches long and ⅛ inch wide. The crowded spathes, with paired silky racemes either exserted or partially enclosed, are reliable identification features. Dead stalks, with spathes attached, often persist through the winter.

The only grass easily confused with Elliott bluestem is fineleaf bluestem. Typical fineleaf bluestem is not more than 2 feet tall with leaves less than ⅛ inch wide. Although fineleaf bluestem is often found on poorly drained soils, the two species intergrade and are often found on the same site. Intergrades not fitting the characteristics of typical Elliott bluestem are usually considered to be fineleaf. Allen (1980), however, includes *Andropogon subtenuis* as a synonym under *A. elliottii.* Although both are common, neither contributes much forage to the diet of grazing animals.

Range: Coastal Plain, Texas to New Jersey.

Perennial. **Culms** 30 – 80 cm tall, in tufts, erect, simple at first, later branching toward the summit; **sheaths** shorter than the internodes, keeled, narrow, glabrous to loosely pilose; **ligule** short, a rounded membrane less than 1 mm long; **blades** to 50 cm long, flat, keeled, 1 – 7 mm wide, glabrous to pilose, drooping and curling on drying; **racemes** 3 – 5 cm long, paired, or rarely in threes or fours, the early ones long-exserted on flexuous peduncles from slender, inconspicuous spathes, the late ones in dense clusters on short peduncles within broad, green, purplish, or coppery spathes; **sessile spikelet** 4 – 5 mm long, the awn loosely twisted, 10 – 25 mm long; **pedicellate spikelet** rudimentary, the slender rachis joints and pedicels long white-villous.



Big Bluestem—*Andropogon gerardii* Vitm.

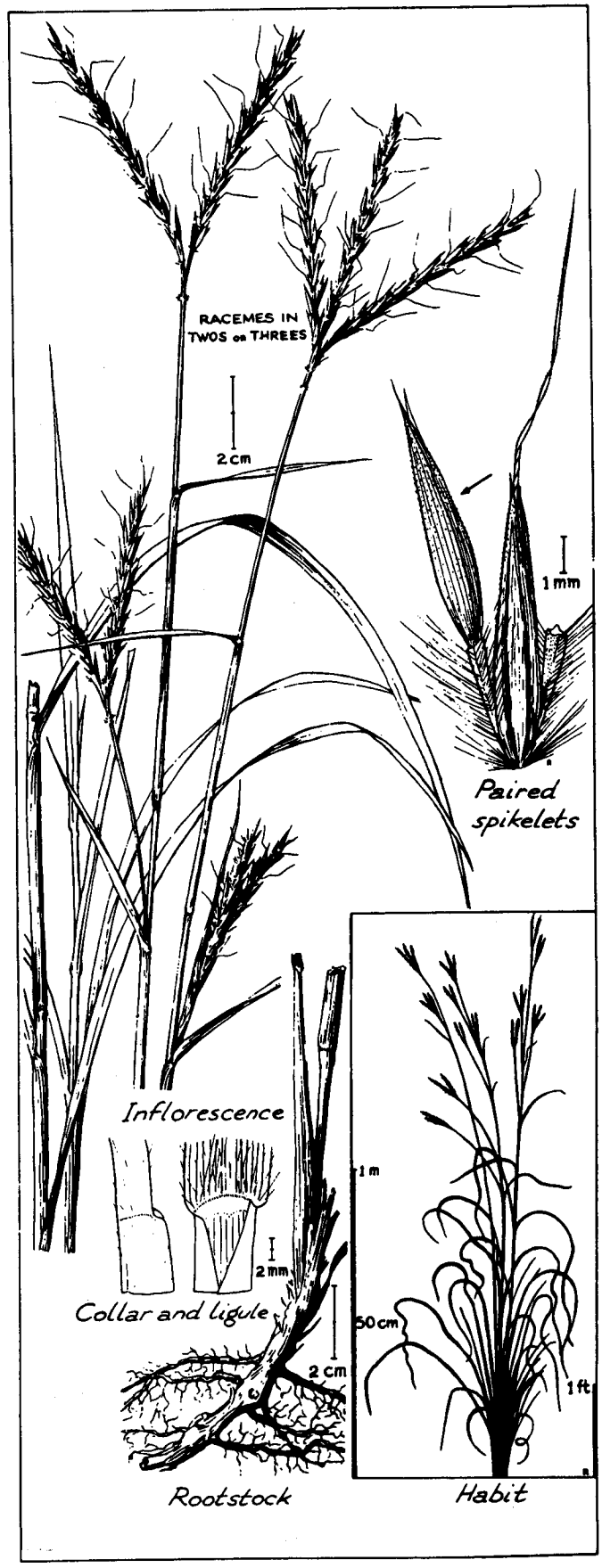
Big bluestem is the largest native bluestem in the United States, often reaching 6 feet or more in height. Although plants spread by short rhizomes, bases are often densely tufted, as in the true bunch grasses. The broad, mostly basal leaves vary from very sparsely to densely hairy. Basal shoots are usually flattened. Thick, purplish racemes are 2 to 4 inches long and generally in twos or threes. They diverge toward the tips forming a bird-foot-like inflorescence that distinguishes big bluestem from all other southern grasses, and gives it another widely known name, "turkey-foot." Identification may be difficult during much of the growing season, however, for flowers rarely appear before late summer. Because palatability is high, cattle often graze the plants closely, delaying or preventing seedstalk development.

Without seed heads, big bluestem resembles Florida paspalum, but the two can usually be distinguished by vegetative characters. In big bluestem, leaf blades narrow slightly near the collar, widening gradually toward the midsection; the lower one-third to one-half of the blade width in Florida paspalum is relatively constant. The inner surface of the big bluestem sheath is brownish to bronze, corresponding in color to the ligule, while that of Florida paspalum is green.

Because of its high yield and palatability, big bluestem is one of the four most important native forage grasses of the North American tallgrass prairie region. Others are little bluestem, indiangrass, and switchgrass (Gould 1975). On southern forest range, however, it is generally too scarce on most sites to contribute much forage. Because it is usually overgrazed when range stocking is based on the proper use of other bluestems, its presence on grazed range indicates lighter than average use.

Range: All of United States east of Idaho and Nevada.

Perennial. **Culms** stout, solid, 1 – 2 m tall, sparingly branched toward the summit; **sheaths** glabrous or villous, wider than the blade, green or purplish, sometimes glaucous; **ligule** membranous, 1 – 4 mm long, with or without a fringed margin; **blades** flat, elongate, 20 – 60 cm long, 4 – 12 mm wide, with scabrous margins and pale midveins wide and prominent near the ligules, tuft of hairs up to 1 cm long behind ligule or only short scattered hairs; **racemes** mainly in twos and threes, but up to six or more on long-exserted terminal peduncles, 5 – 12 cm long, green, yellowish or purplish, often glaucous; **sessile spikelet** perfect, 7 – 10 mm long, usually scabrous, the 1 – 2 cm long awn tightly twisted and bent; **pedicellate spikelet** not reduced, staminate, awnless.



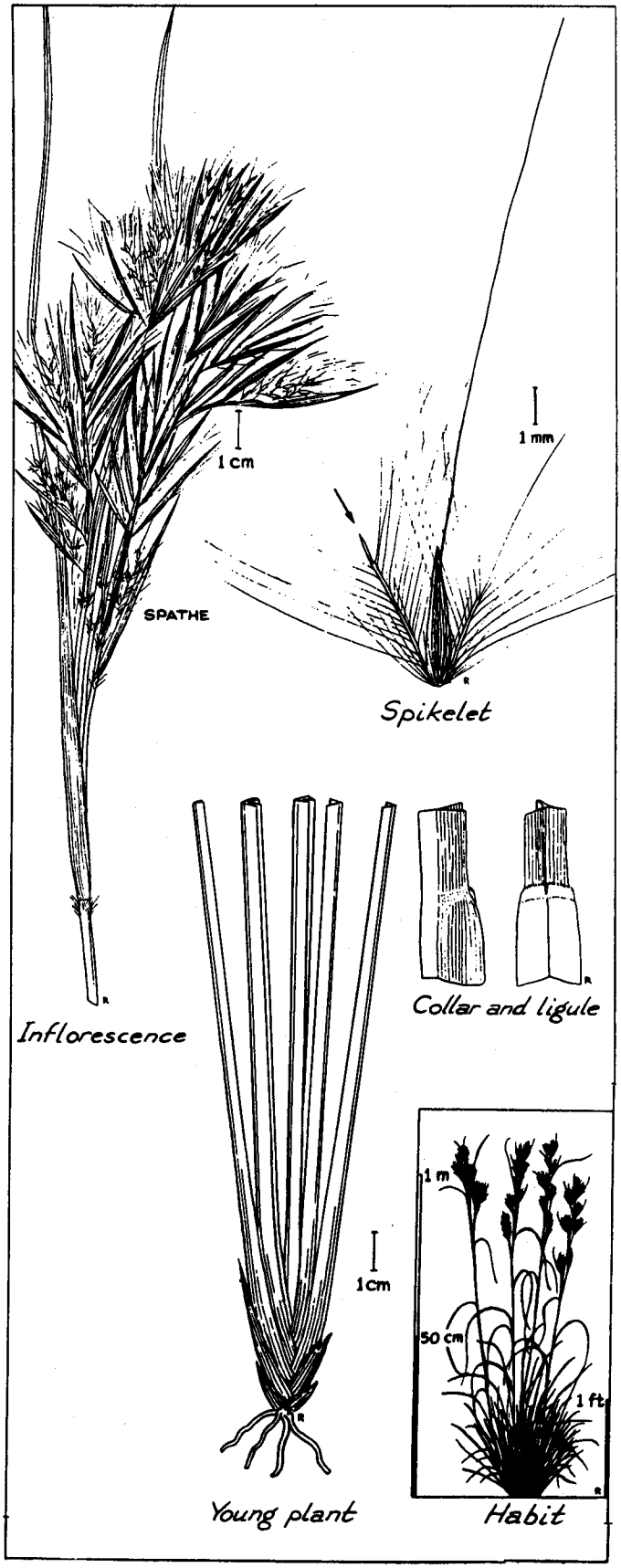
Bushy Bluestem—*Andropogon glomeratus* (Walt.) BSP.—(*Andropogon virginicus* var. *abbreviatus* (Hack.) Fern. & Grisc.)

Bushy bluestem, a stout bunch grass 2 to 5 feet tall, occurs on low wet sites, ditchbanks, pond margins, marshes, and swamps. The inflorescence is a large, dense bundle of silky racemes with leafy spathes interspersed. Density of the seed head is due to its drastically shortened branches and internodes. Each of the many branches bears two racemes, the pair subtended by a spathe. Mature racemes are free from the spathes and equal to them in length. Individual spikelets are almost identical to those of broomsedge, and a recent plant manual included bushy bluestem under broomsedge (Radford and others 1968). Others have accepted the varietal name under broomsedge (Fernald 1950, Godfrey and Wooten 1979). The two grasses are distinct and consistent in appearance and probably deserve recognition as separate species.

Bushy bluestem is not considered a valuable forage plant on pine ranges as it occurs on sites not generally grazed.

Range: Southern California and Nevada, extending east to Florida, Kentucky, and Massachusetts.

Perennial. **Culms** erect, stout, to 8 mm thick, 50 – 150 cm tall, compressed, bushy-branching above; **sheaths** longer than the internodes, flattened, rough, often pubescent in the throat, ciliate on the margins; **ligule** membranous, about 1 mm long, with a truncate, fimbriate margin; **inflorescence** dense, composed of a mass of slightly dilated spathes; **racemes** paired, 1 – 3 cm long from spathes of about the same length; **sessile spikelet** 3 – 4 mm long, the awn straight, 1.0 – 1.5 cm long; **pedicellate spikelet** reduced to a single subulate glume or absent, its pedicel and the rachis joint silky-villous and about the same length as the sessile spikelet.



Hairy Bluestem—*Andropogon longiberbis* Hack.

Hairy bluestem is closely related to broomsedge bluestem, but is generally more hairy, especially the seed heads. Lower leaf sheaths and blades are often woolly with silvery hairs and are not strongly flattened like those of broomsedge.

It is most important in south Florida, where it is abundant on flat, sandy-slough sites, which are covered with shallow slow-moving water during the wet summer season. These sites are usually grazed heavily during late winter and early spring following a burn. Leaves and emerging flower stalks are eaten by cattle from February through June.

A similar grass, *Andropogon tracyi* Nash, grows within the range of hairy bluestem and also extends along the Gulf Coastal Plain to Louisiana. Foliage is generally less hairy than that of *A. longiberbis,* and the stalk (peduncle) supporting each pair of racemes is from ½ to 1¼ inch long; peduncles of *A. longiberbis* are less than ½ inch long.

Range: Georgia and Florida.

Perennial. **Culms** to 1 m tall, glabrous; lower **sheaths** gray-villous, upper glabrous; **blades** 2 – 5 mm wide, elongate, lower blades densely grayish-villous ventrally, greenish and sparsely villous dorsally; **racemes** two to four, 2 – 3 cm long, densely villous; **peduncle** less than 1 cm; **spathe** 3 – 5 cm long, enclosing peduncle and bases of racemes, light brown at maturity; **sessile spikelet** 3 mm long; **awn** straight, about 1 cm long.

Fineleaf Bluestem—*Andropogon subtenuis* Nash

Fineleaf bluestem is among the smallest southern bluestems. It is fairly common and widely distributed, but its small size and narrow leaves make it relatively inconspicuous. It occupies a variety of sites, but grows best on well-drained ridges, mounds, and slopes. On cutover areas it may comprise 25 percent of the grass stand, but generally much less. Like slender bluestem, it tolerates heavier grazing than taller, broad-leaved grasses.

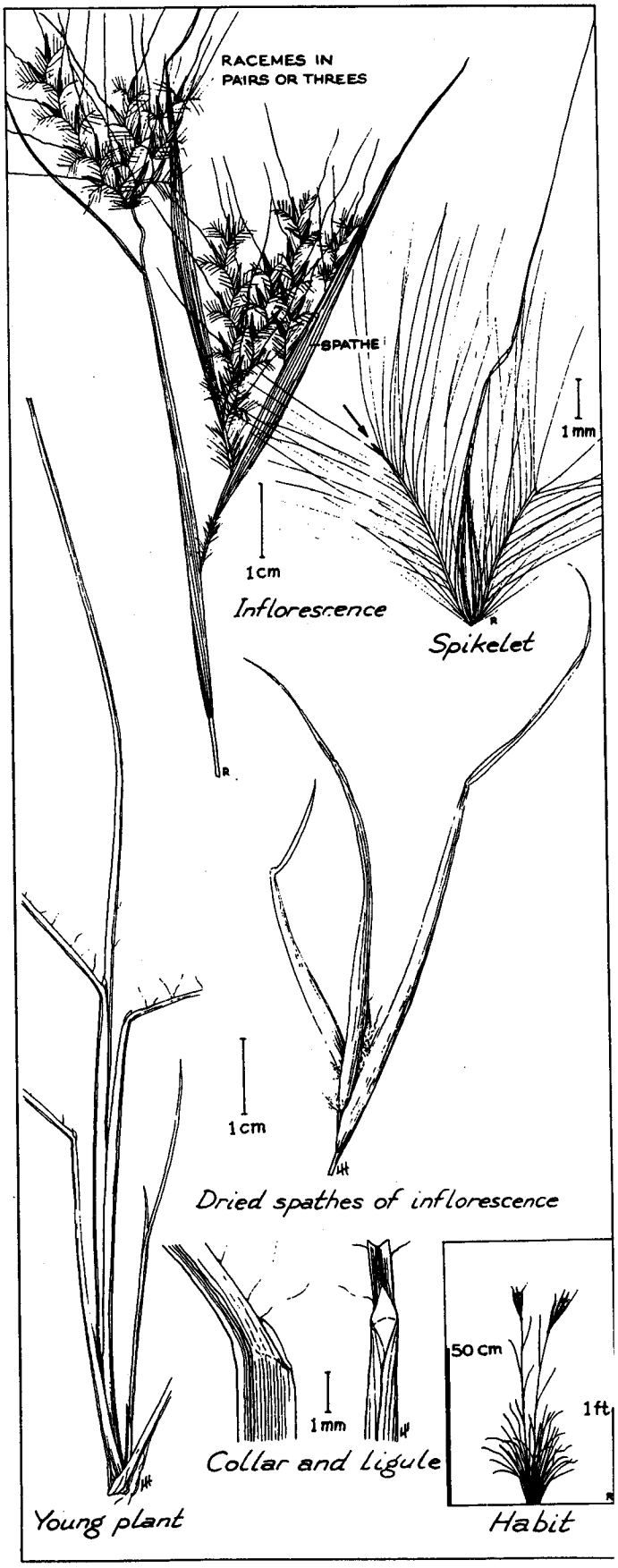
Mature plants are 16 to 28 inches tall and leaves are less than ⅛ inch wide. Lower leaf sheaths are laterally flattened, as in many bluestems. Foliage is similar to that of slender bluestem. Under a hand lens, fineleaf bluestem is distinguishable by its pointed ligule, the ligule of slender bluestem being short and blunt.

Seed heads are borne in slender, slightly inflated spathes, with at least some of the slender, silky racemes protruding. Seed heads may be confused with those of Elliott bluestem, which intergrades with fineleaf bluestem. Spathes of Elliott bluestem are distinctly inflated; they are also longer, more numerous, and more closely crowded.

In forage quality, fineleaf bluestem is similar to slender bluestem, with which it can be easily confused when both grasses are grazed short. Of the two, fineleaf bluestem matures later and is more palatable in summer.

Range: Louisiana to northern Florida.

Perennial. **Culms** erect, in small tufts, very slender, somewhat compressed, 40 – 70 cm tall, sparingly branched above; **sheaths** keeled, wider than the blade, generally glabrous, but occasionally densely long-villous; **ligule** 0.5 – 1.0 mm long, sharply pointed; **blades** 1.5 – 2.0 mm wide, flat or folded, scabrous, generally with long scattered hairs on the margins near the ligule, occasionally densely long-villous; **racemes** two, 2 – 3 cm long, flexuous, from slightly inflated spathes rarely over 7 – 10 cm long; **sessile spikelet** about 4 mm long; **pedicellate spikelet** reduced to a tiny scale on a pedicel much longer than the sessile spikelet.



Paintbrush Bluestem—*Andropogon ternarius* Michx.

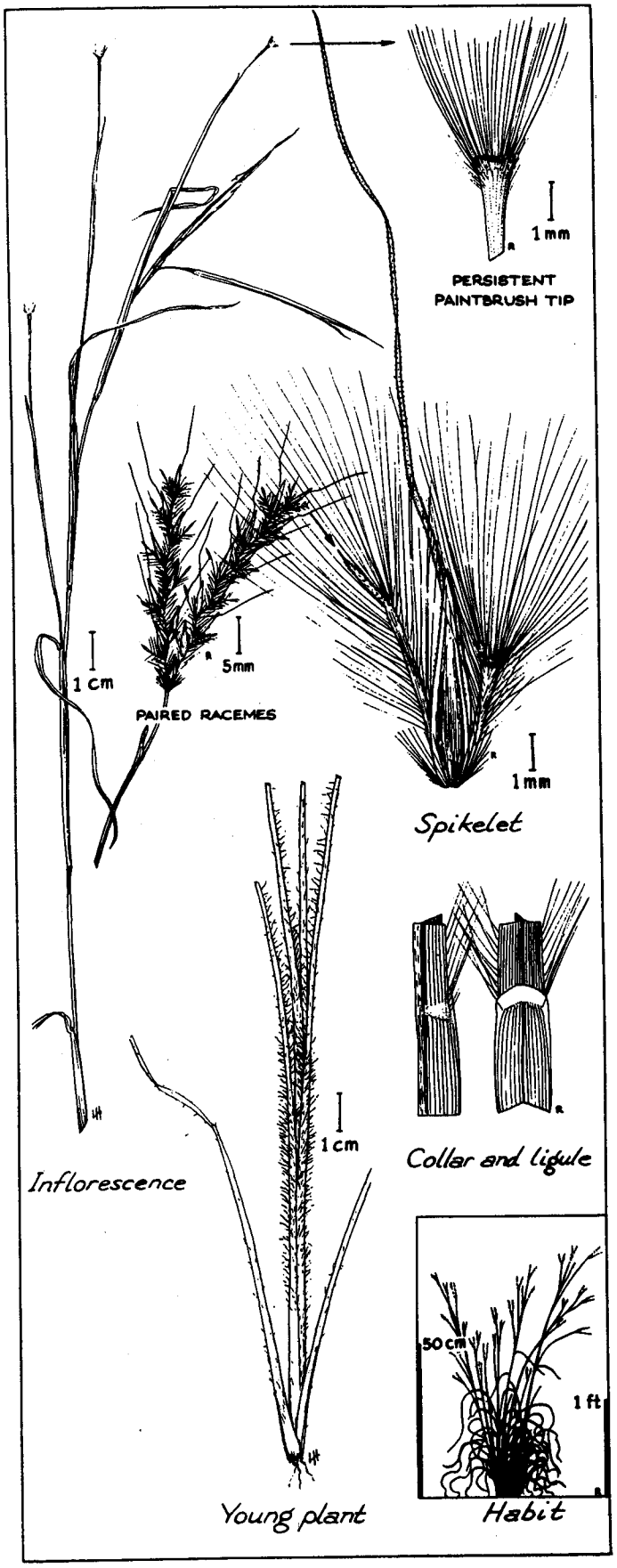
Paintbrush or "splitbeard" bluestem is a common associate of little bluestem, especially on well-drained sandy sites. The two grasses resemble each other until flower heads emerge in early fall. Racemes of paintbrush bluestem are paired. They are silky and much thicker and showier than those of little bluestem, which has only one raceme terminating each inflorescence branch.

Persistent old seedstalks are the best character for distinguishing paintbrush bluestem during winter, spring, and summer. A conspicuous paintbrushlike tuft of hairs remains on the branch tips after racemes shatter, and old-growth basal leaves are curly.

Paintbrush bluestem is similar in forage value to little bluestem. Because it is seldom abundant, however, it contributes little to the cattle diet.

Range: Coastal Plain, Delaware to Texas, extending inland on dry sandy soils to Kentucky and Kansas.

Perennial. **Culms** in tufts, 80 – 120 cm tall, simple below and much branched above; **sheaths** shorter than the internodes, glabrous to densely hirsute near the base; **ligule** about 1 mm long, membranous; **blades** 2 – 4 mm wide, the lower long and curling on drying; **racemes** in pairs, occasionally in threes, 3 – 6 cm long, silvery-silky, with long hairs, more or less exserted on long slender peduncles from slender spathes; **sessile spikelet** 5 – 6 mm long, the twisted and bent awn 1.5 – 2.0 cm long; **pedicellate spikelet** a scabrous scale about 1 mm long on a densely villous pedicel almost as long as the sessile spikelet.



Broomsedge Bluestem—*Andropogon virginicus* L.

Broomsedge bluestem—usually called broomsedge—is a coarse, practically hairless bunchgrass about 3 feet tall. It is one of the most common grasses in the South as its light, windblown seeds invade old fields, roadsides, and overgrazed ranges. The basal leaf sheaths are strongly flattened and colorless or yellow; the rest of the plant is greenish yellow. A glaucous variety, chalky broomsedge, *Andropogon virginicus* var. *glaucopsis* (Ell.) Hitchc., is common on poorly drained sites of the lower Coastal Plain. The two forms may grow on the same site.

Although best known as an old-field invader, broomsedge occurs throughout the piney woods, even on ungrazed ranges. It is most common on sandy sites, but grows on a wide range of soils. On cutover longleaf pine ranges it often inhabits stump holes.

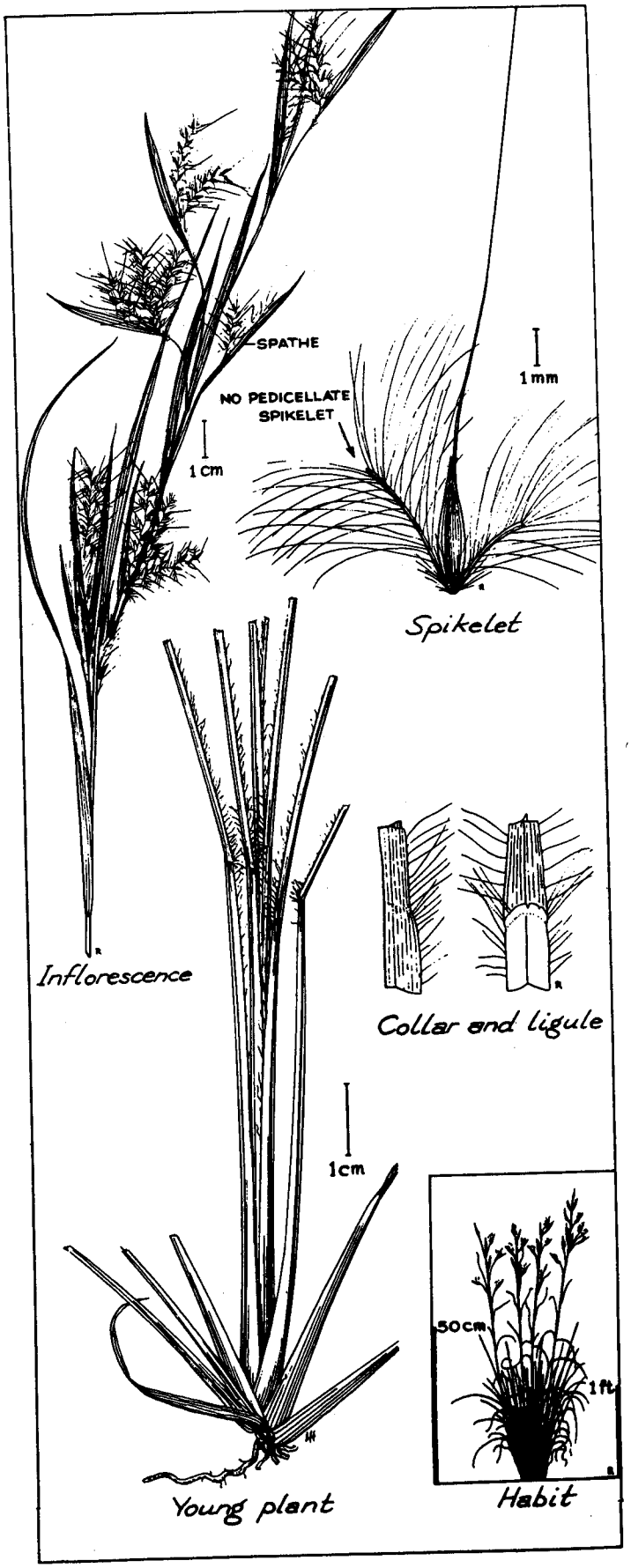
Inflorescence branches are numerous, each bearing two to four slender silky racemes about 1 inch long. A spathe partly encloses each raceme. Broomsedge can be distinguished from its close relatives, Elliott bluestem, fineleaf bluestem, and bushy bluestem, by its extremely flat basal sheaths and yellow-green or blue-gray color.

Except on wet sites and abandoned fields, it is seldom abundant enough to contribute much forage. Where surface drainage is moderately slow, however, the chalky broomsedge variety is valuable as forage, especially in the fall.

Several closely related species occur with broomsedge in the Southeast. Chalky bluestem of the Atlantic Coastal Plain is similar to chalky broomsedge. Hairy bluestem, an early flowering grass of south and central Florida and south Georgia, has grayish, hairy foliage. Inflorescences are similar to those of broomsedge, although three or four racemes may be found on some branches; broomsedge has only two racemes per branch and lower sheaths are usually glabrous, flattened, and yellow to yellow-green in color. Intergradations between the silky-racemed bluestems may be encountered.

Range: Throughout most of the eastern half of the United States; also reported from California.

Perennial. **Culms** erect, 50 – 100 cm tall, often in large tufts, simple at the base, branched above; **sheaths** shorter than the internodes, compressed, hirsute on the margins, otherwise glabrous and shining, conspicuously equitant and flat in mature plants, less so in young ones; **ligule** membranous, short, ciliate; **blades** flat or folded, 2 – 5 mm wide, 15 – 40 cm long, pilose on the upper surface near the base; **racemes** two to four, 2 – 3 cm long, partly included and shorter than the coppery, slightly inflated spathes; **sessile spikelet** glabrous, about 3 mm long with an awn 1 – 2 cm long; **pedicellate spikelet** generally obsolete, the pedicel long-silky-villous.



Little Bluestem—*Schizachyrium scoparium* (Michx.) Nash—(*Andropogon scoparius* Michx.)

Little bluestem occurs across the United States in a complex of ecotypic variations that has been incompletely and inconsistently classified. Generally, the western and northern forms have glabrous foliage, while those found in the South, including pinehill bluestem, *Schizachyrium scoparium* var. *divergens* (Hack.) Gould, have varying degrees of foliage pubescence (McMillan 1964). On cutover or open forest sites in the longleaf - slash pine - bluestem type, little bluestem is usually a major forage plant, often producing over 50 percent of the forage.

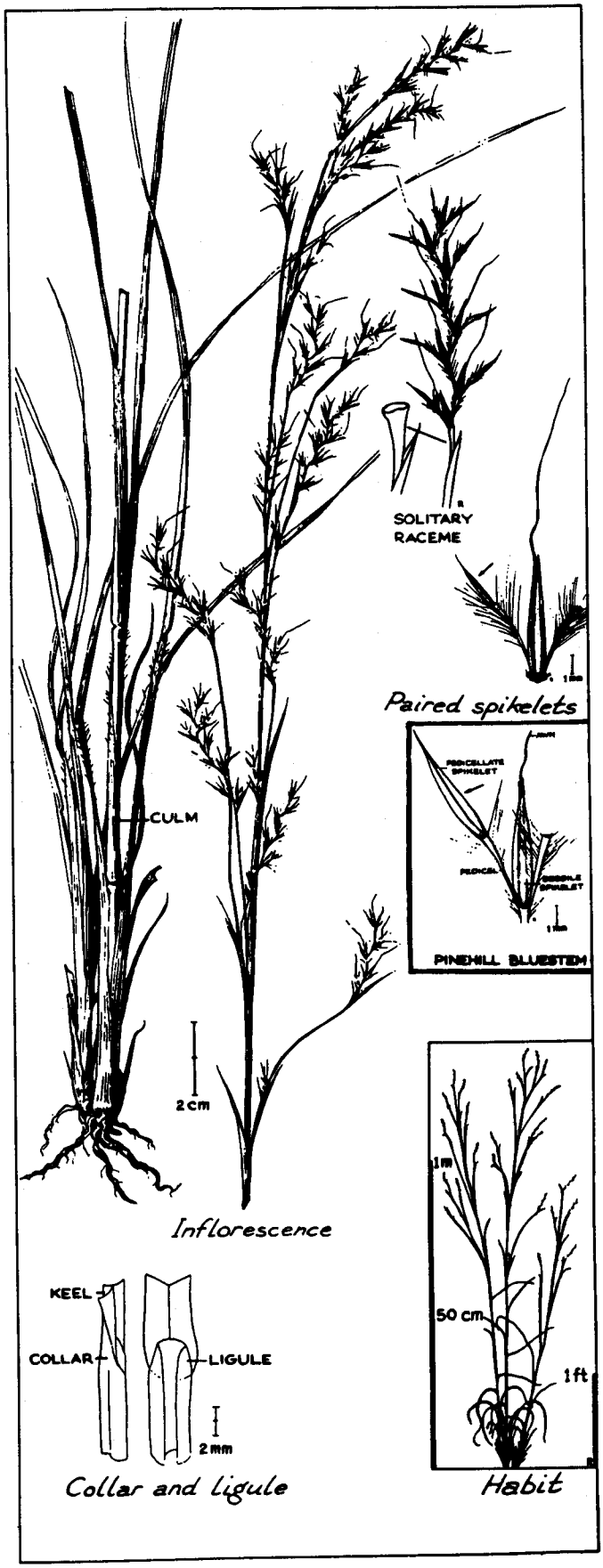
Pinehill bluestem, or eastern little bluestem (Gould 1975), which is the common form of *S. scoparium* in Louisiana and east Texas, differs from typical little bluestem by its unreduced pedicellate spikelet, which may be sterile or staminate. The pedicellate spikelet in little bluestem is a sterile rudiment.

Protein content of new growth is high in spring or following a fire anytime during the growing season. Quality drops rapidly, usually becoming deficient by midsummer. Phosphorus is deficient yearlong. Palatability remains relatively high throughout the growing season; during winter the standing residue provides excellent roughage for cattle being fed a protein supplement.

In Alabama, Georgia, and northern Florida, little bluestem may be confused with creeping bluestem which is rhizomatous. Pinehill bluestem may have short rhizomes, but little bluestem is generally considered a bunch grass.

Range: Found in all but the Pacific Coastal States and Nevada.

Perennial. **Culms** erect, 20 – 150 cm tall, tufted; **rhizomes** occasionally present, short, knotty; **foliage** glabrous to villous, green to glaucous; **sheaths** (lower) laterally compressed and keeled; **blades** 25 – 60 cm long; 3 – 6 mm wide; **racemes** one per inflorescence branch, 3 – 6 cm long; **sessile spikelet** six to eight per raceme, fertile, 6 – 8 mm long; **awn** 8 – 15 mm, paired with **pedicellate spikelet** reduced to sterile rudiment in some varieties, unreduced and sometimes staminate in variety *divergens*.



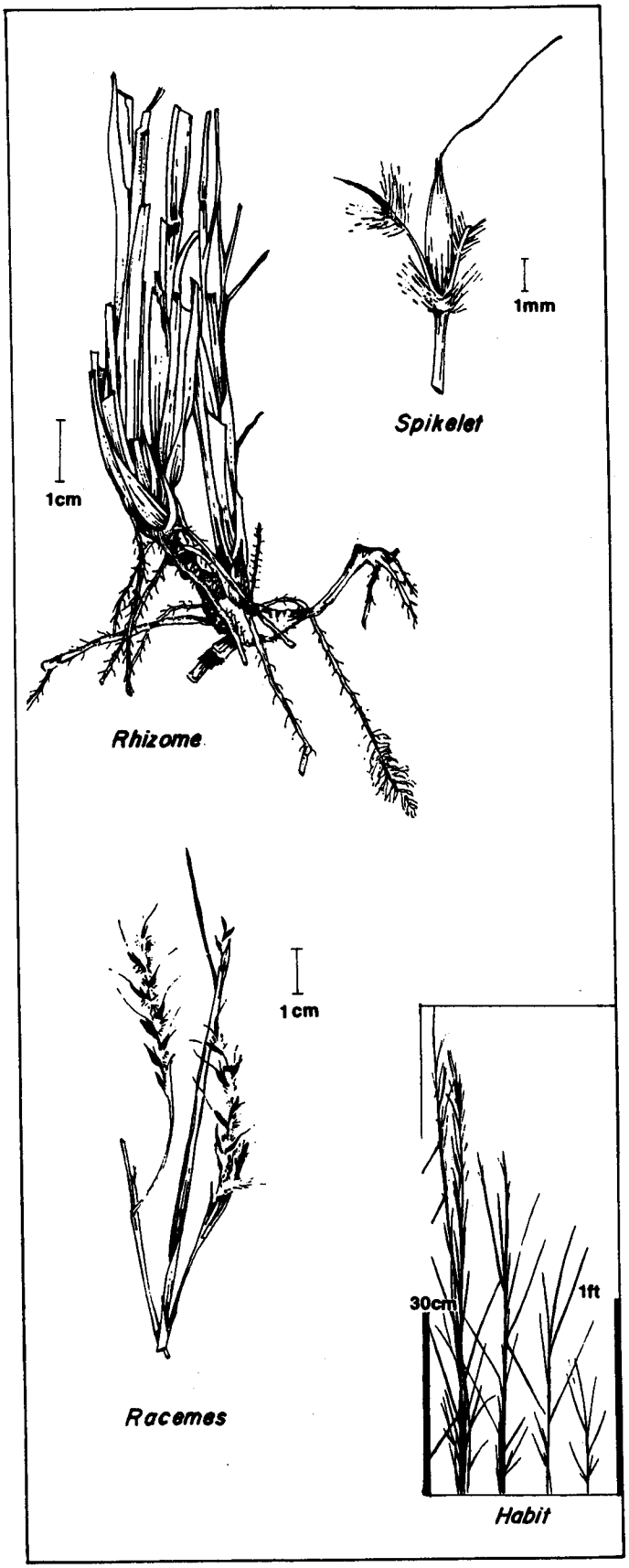
Creeping Bluestem—*Schizachyrium stoloniferum* Nash—*(Andropogon stolonifer* (Nash) Hitchc.)

Creeping bluestem, a close relative of little bluestem, has never been considered a part of the *Schizachyrium scoparium* complex, although the two species reportedly intergrade (Godfrey and Wooten 1979). Its creeping rhizomes separate it from associated forms of little bluestem. Creeping bluestem is one of the major forage grasses of the longleaf-slash pine-wiregrass type, growing in association with pineland threeawn, the common "wiregrass" of the sandy soils of Florida and Georgia. In southern Florida, creeping bluestem may be associated with south Florida bluestem, *S. rhizomatum* (Swallen) Gould. The latter is a smaller grass, usually less than 30 inches tall, with leaf blades ⅛ inch wide or less. South Florida bluestem has shorter rhizomes than creeping bluestem. Inflorescence characteristics of the two grasses are similar, but the axis of the raceme of *S. rhizomatum* is conspicuously curved-zigzag.

Creeping bluestem, like little bluestem, provides excellent forage during spring and early summer. Palatability remains high in winter, and the standing cured forage provides good quality winter roughage for cattle if supplemental nutrients are furnished.

Range: Southern Georgia, Florida, and Alabama.

Perennial. **Culms** to 150 cm tall, solitary or few in a tuft, rhizomatous; **leaves** up to 5 mm wide, elongate; **foliage** glabrous to villous; **racemes** solitary, 3 – 4 cm long; **sessile spikelet** 5 – 7 mm long; **pedicellate spikelet** rudimentary.



Slender Bluestem—*Schizachyrium tenerum* Nees—(*Andropogon tener* (Nees) Kunth)

Slender bluestem is usually the most abundant and important forage plant on cutover longleaf pinelands. As the name suggests, it is fine-stemmed and narrow-leaved; another common name is "wiregrass." The wiry flower stalks are up to 3 feet long but have a sprawling habit, rarely exceeding 1.5 feet in height. In the growing season following a burn, flower stalks grow upright. Slender bluestem grows on a variety of sites, but is most productive on well-drained soils.

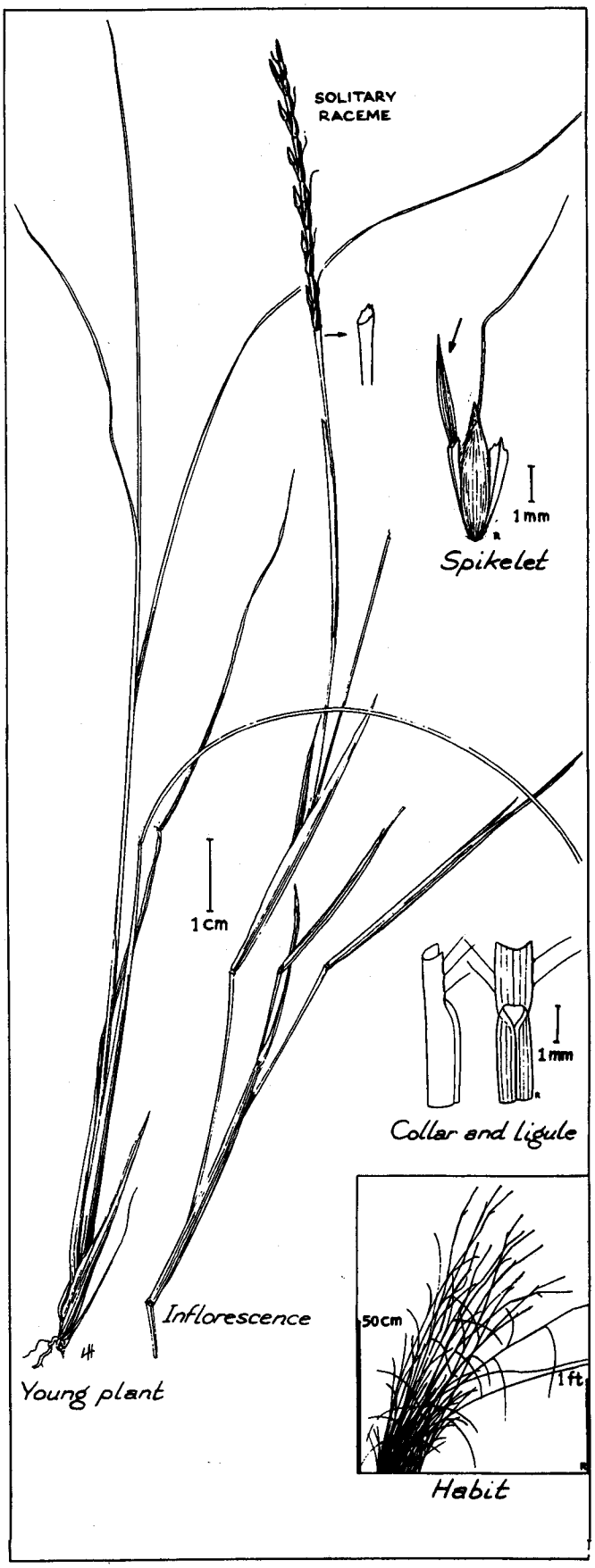
Each flower stalk branch bears a single, slim, practically hairless raceme about 2 inches long. The racemes appear in early summer and shatter soon after maturity. Thereafter, plants can be identified by the slightly enlarged oblique tips of flower stalk branches.

Slender bluestem grows mixed with other grasses. In favorable years on cutover sites its dense mass of reclining seedstalks obscures and may smother other species, creating the appearance of extensive pure stands. As it does not tolerate heavy shade, abundance decreases following reforestation of cutover lands.

On nontimbered sites, this grass is important in the cattle diet. It matures much earlier than most associated grasses and, unless grazed closely, becomes fibrous and unpalatable by midsummer. An accumulation of old growth not only discourages grazing but interferes with growth, thereby reducing herbage production. Where a heavy rough develops, burning may materially improve grazing value.

Range: Texas and Oklahoma to Florida and Georgia.

Perennial. **Culms** 60 – 100 cm long, slender, in tufts, reclining, the upper half sparingly branched; **sheaths** shorter than the internode, broader than the blade, glabrous; **ligule** less than 1 mm long, edge smooth; **blades** about 1 mm wide, flat or loosely involute, glabrous except for sparse, fine hairs at the base; **racemes** solitary, 2 – 6 cm long, glabrous, on long peduncles with slightly flared, obliquely pointed tip; **sessile spikelet** 4 – 5 mm long, the awn 7 – 10 mm long, twisted and bent; **pedicellate spikelet** 4 – 5 mm long, awnless, empty, or sometimes staminate.



Panicum Grasses—*Panicum* spp., *Dichanthelium* spp.

The genus *Panicum*, as outlined in Hitchcock's manual (Hitchcock 1950), consisted of three subgenera, two of which were represented by numerous species throughout the South. Subgenus *Dichanthelium*, the "low" panicums, were those that flowered in spring and again in late summer, with distinct winter, spring, and fall phases; subgenus *Eupanicum*, the "true" panicums, flowered once yearly, whose vegetative appearance did not change appreciably during the growing season. The panicums have been revised in recent years, especially in *Dichanthelium*, which has become the genus for low panicums, and species have been combined to reduce the total number from over 100 to 26 (Gould and Clark 1978). The true panicums of subgenus *Eupanicum* remain in the genus *Panicum*.

Although the revision reduced the number of species, the low panicums remain one of the largest genera of grasses in the South. While they do not produce as much forage as the bluestems, they are often a high-quality component of the diet for deer and cattle in late winter or early spring before other grasses begin new growth. Crude protein of early growth may exceed 15 percent. Mature green leaves contain around 8 percent protein, almost as high as new growth of bluestems. The true panicums, which include switchgrass, beaked panicum, and maidencane, are generally higher in nutrient content than the bluestems.

The panicums included here are those considered important because of wide distribution, general abundance, or unusually high forage value within a range type.

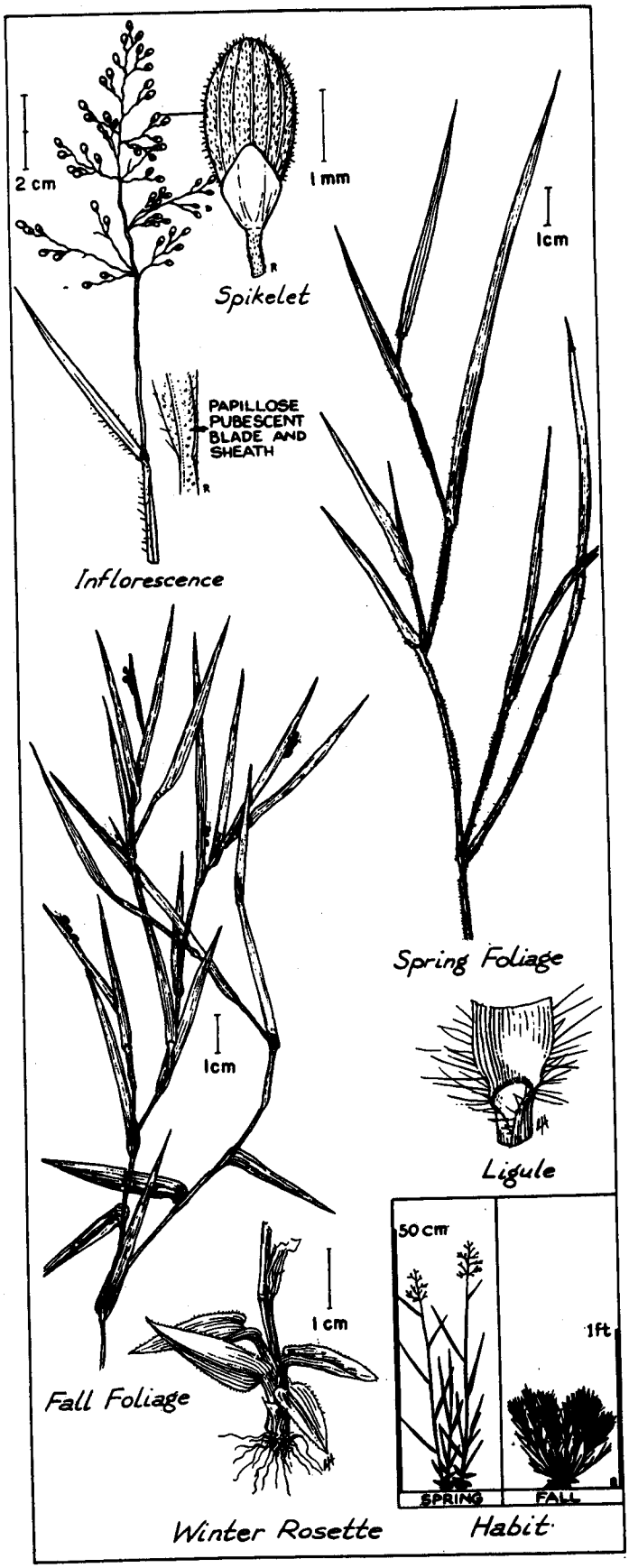
Needleleaf Panicum—*Dichanthelium aciculare* (Desv. ex Poir.) Gould & Clark—(formerly *Panicum aciculare* Desv. ex Poir. and *P. angustifolium* Ell.)

Considered as two separate *Panicum* species before the *Dichanthelium* revision, needleleaf panicum, *P. aciculare,* and narrowleaf panicum, *P. angustifolium,* were combined along with about 20 other names under the name *Dichanthelium aciculare.* The common name associated with *P. aciculare* was retained.

Needleleaf panicum, as now interpreted, is the most common low panicum on sandy longleaf-slash pine sites. Leaves and stems may be 6 inches long and over ¼ inch wide, hairy or hairless, and autumnal leaves may be tightly rolled. Spikelets are 1/16 to ⅛ inch long and minutely hairy or hairless. Because of the numerous former taxa combined under this species and the wide geographical range included, considerable variation must be allowed in all plant characteristics.

Range: Texas to Florida, extending north to Missouri, Indiana, and Massachusetts.

Perennial (spring phase). **Culms** usually stiffly erect, 25 – 75 cm tall, glabrous or moderately pubescent or pilose but the nodes not truly bearded, often branching freely above with age, producing fascicles of reduced leaves and panicles, the leaves narrow, often involute; **sheaths** glabrous, pubescent, or pilose, occasionally with long, papillate hairs; **ligule** usually a fringe of hairs 1 mm or less long; **leaves** firm or stiff, narrowly lanceolate, usually acuminate, glabrous or hairy, 6 – 20 cm long and 2 – 8 mm broad, sometimes becoming tightly involute; **panicles** open or tightly contracted, mostly 4 – 9 cm long; **spikelets** elliptic-ovate to obpyriform or fusiform, glabrous or puberulent, 1.9 – 3.6 mm long; **first glume** about half as long as the spikelet.



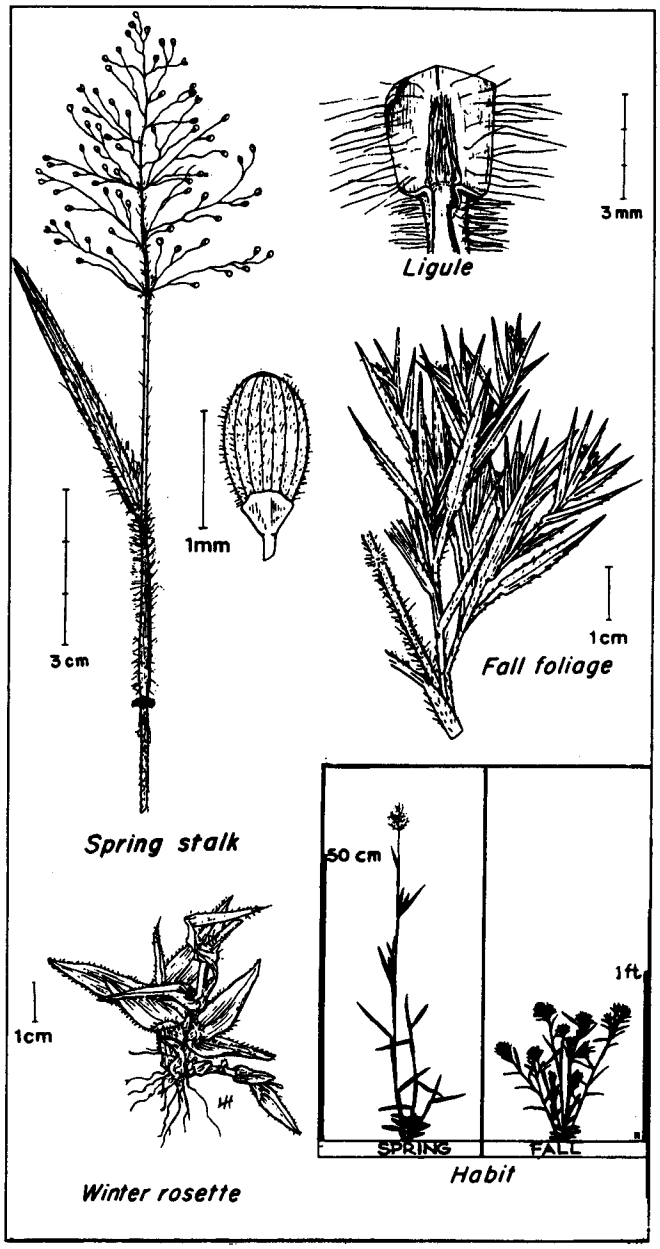
Woolly Panicum—*Dichanthelium acuminatum* (Swartz) Gould & Clark var. *acuminatum*—*(Panicum lanuginosum* Ell.)

Approximately 70 former species or varieties of hairy low panicums were placed in four varieties of *Dichanthelium acuminatum* by Gould and Clark. More than 40 plant names were combined under the variety *acuminatum.* Several varieties of *D. acuminatum*, including Lindheimer panicum, are almost hairless. In this handbook, *D. acuminatum* var. *acuminatum* will represent the "woolly" varieties and var. *lindheimeri* the nearly hairless varieties of *D. acuminatum*.

Woolly panicum grows throughout North America on sandy woodland soils. It is a consistent, although minor, component of the forage in open southern pine forests. Like other low panicums, it exhibits the three seasonal growth forms and provides limited early green forage.

Range: British Columbia and Quebec to California and Florida; Central and South America.

Perennial (spring phase). **Culms** usually in large clumps, 15 – 60 cm tall, usually densely villous below with long, soft hairs, these often minutely papillate; **leaves** variously pubescent to nearly glabrous, 5 – 10 cm long and 5 – 12 mm broad, the hairs soft or coarse, usually long; **sheaths** shorter than the internodes, soft-villous or puberulent on the back, ciliate on the margins; **ligules** well developed with hairs mostly 2 – 4 mm long; **panicles** 5 – 8 cm long, loosely-flowered, commonly pubescent on the main axis and lower branches; **spikelets** pubescent, elliptic-obovate, 1.6 – 2.5 mm long; **first glume** about as broad as long, one-third as long as the spikelet, broadly pointed to somewhat rounded at the apex.



Lindheimer Panicum—*Dichanthelium acuminatum* var. *lindheimeri* (Nash) Gould and Clark—*(Panicum lindheimeri* Nash)

This low panicum is common in dry sandy woods throughout the eastern half of the United States. Spring flower stalks are 1 to 3 feet tall. Leaf blades are ascending, 1 to 4 inches long and 1/5 to 2/5 inch wide. The ligule is a dense ring of hairs 1/5 inch long, easily seen with the naked eye. The panicle is 1½ to 2½ inches long with spikelets less than 1/16 inch in length. The tiny spikelets and the hairy ligule are good distinguishing characteristics for this grass.

Fall foliage consists of stiffly spreading, often prostrate stems made top-heavy by crowded branches of small leaves. Fall leaves average about 1 inch long and 0.1 inch wide.

Range: Texas to Minnesota and eastward; also New Mexico, California, and Oregon.

Perennial (spring phase). **Culms** tufted, stiffly ascending or spreading, 30 – 90 cm tall; **blades** lanceolate 3 – 15 cm long, 3 – 15 mm wide; **sheaths** ciliate on margins; **ligule** a tuft of white hair 4 – 5 mm long; **panicle** 4 – 7 cm long, about as wide; **spikelets** 1 – 2 mm long, puberulent.

Delicate Panicum—*Dichanthelium dichotomum* var. *ensifolium* (Baldw.) Gould & Clark—(*Panicum chamaelonche* Trin.)

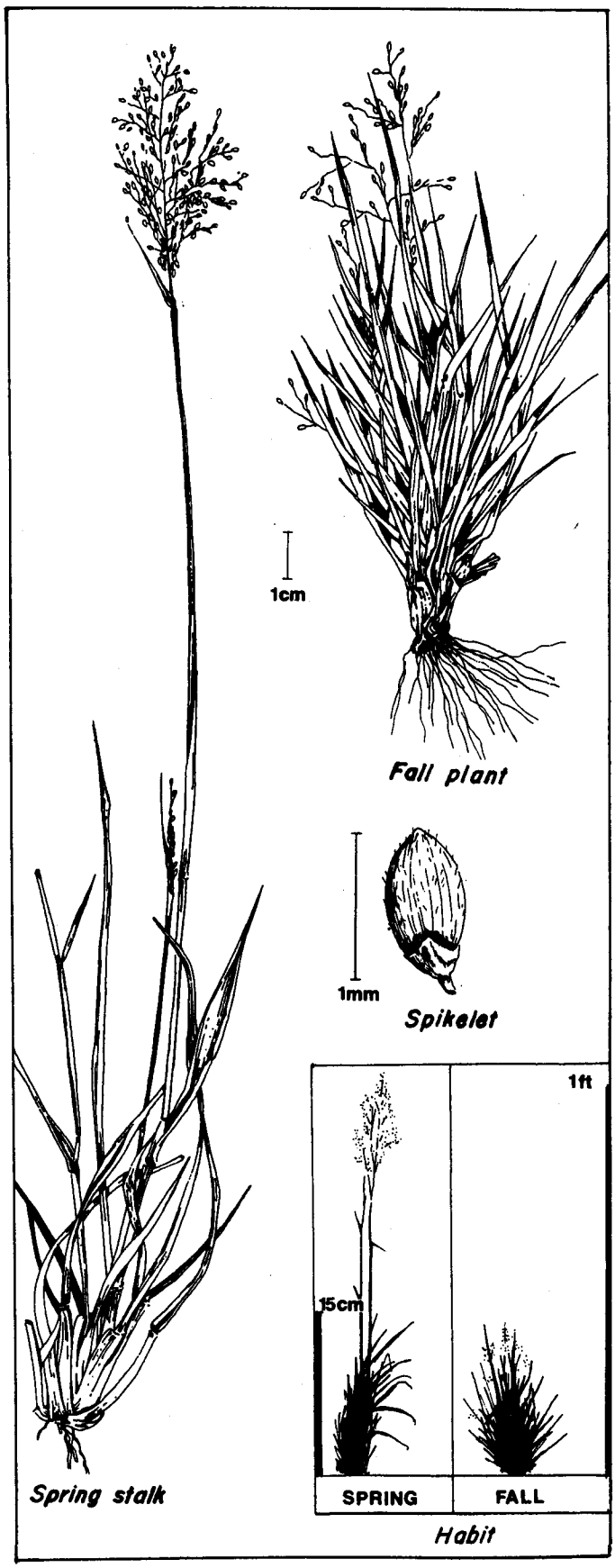
As its common name indicates, this low panicum is a small, slender grass, seldom exceeding 18 inches in height. Spring plants form dense tufts, and freely branching fall growth forms dense cushions; on low sandy sites with little competition, fall clumps may grow to 20 inches in diameter. It is found on wet seeps, marshy areas, and acid bogs, usually in shade.

Foliage of delicate panicum is hairless and makes excellent forage, although it seldom contributes a significant amount to the cattle diet. In south Florida, plants remain partially green during winter. Winter rosettes furnish some green winter forage for deer. Seeds, though tiny, are eaten by quail.

Spring plants have leaf blades ½ to 1½ inches long, and panicles are 1 to 2 inches long. Seeds are among the smallest of the panicums, only slightly more than 1/16 inch long. Numerous similar, closely related panicums were combined under *Dichanthelium dichotomum* in the Gould and Clark (1978) revision. Approximately 50 *Panicum* species or varieties, including *P. glabrifolium* Nash, a similar but larger plant found in south Florida, were assigned among five varieties of *Dichanthelium dichotomum*. *Panicum glabrifolium* is now *D. dichotomum* var. *glabrifolium* (Nash) Gould & Clark.

Range: Texas and Arkansas to Florida and New Jersey.

Perennial (spring phase). **Culms** densely tufted, to 45 cm tall, ascending; **blades** firm, 1.5 – 4.0 cm long, 2 – 3 mm wide; **panicle** 2 – 6 cm long; **spikelets** 1.1 – 1.5 mm long, glabrous.



Wideleaf Panicum—*Dichanthelium latifolium* (L.) Harvill—*(Panicum latifolium* L.)

Wideleaf panicum is a low panicum in rocky or sandy woods of the northern portion of the loblolly-shortleaf pine-bluestem type. Plants may be over 3 feet tall with leaves 7 inches long and 1½ inches wide. Except for scattered hairs on lower stems and sheaths, foliage is hairless, including stem joints. Panicles are up to 6 inches long with spikelets about ⅛ inch long.

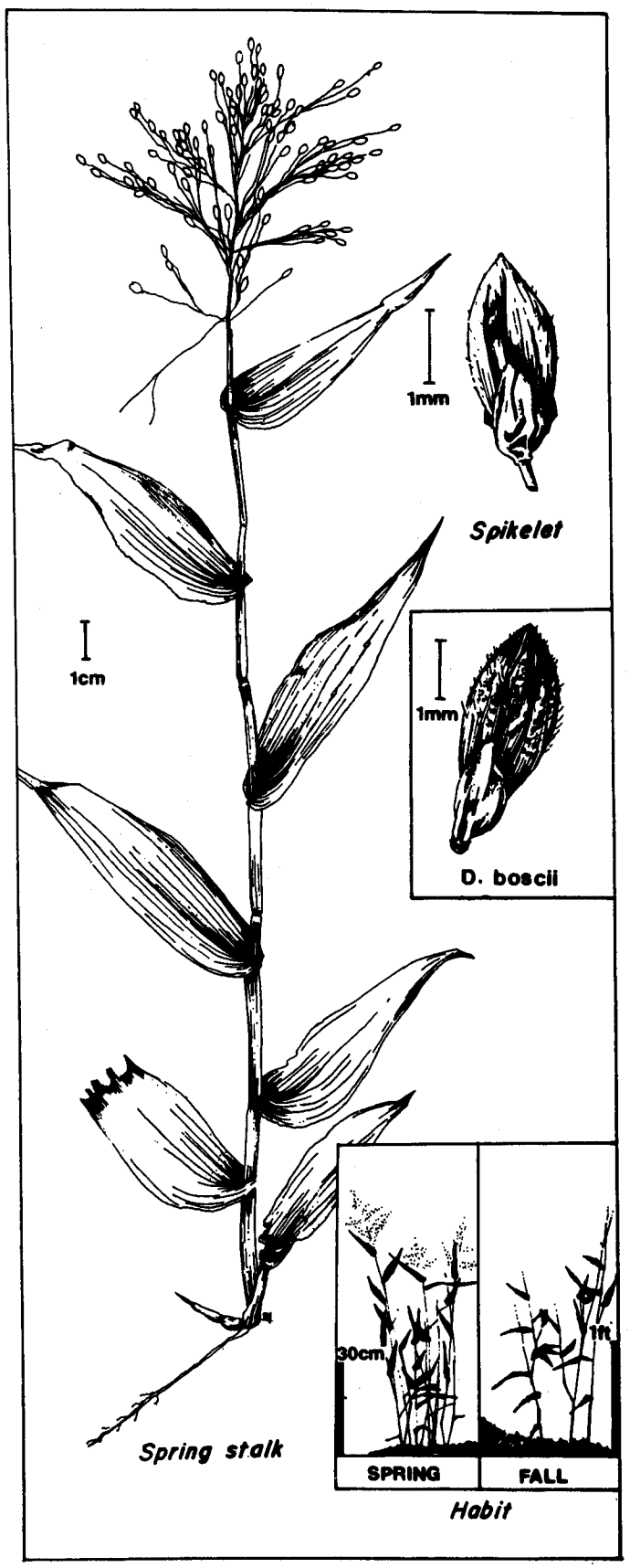
Another broadleaf panicum, *Dichanthelium boscii* (Poir.) Gould, found throughout the southern states, is similar to wideleaf panicum. Stem joints are bearded in *D. boscii,* however, and spikelets are larger. These two grasses have the broadest leaves of all low panicums, and their spikelets are among the largest. Autumn foliage is crowded on top-heavy, branched stems; leaves are about the same size as those produced in spring.

Velvet panicum, *D. scoparium* (Lam.) Gould, is one of the coarsest and tallest of low panicums, reaching a height of 4 to 5 feet on favorable sites such as sandy ditches and swales throughout the South. Leaves are not as wide and spikelets not as large as those of *D. latifolium* and *D. boscii.* Velvet panicum is seldom found on burned or grazed forest range.

A common broadleaf low panicum of shaded loblolly-shortleaf pine-hardwood sites that may be confused with wideleaf panicum is variable panicum, *D. commutatum* (Schult.) Gould. It is found also in river bottoms and other moist shaded sites throughout the eastern and Gulf Coastal States.

Range: Arkansas to northern Georgia, extending northward to Canada.

Perennial (spring phase). **Culms** 45 – 100 cm tall, glabrous or sparsely pubescent toward base, nodes glabrous; **sheaths** ciliate; **blades** 8 – 18 cm long, 3 – 35 mm wide, thin, glabrous; **ligule** a minute fringed membrane, rarely 1 mm long; **panicle** 6 – 20 cm long; **spikelets** 3.3 – 3.8 mm, puberulent to nearly glabrous.



Little Panicum—*Dichanthelium leucoblepharis* var. *glabrescens* (Griseb.) Gould & Clark—*(Panicum polycaulon* Nash)

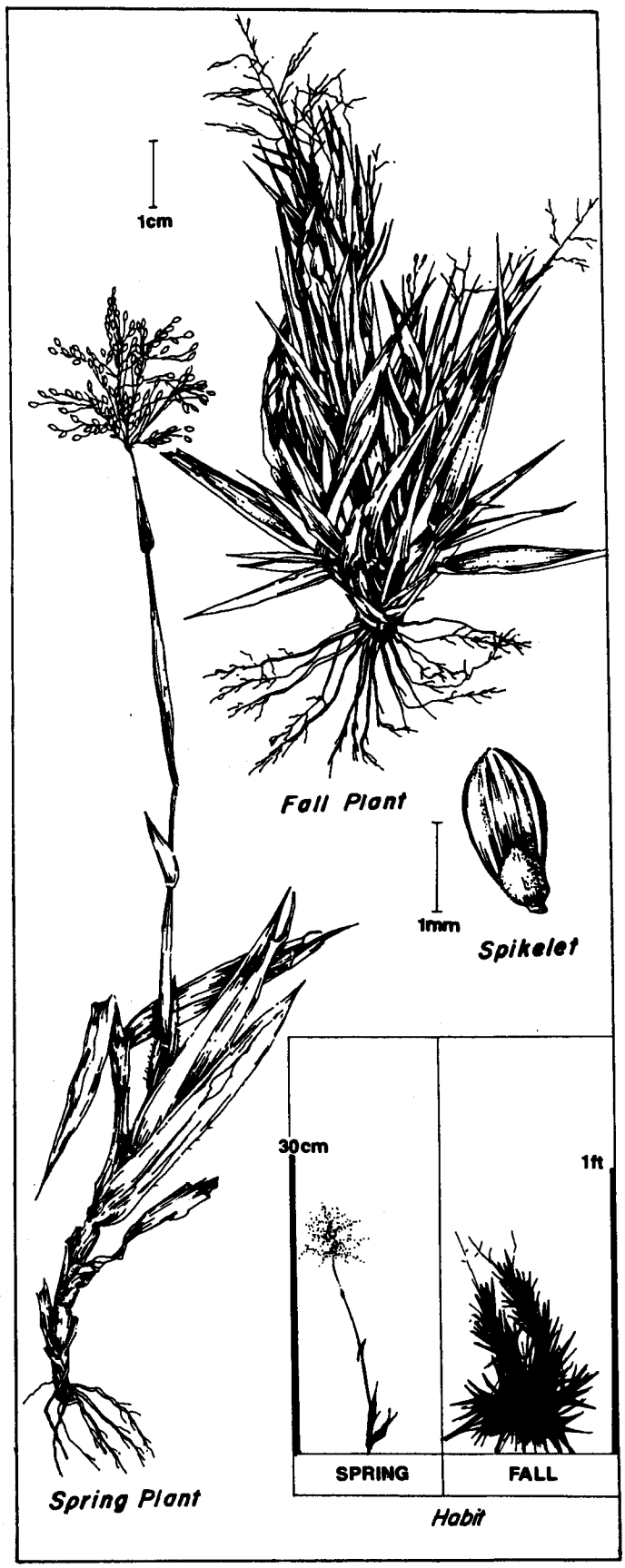
This low panicum rarely exceeds 6 inches in height. In the pine flatwoods of the Coastal Plain where it commonly occurs, it is usually the smallest panicum. Winter rosette leaves are about 3 inches long and ¼ inch wide. Later spring leaves are about half that size, and those just below the inflorescence are often less than ½ inch long. Foliage is light green and soft, often turning purplish after flowering heads are produced. Except for ciliate hair on leaf margins, foliage is glabrous. Spring panicles, which are about 1½ inches long and 1 inch wide, also turn purple.

Dichanthelium leucoblepharis (Trin.) Gould & Clark var. *leucoblepharis (Panicum ciliatum* Ell.) is found on similar sites throughout the range of little panicum. Its spikelets, which are slightly larger than those of little panicum, are usually pubescent; those of little panicum are glabrous.

Little panicum is a frequent associate of pineland threeawn in the longleaf-slash pine-wiregrass type in Florida and Georgia.

Range: Coastal Plain, Louisiana to Florida and Southern Georgia.

Perennial (spring phase). **Culms** tufted, 15 – 45 cm tall, usually erect; **leaves** mostly basal, **blades** 3 – 6 cm long, 4 – 6 mm wide, ciliate; **cauline leaves** few, reduced in size; **panicle** 3 – 4 cm long, about as wide, axis pilose; **spikelets** 1.2 – 1.8 mm long, glabrous, obovate.



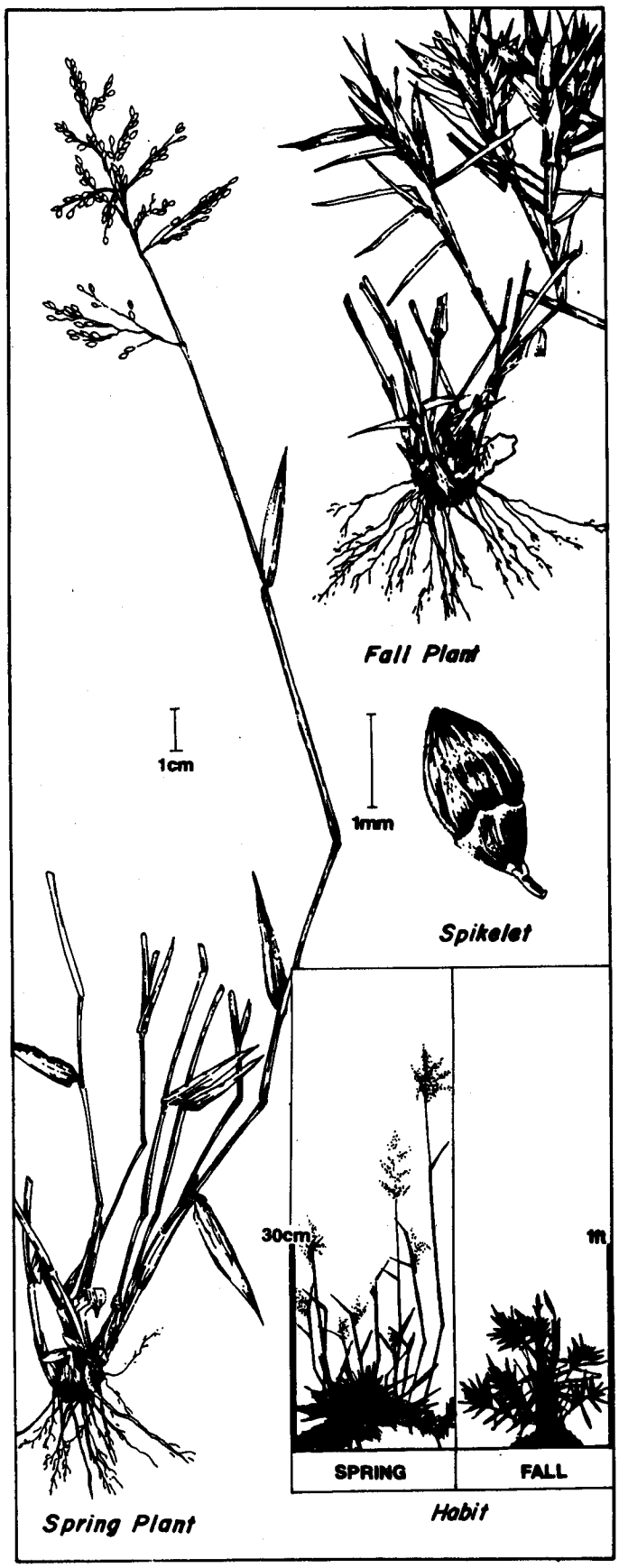
Lance Panicum—*Dichanthelium sabulorum* var. *patulum* (Scribn. & Merrill) Gould & Clark—*(Panicum lancearium* Trin.)

This low panicum is found in low, moist, sandy woods of the Coastal Plain, primarily in the pine flatwoods of the longleaf-slash pine-wiregrass type. Spring clumps have numerous erect purplish stalks about 1 foot tall, the outer bent upward at the lower joints. Leaves as well as stems may turn purple as spring foliage matures. Although plants appear hairless to the naked eye, stems and leaves are sparsely coated with short gray hairs.

Spring leaf blades are 1 to 2 inches long. Panicles are about 2 inches long and about as wide, with fine wavy branches and spikelets about ⅛ inch long. Fall foliage branches are less than 6 inches long with closely spaced blades about 1 inch long. As in most low panicums, fall seeds are on reduced axillary panicles, partially hidden by leaves.

Range: Coastal Plain, Texas to Florida and Massachusetts.

Perennial (spring phase). **Culms** 20 – 50 cm tall, puberulent, cespitose, branching from base only, erect, outer stems decumbent at base; **blades** 2 – 6 cm long, 3 – 7 mm wide, glabrous on upper surface, puberulent below; **panicle** 3 – 6 cm long, 2.5 – 5.0 cm broad; **spikelets** 1.8 – 3.6 mm long, puberulent or occasionally glabrous.



Roundseed Panicum—*Dichanthelium sphaerocarpon* (Ell.) Gould var. *sphaerocarpon*—(*Panicum sphaerocarpon* Ell.)

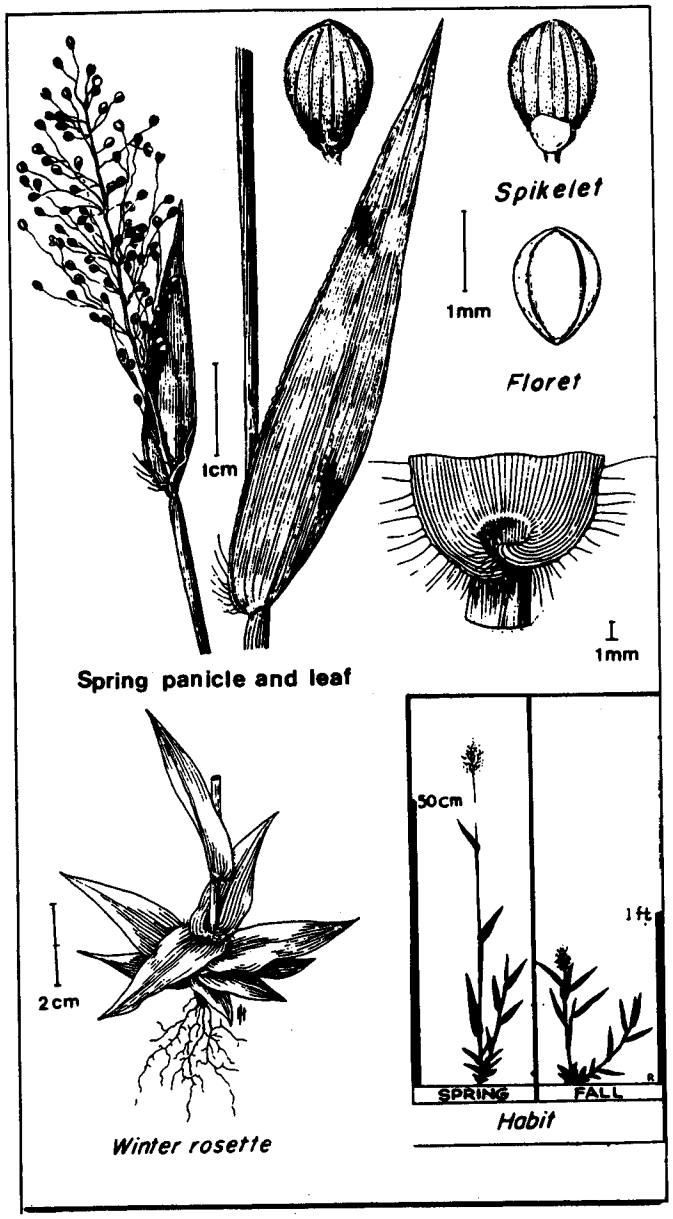
Although roundseed panicum has the seasonal vegetational variations of the low panicums, its fall and spring phases do not differ drastically. Thus, fall leaves are not greatly reduced or crowded, and fall panicles are fully exserted above the leaves. The short, broad leaves of the winter rosette are conspicuous.

This panicum is widely distributed through the piney woods in the Southeast, in association with the bluestems. In the northern states, it grows on sandy woodland soils. Like other low panicums, it yields little forage, but quality is good.

Roundseed panicum is distinctive because of its relatively broad leaves and tiny spikelets. Spring leaves are mostly 2 to 4 inches long, lance shaped, and about ½ inch wide. Except for a few long white hairs at the leaf blade base, the plant appears almost hairless. Usually there is no ligule. When fully expanded, spring panicles are conical and 2 to 4 inches long. Spikelets are generally purple and about 1/16 inch long.

A variety, *Dichanthelium sphaerocarpon* var. *isophyllum* (Scribn.) Gould & Clark, with larger leaves (to 10 inches long and 1¼ inches wide) and larger inflorescences (7 inches long and 3 inches wide), grows throughout most of the range of typical roundseed panicum.

Range: Practically the entire eastern half of the United States from Texas and northern Florida to Kansas, Michigan, and Vermont; also reported from Mexico to Venezuela.



Perennial (spring phase). **Culms** 20 – 80 cm tall, spreading, sometimes nearly erect, the nodes appressed-pubescent; **sheaths**, the upper shorter, the lower longer than the internodes, ciliate on the margin, sometimes with viscid tubercles between the nerves; **ligule** obsolete or nearly so; **mid-culm blades** 5 – 10 cm long, 6 – 11 mm wide, the lowermost and uppermost shorter, thick, firm, acuminate, slightly narrowed to a subcordate base, margins cartilaginous and stiffly ciliate, often papillose; **inflorescence** a long-exserted panicle 5 – 10 cm long, nearly as wide, the axis and ascending branches with viscid spots; **spikelets** 1.4 – 2.2 mm long, dark purple, green, or white, puberulent; **first glume** about one-fourth the length of the spikelet; **second glume** and **sterile lemma** equaling the fruit at maturity, 5- to 7-nerved.

Spreading Panicum—*Panicum anceps* var. *rhizomatum* (Hitchc. & Chase) Fern.

Although some recent authors (Gould 1975, Allen 1980, Correll and Johnston 1970) consider spreading panicum only a Coastal Plain variant of beaked panicum, *Panicum anceps* Michx., others (Radford and others 1968, USDA 1982) recognize them as separate varieties. The criteria used to separate the two are:

Variety	*Panicle*	*Spikelet size*	*Rhizome*	*Range*
anceps	open	2.5 – 3.8 mm	short	throughout SE U.S.
rhizomatum	more or less contracted	< 2.2 – 2.8 mm	elongate	Coastal Plain

The varietal difference is probably valid, especially when inland specimens from Missouri are compared with plants from the lower Coastal Plain of Louisiana. However, both types can be lumped under *P. anceps* without fear of error.

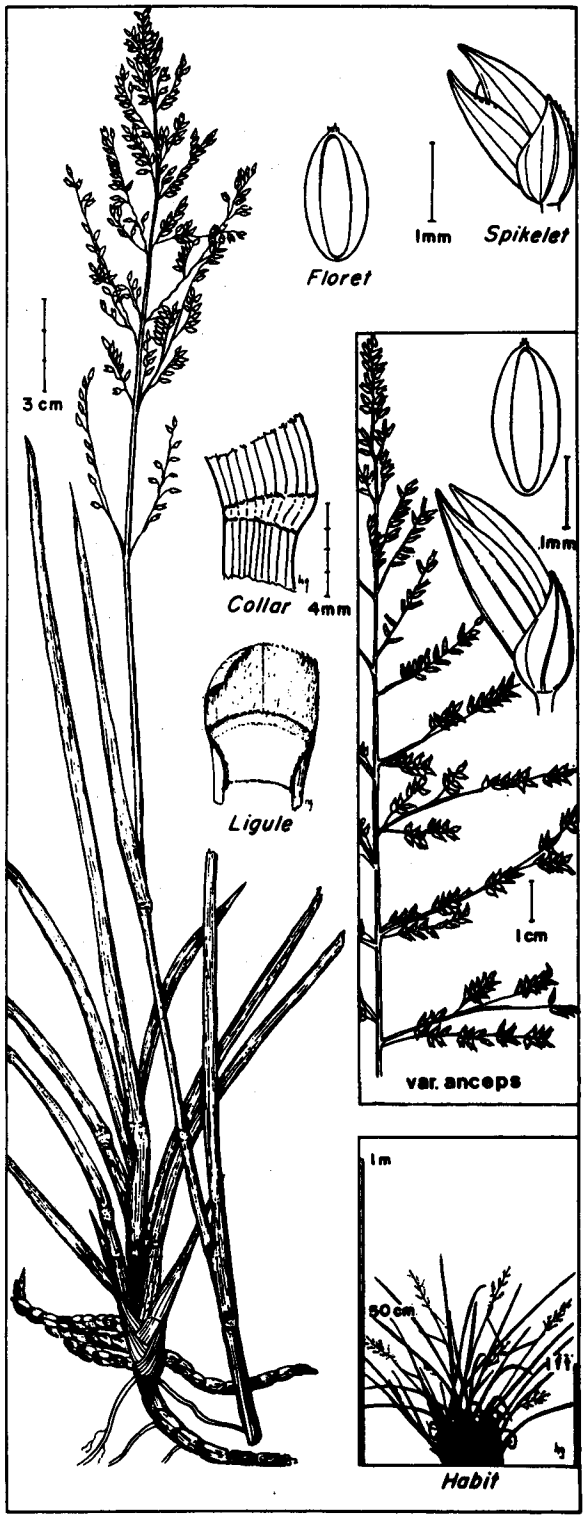
Gaping panicum grows on the same sites as spreading panicum. Although the two are similar, spikelets of spreading panicum sit obliquely on pedicel tips, while those of gaping panicum sit straight with the pedicel axis. Gaping panicum has no rhizomes.

Spreading panicum grows on wet sites throughout pine forests of the lower Coastal Plain. It commonly inhabits poorly drained flats, shallow depressions, drainageways, and stump holes on open sites or under moderate pine canopies.

Like other true panicums, it lacks distinct seasonal phases and flowers only once a year. Seedstalks are generally less than 3 feet tall, from long, slender rhizomes. Basal leaves are usually numerous; the blades measure about ½ inch wide and a foot or more in length. Close grazing causes basal tufts to spread widely, the prostrate leaves forming a dense cover over small areas.

Spreading panicum is readily eaten by cattle. Even on moderately grazed range, plants usually are closely utilized. The species withstands heavy use, but is rarely abundant except on small areas, and hence contributes only small quantities of forage.

Range: Coastal Plain, Texas to Florida, extending north to Maryland, inland to Tennessee.



Perennial. **Culms** 50 – 100 cm tall, compressed, from slender, scaly rhizomes; **sheaths** crowded at the base, glabrous to densely papillose-villous, particularly villous at the collar; **ligule** short, almost obsolete, with a dense area of hairs above it; **blades** 10 – 40 cm long, erect or spreading, 5 – 10 mm wide, glabrous to villous on both surfaces; **inflorescence** a terminal panicle 10 – 25 cm long, somewhat contracted and densely flowered; **spikelets** 2.2 – 2.8 mm long, obliquely set on their appressed, scabrous pedicels; **first glume** one-third to one-half as long as the lemma, with a prominent scabrous keel; **second glume** and **sterile lemma** subequal, slightly beaked; **floret** about 1.9 mm long, ovoid, pale and shining, tipped with a group of minute, thick hairs.

Maidencane—*Panicum hemitomon* Schult.

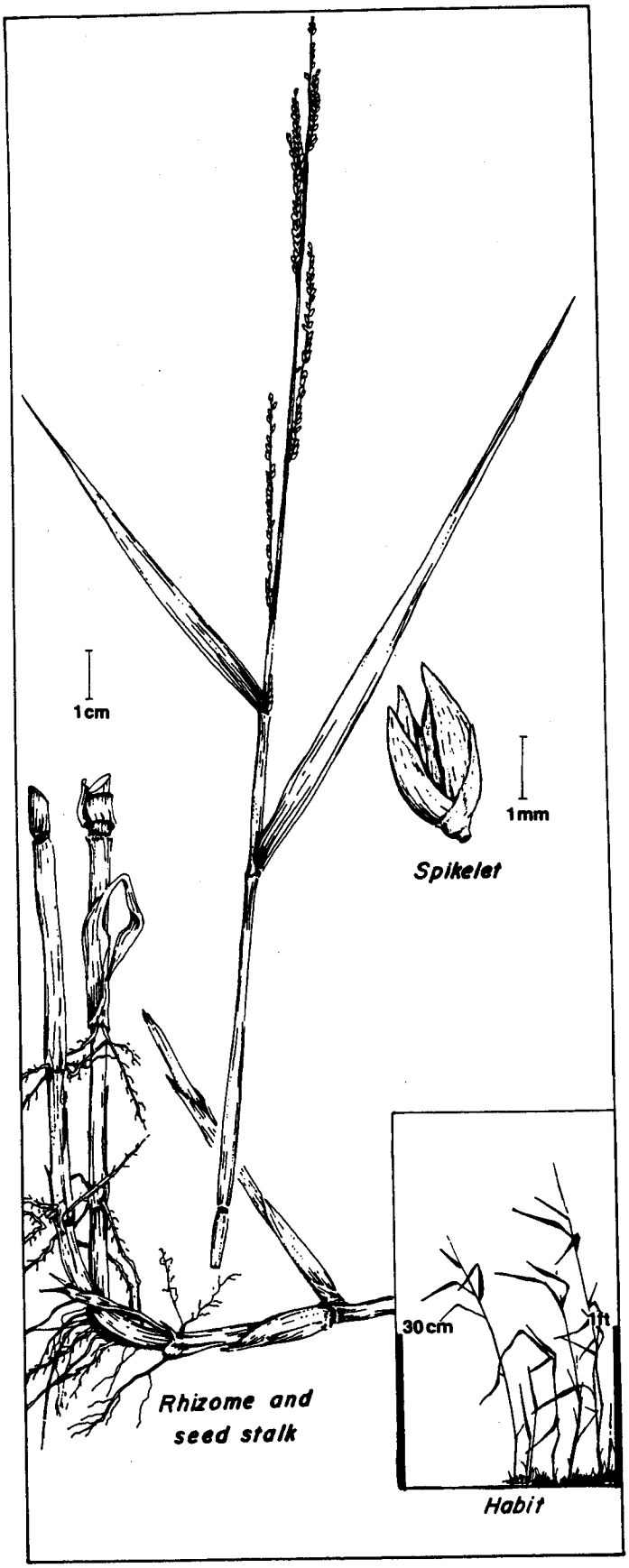
Maidencane or "paille fine" as it is called in Louisiana and east Texas, is a warm-season perennial grass important on freshwater marshes and open, wet sites in the Coastal Plain. It spreads by underground runners and may occur in extensive, almost pure stands. Stems, some sterile, some producing seed heads, are 20 to 60 inches tall. Sterile stems, which produce no seed heads, have hairy leaf sheaths; stems producing seeds are hairless.

When not killed by frost, maidencane produces high quality forage yearlong. In Louisiana marshes, earthen walkways are often constructed to allow cattle easier access to the wet sites occupied by this grass. Periods of high water during summer months provide marsh ranges a natural grazing deferment. Overgrazing can be very detrimental to maidencane, especially if sites are abnormally dry.

Maidencane yields 4 to 5 tons per acre of high quality herbage. When cut in the young growth stage, it makes excellent hay. Mature herbage, though tougher and less palatable than spring growth, may contain over 9 percent protein.

Range: Coastal Plain, Texas to Florida, extending north to New Jersey; reportedly collected also in Tennessee.

Perennial. **Culms** rhizomatous, sterile stalks with densely hirsute sheaths, fertile stalks 50 – 150 cm tall with glabrous sheaths; **blades** 10 – 25 cm long, 5 – 15 mm wide, glabrous; **panicle** 15 – 30 cm long, branches appressed, 2 – 10 cm long; **spikelets** 2.4 – 2.7 mm long, lanceolate; **first glume** about half the length of spikelet, acute.



Torpedograss—*Panicum repens* L.

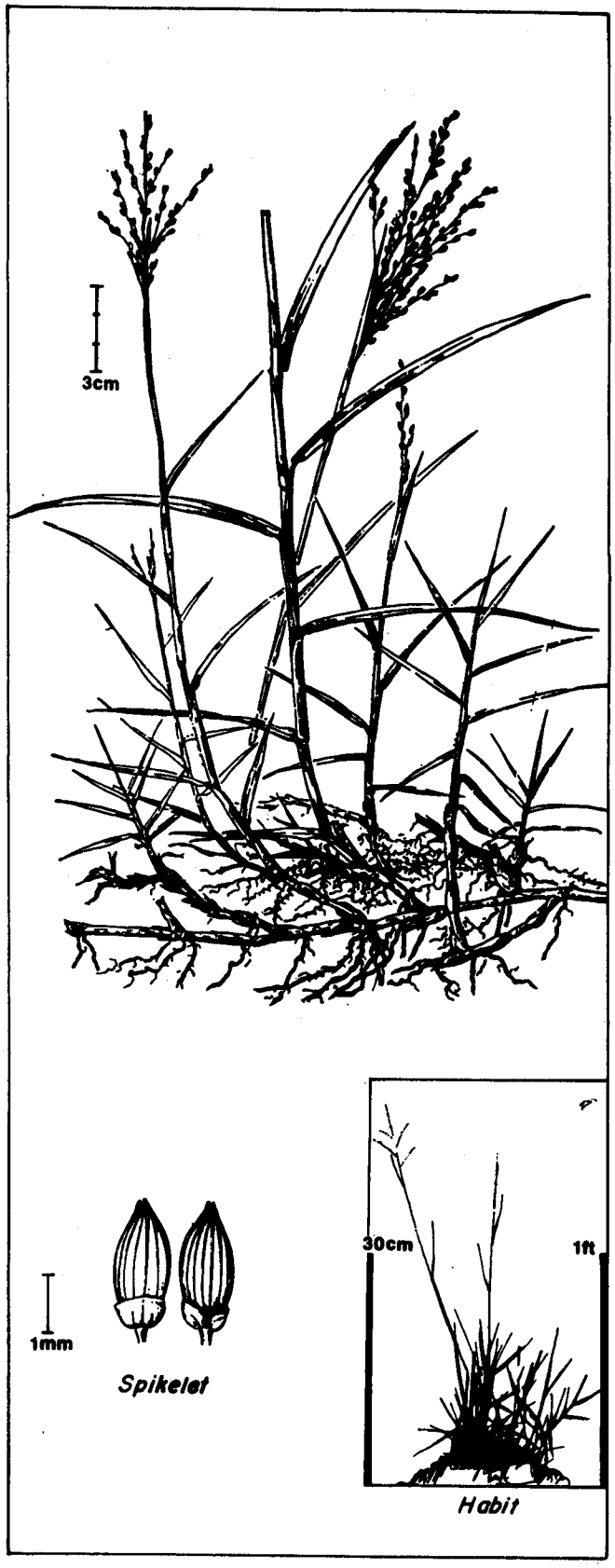
Torpedograss is a familiar grass on gulf coastal beaches, where it is a major natural factor in stabilizing sand dunes. Rigid stalks 1 to 4 feet tall rise from the nodes of extensively creeping rootstocks, which also may root at the nodes. Seed heads are open, 3 to 5 inches long, with ascending branches. The common name was derived from the sharp-pointed rhizomes. Torpedograss grows inland on ditch and canal banks, often extending into the water. It invades cultivated cropland on moist fertile sites and thrives as a pasture plant.

Foliage is gray-green to blue-green and practically hairless. Leaves are palatable to cattle and nutritious. Although foliage is easily killed by frost, dry grass in winter retains a relatively high nutrient content.

Torpedograss is a member of the true panicum group, and is closely related to switchgrass. The stout, sharp-pointed rhizomes, however, distinguish torpedograss from any other similar grass.

Range: Gulf coast, Texas to Florida.

Perennial: **Culms** erect, rigid, 30 – 100 cm tall from extensively creeping horizontal rootstocks; **rootstocks** with bladeless sheaths from nodes; **sheaths** (culm) more or less pilose; **blades** flat or folded, 2 – 5 mm wide, linear-lanceolate, sparsely pilose to glabrous; **ligule** membranaceous, ciliate; **panicle** open, 7 – 12 cm long, branches somewhat distant, stiffly ascending; **spikelets** 2.2 – 2.5 mm long, ovate, pale, turgid, strongly 5- to 9-nerved, glabrous, pointed; **first glume** truncate, about one-fifth as long as the spikelet.



Bluejoint Panicum—*Panicum tenerum* Beyr.

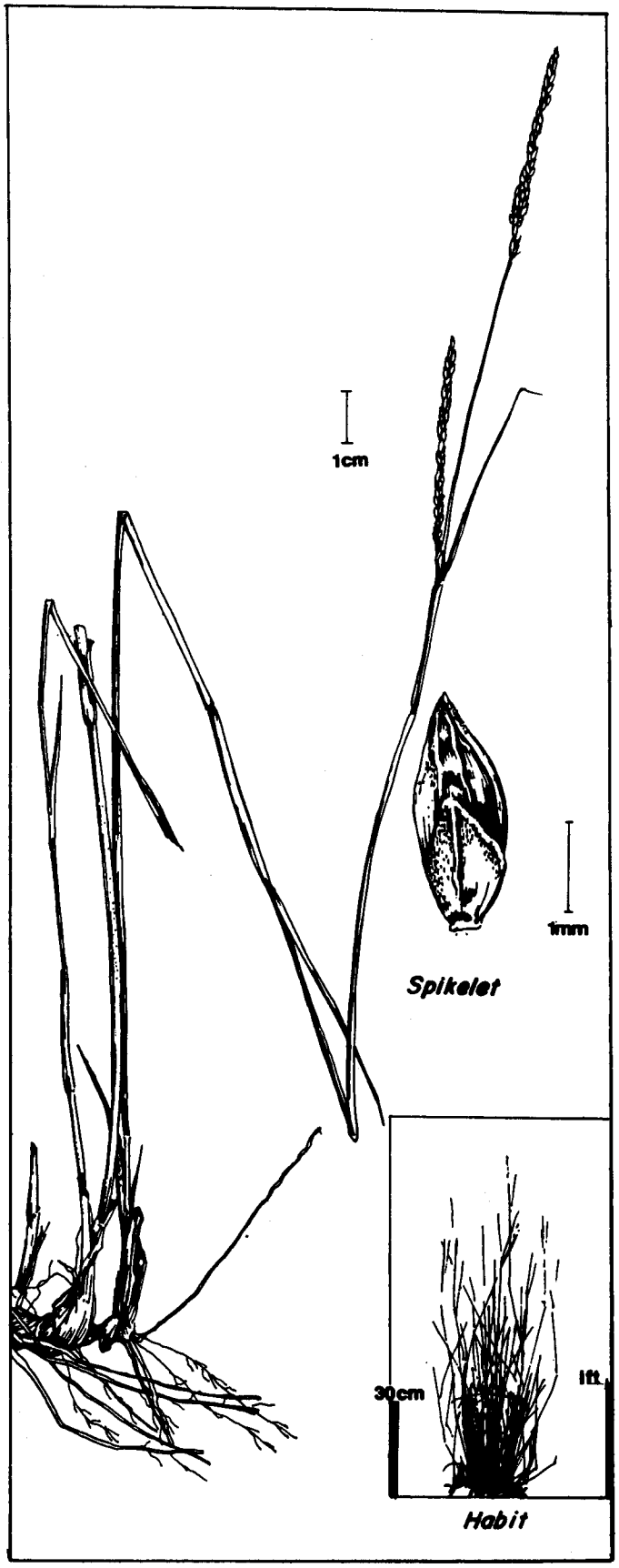
Bluejoint panicum is a wiry perennial bunch grass of the true panicum group, with erect stems about 2 feet tall arising from a knotted crown. Foliage is hairless, and the nodes, or joints, are smooth and blue or purple in color, giving plants a distinctive "bluejoint" appearance. The plant grows on a variety of wet sites along the gulf and Atlantic coasts.

Cattle graze bluejoint panicum in the spring before foliage matures. Regrowth following a spring burn is palatable, but by late summer even burned herbage is tough and wiry. On slough sites in good condition, it may contribute up to 35 percent by weight of the total herbage.

Flower stalks are produced from June through August. The inflorescence consists of one to several ascending branches about 3 inches long, with small, crowded spikelets. Branches, which may be terminal or axillary or both, are often only slightly exserted from leaf sheaths. Appearance of the inflorescence, along with the wiry leaves and stems, may lead to confusion with some of the dropseeds *(Sporobolus* spp.). Bluejoint panicum, however, has a typical true panicum spikelet; the first glume is about half the length of the spikelet, with a strongly nerved and pointed second glume and sterile lemma.

Range: Near the coast, Texas to Florida and North Carolina.

Perennial. **Culms** wiry, in small tufts from a knotted crown 40 – 90 cm tall; **nodes** glabrous, purple or bluish; **lower sheaths** pubescent with spreading hairs toward summit; **blades** 4 – 15 cm long, 2 – 4 mm wide, ascending or erect, sub-involute, pilose on the upper surface toward base, glabrous beneath; **panicles** 3 – 8 cm long, 0.5 – 1.0 cm wide, very slender, terminal and axillary, branches ascending to appressed; **spikelets** 2.2 – 2.8 mm long, pointed, glabrous; **fruit**, brownish, shiny.



Warty Panicum—*Panicum verrucosum* Muhl.

This annual of the true panicum group is a sprawling grass with culms up to 5 feet long branching and rooting at the nodes. It inhabits moist sandy sites and is most abundant in the understory of open woods. Foliage is lax, hairless, and light green with white midribs in the blades and white veins in the sheaths. Basal joints are bent and the lower joints of the stem are purple. The upper stem is hidden by the sheaths. Blades are 2 to 8 inches long and 1/5 to 2/5 inch wide.

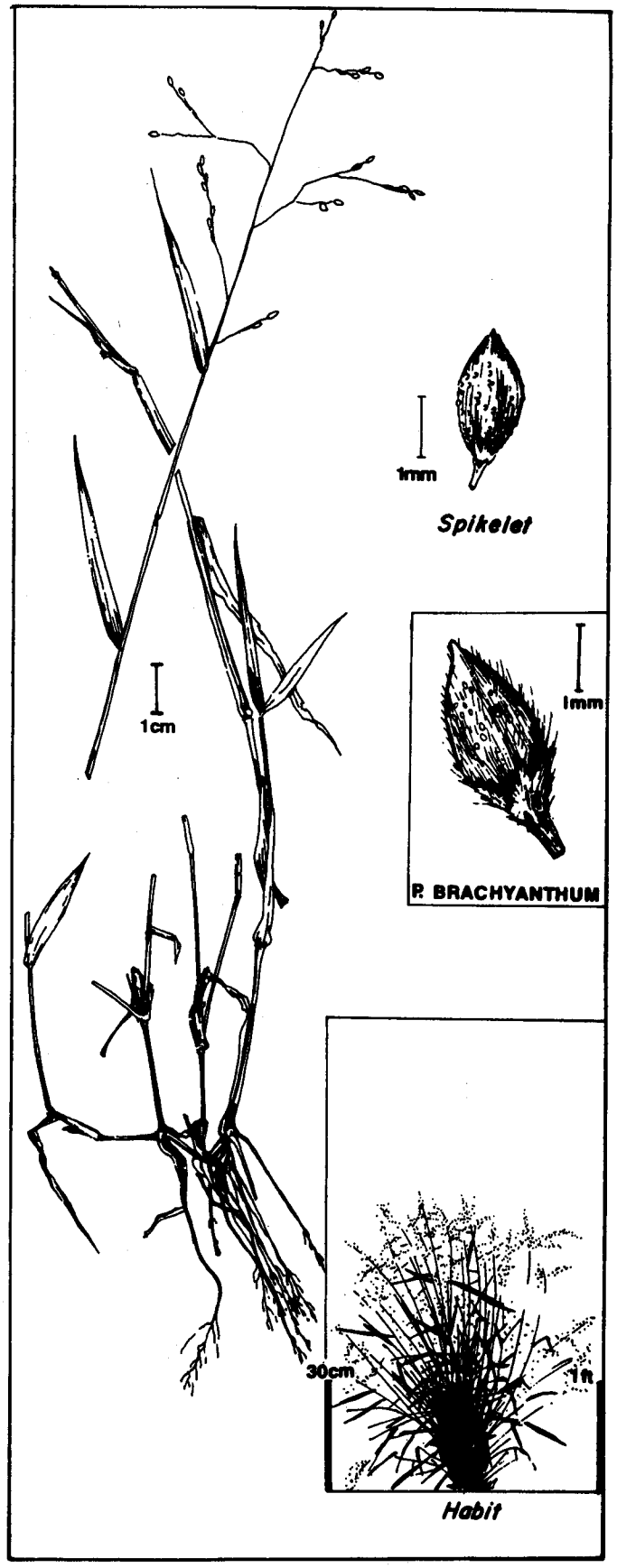
The panicle is 2 to 12 inches long with numerous ascending branches. Spikelets, borne on short appressed branchlets on the outer half of the main branches, are about 1/16 inch long and green. The outer bracts are covered with small tubercles, giving spikelets a "warty" appearance.

Seeds of warty panicum usually germinate by March, and plants are tall enough to furnish some grazing by May. The grass provides excellent forage through September. Seeds are eaten by quail and other birds.

Before seedheads form, warty panicum may be confused with crabgrasses, *Digitaria* spp., which have a similar sprawling growth habit. A close relative, pimple panicum, *Panicum brachyanthum* Steud., occurs in sandy sites in Texas, Oklahoma, Arkansas, and Louisiana. It is also an annual, but wiry, with very narrow leaves, and is practically worthless as forage. Pimple panicum has fewer branches, and spikelets are hairy as well as warty.

Range: Texas and Arkansas to Florida, Michigan, and Massachusetts.

Annual. **Culms** to 150 cm long, nodes glabrous and purple, hidden by sheaths except near base, lower stems decumbent, rooting at nodes; **foliage** lax, light green, glabrous; **sheaths** with white veins; **blades** 5 – 20 cm long, 4 – 10 mm wide, with white midrib; **panicles** 5 – 30 cm long, about as wide, with ascending compound branches; **spikelets** few (usually two) at tip of branches and branchlets; 1.8 – 2.1 mm long, elliptic-obovate, tuberculate.



Switchgrass—*Panicum virgatum* L.

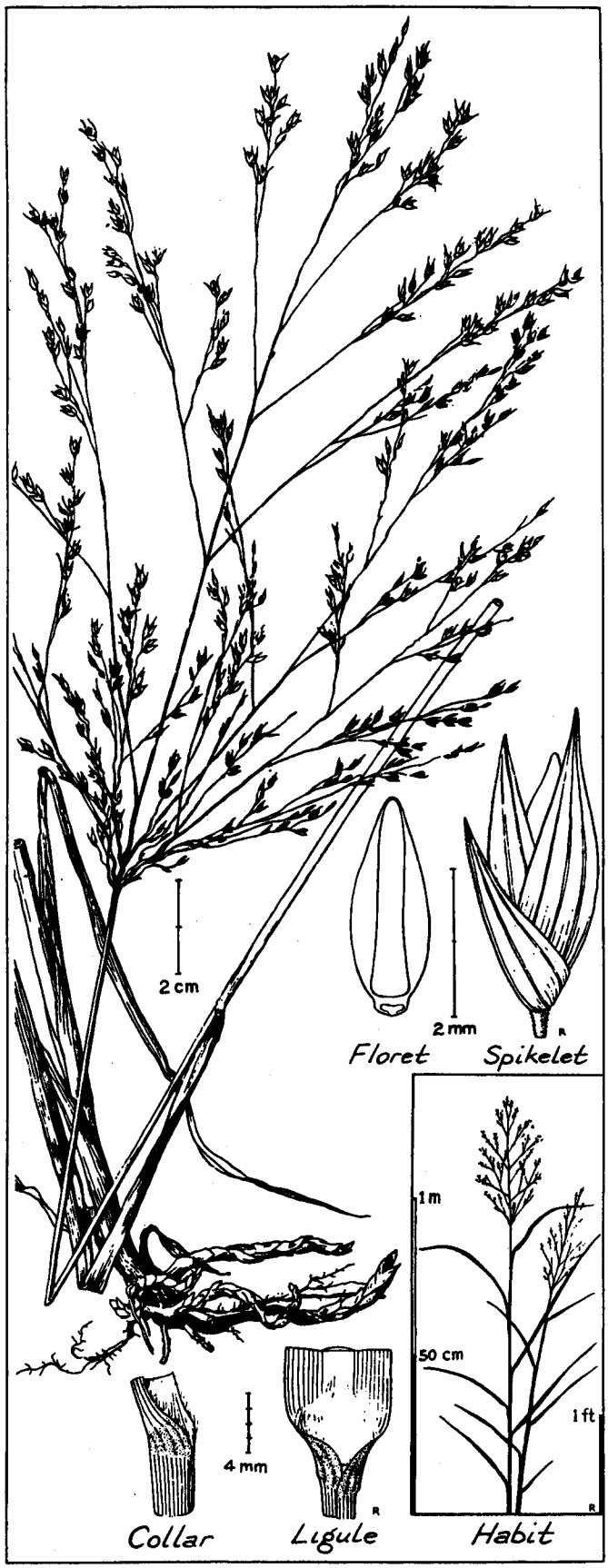
Switchgrass is one of the true panicums, having no seasonal phases and flowering only in late summer or early fall. It is among the tallest panicums in the South, averaging 3 to 4 feet tall on forest range, but reaching 6 to 7 feet on favorable sites. Switchgrass is highly variable, however, and small, fine-stemmed specimens may be encountered.

Because plants spread by numerous scaly rhizomes, switchgrass often forms large, dense colonies. It is usually sparse on well-drained range sites, but on moderately wet sandy soils it may be the dominant grass. Tolerance of shade renders this grass potentially important for grazing under young pines and in stands that have been thinned several times. Before foliage matures, cattle prefer it to most associated species. Where it comprises a minor part of the forage, therefore, it is overgrazed. Switchgrass also has value for wildlife. Birds eat the seeds, and deer reportedly paw up and eat the rhizomes when winter food is scarce.

Plants are generally hairless except for dense white hairs behind the ligules and scattered hairs on the bases of leaf blades. The inflorescence is an open panicle ½ to 1½ feet long with ascending branches. Dried panicles persist on stiff, stout flower stalks through the winter and well into the next growing season, providing a reliable guide to identification. Spikelets are up to 3/16 inch long, among the largest in southern panicums.

Beaked panicum and spreading panicum, though similar in form, are usually smaller throughout. These are distinguishable from other panicums by the gleaming white midribs of their leaf blades and satiny sheath linings. While foliage of switchgrass resembles that of yellow indiangrass, the latter can be identified by prominent auricles at its leaf collars.

Range: Throughout the United States except Idaho, Montana, and the Pacific States.



Perennial. **Culms** 1 – 2 m tall, terete, robust, erect, solitary or in clumps from long, hard, scaly rhizomes; **sheaths** green to purple tinged, often glaucous, gleaming white within, mostly glabrous, though sometimes pilose; **ligule** membranous-ciliate, a pale tan to brown membrane 1 – 2 mm long with a dense mass of fine, white hairs on the back and arising from it, 3 – 7 mm long, the membrane sloughing off with age to leave a dense ring of hairs; **blades** 3 – 15 mm wide, often glaucous, 10 – 60 cm long, with a prominent, wide, white midrib, ascending, taper-pointed, mostly glabrous but sometimes pubescent to pilose on both surfaces, margins scabrous; **inflorescence** a long-exserted open panicle 15 – 50 cm long with ascending branches; **spikelets** 3.5 – 5.0 mm long, ovoid, acuminate, with prominent nerves; **first glume** shorter, **second glume** longer than the **sterile lemma**; **floret** narrowly ovoid, 2.6 – 3.8 mm long or about three-fourths the length of the spikelet.

Gaping Panicum—*Steinchisma hians* (Ell.) Nash—(*Panicum hians* Ell.)

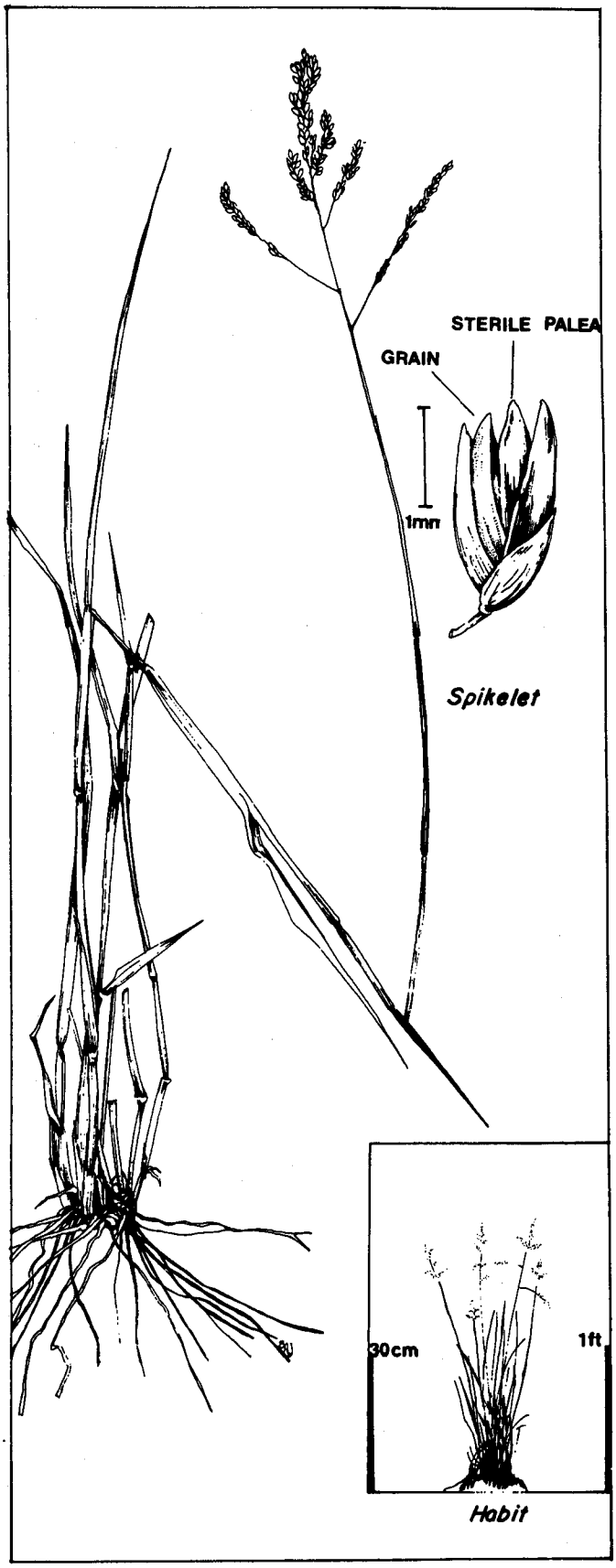
An old name, *Steinchisma hians,* was restored as the preferred synonym in the "National List of Scientific Plant Names" (USDA 1982). No new common name was proposed, however, so the grass will probably continue to be known as gaping panicum. In this handbook it is included with the true panicums.

Gaping panicum grows to 2 feet tall in ditches, stumpholes, on pond or stream margins, and other moist sites. It is a common grass on such sites from the desert southwest to the Atlantic coast, but seldom grows in abundance. Flowering begins in late spring and many plants mature seed by mid-summer. Forage value is considered only fair, although new growth in spring or following fire is grazed readily by cattle.

Gaping panicum leaves are 2 to 6 inches long and less than ¼ inch wide. Growth form varies from upright clumps of erect, narrow leaves to sprawling or prostrate plants with relatively broad, lax blades. The inflorescence is an open panicle, with few widely spaced branches. Small short-stalked spikelets are crowded on the outer half of each branch. The inflorescence resembles that of longleaf wedgescale, *Sphenopholis filiformis* (Chapm.) Scribn., a common grass on dry sites throughout the Southern states. The spikelet of gaping panicum is unique; a sterile bract (palea) is inflated and hardened, appearing almost as a second grain.

Range: New Mexico and Missouri to Florida and Virginia.

Perennial. **Culms** 20 – 60 cm tall, erect or sometimes decumbent or prostrate; **sheaths** shorter than internodes, ciliate or pilose near collar; blades 5 – 15 cm long, pilose to glabrous, about 6 mm wide; **panicle** loose and open, 5 – 20 cm long, primary branches few, ascending to drooping; **spikelets** glabrous, 2.2 – 2.4 mm long, about as wide and thick as long at maturity, falling entire; **sterile palea** inflated, indurate at maturity; **grain** about 1.5 mm long.



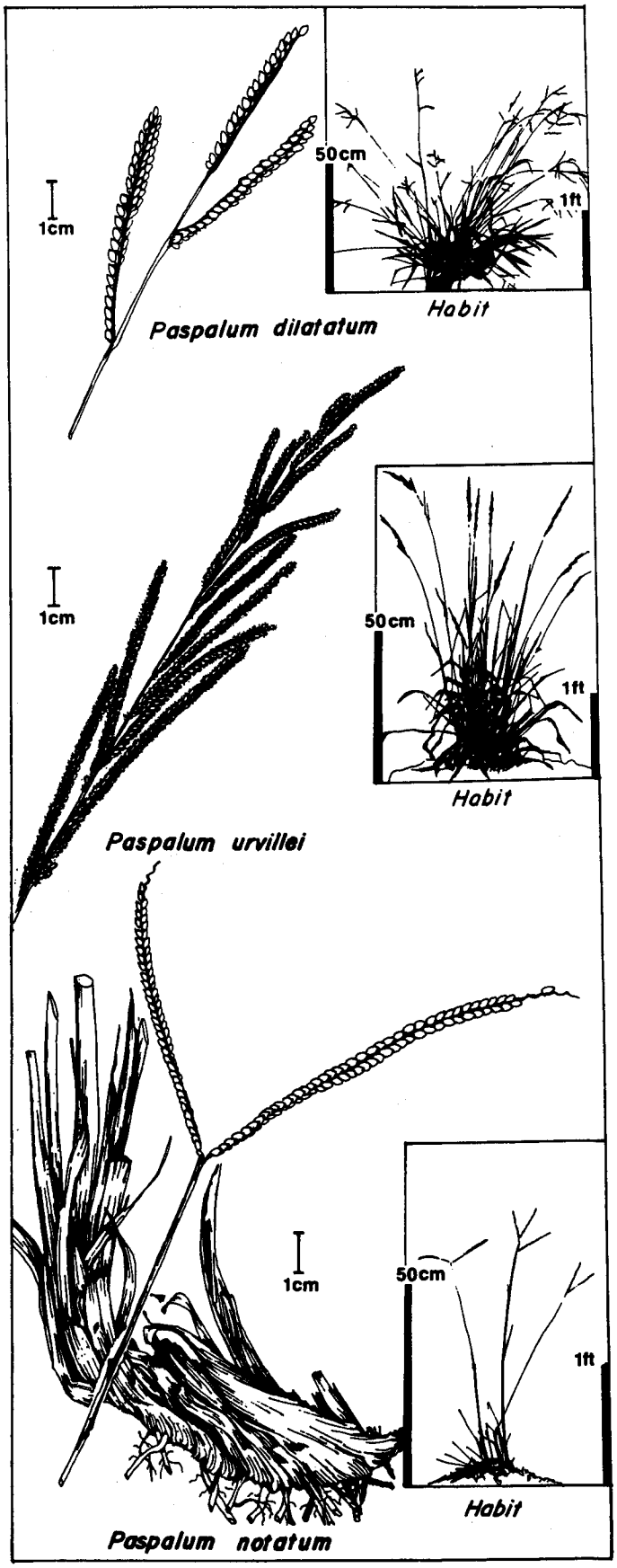
Paspalum Grasses—*(Paspalum* spp.)

The paspalums constitute the second largest group of grasses in the southeastern United States, with approximately 50 species. Many have ranges extending into Mexico, Central and South America, and the Caribbean Islands. Included are several species introduced from South America into the southern United States as pasture grasses. Vaseygrass, *Paspalum urvillei* Steud., dallisgrass, *P. dilatatum* Poir., and bahiagrass, *P. notatum* Fluegge, are notable examples. The latter two species can be troublesome weeds in lawns across the South.

Paspalums occur on a variety of sites. Species on upland range usually grow as scattered clumps or individual plants and do not produce abundant forage. New growth is palatable and relatively high in nutrients, but plants mature early, and the mature foliage weathers rapidly. Paspalums are most abundant and robust where plant competition is light, as on firelines and roadsides.

The paspalum inflorescence usually consists of one to several racemes, each with spikelets in rows along the lower side. In prevalent native species, only one raceme originates from a given point on the main axis. These often extend in a common direction, making the inflorescence one sided. Grains are flat on one side, convex on the other.

Flowers of several paspalums are often infected by ergot, produced by a fungus *(Claviceps paspali* F. S. Stevens and J. G. Hall) that attacks and destroys the immature grain. Other fungi sometimes grow on the "honeydew" exuded by the ergot and produce a variety of colors in the seed heads. Although ergot is toxic to cattle, danger of ergot poisoning is slight on properly managed ranges, as paspalums usually comprise a small part of the diet.



Florida Paspalum—*Paspalum floridanum* Michx. var. *floridanum*

Florida paspalum is one of the most robust grasses on southern pine ranges. It averages 3 feet tall, but some plants may reach 6 feet or more. Leaves, which are mostly basal, ascend stiffly. Blades are up to 20 inches long and ⅜ inch wide. The dark green foliage is usually densely hairy, but occasional specimens are almost hairless. Each stalk has two to five thick racemes, each about 3 inches long.

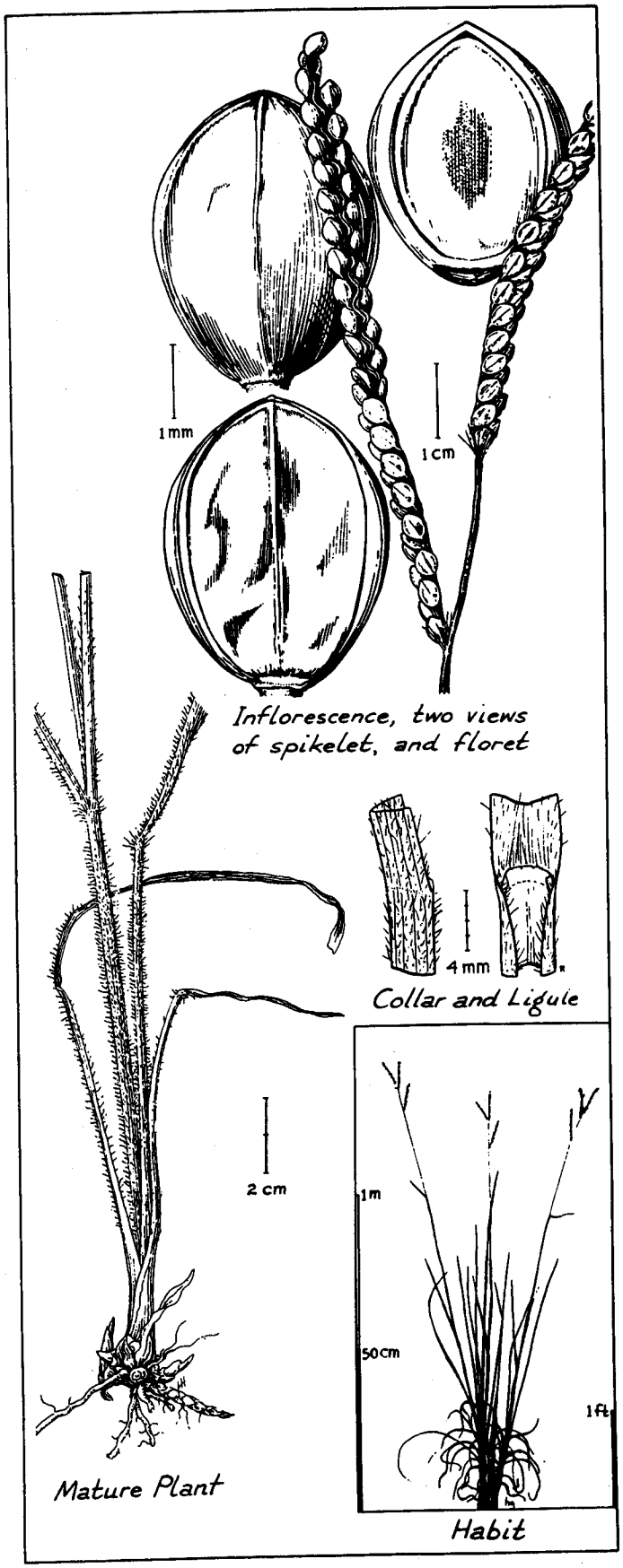
This grass thrives on disturbed sites such as firelines, road ditches, and stump holes. On undisturbed range, it prefers moist, well-drained soils, but also grows on dry sandy sites and poorly drained flats. Under light competition, plants spread by stout, scaly rhizomes to form large, loose bunches; in dense bluestem stands clumps are small.

Florida paspalum is readily distinguishable from other paspalums on longleaf pine ranges by its robust habit, large spikelets, and long, broad leaves. Until inflorescences appear in early summer, the species may be confused with big bluestem. Thereafter, and where old seedstalks persist, Florida paspalum can be distinguished by the conspicuously zigzag rachises of the shattered racemes. Vegetative differences are described under big bluestem. An even more robust form with hairless, chalky foliage, *Paspalum floridanum* var. *glabratum* Engelm. ex Vasey, is commonly found in brackish marshes along the Atlantic and gulf coasts and may be found as a weed on wet sandy sites throughout the range of typical Florida paspalum.

The young leaves are palatable and nutritious. As plants mature, the foliage becomes tough and less palatable. The grain, which is among the largest of southern range grasses, is eaten by quail, doves, and turkey.

Range: Texas to Florida, extending north to Missouri and Maryland.

Perennial. **Culms** 1 – 2 m tall, solitary or sparse from robust, scaly rhizomes; **sheaths** keeled, overlapping below, glabrous to villous, sometimes papillose; **ligule** a firm brown membrane 2 – 3 mm long; **blades** 15 – 50 cm long, 4 – 10 mm wide, usually villous on the upper surface near the base, ascending, firm, flat or folded, the upper ones reduced in size; **inflorescence** of two to five racemes 4 – 12 cm long; **spikelets** 4 mm long, crowded, ovoid, pale, and glabrous, usually in pairs, on each side of a zigzag rachis, but one sometimes absent or rudimentary; **first glume** wanting; **second glume** and **sterile lemma** equal, scarcely covering the fruit at maturity; **grain** 3.0 – 3.5 mm long, ovoid, light brown, minutely papillose, striate.



Brownseed Paspalum—*Paspalum plicatulum* Michx.

Brownseed paspalum grows in forest openings and on cutover lands throughout the South. It invades where the soil has been disturbed and on areas that have been heavily grazed. Preferred sites include wet meadows, drainageways, and roadside ditches, where plants spread by rhizomes to form dense colonies. It is rare under well-stocked timber stands.

Plants produce several seedstalks from 1 to 3 feet tall. Each stalk bears several slender racemes 1 to 4 inches long. Spikelets are in two rows on the lower side of a flattened, zigzag axis. Grains are about ⅛ inch long, medium to dark brown, and shiny. In mature plants, grain color readily distinguishes brownseed paspalum from other paspalum grasses. Foliage is green to gray green or blue green. Leaves are firm to wiry, with blades up to 18 inches long.

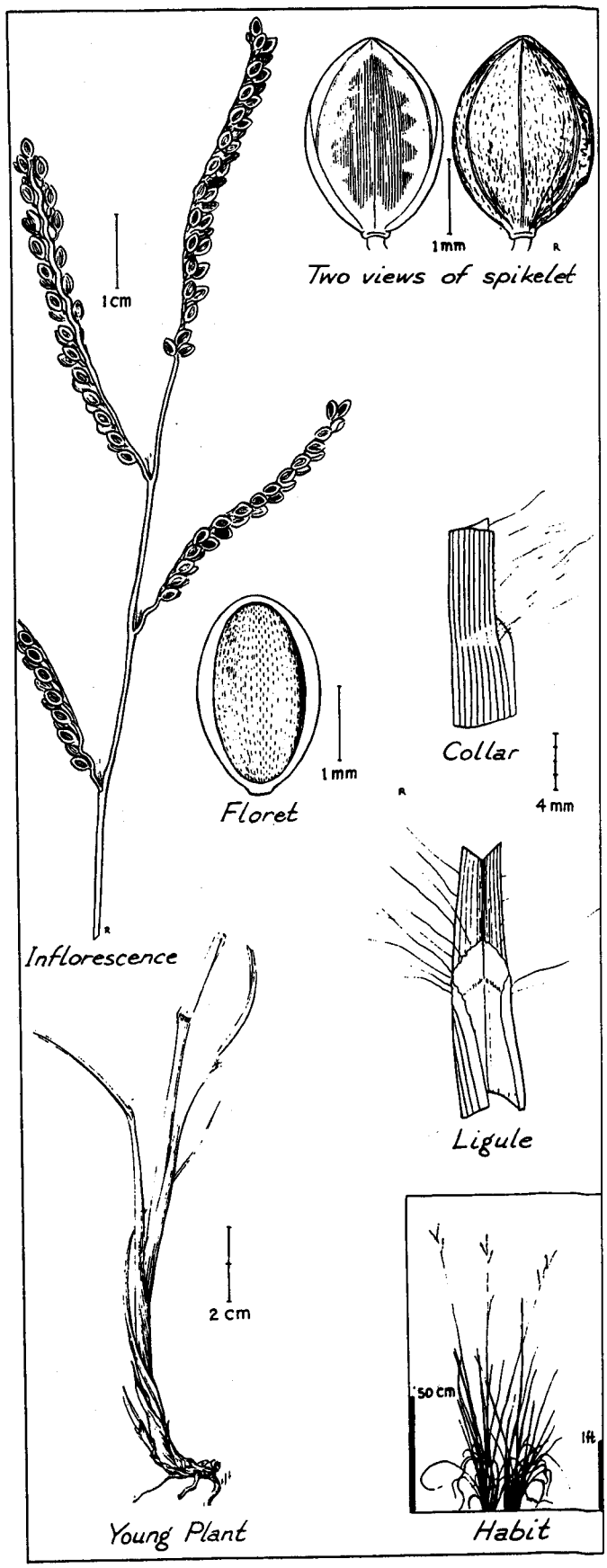
The common occurrence of brownseed paspalum along roadways and firebreaks within forests may exaggerate its abundance. Plants are sparse on most forest range sites, thus this species normally contributes only a minor part of the cattle diet. The foliage becomes tough and low in palatability by midseason, but because leaves frequently remain green through much of the winter, cattle may eat large amounts after frost kills back other grasses. In Florida, brownseed paspalum is one of the more palatable grasses.

Extensive stands should not be grazed when spikelets are heavily infected with ergot. Grazing may be resumed with little risk after seed heads shatter.

Birds eat the grain, but ergot makes the supply unreliable.

Range: Coastal Plain, Texas to Florida and Georgia.

Perennial. **Culms** 50 – 100 cm tall, in tufts with many leafy shoots, erect or ascending from a slightly decumbent base; **sheaths** keeled, the lower crowded, glabrous to papillose-pilose along margins and keel, or rarely hirsute throughout; **ligule** a pointed, pale-brown membrane 2 – 3 mm long; **blades** 8 – 45 cm long, 3 – 10 mm wide, basal ones folded, upper ones flat and usually greatly reduced in length, glabrous, but pilose at the base; **inflorescence** of three to eight racemes, each 3 – 10 cm long; **spikelets** 2.5 – 2.8 mm long, ovoid, brown at maturity; **first glume** wanting; the glabrous or appressed-pubescent **second glume** and transversely wrinkled **sterile lemma** equal, both thin and 5-nerved; **grain** 2.3 – 2.5 mm long, ovoid, brown, and shining.



Fringeleaf Paspalum—*Paspalum setaceum* var. *ciliatifolium* (Michx.) Vasey—*(Paspalum ciliatifolium* Michx.)

Fringeleaf paspalum, hurrahgrass, and barestem paspalum are closely related and intergrading species that were combined with a few other species under *Paspalum setaceum* Michx. (Banks 1966). Separate taxa were maintained by assigning them as varieties. Several recent plant manuals recognize only the species, thus lumping all the varieties (Radford and others 1968, Allen 1980). While separation may no longer be practical in forage management, the grasses are described as separate varieties in this book.

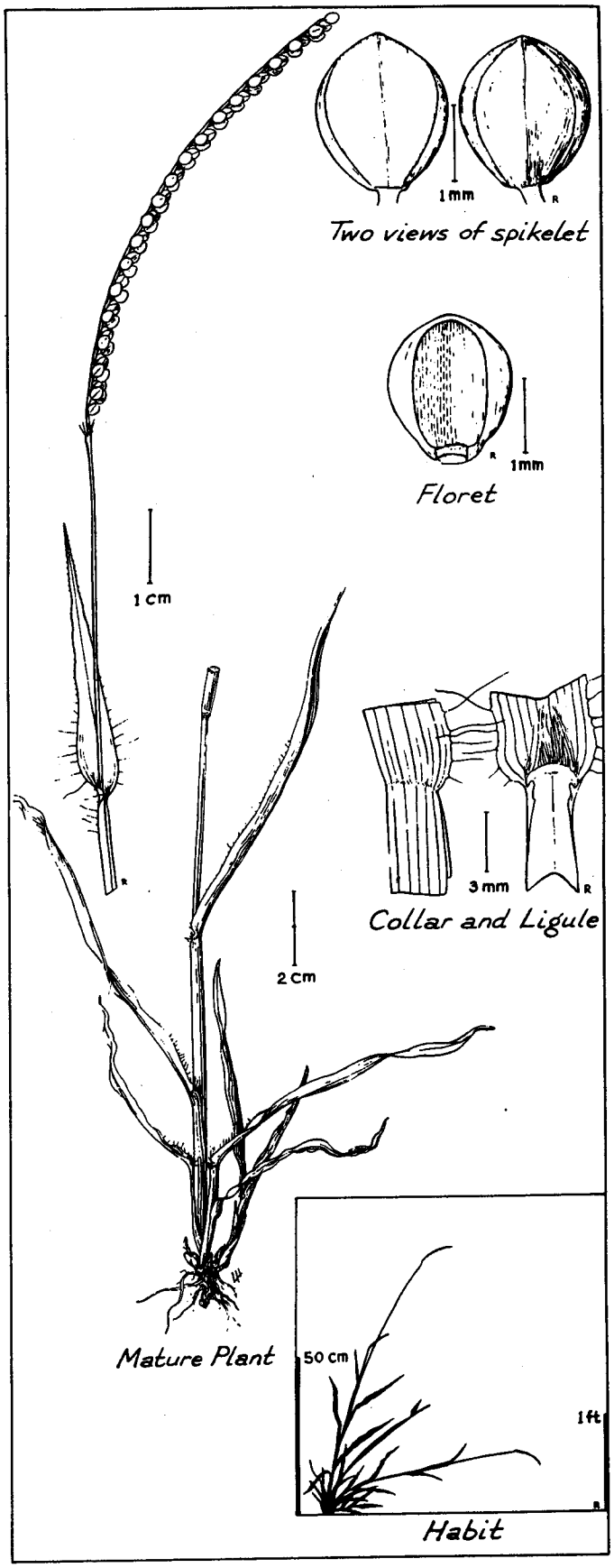
Fringeleaf paspalum is one of the smallest native paspalums. The slender flower stalks occasionally exceed 2 feet, but at this length they rarely stand erect. Leaves are mostly basal, often spreading along the ground. Light green blades, usually less than 8 inches long, are often twisted. The flower stalk ends in an inflorescence of one to three slender racemes, each 1½ to 4 inches long. In addition, there are axillary inflorescences, usually enclosed or half hidden in leaf sheaths. The grain is smooth, pale, and small—1/16 inch or less in length.

Growth habit and foliage of fringeleaf paspalum resemble those of some of the crabgrasses, *Digitaria* spp., which may inhabit the same site. Hairs are only on the margins of fringeleaf paspalum leaf blades; hairs of crabgrass blades, if present at all, grow from surfaces as well as margins. Through most of the growing season they can be distinguished by floral characteristics. Crabgrasses have only terminal racemes—generally three or more.

Fringeleaf paspalum grows almost exclusively on disturbed sandy sites. It is never abundant and hence not an important forage producer, even though palatable.

Range: Texas to Florida, extending north to Minnesota and New Jersey.

Perennial. **Culms** 20 – 90 cm tall, erect, or spreading from a knotted base, lower parts brown or purplish; **sheaths** keeled, glabrous, or the lower ones puberulent, glabrous, or ciliate along the overlapping margins; **ligule** membranous, short, backed by a ligular beard 1 – 3 mm long; **blades** ascending or spreading, 10 – 35 cm long, 7 – 12 mm or rarely 20 mm wide, usually strongly ciliate to ciliate-papillose along the undulate margin, otherwise glabrous, flat, acuminate at the apex, rounded to subcordate at the base; **inflorescence** of one to three terminal racemes, each 5 – 10 cm long, axillary raceme may be hidden in sheath; **spikelets** about 2 mm long, suborbicular; **first glume** wanting; **second glume** slightly shorter than the **sterile lemma**, exposing the fruit at maturity, second glume and sterile lemma both 3-nerved, the former glabrous to minutely pubescent with obscurely capitate hairs, sometimes minutely and dimly speckled; **grain** about the size and shape of the spikelet, pale yellow, smooth, and shining.



Barestem Paspalum—*Paspalum setaceum* var. *longepedunculatum* (LeConte) Wood—(*P. longepedunculatum* LeConte)

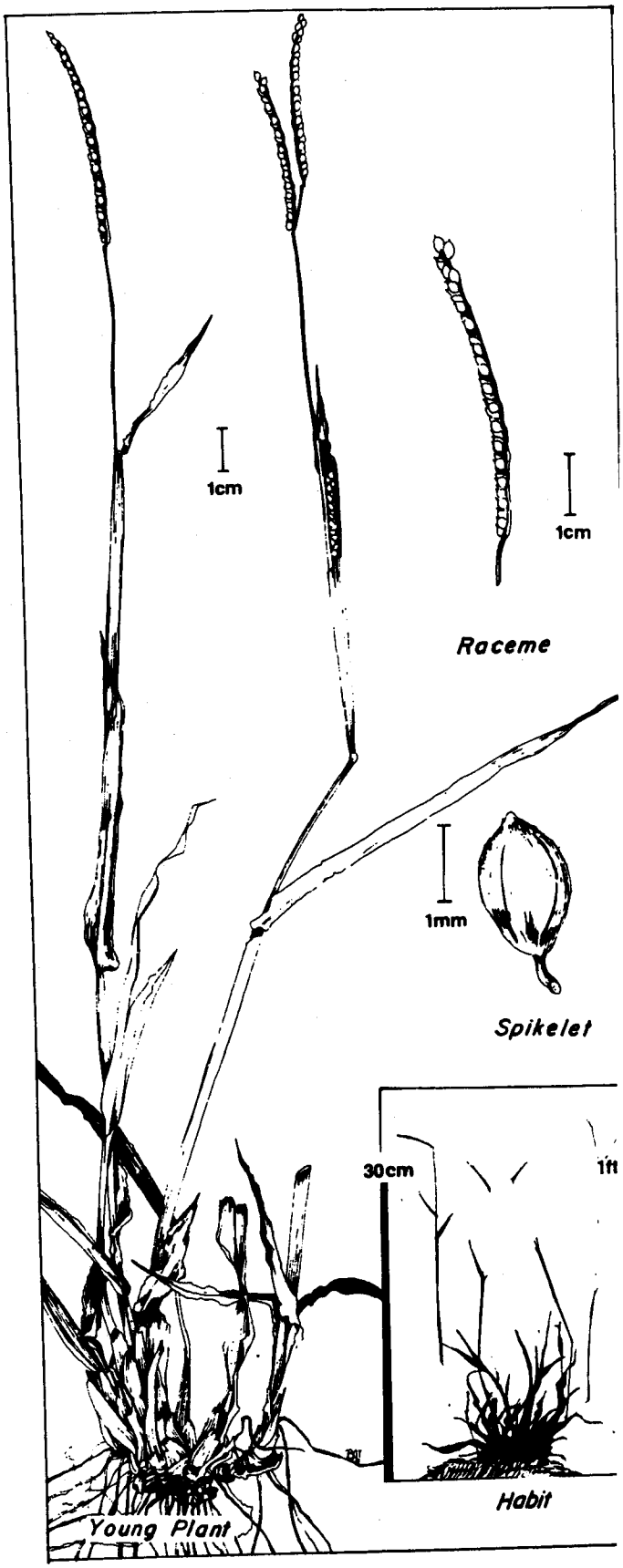
The common name for this grass was inspired by the long, slender, naked seedstalks (peduncles) which emerge from the upper leaf sheaths, supporting the terminal racemes as high as one foot above the uppermost leaf. A single stalk, terminated by one or two racemes, usually emerges fully, while others may be hidden in sheaths. Plants range in height from 8 inches to over 2 feet. It is found on low sandy pinelands throughout the South but is perhaps most common and important on the pine flatwoods of Georgia and Florida. As with most paspalums, however, plants are seldom found in abundance on undisturbed range. The largest number of plants are found on disturbed sites where plant competition has been reduced. Plants occur as clumps of a few to many stems arising from a knotty base, growing outward and bending upward at the lower joints.

Although forage value is considered only fair because of the limited quantity produced, seeds are eaten by quail and doves. Seeds mature by midsummer, and plants provide poor winter forage.

Fringeleaf paspalum is most likely to be mistaken for barestem paspalum; both have ciliate hairs on the margins of leaf blades, which are otherwise hairless. Spikelets of fringeleaf are larger and sometimes hairy; those of barestem are smooth. Leaf blades of barestem are 2 to 4 inches long and ⅛ to ⅝ inches wide; fringeleaf blades may be over 4 inches long. Other similar paspalums are generally hairy throughout. The slender racemes, small spikelets, and low foliage habit are also typical of some of the crabgrasses.

Range: Coastal Plain, Mississippi to Florida and North Carolina.

Perennial. **Culms** one to several from short rhizomes, ascending to erect, 20 – 80 cm tall, glabrous; **sheaths** ciliate on margin, purplish with age; **blades** ciliate on margins, 4 – 10 cm long, 3 – 8 mm wide; **ligule** a short, brown membrane with a ring of white hairs; **racemes** one to several, 3 – 8 cm long, terminating slender elongate peduncles, axillary raceme may be hidden in sheaths; **spikelets** glabrous, elliptic-obovate, 1.5 – 2.0 mm long, 1.0 – 1.2 mm wide.



Hurrahgrass—*Paspalum setaceum* var. *muhlenbergii* (Nash) Banks—*(Paspalum pubescens* Muhl.)

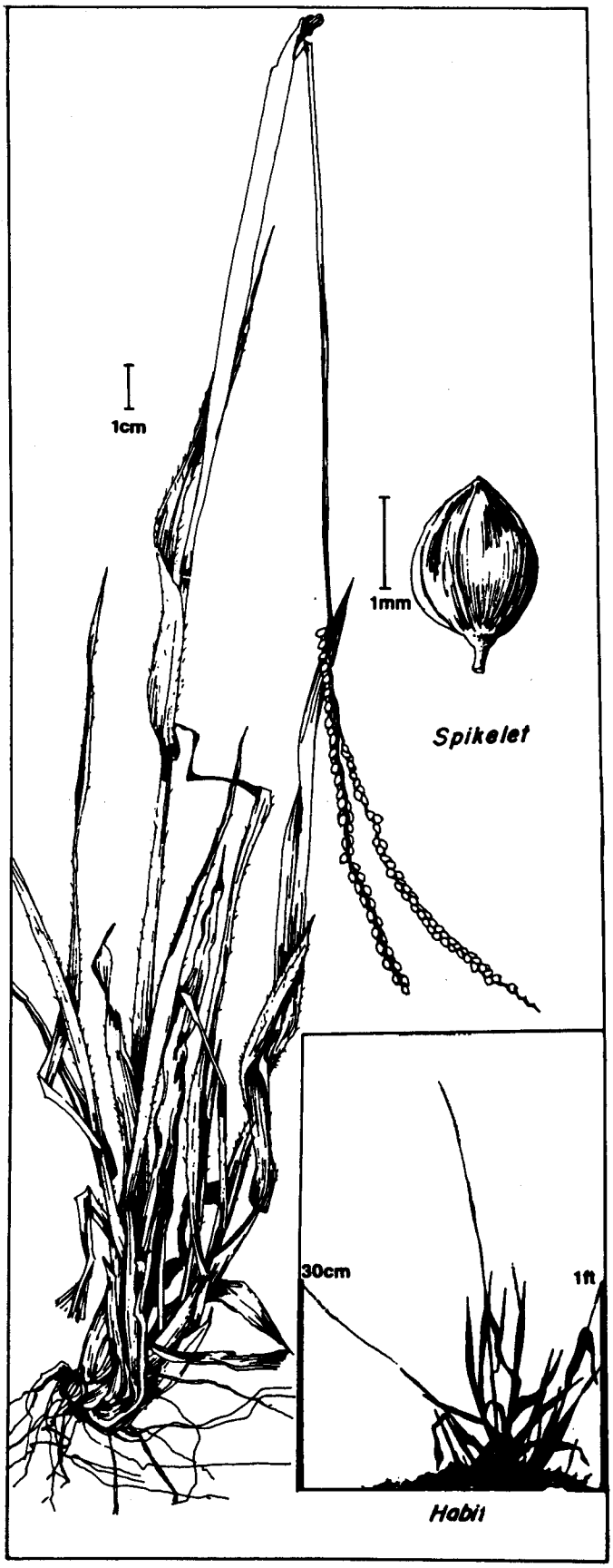
Hurrahgrass is a small paspalum grass frequently encountered throughout the South but seldom abundant. It is found most often on disturbed sandy sites growing as scattered individuals, sometimes in dense clumps. Flowering plants are about 2 feet tall, with ascending stalks. Foliage is usually covered with erect but soft hairs, but some plants are almost completely hairless.

As in other varieties of *Paspalum setaceum,* racemes are slender and usually about 2½ to 3 inches long. Each stalk is terminated by a single raceme, although there may be one or two hidden below. Flowering branches also may emerge from the upper sheaths. Spikelets are hairless, almost round and about 1/16 inch long. Seed are eaten by birds, but the plant is not abundant enough to be considered a major wildlife food plant.

Fringeleaf paspalum and barestem paspalum have approximately the same range as hurrahgrass and occur on similar sites. Leaf blades of both are essentially hairless, however, and spikelets are slightly smaller than those of hurrahgrass.

Range: Texas and Kansas, extending to Florida, Michigan, and Vermont.

Perennial. **Culms** ascending, branching at base, from short rhizomes, 45 – 90 cm tall; **sheaths** usually pilose toward summit, occasionally glabrous; **blades** 8 – 20 cm long, 2 – 10 mm wide, pilose on both surfaces; **racemes** one to three terminal, 4 – 17 cm long, one or more hidden in sheath; **spikelets** about 2 mm long, suborbicular, usually glabrous.



Miscellaneous Grasses

Although the bluestems, panicums, and paspalums account for most grass forage on southern pine forest range, many other grass genera are represented, often by a single species. Few are important forage plants. Some are grazed only when other forage is unavailable; others, though readily eaten by cattle, either are widely scattered individuals or grow abundantly only on certain sites.

Goobergrass—*Amphicarpum muhlenbergianum* (Schult.) Hitchc.

Goobergrass, known also as blue maidencane, is a warm-season perennial grass found on wet sites, such as low pine forests and pond or marsh shores. Its range is limited to the Coastal Plain of the four southeasternmost states. Spikelets produced in the terminal panicle are perfect but do not produce seed. Seed are produced on underground branches by spikelets that do not open. This similarity to the common peanut or "goober," *Arachis hypogaea* L., inspired the common name.

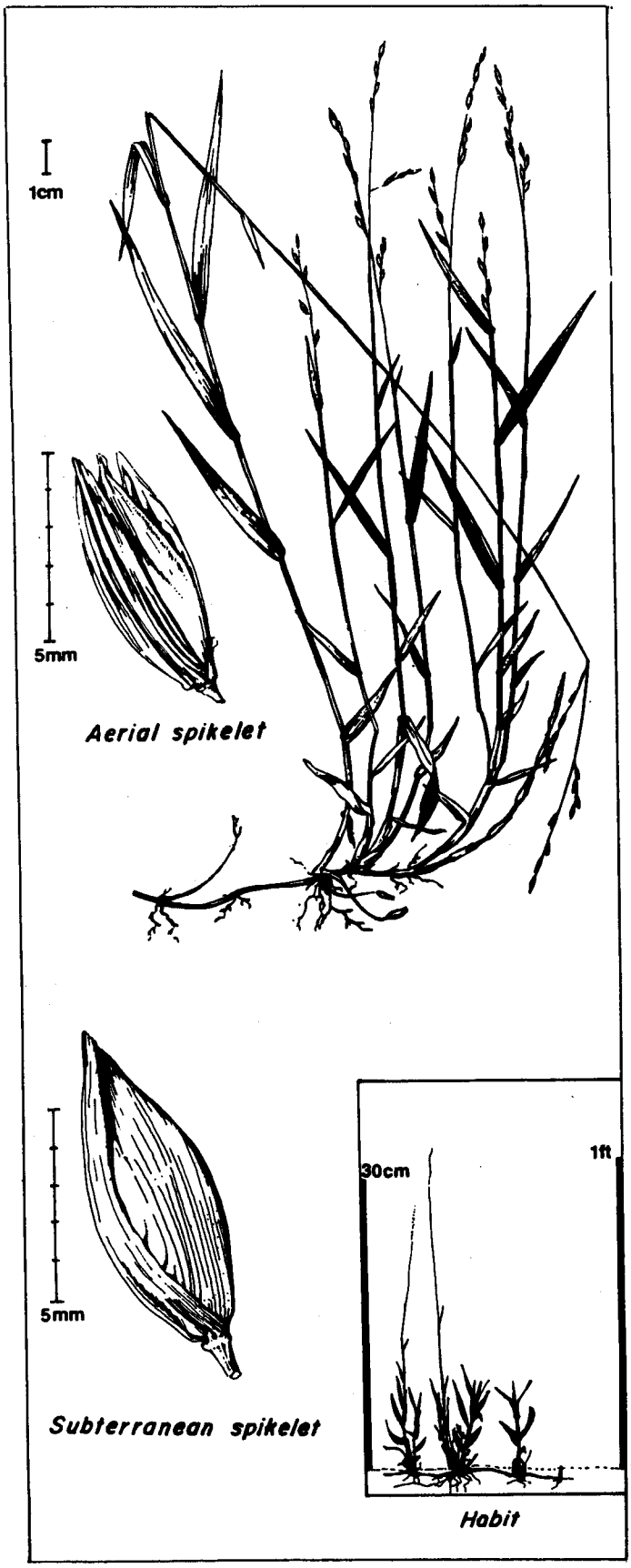
Stalks arise from a slender rhizome, producing a spikelike panicle about 5 inches long, with few flowers. Plants are 1 to 3 feet tall, with decumbent stems. Leaves are about 2½ inches long and ¼ inch wide. They are hairless except for occasional marginal hairs. Blades are conspicuously white-margined.

Goobergrass grows in pure stands on wet sandy flats, shallow ponds, or sloughs; it will not grow where water depth permanently exceeds 6 or 8 inches. Cattle graze it yearlong and deer utilize it in winter.

A hairy annual species, *Amphicarpum purshii* Kunth, grows from Georgia to New Jersey.

Range: South Alabama, Florida, coastal Georgia, and southeastern South Carolina.

Perennial. **Culms** usually decumbent at base, 30 – 100 cm tall, rhizomatous; **leaves** firm, blades white-margined when dry, 10 cm or less in length, 5 – 10 mm wide; **panicle** narrow, long-exserted, few-flowered; **spikelets** narrowly lanceolate, 6 – 7 mm long, subterranean spikelets 6 – 9 mm long.



Green Silkyscale—*Anthaenantia villosa* (Michx.) Beauv.

Green silkyscale is most common on longleaf-slash pine range. It grows on sandy sites, frequently in association with Elliott bluestem and paintbrush bluestem.

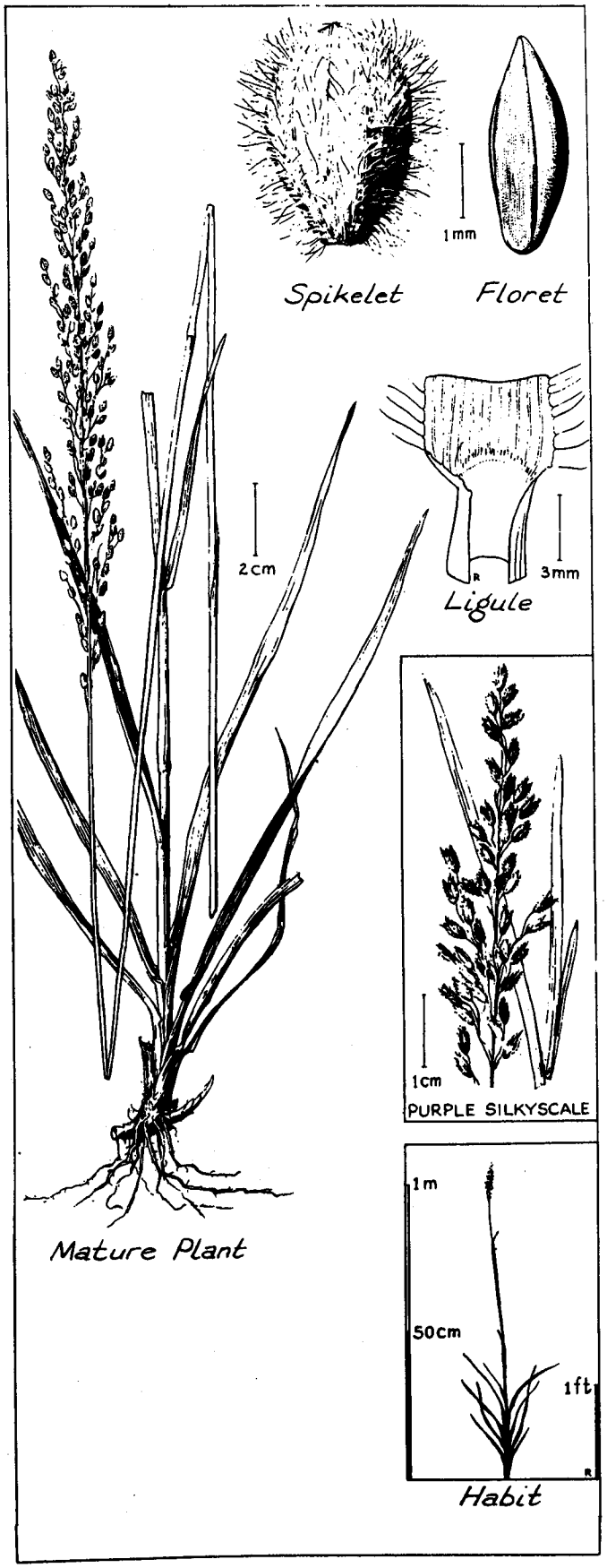
Mature plants are about 3 feet tall and spread by short rhizomes. In heavy bluestem stands, they usually form small, irregular, densely tufted clumps. Where soil is unusually fertile, clumps of plants may occasionally attain basal diameters of 10 to 12 inches. The smooth, pea-green, twisted foliage is conspicuous among other grasses. Basal leaves frequently reach 1 foot in length, but upper leaves are very short. Blades are about ¼ inch wide, most tapering abruptly to a point at the tip. Leaf margins are fringed with short hairs, and blades have no prominent midrib. The inflorescence is a narrow panicle up to 7 inches long. Spikelets are green, conspicuously fuzzy, about ⅛ inch long, and ovoid in shape.

Purple silkyscale, *Anthaenantia rufa* (Ell.) Schult., also grows throughout the southern Coastal Plain, usually on wetter sites than green silkyscale. It can be distinguished from green silkyscale either by its purplish spikelets or the lack of hairs on leaf margins.

Green silkyscale foliage is palatable and nutritious, but its grazing value is limited by its lack of abundance.

Range: Coastal Plain, Texas to Florida and North Carolina.

Perennial. **Culms** 60 – 120 cm tall, slender, in small tufts or singly from short rhizomes; **sheaths** glabrous, nonkeeled, much shorter than the internodes, crowded and overlapping at the base of the plant; **ligule** a short, ciliate membrane; **blades** 5 – 10 mm wide, glabrous with ciliate margins, flat, twisted along the length one to several times, tapered at the apex, the basal blades 10 – 30 cm long, the upper ones much reduced; **panicle** 10 – 17 cm long, pale green, long-exserted above the last reduced blade; **spikelets** 3 – 4 mm long, stalked, solitary, obovoid, with rows of long hairs between the nerves on the second glume and sterile lemma; **first glume** wanting; **grain** 2.5 mm long, brown, shining.



Arrowfeather Threeawn—*Aristida purpurascens* Poir.

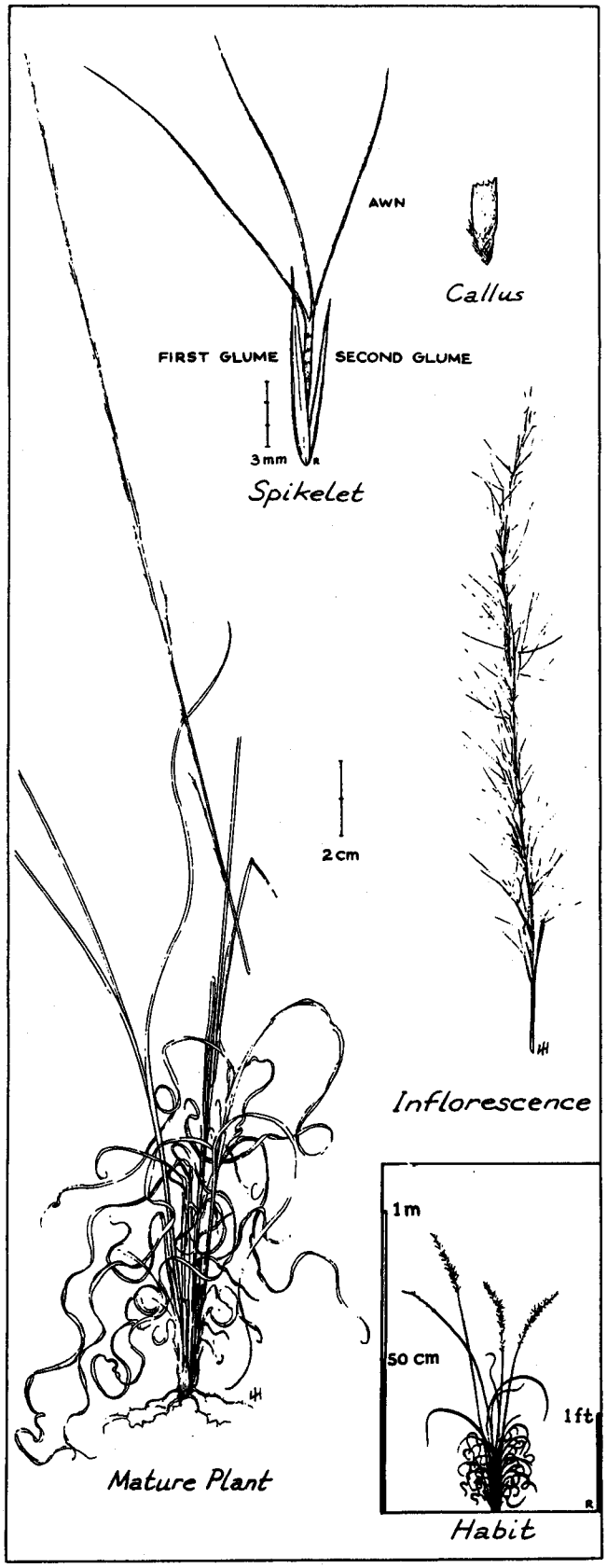
Arrowfeather threeawn is common on longleaf-slash pine sites across the South. It grows on dry sandy sites and increases in abundance on overgrazed range.

It is a perennial with mostly basal leaves and forms dense clumps that are usually less than 3 inches in diameter. Flower stalks, which mature in the fall, average 2 feet tall. The inflorescence is a narrow, nodding panicle 6 to 12 inches long. Spikelets are round in cross section and one-flowered. They terminate in three spreading awns, each about ¾ inch long. Exclusive of awns, spikelets are about ⅜ inch long. Although panicles may become purplish toward maturity, this color is less characteristic than *purpurascens* implies. The thin papery glumes, up to ½ inch long, persist after spikelets shatter. Foliage curls conspicuously in the fall, with many of the leaf blades forming one or more ringlets.

Arrowfeather threeawn is low in forage value. Cattle may graze it in spring, especially on freshly burned range. Palatability declines after early summer, as the foliage becomes tough and somewhat wiry.

Range: Texas to Florida, extending north to Wisconsin and Massachusetts.

Perennial. **Culms** 40 – 70 cm tall, slender, in tufts of several stems from a weak, knotty base; **sheaths** smooth and glabrous; **ligule** a short-ciliate membrane less than 0.5 mm long; **blades** 1 – 2 mm wide, flat, to 20 cm long, sometimes with a tuft of long hairs above the ligule, long-acuminate, in age forming curls or ringlets; **panicle** 15 – 30 cm long, one-third to one-half the total length of the culm, the branches short, appressed; **spikelets** with three straight spreading awns 12 – 25 mm long, the center one sometimes slightly exceeding the others in length; **glumes** 6 – 12 mm long, the first longer than the second, scabrous; **lemma** 6 – 8 mm long, hispid, sometimes marked with six to eight diagonal dark-purple bands, the callus about 0.5 mm long, pubescent; **anthers** purple.



Bottlebrush Threeawn—*Aristida spiciformis* Ell.

This showy perennial grass is common on disturbed or overgrazed Coastal Plains flatwoods sites from Mississippi to South Carolina, but has little worth as forage. It is found on seepage slopes and occasionally on well-drained uplands. The 6- to 8-inch bristly seed head on the bare stalk resembles a bottle brush.

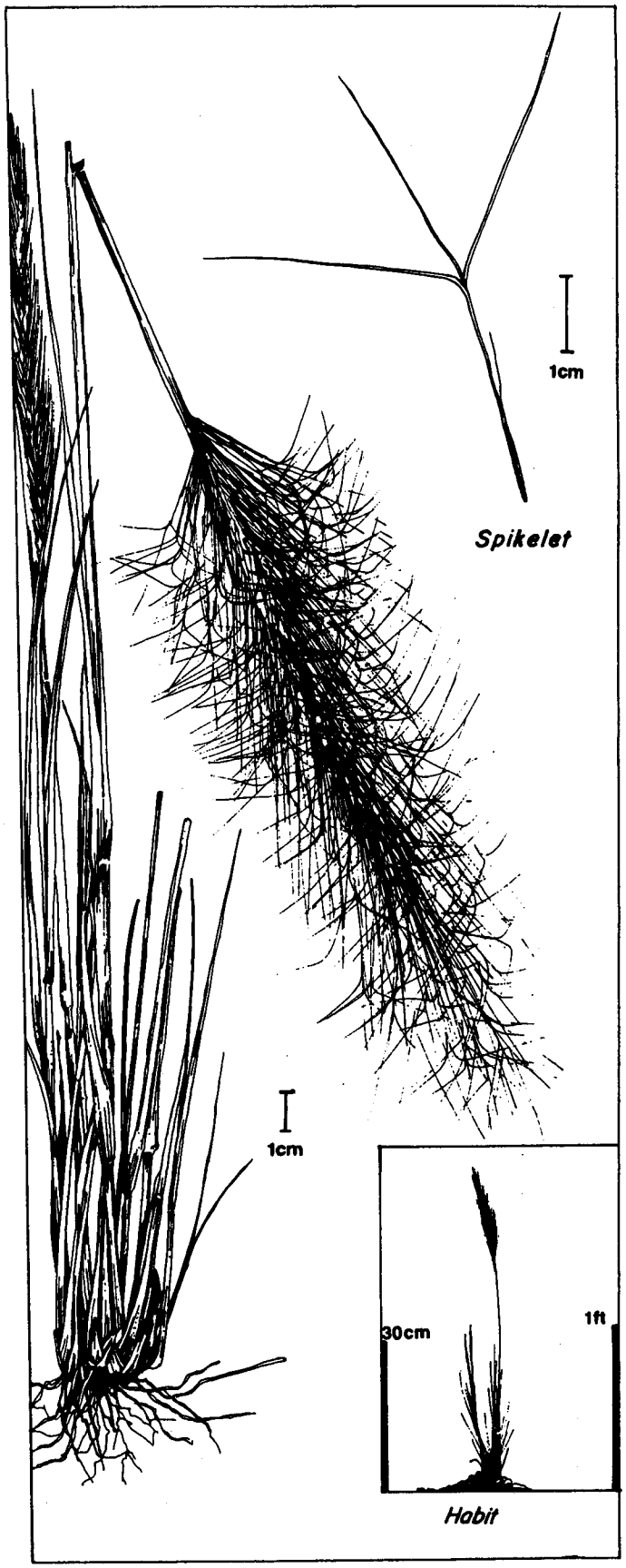
Like most threeawns, bottlebrush threeawn grows best where competition is light. It is a short-lived perennial that depends on its abundant seed production for reproduction.

Plants produce very little forage even where stems are dense. Cattle avoid plants after the bristly seed heads form in late August and September. The large seed head distinguishes bottlebrush from pineland and arrowfeather threeawns.

Several annual threeawns are common and often abundant on roadsides, overgrazed range, and other disturbed sites. Churchmouse threeawn, *Aristida dichotoma* Michx., oldfield threeawn, *A. oligantha* Michx., and slimspike threeawn, *A. longespica* Poir., are three annuals with southwide distribution.

Range: Coastal Plain, Mississippi to central Florida and South Carolina.

Perennial. **Culms** erect, 50 – 100 cm tall, glabrous; **blades** 1 – 3 mm wide, elongate, stiffly erect, involute, glabrous; **sheaths** glabrous; **panicle** dense and spike-like, 10 – 25 cm long; **glumes** unequal, the first 4 – 5 mm long, about half as long as second, both awned; **lemma** 1 – 3 cm long including column, awns subequal, 2 – 3 cm long.



Pineland Threeawn—*Aristida stricta* Michx.

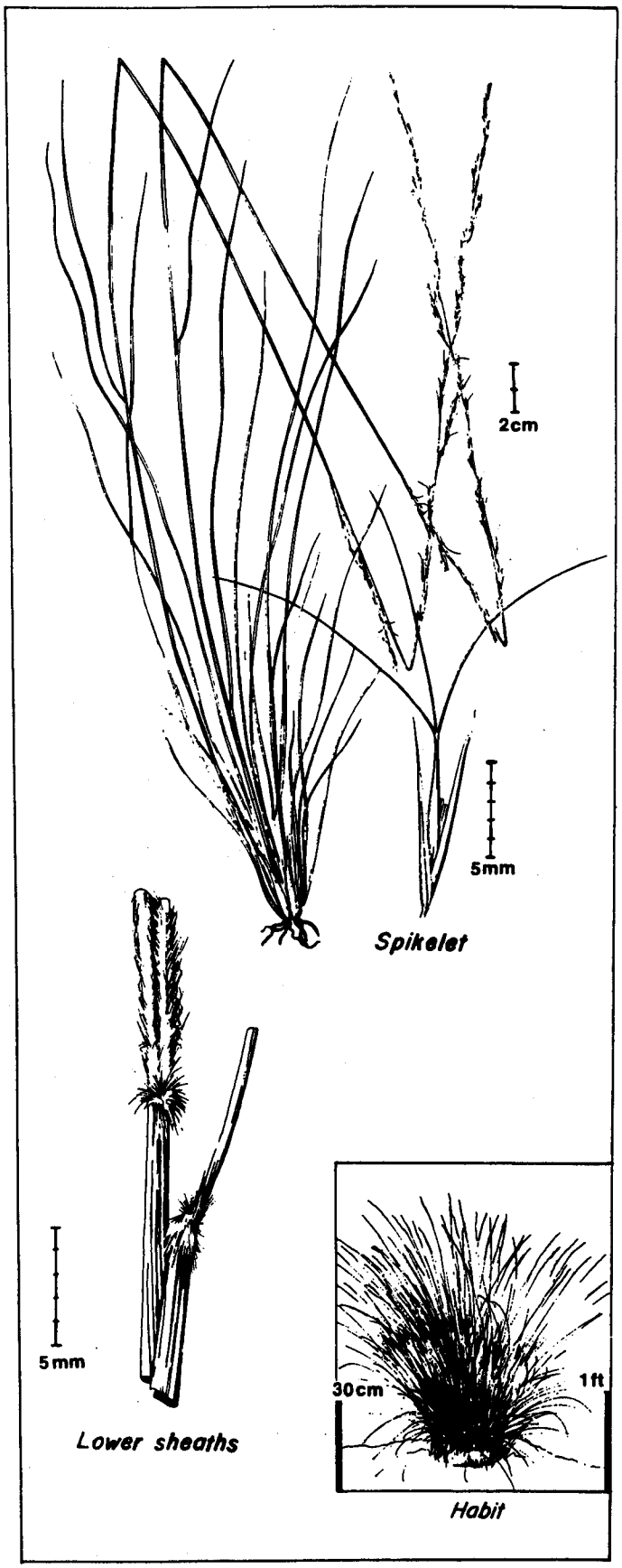
This is the "wiregrass" of the southeastern Coastal Plain. It is a principal forage grass of pine flatwoods range in Florida and Georgia. Although it withstands heavy grazing and frequent burning, it is palatable and nutritious for livestock only for a short time after a fire. Abundant seedstalks are produced by midsummer, following an early spring burn. Two or three years with no burning reduces seedstalk production drastically, and a dense wiregrass rough builds up. Very little grazing is possible on wiregrass range without prescribed fire. Plants with seedstalks are about 3 feet tall. Stalks are erect and slender with a spikelike terminal panicle about 12 inches long. Leaf blades are tightly rolled and tough except in very new growth. Recently burned plants have stiffly ascending leaves and seedstalks, appearing quite different from the stalkless, spreading clumps in the unburned rough.

Cutover muhly is similar in growth habit to pineland threeawn, but its leaf blades are not as tightly rolled. A distinguishing characteristic of pineland threeawn is a conspicuous band of white hair covering the collar, lower blade, and upper sheath of the lower leaves.

Dense colonies of pineland threeawn are found in the wet sandy flatwoods of the pine-wiregrass type. The grass is also the dominant herbaceous plant on dry sandhills. When eliminated from a site, as by chopping, it does not return, indicating that few viable seeds are produced.

Range: Mississippi to Florida and North Carolina.

Perennial. **Culms** 50 – 100 cm tall, glabrous; **leaves** densely tufted, mostly basal, **blades** involute, elongate, to 50 cm long; **collar** densely pilose; **panicle** slender, to 30 cm long; **glumes** 7 – 10 mm long, **lemma** 6 – 8 mm long, scarcely beaked; **awns** divergent, the central 1.0 – 1.5 cm long, the lateral slightly shorter.



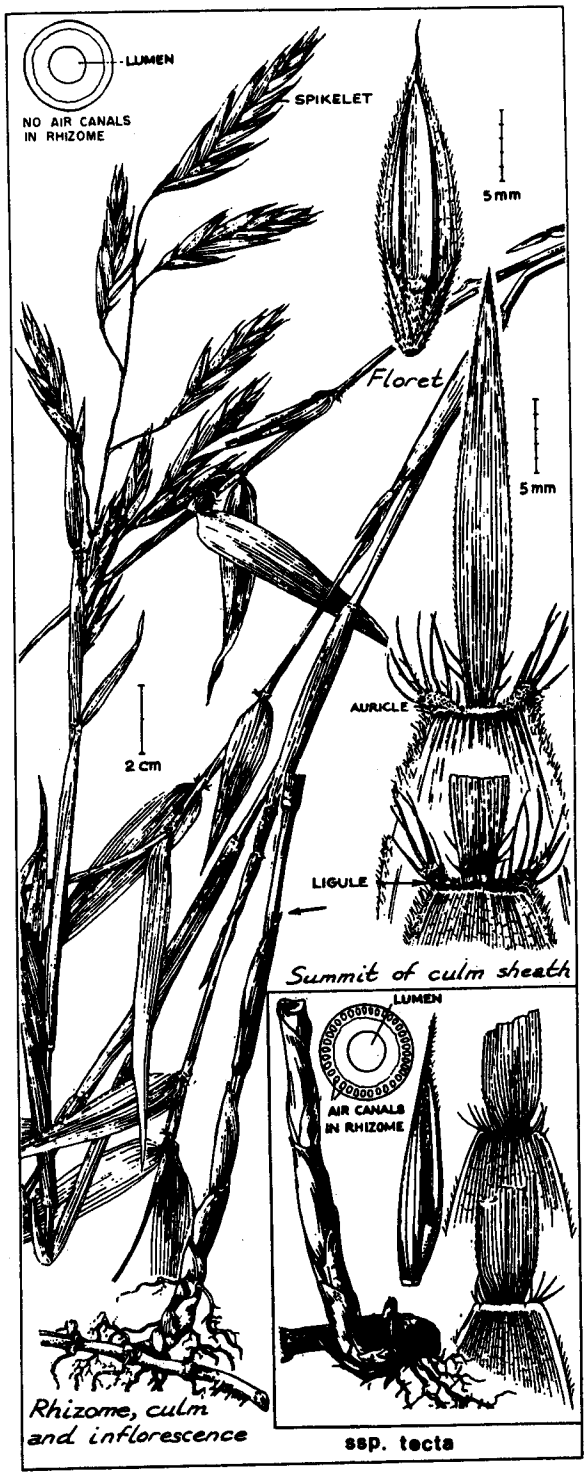
Cane—*Arundinaria gigantea* (Walt). ex Muhl.

Until recently, switch cane and giant cane were considered two separate species of *Arundinaria;* switch cane was *A. tecta* and giant cane was *A. gigantea.* McClure (1978) changed the rank of switch cane to subspecies *tecta* of *A. gigantea,* made giant cane *A. gigantea* spp. *gigantea,* and separated a third subspecies, *A. gigantea* spp. *macrosperma.* No attempt will be made here to distinguish between subspecies as differences are based primarily on the presence or absence of air canals in the rhizome (see illustration) and are not always conclusive.

Cane is the largest native grass in the United States. On moist, fertile bottomlands, it may reach 25 feet in height with stems up to ¾ inch in diameter. Scattered small plants may be found on uplands adjacent to bottomlands. Unlike most other grasses, it is an evergreen shrub, the stems surviving for several years. Cane does not flower often enough to be identified by usual taxonomic procedures but is easily distinguishable from other grasses by its stout, hollow, jointed stems similar to cane fishing poles. Wide leaf blades are narrowed to short petioles. On upland sites, plants flower following grazing or burning.

Cane is excellent forage. Cattle graze leaves and twigs during winter, when other green herbage is scarce. On an experimental range in North Carolina, cane was grazed from May until January and furnished 70 to 93 percent of the cattle diet. Crude protein, calcium, and phosphorus content of cane averaged higher than in other grasses studied and well above the requirements of growing cattle. Under careful management, grazing capacity was high; ½ to 1 acre per cow-month. Despite its high nutritive value, cane is not abundant enough on upland sites to be considered an important range forage plant. Although extensive canebrakes were once common along many streams, most have been seriously depleted by overuse. Burning to reduce height, followed by concentrated grazing, eliminated many stands. Large brakes can be very productive if judiciously managed. Where cane furnishes a minor part of the forage, it is usually overgrazed.

Range: Southern and southeastern states from Texas and Oklahoma, extending eastward to West Virginia, Delaware, and Florida.



Perennial. **Culms** 1 – 8 m tall, erect, smooth, and woody, to 2 cm in diameter, arising abruptly from a stout rhizome; lower culm sheaths about half as long as the internode, withering and soon falling; upper culm sheaths with 10 to 12 bristles 6 – 9 mm long at the summit, occasionally growing out of a definite pair of auricles, a dense band of stiff hairs across the collar; **ligule** firm, scarcely 1 mm long; **leaf blades** petiolate, rounded at the base, acuminate at the tip, glabrous to pubescent, 15 – 27 cm long, 2.5 – 4.0 cm wide on the main culm and primary branches, shorter and narrower on the ultimate branchlets, often in dense flabellate clusters; **inflorescences** paniculate or racemose, crowded toward the ends of leafy or leafless twigs with few to several spikelets on slender, angled pedicels 2 – 30 cm long, hirsute to nearly glabrous; **spikelets** 4 – 7 cm long, about 8 mm wide, mostly with 8 to 12 flowers, rather loose; **glumes** distant, acuminate, pubescent, the lower sometimes wanting; **florets** 1.5 – 2.0 cm long, the keeled, broadly lanceolate lemma tapering to an awn about 4 mm long.

Common Carpetgrass—*Axonopus affinis* Chase

Carpetgrass differs markedly in growth habit from most southern range grasses. Under favorable conditions it spreads rapidly by stolons, developing a dense sod. The best carpetgrass site is a moist, medium- to fine-textured soil where grazing is intense. On dry sandy soils it occurs sparingly, growing in shallow depressions or as small, widely scattered colonies along animal trails and on intensely grazed areas.

Where use is light, carpetgrass cannot compete successfully with taller grasses. On a Louisiana range that had been grazed heavily for 12 years, it comprised 15 percent of the vegetation. Three years after grazing was discontinued it declined to 3 percent.

Slender flower stalks up to 2 feet tall are produced throughout the growing season. The inflorescence consists of two to four slender racemes 1 to 3 inches long. Leaf blades are mostly 4 to 6 inches long and about ¼ inch wide, with bluntly rounded tips.

The foliage of carpetgrass resembles centipedegrass, *Eremochloa ophiuroides* (Munro) Hack., and St. Augustinegrass, *Stenotaphrum secundatum* (Walt.) Kuntze. Its inflorescence consists of several racemes, however, while those of the other grasses are solitary spikes.

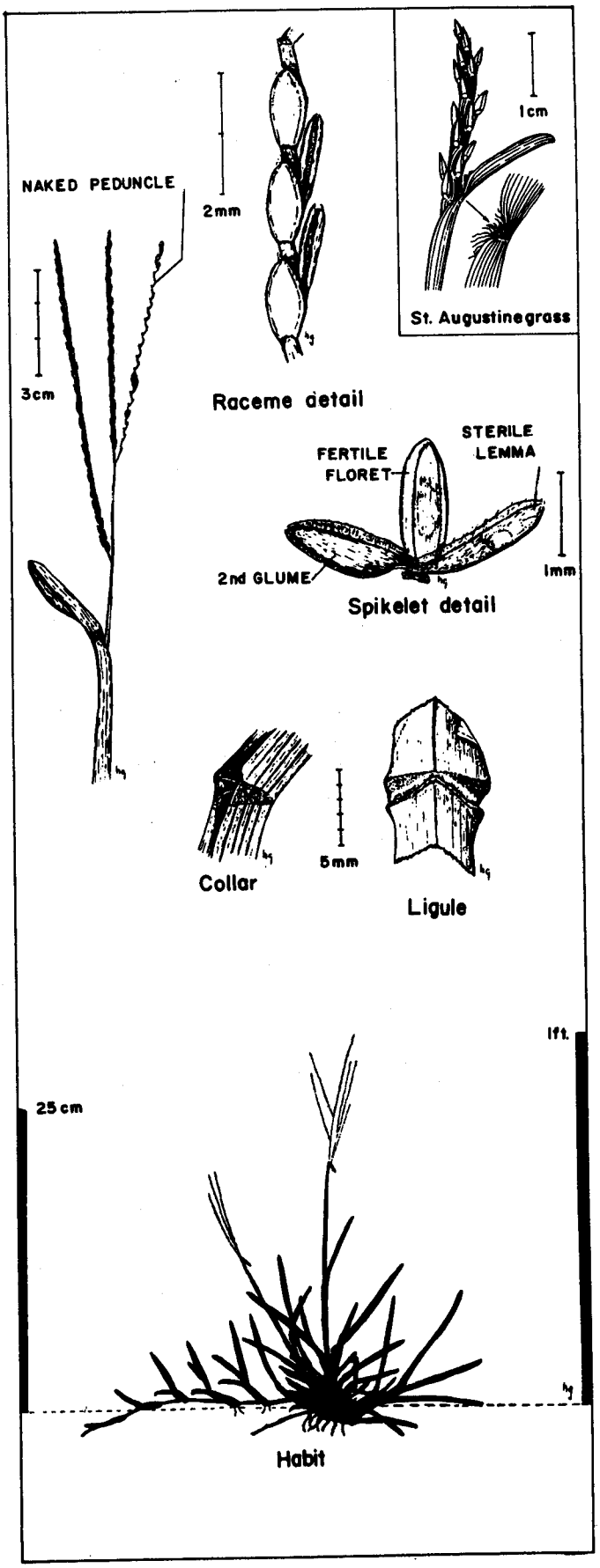
Big carpetgrass, *Axonopus furcatus* (Fluegge) Hitchc., and tropical carpetgrass, *A. compressus* (Swartz) Beauv., also grow on southern pine forest ranges. Their characteristics and forage values are similar to those of common carpetgrass. Both are usually found on wetter sites than those occupied by common carpetgrass.

Common carpetgrass is nutritious and highly palatable throughout the growing season. Although cattle usually prefer it over most of the associated grasses, it is too sparse on well-managed ranges to contribute much forage. Grazing intensely enough to maintain carpetgrass stands adversely affects soil conditions and pine regeneration; it also leaves little forage for winter use.

Carpetgrass is valuable mainly as cover on range areas grazed too heavily to support other perennial grasses. It is also useful for seeding grazed firebreaks, for it readily withstands the utilization pressure necessary to minimize fuel.

Range: Coastal Plain, North Carolina to Texas, extending north to Oklahoma and Arkansas.

Perennial. **Culms** slender, glabrous, 25 – 60 cm tall in erect tufts or from stolons; **sheaths** broad, compressed-keeled, glabrous; **ligule** membranous, less than 0.5 mm long, margin fringed; **blades** 2 – 6 mm wide, flat or folded, usually short in relation to the long sheaths, conspicuously rounded at the tip; **racemes** two to four, subdigitate, 2 – 10 cm long; **spikelets** about 2 mm long, oblong-elliptic, blunt at the tip, sparsely silky-pilose.



Longleaf Uniola—*Chasmanthium sessiliflorum* (Poir.) Yates—*(Uniola sessiliflora* Poir.)

With the exception of seaoats, *Uniola paniculata* L., all uniolas, known also as spikegrasses, are now in the genus *Chasmanthium.* Longleaf uniola is perhaps the most characteristic grass of the loblolly-shortleaf pine-hardwood type; in densely shaded stands, it may be the only grass present. It grows in loose tufts from short, knotty rhizomes. Stalks are erect to spreading or slightly nodding, from 2 to 4 feet tall. Although classified as a warm season perennial, it produces new growth sporadically during the winter and early spring. By late spring or early summer, vegetative growth ceases and seedstalks form. Seed do not mature until fall.

Leaf blades are 3 to 16 inches long and up to ½ inch wide, tapering toward both the tip and base. Blades are usually thinly coated with short white hairs on the lower surface. Upper surfaces are hairless except near the base. Sheaths are conspicuously hairy, especially at the summit.

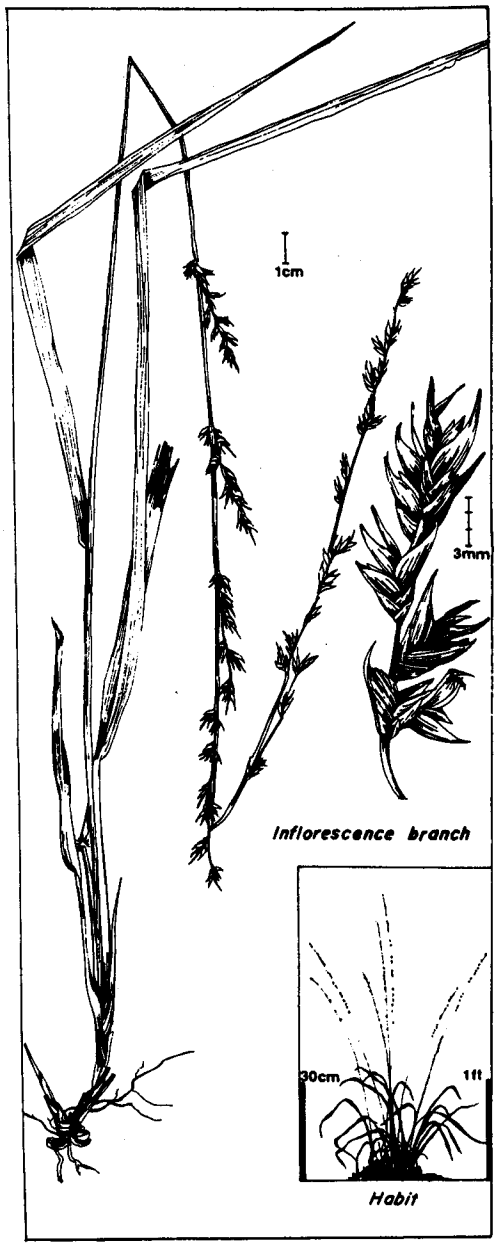
The inflorescence is a spike-like panicle 8 to 20 inches long with stiffly ascending or appressed branches up to 3 inches long. The flat, three- to five-flowered spikelets are clustered along the panicle branches. Mature seed are black, about 1/10 inch long.

Despite its tolerance of fairly heavy shade, longleaf uniola produces more forage in stands opened up by thinning or removal of weed trees and brush. However, it cannot tolerate full sunlight. The uniolas rank below the bluestems in quantity and quality of forage produced, but the value is enhanced by winter burning, which destroys old growth and promotes early regrowth. New growth following a winter fire is palatable and comparable to the better bluestems in protein content. By the time seedstalks appear in early summer, however, palatability is much below that of the bluestems, although protein content remains relatively high. Some foliage retains a green color throughout the winter.

Spike uniola, *C. laxum* (L.) Yates, is similar in appearance and growth habit to longleaf uniola. The two grow together throughout the South, but on pineywoods range, longleaf uniola is usually most abundant. Spike uniola, which has hairless foliage, narrower leaves, and a more nodding seedstalk than longleaf, is generally more common on sites somewhat wetter than those occupied by longleaf uniola. The conspicuously hairy sheaths of longleaf uniola are the most reliable distinguishing characteristics; spike uniola is hairless. The two grasses are similar in forage value as well as in appearance; thus, there is little need to distinguish between them.

Broadleaf uniola, *C. latifolium* (Michx.) Yates, has leaves up to 1 inch wide and is found on shaded, sandy streambanks throughout the South. Its flat, several-flowered spikelets resemble those of seaoats more than those of other species of *Chasmanthium.*

Range: East Texas and Oklahoma to Florida and Virginia.



Perennial. **Culms** 50 – 150 cm tall, erect in loose tufts from short, knotted rootstocks; **sheaths** pilose, at least toward summit, densely pilose at collar; **blades** 8 – 38 cm long, 5 – 10 mm wide, firm, sparsely pilose on upper surface near base, puberulent on lower surface or merely short ciliate on margins; **ligule** short, membranous, finely ciliate; **panicle** long-exserted, 20 – 50 cm long, branches narrow, distant, ascending or appressed; **spikelets** in fascicles 1 – 3 cm apart, flat, 3- to 5-flowered, broadly v-shaped at maturity, 6 – 8 mm long; **glumes** 1.5 – 2 mm long, much shorter than lemmas; **first lemma** sterile; fertile lemma 3 – 5 mm long, acuminate, beaked, striate-nerved; palea shorter than lemma, acute; **grain** about 3 mm long, black.

Carolina Jointtail—*Coelorachis cylindrica* (Michx.) Nash—*(Manisuris cylindrica* (Michx.) Kuntze)

Recent revision of the genus *Manisuris* and related genera moved all southern species of *Manisuris* to the genus *Coelorachis,* an earlier name for the jointtails. Itchgrass, formerly *Rottboellia exaltata* L. f., is now *Manisuris exaltata* (L. f.) Kuntze. An agricultural weed throughout the South, itchgrass is now the only species in the genus *Manisuris.*

Carolina jointtail grows on sandy soils throughout the South, usually on disturbed sites such as firelines. In spring and early summer, plants are easily identified by the jointed, cylindrical, spikelike raceme at the tip of each flower stalk. Racemes are generally 3 to 6 inches long and about ⅛ inch in diameter. They shatter readily at maturity; plants may afterwards be recognized by the swollen joint at the stalk tip.

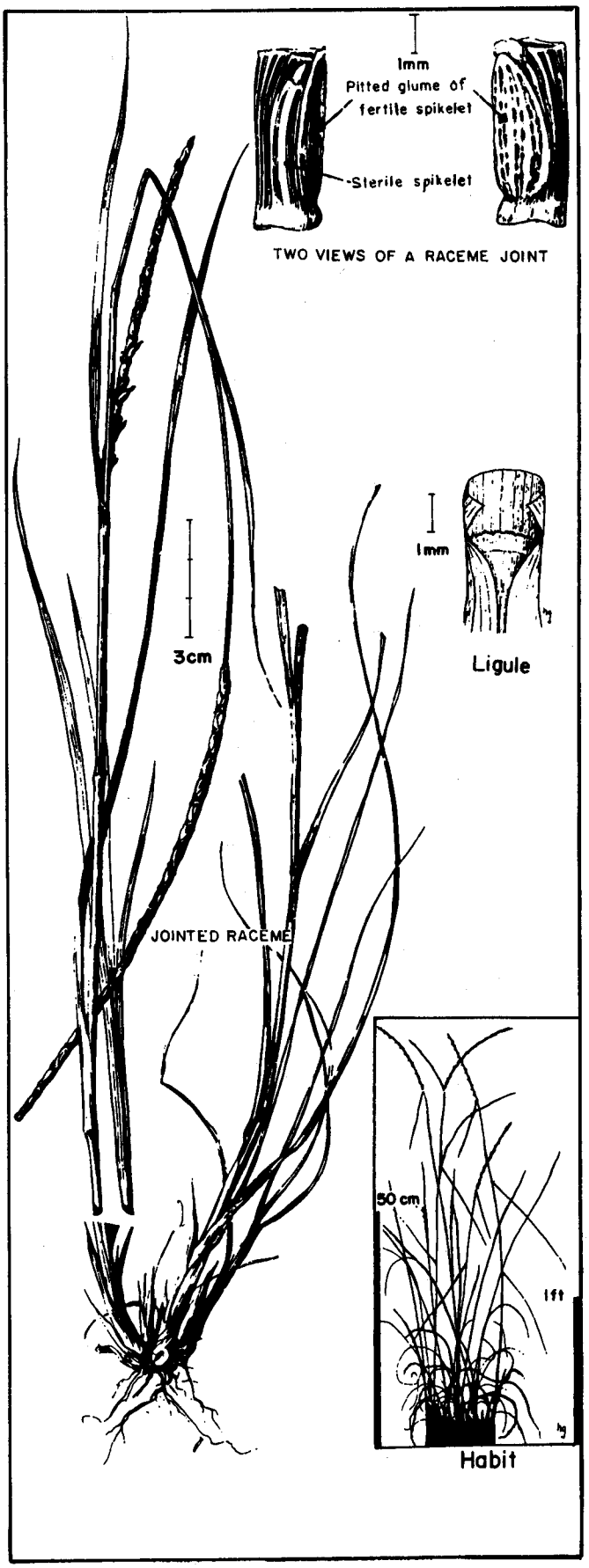
Carolina jointtail usually grows in small colonies. Since the seedbearing joints of the racemes are heavy, most seeds remain near the parent. New plants begin as small tufts, spreading by short rhizomes. Height at maturity is about 3 feet.

Lattice jointtail, *C. tessellata* (Steud.) Nash, and wrinkled jointtail, *C. rugosa* (Nutt.) Nash, also grow in the South, but not on dry sites. Both have flattened leaf sheaths; those of Carolina jointtail are round.

Carolina jointtail is palatable and nutritious until plants mature in late spring or early summer. It is apparently intolerant of heavy grazing.

Range: Texas to Florida, extending north to North Carolina and Missouri.

Perennial. **Culms** 30 – 100 cm tall, broad at the base, in tufts from short, stout rhizomes, erect, slender, generally unbranched; **sheaths** 2 – 3 mm wide, shorter than the internodes, cylindrical, sometimes reddish or purplish; **ligule** a short membrane, collar and nodes purple; **blades** 1 – 3 mm wide, to 30 cm long, slightly curved, flat or involute; **racemes** 10 – 20 cm long, cylindrical, purple, solitary on main culm and branches; **spikelets** awnless, in pairs at the nodes of a thickened rachis; **sessile spikelet** 4 – 5 mm long, perfect, first glume pitted along the nerves; **pedicellate spikelet** reduced to two scales.



Toothachegrass—*Ctenium aromaticum* (Walt.) Wood

Toothachegrass commonly inhabits flatwoods sites in cutover areas. It is commonly found on sandy bogs, where pitcherplants *(Sarracenia* spp.) are the dominant plants. These may be narrow hillside bogs between a creek and a sandy pine hill.

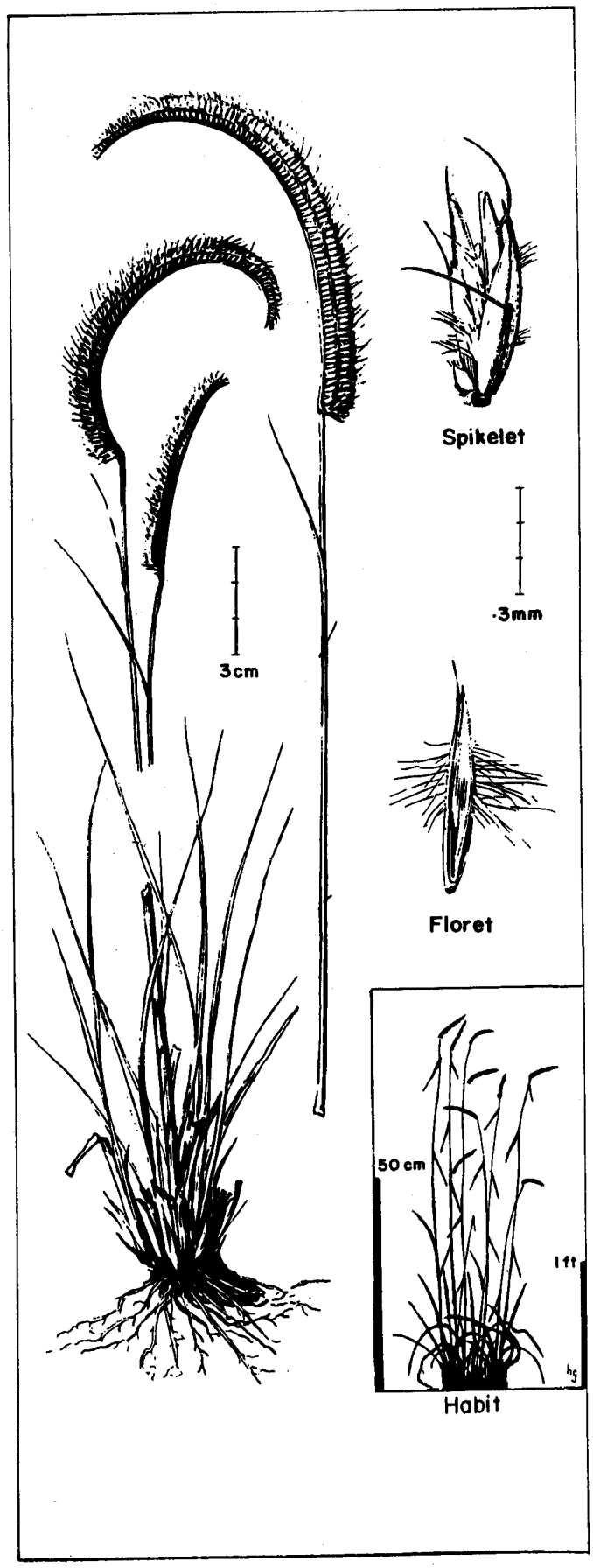
The plants are conspicuous, growing in clumps with scant foliage and many erect flower stalks 3 to 5 feet tall. Each stalk ends in a solitary, thick, usually curving, comblike spike 2 to 6 inches long. Spikelets, crowded on one side of the axis, bear a straight awn about ¼ inch long. Except for *Ctenium floridanum* (Hitchc.) Hitchc., which is restricted to Florida, no southern grass has an inflorescence resembling that of toothachegrass.

The foliage of toothachegrass is distinguishable from other grasses by the fibrous mat that remains after old leaf sheaths disintegrate. Although it resembles cutover muhly in this character, its fibers are straight to gently curving, not curly as in cutover muhly. Its leaf blades are up to ¼ inch wide; those of cutover muhly are less than ⅛ inch wide. Freshly dug roots emit a distinctive spicy odor; the substance responsible is reputedly effective in relieving toothache. Chewing the roots produces a slight numbness in the tongue and gums.

On unburned range, the persistent old leaves and flower stalks make toothachegrass relatively unpalatable. After a fire, cattle readily graze the herbage.

Range: Coastal Plain, Louisiana to Florida and Virginia.

Perennial. **Culms** stout, unbranched, 10 – 150 cm tall, from aromatic roots; **sheaths** shorter than the internodes, ribbed, glabrous, persistent, the old ones forming a conspicuous fibrous mass at the base; **ligule** about 1 mm long, membranous, truncate; **blades** 2 – 6 mm wide, flat or involute, elongate with attenuate tips; **inflorescence** a single straight or curved thick spike 5 – 15 cm long; **spikelets** 5 – 7 mm long, arranged on one side of the pubescent rachis.



Poverty Danthonia—*Danthonia spicata* (L.) Beauv. ex R. & S.

Poverty danthonia, known also as poverty oatgrass, povertygrass, or junegrass, is a weedy cool-season perennial bunchgrass found along roadsides and on rocky, sandy, generally dry or sterile sites throughout most of the United States. In the South, it is found most frequently in the loblolly-shortleaf pine-hardwood and upland hardwood-bluestem types.

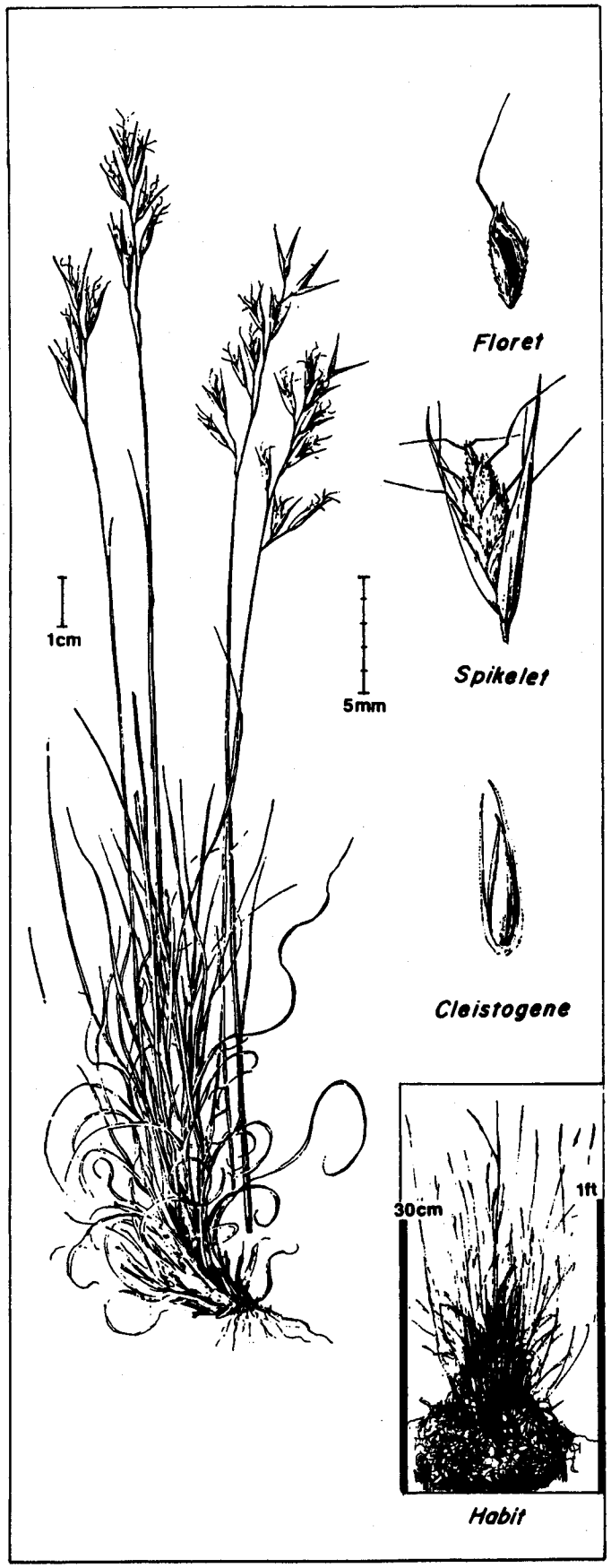
Plants average about 1½ feet in height, seldom exceeding 2 feet. Most of the foliage is in a crowded basal clump of leaves, with narrow blades 4 to 6 inches long and often curved or twisted. A constricted panicle of 2 to 13 spikelets terminates each culm. A reduced spikelet with a single unopened, self-fertilized floret (cleistogene) is produced inside one or more leaf sheaths.

Two other closely related species, flatstem danthonia, *Danthonia compressa* Austin, and downy danthonia, *D. sericea* Nutt., occur on southern forest ranges. Flatstem danthonia, which overlaps the range of poverty danthonia at the mountainous eastern end of the loblolly-shortleaf pine-hardwood type, has crooked culms and a much looser inflorescence than poverty danthonia. Downy danthonia, a larger and hairier species, occurs throughout the South, and is common but not abundant in longleaf pine forests of southern Alabama and northwest Florida.

Cattle, deer, and wild turkeys eat the young basal foliage of poverty danthonia, but the plant is considered an indicator of abused range or poor soils. Western varieties reportedly have no forage value. Seeds of both poverty and downy danthonias have limited value as food for wildlife.

Range: From Maine and Florida to Washington, Oregon, and New Mexico. Rare in the Coastal Plain.

Perennial. **Culms** erect, straight, 20 – 60 cm tall, densely cespitose; **leaves** mainly basal; **sheaths** glabrous or occasionally pilose, a tuft of long hairs at the throat; **blades** up to 20 cm long, 2 mm wide, involute; **inflorescence** a contracted panicle 2 – 5 cm long with 2 to 13 spikelets; **spikelets** 5- to 8-flowered; **glumes** lanceolate-acuminate, 10 – 12 mm long; **lemma** 3.5 – 5.0 mm long, sparsely villous, awned from bifid apex, 4.5 – 9.0 mm; **palea** broad flat obtuse, ciliolate, reaching to base of awn; **cleistogamous spikelet** usually of one fertile, unawned floret slightly larger than normal florets.



Hairy Crabgrass—*Digitaria sanguinalis* (L.) Scop.

Hairy crabgrass is the most common of the southern crabgrasses. A native of Europe, it is thoroughly naturalized and is a weed of lawns and cultivated ground throughout the United States. On native range, it occurs on firelines, roadsides, and areas denuded by overgrazing or mechanical disturbance. It is a spreading, warm-season annual, rooting at the nodes of reclining stems. On rich soils, with little or no competition, it may form large clumps. Stems may be 3 feet, but the height of the clump is seldom more than 18 inches.

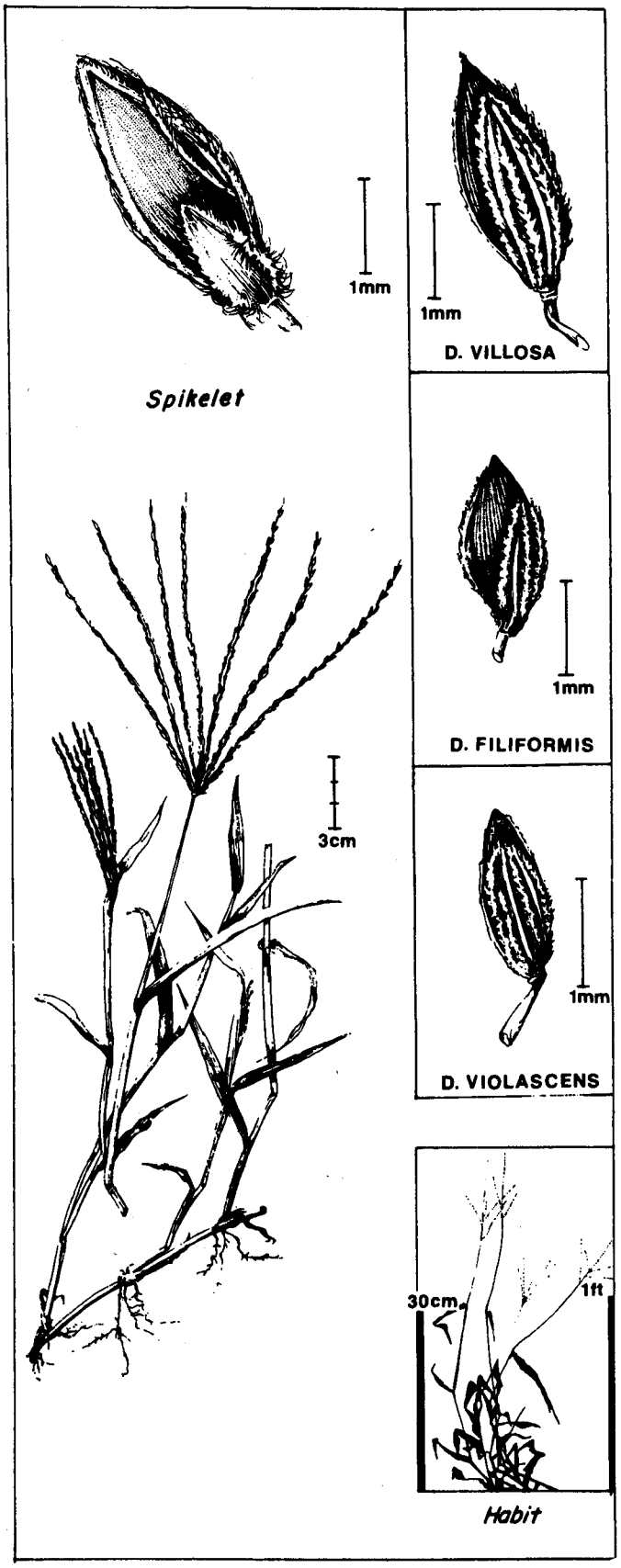
The closely related southern crabgrass, *Digitaria ciliaris* (Retz.) Koeler *(D. adscendens* (H.B.K.) Henr. or *D. sanguinalis* var. *ciliaris* (Retz.) Parlat.), is widespread and may be mistaken for hairy crabgrass. Southern crabgrass has glabrous or sparsely papillose-pilose foliage and glabrous nerves on the sterile lemma; hairy crabgrass foliage is densely pilose, and nerves of the sterile lemma have short vitreous spines.

Other common crabgrasses include violet crabgrass, *D. ischaemum* var. *violascens* (Link) Radf., *(D. violascens* Link), slender crabgrass, *D. filiformis* (L.) Koel., and shaggy crabgrass, *D. villosa* (Walt.) Pers. All three are found throughout the South and have dark-brown seeds. Seeds of hairy crabgrass are pale in color. There are approximately a dozen other crabgrasses in the United States with about half of them found only in southern Florida.

Spring growth is of good quality for cattle forage, but plants mature early, becoming dry and unpalatable. Since it seldom occurs on undisturbed ranges, however, little crabgrass forage is included in the cattle diet.

Range: Throughout the United States.

Annual. **Culms** branching and spreading, decumbent, rooting at lower nodes, finally erect or ascending, 30 – 120 cm long; **sheaths**, at least the lower, papillose-pilose; **ligule** erose, 2 – 3 mm long; **blades** to 16 cm long, 5 – 10 mm wide; **racemes** three to nine, 5 – 10 cm long, digitate; **spikelets** pale or grayish, about 3 mm long; **first glume** minute, **second glume** approximately one-half spikelet length.



Virginia Wildrye—*Elymus virginicus* L.

Virginia wildrye, or Terrellgrass, is a cool-season, weakly perennial bunchgrass occurring in several varieties throughout most of the United States. Although not a common plant of the pine forests, it grows in all the southern states. Stream borders, pond shores, moist swales, and rich woods are common habitats. New plants are produced by tillering as well as by seed.

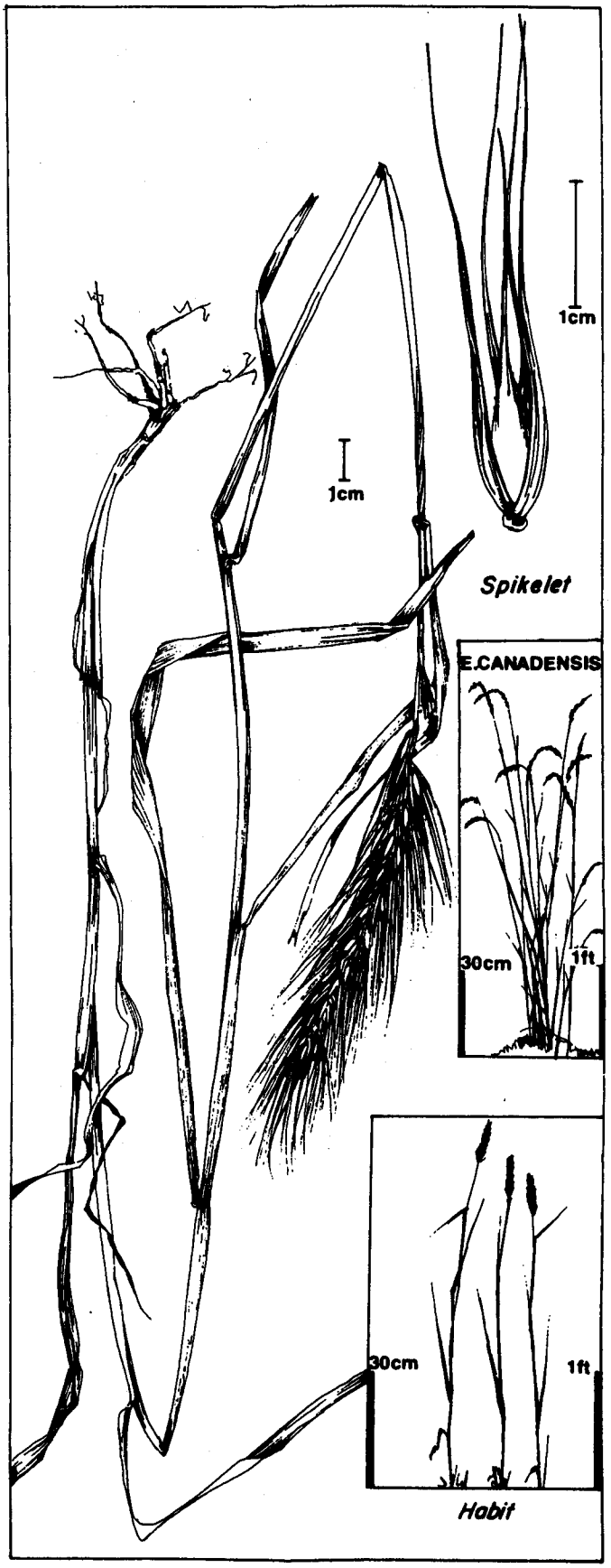
Stalks are 2 to 3 feet tall with erect seed heads. Leaf blades are up to 12 inches long, gradually tapering to a fine point from a basal width of about ¼ inch. Stems, leaves, and seed heads are usually hairless. A good identification character of Virginia wildrye is the hardened rounded, usually bowed-out base of the glumes; no other wildrye has this feature.

Canada wildrye, *Elymus canadensis* L., grows throughout much of the range of Virginia wildrye, but is not common in Coastal Plain pine forests. The two may occupy the same site and much of the variation recognized within each species is attributed to hybridization. Canada wildrye is more common on prairies and roadsides and can usually be distinguished by its lax, nodding seed heads and broader, lance-shaped leaves. Several other wildryes, especially Texas wildrye, *E. interruptus* Buckl., and hairy wildrye, *E. villosus* Muhl., occur at the western and northern fringes of the loblolly-shortleaf pine type. In these areas, an appropriate plant manual should be consulted for positive identification.

Early foliage of Virginia wildrye is palatable and nutritious, but plants mature by early summer. Both Virginia and Canada wildrye are classed as "decreasers," plants that decrease in percent composition on overgrazed range. Plants apparently cannot tolerate fire and the widespread use of prescribed burning, usually accompanied by heavy grazing, further limits its abundance.

Range: Most of United States.

Perennial. **Culms** 60 – 120 cm tall, tufted, erect; **sheaths** glabrous or with inconspicuously ciliate margins; **ligule** less than 1 mm long, brown, membranous; **blades** 5 – 15 cm long, 4 – 8 mm wide, flat, scabrous; **inflorescence** a single spike 5 – 15 cm long, erect, often partly included in sheath of upper leaf; **spikelets** two per node, 3- to 5-flowered; **glumes** 12 – 15 mm long, scabrous, strongly nerved, except nerveless at bowed-out base, indurate, tapering into a straight awn about as long as the body; **lemmas** glabrous and nerveless below, scabrous and nerved above, 6 – 8 mm long tapering into straight awn 1 cm long; **palea** equal in length to body of lemma; **grain** encased in lemma and palea, disarticulating above the glumes.



Purple Lovegrass—*Eragrostis spectabilis* (Pursh) Steud.

With its large colorful inflorescence fully expanded, purple lovegrass is among the showiest of southern grasses. Until the panicles emerge in late summer, however, the plants are relatively inconspicuous. This grass grows mainly on sandy ranges that have been grazed heavily or burned frequently.

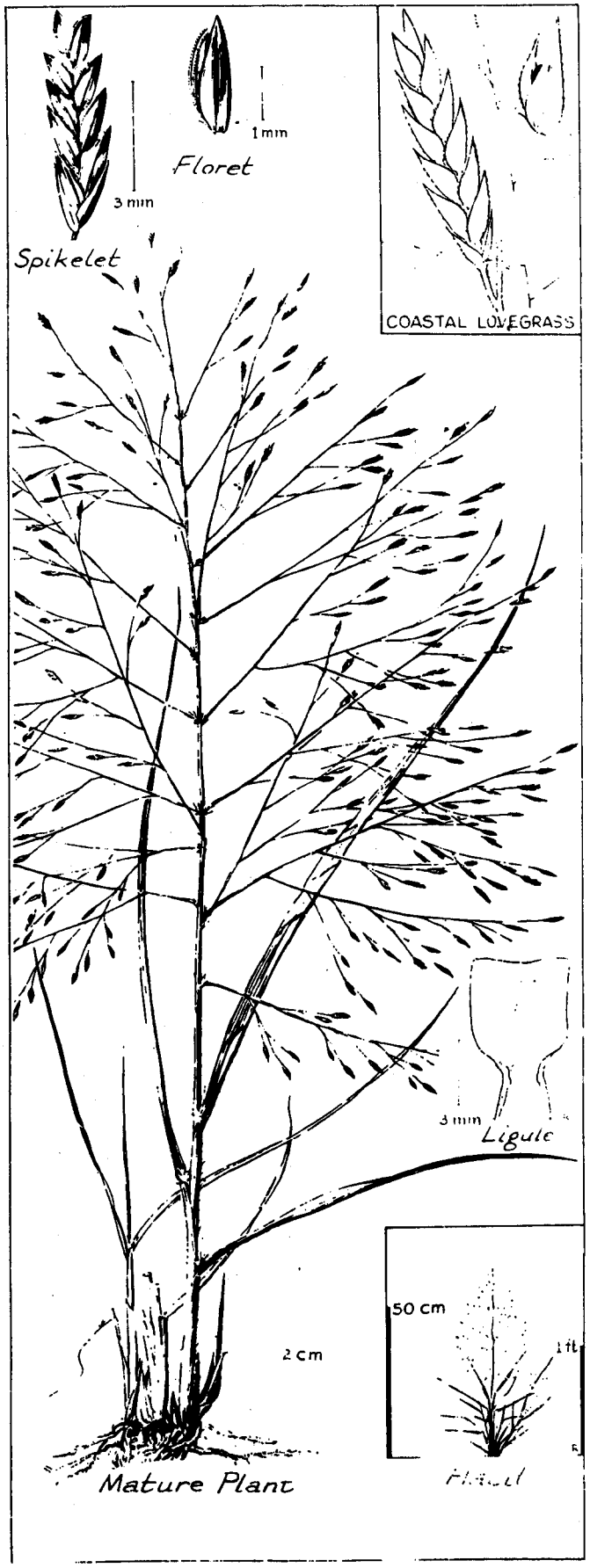
Mature plants are 1 to 2 feet tall, with the panicle usually two-thirds the height and about as broad as long. At maturity, panicles break away from the stalk to become "tumbleweeds." Leaf blades are 6 to 12 inches long and ⅛ to ⅜ inch wide, tapering to a fine point.

Coastal lovegrass, *Eragrostis refracta* (Muhl.) Scribn., and Elliott lovegrass, *E. elliottii* S. Wats., resemble purple lovegrass in size and growth habit. Their panicles are green to dark gray with delicate branches, whereas panicles on purple lovegrass are bright purple with comparatively rigid branches. Spikelets of coastal lovegrass are essentially sessile on panicle branches, while those of Elliott lovegrass are on long capillary pedicels.

In the spring, purple lovegrass foliage is palatable and nutritious. With emergence of the inflorescence in late summer, palatability declines rapidly. Plants are rarely abundant enough to supply significant amounts of herbage.

Range: Arizona to Minnesota, extending east to Maine and Florida.

Perennial. **Culms** 30 – 75 cm tall, in tufts from a knotty, rhizomatous base; **sheaths** longer than the internodes, overlapping, glabrous to pilose, conspicuously long-pilose at the summit; **ligule** a short, ciliate membrane 0.2 mm long backed by a ring of silky hairs 2 – 4 mm long; **blades** 3 – 8 mm wide, to 30 cm long, taper-pointed, stiff, flat, scabrous above, smooth beneath, ascending, glabrous to pilose; **panicle** 15 – 45 cm long, ovoid, about two-thirds the entire height of the plant, branches minutely scabrous, strongly pilose in the axils; **spikelets** 4 – 8 mm long, about 2 mm wide, on long pedicels, 5- to 12-flowered, purple; **florets** about 1.6 mm long, keels of the palea short-ciliate and bowed out; **grain** 0.6 – 0.8 mm long, brown.



Bent-Awn Plumegrass—*Erianthus contortus* Baldw. ex Ell.

This grass and several other common plumegrasses constitute a group of the largest, most conspicuous, upland grasses in the South. Bent-awn plumegrass grows throughout the Southeast, primarily on moist sandy soils of the longleaf-slash pine and loblolly-shortleaf pine types. Individual plants may reach 9 feet in height, but most are 6 feet or less.

Until seed heads form, plants may be confused with yellow indiangrass; both have long, slender leaf blades, and bent-awn plumegrass has sheath auricles somewhat like those of indiangrass. However, the narrowed bases of indiangrass leaf blades and the purplish culms of plumegrass should distinguish the two.

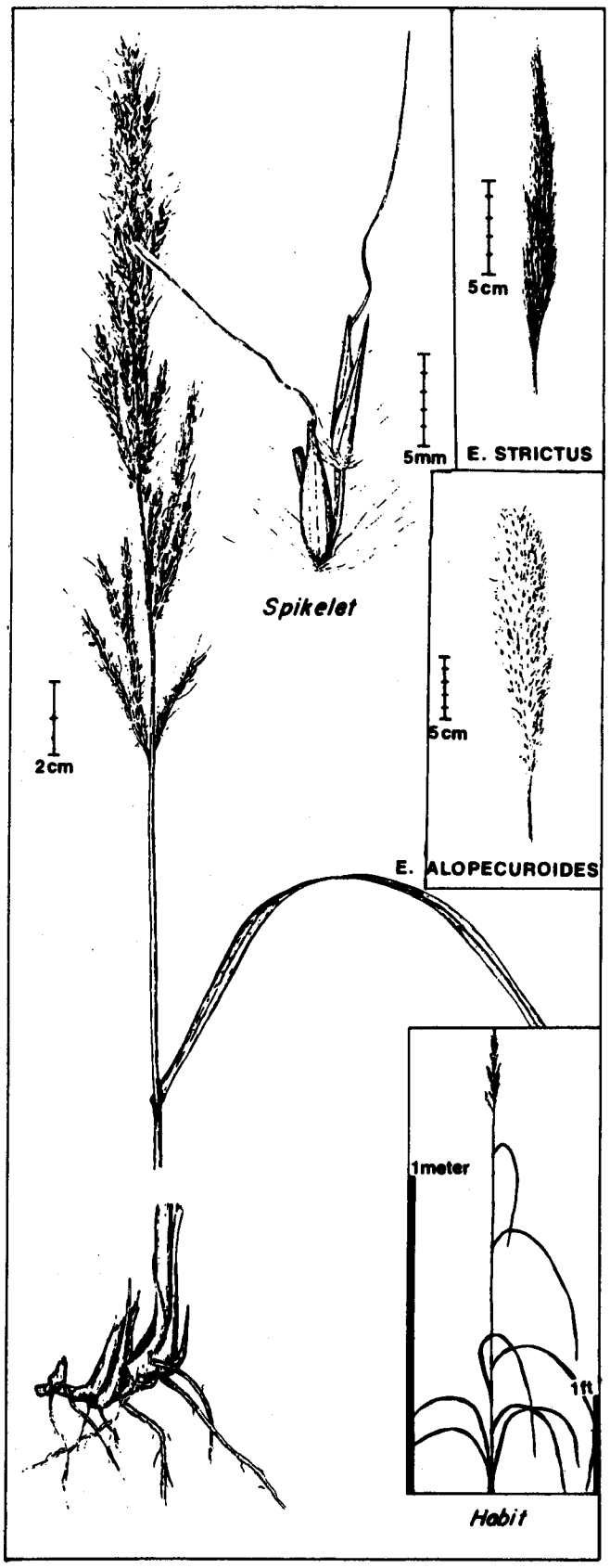
The inflorescence, produced from midsummer to early autumn, is a loosely constricted panicle 5 to 15 inches long. Each brownish spikelet has a basal whorl of tawny hairs and a conspicuous, twisted awn. The arrangement of spikelets on inflorescence branches is similar to that in the bluestems. Pedicellate spikelets in the plumegrasses, however, are perfect; in the bluestems, pedicellate spikelets may be staminate but never perfect. Indiangrass seed heads, while outwardly similar to those of bent-awn plumegrass, have no pedicellate spikelets.

Other common plumegrasses include giant plumegrass, *Erianthus giganteus* (Walt.) Hubb. non Muhl., and silver plumegrass, *E. alopecuroides* (L.) Ell., which have denser, much silkier inflorescences; and narrow plumegrass, *E. strictus* Baldw., with a constricted, practically hairless, brown seed head. All are usually found on wetter sites than those occupied by bent-awn plumegrass.

A single plumegrass clump does not produce much foliage, and clumps are usually scattered. Early growth may be grazed by cattle and deer, but unless plants are grazed repeatedly, rapid growth renders plants tough and unpalatable by midsummer. As with big bluestem and other tall grasses, however, grazing intensity based on the total forage resource may weaken or kill plumegrass plants. Despite these limitations, plumegrasses as a group are classed as desirable forage plants.

Range: Texas and Oklahoma to Florida, Tennessee, and Maryland.

Perennial. **Culms** tufted, stout, erect, 1 – 2 m tall, glabrous or sparsely pubescent below panicle and at nodes; **sheaths** sparsely hirsute at throat; **ligule** 1 – 2 mm long, firm, minutely ciliate; **blade** 15 – 90 cm long, 5 – 24 mm wide, flat or folded at the narrow base, densely hirsute on upper surface near ligule; **inflorescence** a purplish-brown, exserted panicle 12 – 42 cm long, 3 – 5 cm wide; **spikelets** all alike, 6 – 8 mm long, brownish, basal hairs as long as spikelet; **glumes** more or less hirsute on back and margins, second longer than first; **sterile lemma** shorter than glumes, pubescent; **lemma** 3 – 4 mm long, 2-toothed, hyaline, midnerve extended into scabrous awn 12 – 20 mm long.



Bearded Skeletongrass—*Gymnopogon ambiguus* (Michx.) BSP.

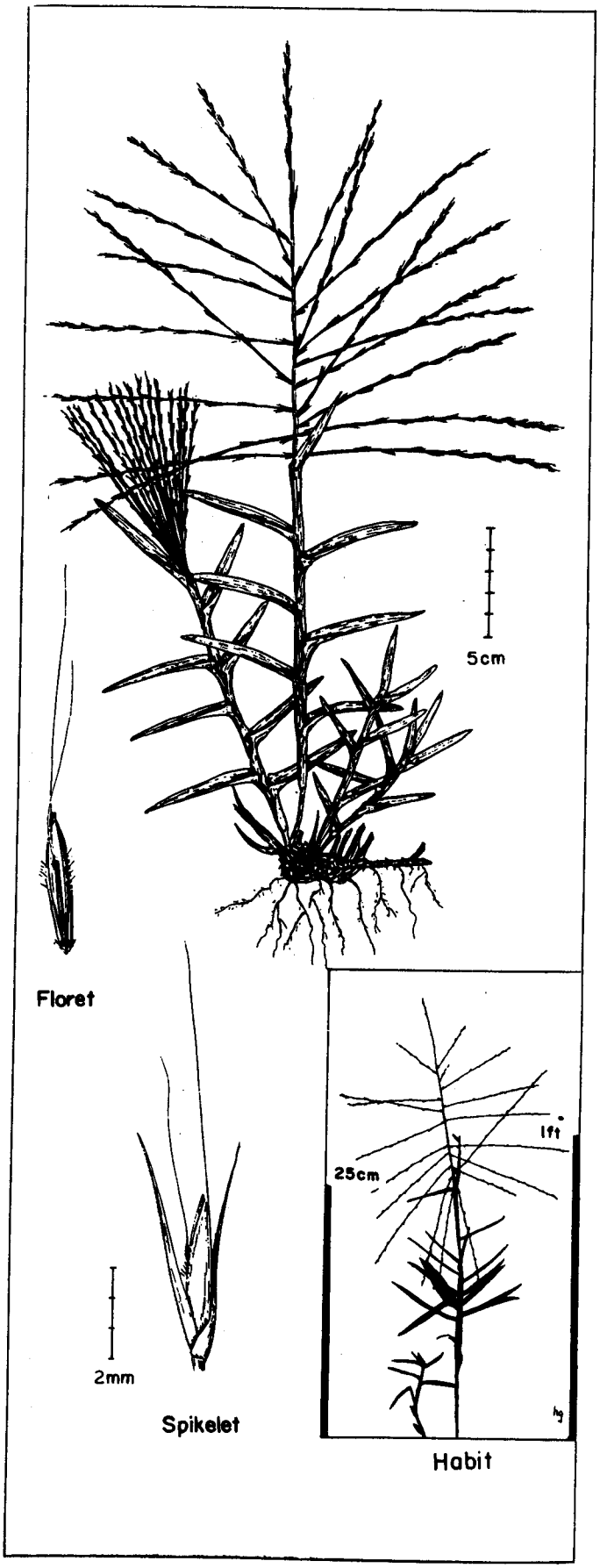
Bearded skeletongrass, though seldom abundant, is conspicuous on sandy pinelands in the South. Distinctive features include short, broad, stiff leaves and an inflorescence of many stiff, slender, divergent spikes scattered along the upper part of the flower stalk. At maturity, the seedstalk breaks below the lowermost spike, and the entire inflorescence becomes a "tumbleweed." Plants spread by short rhizomes to form small clumps. Basal foliage is scant; leaves are mostly crowded along the rigid stalks, which are 1 to 2 feet tall at maturity.

Although slim skeletongrass, *Gymnopogon brevifolius* Trin., is sometimes associated with bearded skeletongrass, it is also found on more mesic sites than commonly associated with bearded skeletongrass. It is distinguishable by its inflorescence branches, which have flowers only on the outer half; those of bearded skeletongrass bear flowers over their entire length.

Bearded skeletongrass rarely yields significant amounts of forage. Cattle apparently eat it, for plants are scarce on grazed range. The clumps are poorly anchored in the soil; thus cattle probably uproot many plants. Deer sometimes paw the rhizomes out of the soil in winter when better food is scarce.

Range: Texas to Florida, extending north to Kansas, Ohio, and New Jersey.

Perennial. **Culms** 30 – 60 cm tall, from short, scaly rhizomes, erect or decumbent at the base; **sheaths** crowded, overlapping with a villous ring at the summit, otherwise glabrous; **ligule** membranous; **blades** spreading, 5 – 15 cm long, 5 – 14 mm wide, flat, firm, cordate-lanceolate, glabrous with scabrous margins; **inflorescence** of numerous unbranched purplish spikes 10 – 20 cm long; **spikelets** 4 – 6 mm long, excluding the 6 mm awn, arranged the full length of the branch on two sides of a 3-sided rachis.



Cutover Muhly—*Muhlenbergia expansa* (DC.) Trin.

Cutover muhly grows throughout the lower Coastal Plain in swales and on moist pinelands. Although the name implies that it occupies only cutover lands, it is sometimes abundant under open pine stands. On unburned ranges, the long, stiff, slender leaves are in large, tightly tufted bunches, with blades near the perimeter of the bunch reclining and those near the center standing erect. The plants resemble grass-stage longleaf pines.

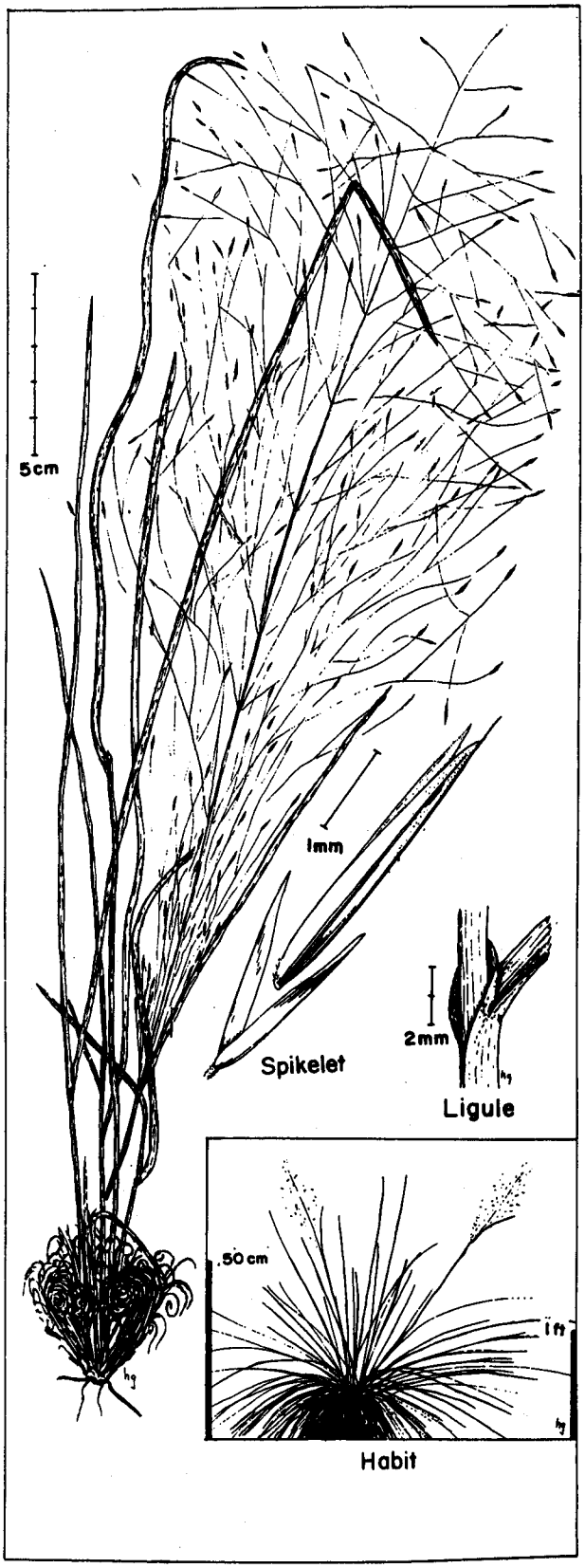
Flower stalks, 2 to 3 feet tall, are slender and weak, often reclining at maturity. Panicles are purplish, conical, and usually 6 inches long, but occasionally they reach 18 inches, and branches are delicate.

Hairawn muhly, *Muhlenbergia capillaris* (Lam.) Trin., is a similar and closely related grass with a wider range than cutover muhly. It is found on drier, more inland sites than cutover muhly. Some authors consider cutover muhly a Coastal Plain variant of hairawn muhly. Although its foliage resembles that of pineywoods dropseed, cutover muhly can be distinguished by its curly, fibrous remnants of old basal leaves. Its prominent, pointed, white ligules also help distinguish it from pineywoods dropseed, the ligule of which is barely visible.

Cutover muhly is low in forage value. Cattle ordinarily eat small amounts of new leaves in the spring, but they usually reject the foliage later in the growing season. Although mature leaves are tough and fibrous, some are eaten during the winter, because they often remain green. This species may impair production of better forage. On unburned, moderately grazed range, the plants attain large basal areas, and their leaves reach far beyond the basal perimeter. Thus, a comparatively sparse stand may dominate a site, excluding most plants of higher quality.

Because cutover muhly is generally considered a range weed, control has been studied. Although a single fire failed to kill plants in Louisiana trails, clump size was reduced. Where 30 to 40 percent of the range was burned each year in rotation, cattle concentrated on new burns in the spring. With the old growth destroyed by fire, cattle closely utilized new foliage. One cycle of burning and subsequent brief heavy use largely eliminated the species without significantly damaging the better grasses.

Range: Coastal Plain, east Texas to Florida and Virginia.



Perennial. **Culms** 60 – 100 cm tall, slender, erect, in dense tufts; **sheaths** longer than the internodes, wider than the blade, loose, smooth to slightly scabrous, weathering to form a fibrous, curling mass; **ligule** 2 – 3 mm long, wider than the blade, firm, pointed; **blades** 1.0 – 2.5 mm wide, to 40 cm long, the upper short, the lower long, flat, becoming involute; **panicles** 10 – 45 cm long, pyramidal, with capillary branches; **spikelets** 3.5 – 5.0 mm long, purple, on long, scabrous, capillary pedicels, awnless or with a short awn 2 – 3 mm long.

Knotroot Bristlegrass—*Setaria geniculata* (Lam.) Beauv.

Knotroot bristlegrass is common but seldom abundant along roadsides, in old fields and pastures, and on other disturbed sites throughout the South. It occurs infrequently on regularly burned, moderately grazed range. In Florida, however, it is a component of the stable plant community on flatwoods, slough, and salt marsh sites. Although a perennial, it produces little forage in competition with major forage plants like creeping bluestem.

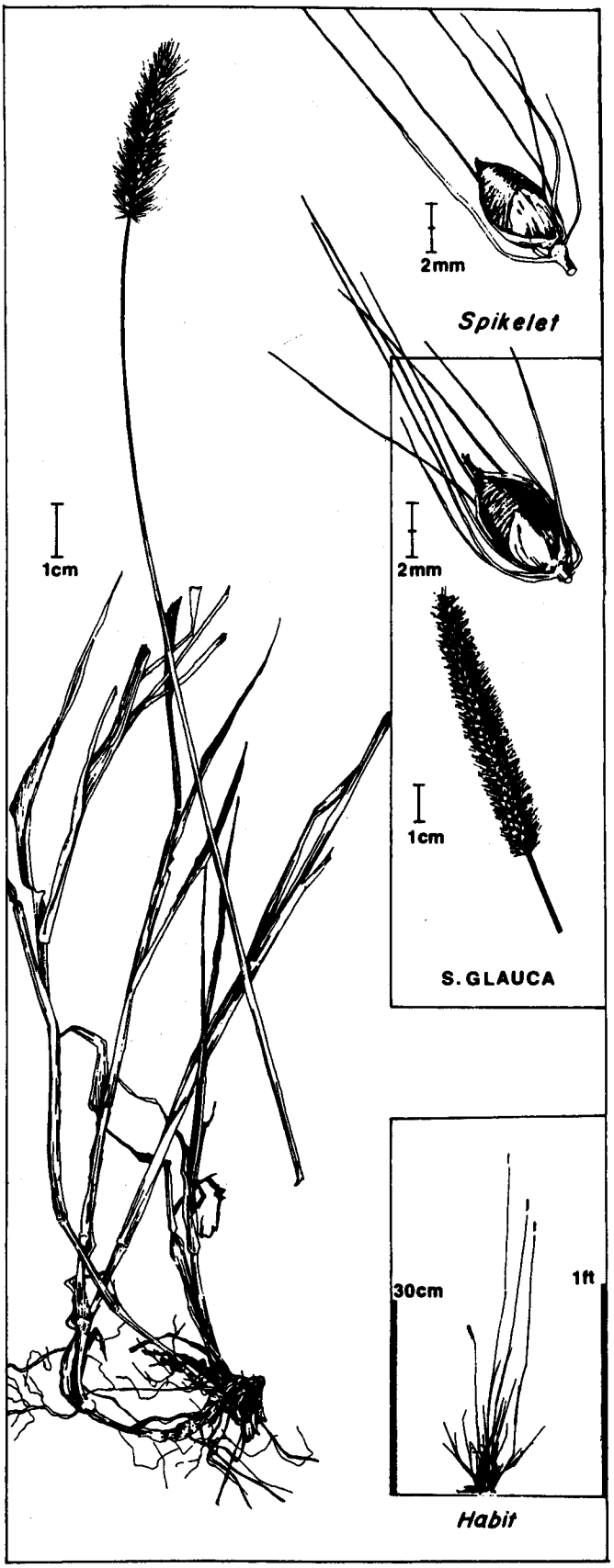
Plants are 2 to 3 feet tall, growing singly or in small tufts from brittle, knotty rhizomes. Stems are often geniculate, or bent at the lower joints, giving greater basal spread to the clumps. This characteristic is common to several other bristlegrasses as well as to some of the crabgrasses *(Digitaria* spp.). Leafblades are flat, about 1/5 inch wide and 2 to 9 inches long. Each seed stalk is terminated by a spikelike, bristly panicle ½ to 4 inches long.

A similar and equally common species, yellow bristlegrass, *Setaria glauca* (L.) Beauv. *(S. lutescens* (Weig.) F. T. Hubb.), is an annual introduced from Europe. Like knotroot bristlegrass, it has numerous bristles subtending each spikelet; bristles of most other bristlegrasses are generally longer and more cylindrical than those of knotroot. Leaf blades are wider in the annual species and rhizomes are present only in knotroot. Several other bristlegrasses occur in the Southeast, but knotroot is the only southern perennial.

Forage value of knotroot bristlegrass is limited by its lack of abundance. Even in Florida, where it is part of the "climax" vegetation, it produces scant herbage. It is grazed during spring and summer months but becomes unpalatable by fall. Knotroot bristlegrass is considered a food plant for birds and small mammals.

Range: California to Florida, extending north to Kansas, Illinois, and Massachusetts.

Perennial. **Culms** cespitose or single, 40 – 100 cm tall, often geniculate at base, erect or decumbent, often with short, knotty rhizomes; **blades** flat, strongly ascending, long-attenuate, 5 – 23 cm long, 4 – 7 mm wide, glabrous below, sparsely pilose above; **sheaths** glabrous with scarious margins; **ligule** membranous, short-ciliate; **inflorescence** a spiciform panicle, dense, yellowish to purplish, 1.5 – 10.0 cm long, 7 – 8 mm wide (excluding bristles); **spikelets** 2 – 3 mm long, subtended by 8 to 12 bristles, 2-flowered, the lower floret neuter, upper floret perfect; **first glume** one-half length of spikelet; **second glume** longer, with excurrent midrib; **sterile lemma** 5- to 7-nerved with well developed palea, fertile floret plano-convex 2 – 3 mm long; **lemma** transversely rugose.



Yellow Indiangrass—*Sorghastrum nutans* (L.) Nash—(*Sorghastrum avenaceum* (Michx.) Nash)

Although yellow indiangrass is best known as a component of tall-grass prairies, it occurs throughout the southern pine region. Plants are among the tallest grasses found on the range. Seedstalks average 4 to 5 feet but occasionally reach 8 feet. Foliage is mainly basal, with leaves up to 18 inches long and ½ inch wide. Plants spread by short, scaly rhizomes, often forming large clumps.

This grass produces large plumelike panicles, varying from bright yellow bronze to dark brown bronze. Panicles shatter quickly upon maturing; the plants remain showy only briefly, usually from late September to early October.

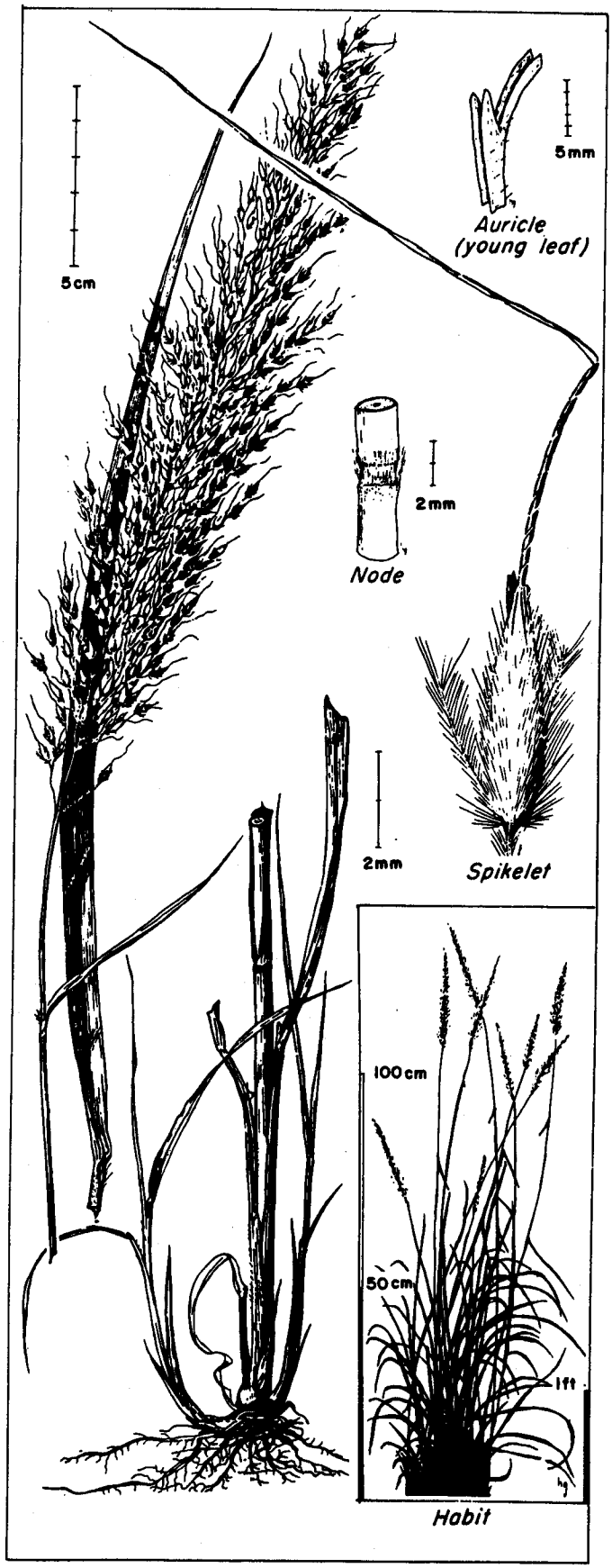
In the absence of panicles, yellow indiangrass superficially resembles switchgrass, big bluestem, and other robust grasses. Yellow indiangrass is distinguishable by its conspicuous, straight, stiff auricles and bristly nodes.

Two other *Sorghastrum* species growing on longleaf pine-bluestem range also closely resemble yellow indiangrass. Lopside indiangrass, *S. secundum* (Ell.) Nash, is common on sandhills of west Florida and south Georgia and in sandy pinelands of Alabama. As the name implies, its panicles, in contrast to the relatively symmetrical ones of yellow indiangrass, are one-sided. Slender indiangrass, *S. elliottii* (Mohr) Nash, grows throughout the South, mainly on sandy sites. Its flower stalks, in contrast to the relatively stiff ones of yellow indiangrass, are weak and nodding, and the spikelets are chestnut brown. Lopside and slender indiangrass lack rhizomes; both have twice-bent awns about 1 inch long, while awns of yellow indiangrass are bent once and are ½ to ¾ inch long.

Yellow indiangrass is an excellent forage plant. Because it is highly palatable and scarce on most ranges, it is usually overgrazed, even under moderate use. On heavily grazed ranges, it is confined to brushy areas that cattle cannot readily penetrate. Managing for a high yield of this grass therefore appears impractical.

Range: Eastern United States, extending west to Arizona, Utah, Wyoming, and North Dakota.

Perennial. **Culms** glabrous with hairy nodes, 1.0 – 2.5 m tall, in loose tufts from scaly rhizomes; **sheaths** glabrous or papillose-pubescent, often hairy in the throat; **ligule** 2 – 4 mm long, thick, stiff, conspicuous, between straight, stiff auricles; **blades** 5 - 10 mm wide, sometimes glaucous, scabrous, elongate; **panicle** narrow, exserted, nodding at the apex, bronze to golden brown and shining, branches villous, shattering early; **sessile spikelet** fertile, 6 – 8 mm long, hirsute, the awn once-geniculate, 1.0 – 1.5 cm long; **pedicellate spikelet** wanting, the villous pedicel one-half to one-third the length of the fertile spikelet.



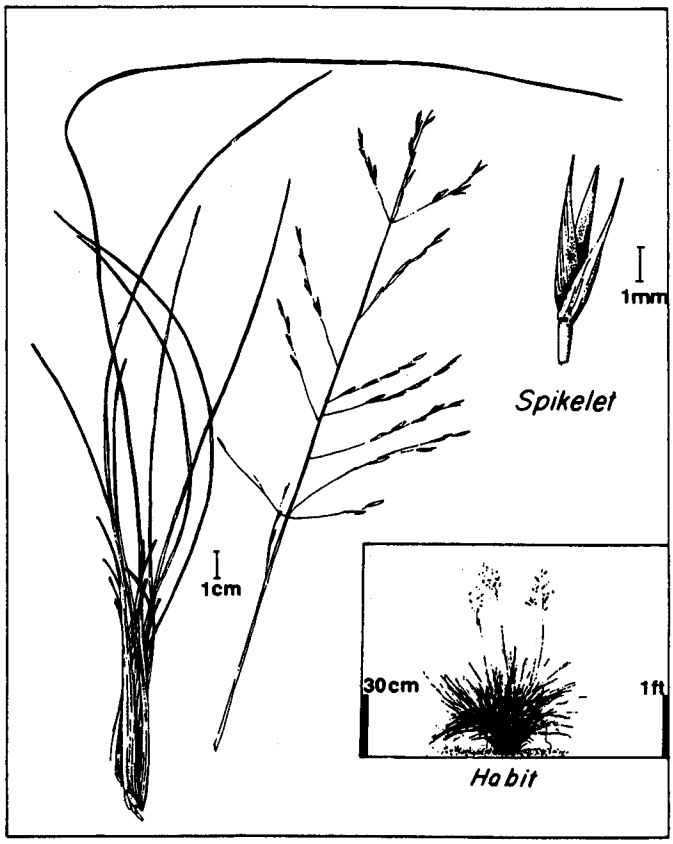
Curtiss Dropseed—*Sporobolus curtissii* (Vasey) Small

This small bunchgrass is found most commonly on southeastern pine flatwoods sites where it grows in close association with pineland threeawn. It grows as dense tufts or small bunches that remain partly green in winter. On pine-wiregrass range of south Georgia, Curtiss dropseed provides more cattle forage than any other grass during fall and winter but is grazed less than pineland threeawn during spring. Although it thrives on frequently burned range, it withstands smothering by litter in the absence of fire.

On closely grazed range, Curtiss dropseed may be mistaken for pineland threeawn; both have narrow leaves and grow in clumps. Leaf blades of Curtiss dropseed, though narrow, are flat, compared to the almost round blades of pineland threeawn. This distinction is noted in another common name for Curtiss dropseed, "flatleaf wiregrass."

Florida dropseed, *Sporobolus floridanus* Chapm., is a common associate of Curtiss dropseed and pineland threeawn on pine flatwoods. It is a more robust grass than Curtiss dropseed, with basal leaves about ¼ inch wide and up to 20 inches long. Stalks are up to 3 feet tall, with the narrow, open panicle occupying the upper half. Panicles are diffusely branched with a single spikelet at the top of each branch.

Range: Coastal Plain, central Florida to North Carolina.



Perennial. **Culms** slender, 30 – 70 cm tall; **sheaths** pilose at throat; **blades** light green, flat or folded, about 1 mm wide, pilose on the upper surface near the base; **panicle** pyramidal, 15 – 25 cm long, open, branches stiffly ascending; **spikelets** appressed along the branches, distant, bronze or purplish, about 4.5 mm long; **glumes** about equal, as long as or longer than lemma.

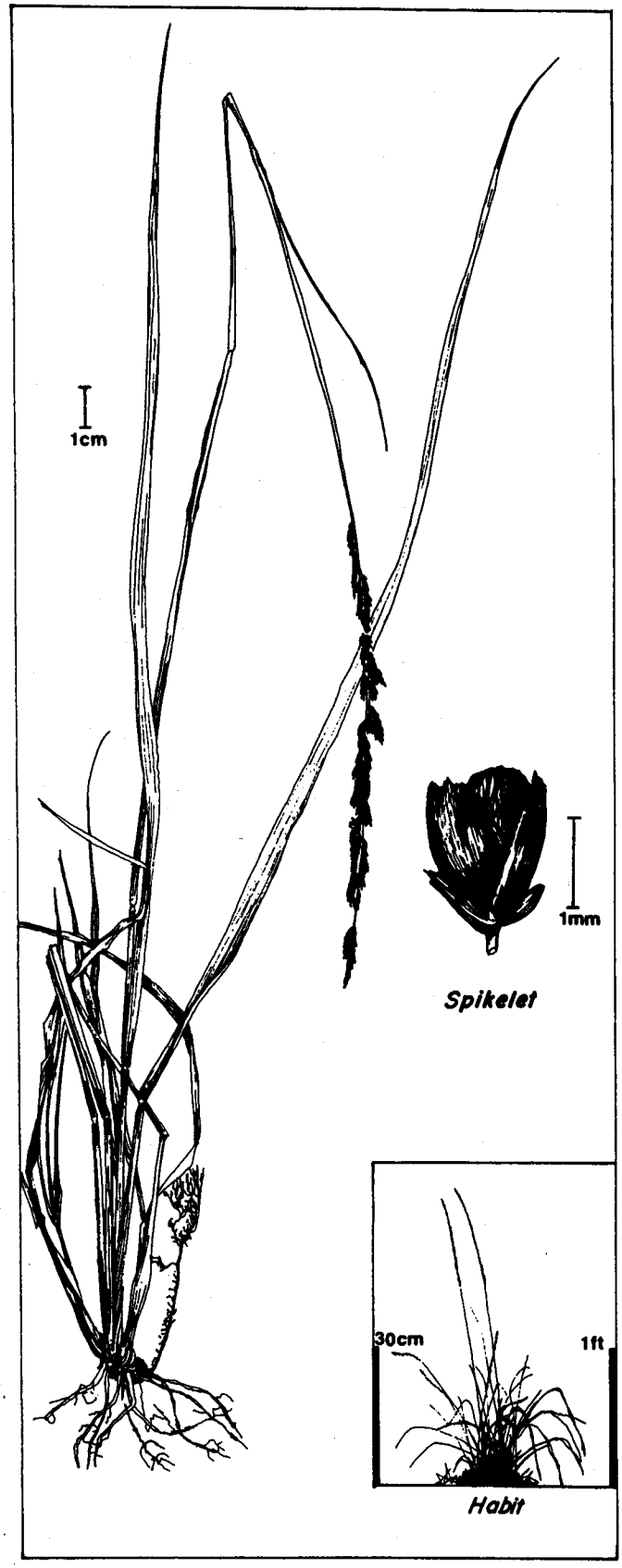
Rat- tail Smutgrass—*Sporobolus indicus* (L.) R. Br.—*(Sporobolus poirettii* (R. & S.) Hitchc.)

Smutgrass is a perennial grass common throughout the southern states, and can usually be identified by its long, narrow seed heads, which are often blackened by smut resulting from infection by the fungus, *Helminthosporium ravenelii* Curt. Introduced into the southern United States and South America from tropical Asia, smutgrass has become a serious weed of improved pastures in sandy Coastal Plains soils across the South. It is common along roadsides, trails, and in recreational areas, apparently thriving under adverse conditions.

Cattle seldom eat smutgrass, especially after the flower stalks are formed. Plants not infested with the black fungus produce abundant tiny seeds that are eaten by birds and small mammals.

Range: Texas and Oklahoma to Florida and Virginia.

Perennial. **Culms** erect, 30 – 100 cm tall, glabrous; **blades** 15 – 55 cm long, 1.5 – 3.0 mm wide; **sheaths** glabrous, longer than internodes, junction with blade obscure; **ligule** a ring of very short hair; **panicle** spike-like but interrupted, 10 – 40 cm long, 3 – 6 mm thick; **spikelets** 1.5 – 2.0 mm long; **seed** naked, reddish.



Pineywoods Dropseed—*Sporobolus junceus* (Michx.) Kunth

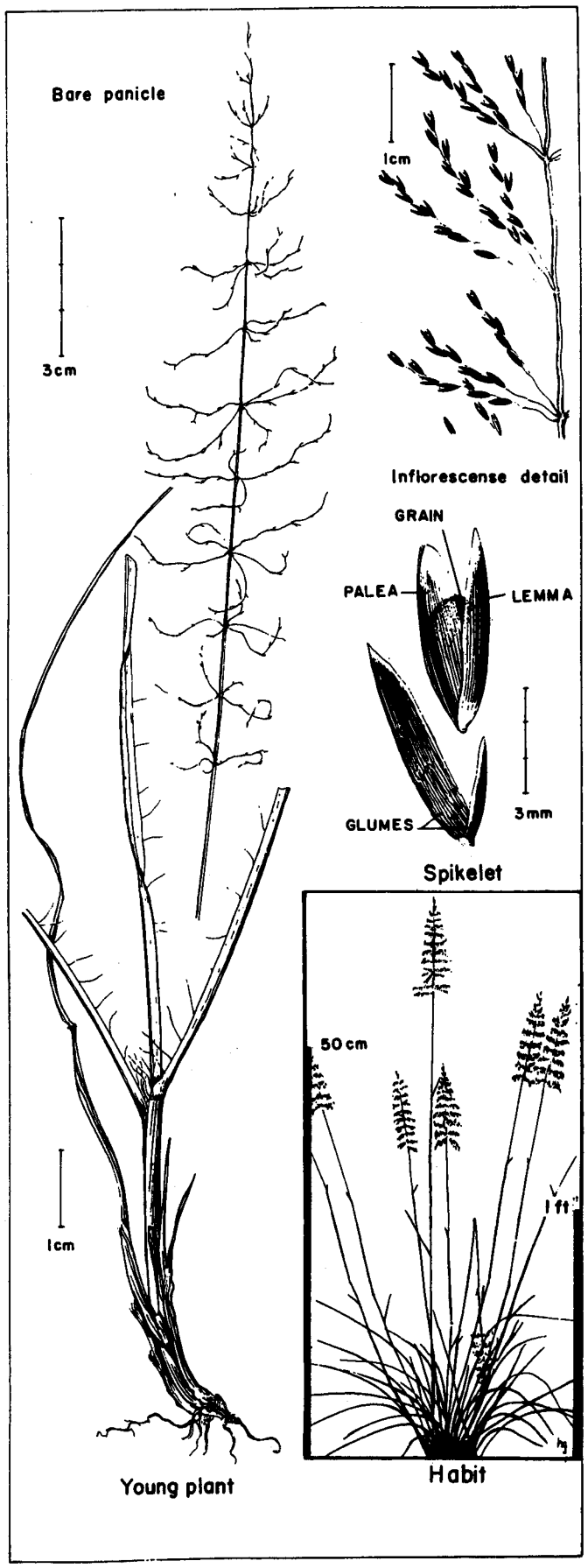
Pineywoods dropseed is a bunchgrass, with basal tufts arising from short, scaly rhizomes. In light herbaceous cover it may form large dense clumps. Where grass is dense, bunches are usually small, often consisting of only a few slender tufts. Foliage is mostly basal. Leaf blades are long, slender, blue green, and practically hairless. They often fold lengthwise, becoming almost tubelike in cross section. Thus, the leaves may superficially resemble longleaf pine needles. Flower stalks are 1 to 2 feet tall. They end in distinctive yellow- to brown-bronze, narrowly conical panicles that are usually 4 to 6 inches long and about one-third as wide.

Until inflorescences appear, pineywoods dropseed resembles cutover muhly. The latter is distinguishable by its prominent, white, pointed ligule, and by fragments of old basal foliage, which persist as a tangled mat of straw-colored fibers. The ligule in pineywoods dropseed is barely visible, and fibers of basal sheaths are nonpersistent.

Pineywoods dropseed rates fair as a forage grass. Its leaves become tough by midseason; thus, palatability is low during summer and fall. Herbage often remains green well into the winter. Although nutritive content is low during winter, cattle are attracted by the green color, and they may eat large amounts. On a Louisiana range where this species was only 1 percent of the ground cover, it provided 3 to 5 percent of the yearly diet. In January and February, it supplied about 10 percent of the grazing.

Range: Coastal Plain, Texas to Florida and Virginia.

Perennial. **Culms** 30 – 100 cm tall, erect, rigid, slender, in small clumps, leafy at the base, naked above, from short, scaly rhizomes; **sheaths** glabrous, strongly overlapping; **ligule** a smooth or ciliated short membrane; **blades** 2 – 4 mm wide, 2 – 25 cm long, folded or involute with a thickened, pointed apex, glabrous, base of lower blades with setaceous margins, the upper blades short and far below the panicle; **panicle** 2 – 5 cm wide, 10 – 20 cm long, lanceolate, with several sets of verticillate, spreading branches spaced at regular intervals; **spikelets** 2.5 – 3.5 mm long, acute, lanceolate, green, purple, or bronze in color; **glumes** of unequal length; **lemma** and **palea** thin, free from the seed; **seed** ovoid, brown, 1.5 – 2.0 mm long.



Pinebarren Tridens—*Tridens ambiguus* (Ell.) Schult.

Pinebarren tridens grows on moist flatwoods sites, particularly where moderate to heavy grazing prevents accumulation of a heavy rough. It is commonly associated with slender bluestem, both on cutover lands and under open pine canopies.

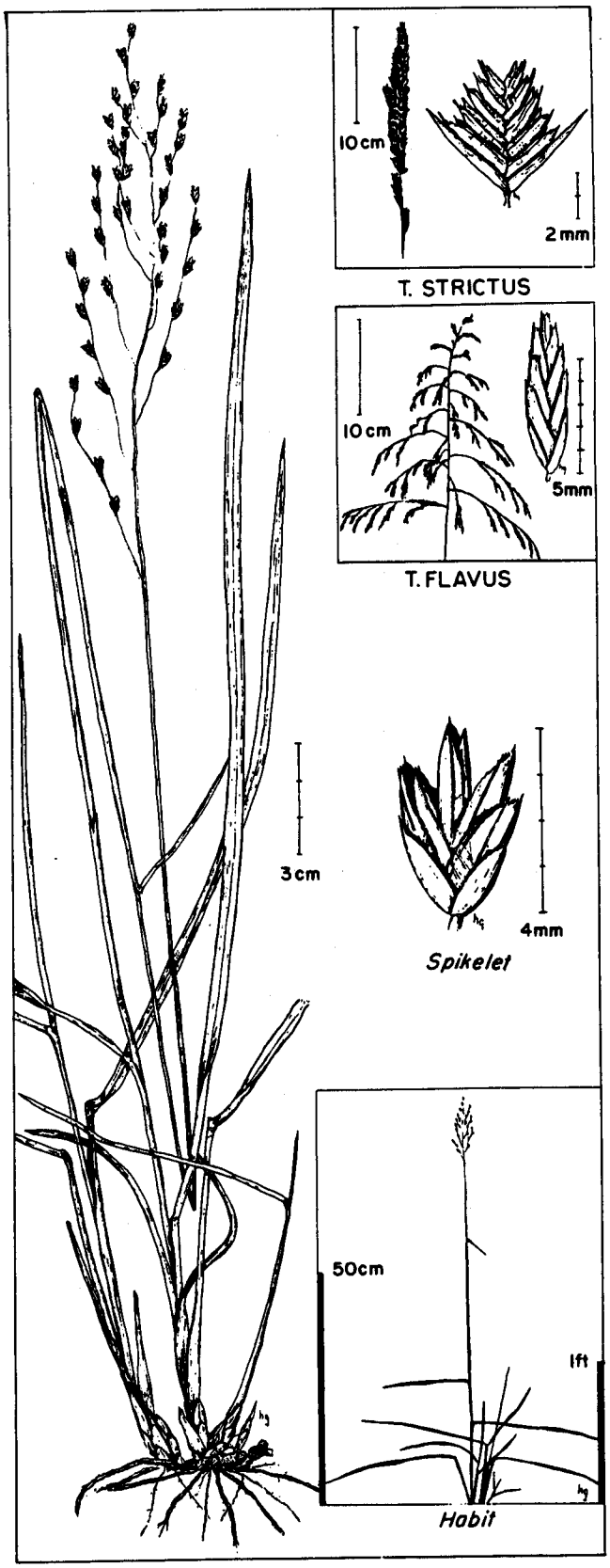
Leaves are mostly basal, usually with one or two small tufts per plant. They are generally pale green, but the upper surface is sometimes gray-green. Blades are about ⅛ inch wide and up to 12 inches long. Except for conspicuously hairy leaf collars, the foliage is hairless. Flower stalks 2 to 3 feet tall support open panicles that bear small, orange-tan to purplish spikelets. Panicle branches characteristically point upward at an angle of less than 45° from the main axis. Spikelets measure ⅙ to ⅜ inch long, each with four to seven flowers. Spikelets are round in cross section when immature but become flattened with age.

Pinebarren and other tridens grasses may be mistaken for lovegrasses *(Eragrostis* spp.) because of the several-flowered, flattened spikelets. The genus *Tridens* is characterized by lemmas with three hairy nerves that project beyond the margin of the lemma tip, while the lemma of *Eragrostis* has hairless nerves which do not extend past the margin.

Several species of *Tridens* grow on southern pine ranges. Purpletop, *T. flavus* (L.) Hitchc., is a robust perennial occupying old fields and timbered sites. It is distinguishable by its large panicles with drooping branches and dark purple spikelets. Longspike tridens, *T. strictus* (Nutt.) Nash, inhabits wet sites. Its dense, spikelike panicle differs distinctly from the open inflorescence of other common tridens grasses. Also, its spikelets have glumes longer than the lowest florets. Carolina tridens, *T. carolinianus* (Steud.) Henr., is a rhizomatous species, infrequent on moist sandy sites, with an inflorescence similar to that of pinebarren tridens. In both, mature spikelets are slightly flattened in cross section and ¼ inch or more long.

Young foliage of pinebarren tridens is grazed in the spring and early summer. Because plants are widely scattered and foliage is sparse, this species contributes little to the yearly diet of cattle. After the panicles emerge, plants are grazed sparingly, if at all. The spikelets emit a distinctive pungent odor that may account for the low palatability of mature plants.

Range: Coastal Plain, Texas to Florida and South Carolina.



Perennial. **Culms** 60 – 100 cm tall, from a knotted base, slender, erect; **sheath** flattened, shorter than the internodes, glabrous; **ligule** a conspicuous ring of hairs; **blades** pointed, flat or slightly involute, the upper short, the lower long, but not exceeding the extended panicle; **inflorescence** a loose, tan or purplish panicle 8 – 20 cm long with ascending branches; **spikelets** 4 – 6 mm long, 3 – 4 mm wide, 4- to 7-flowered, flattened; **florets** conspicuously pilose on the lower half; **lemma** with three prominent veins forming short teeth at the apex; **palea** with a conspicuously bowed keel.

GRASSLIKE PLANTS

Because they superficially resemble grasses, members of the sedge family (Cyperaceae) and rush family (Juncaceae) are known as grasslike plants. They are a minor part of the vegetation on most upland pine forest sites, but several species grow abundantly on poorly drained soils.

The sedges most closely resemble grasses; both the sedge and grass families belong to the order Graminales. Their flowers are in spikelets and lack regular sepals and petals, each flower being subtended by bracts or scales. In most sedges, the stems are solid and triangular in cross section, with leaves three-ranked; grass stems are more or less cylindrical and leaves are in two ranks. Sheaths of sedge leaves are closed tubes that encase the stem. In all but a few grasses, sheaths are open. A minor technical difference distinguishes the one-seeded sedge fruit, an achene, from the grass fruit, a caryopsis.

Rushes are related more closely to lilies than to the grasses. Despite their morphological similarity to lily flowers, rush flowers appear grasslike, with sepals and petals that are small and chaffy or membranous. Although flowers may occur in dense heads, or glomerules, each is a separate unit with three sepals, three petals, and reproductive parts. The fruit is a capsule with many seeds. Stems may be rounded or flattened and pithy or hollow. Unlike grass stems, rush stems are not jointed. Rush leaves are mostly basal and not distinctly two- or three-ranked, as in grasses and sedges.

Grasslike plants are important in the cattle diet only on wet sites. Forage value is generally inferior to that of grasses. Cattle graze both rushes and sedges in spring and early summer but usually avoid them in late summer and fall. Since the plants often remain green well into the winter, cattle may again seek them after frost kills back other herbage.

Blue Sedge—*Carex complanata* Torr. & Hook.

Blue sedge plants are stiffly erect and 3 feet tall or less. They form many-stemmed clumps from knotty rootstocks, growing mostly on upland sites in association with bluestem and panicum grasses.

Flowers are unisexual, with male flowers found only basally on the uppermost spike; the remainder of this spike is comprised of female flowers. The uppermost spike is the only mixed spike; spikes below this are made up of only female flowers, and usually there are no more than four of these female-only spikes. The spikes are densely flowered, ¼ to 1 inch long, and about ¼ inch wide. Bracts subtending each flower give the spikes a bristly appearance. The sac (perigynium) enclosing individual female flowers is flattened, with obtuse or rounded tips.

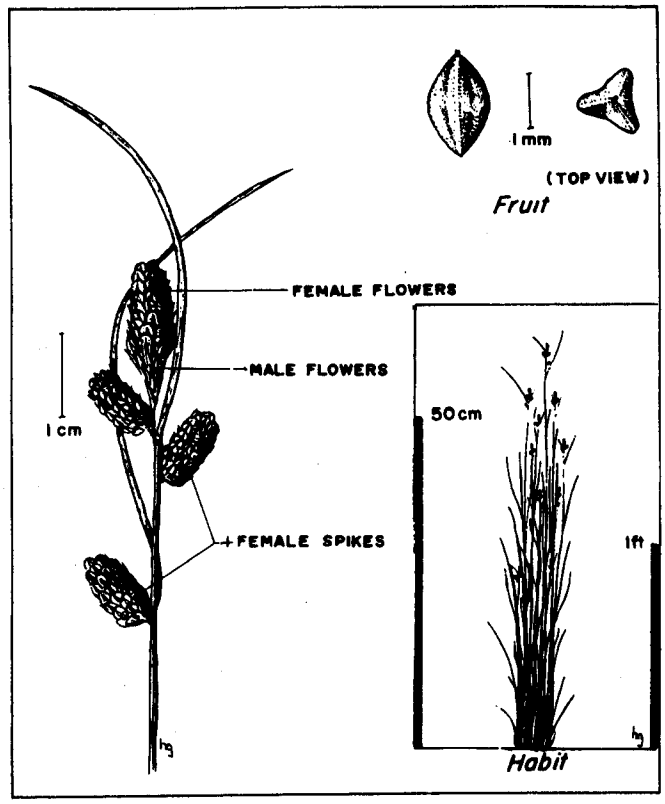
Leaves are stiff and erect, with blades about 1/16 inch wide. Although a few hairs are scattered on the leaf sheaths, plants generally appear smooth and hairless. Basal sheaths are purplish or reddish brown. Leaves seldom exceed the inflorescence, but one or two leaflike bracts may surpass the upper spike.

Although plants are often numerous, they produce little herbage. Hence, blue sedge seldom contributes significantly to the cattle diet.

Frank sedge, *Carex frankii* Kunth, on moist hardwoods sites, and southern sedge, *C. glaucescens* Ell., on pine-hardwoods uplands, are common throughout the South. Both have leaf blades ¼ to ½ inch wide. Blades of southern sedge have a gray-green upper surface; this coloration is lacking in Frank sedge. Southern sedge is the taller of the two, but both may exceed 2 feet in height.

Range: Texas, Oklahoma, and Missouri to Georgia and Pennsylvania.

Perennial. **Stems** 30 – 120 cm tall, stiff, erect, usually in small dense clumps from short, knotty rhizomes; **leaves** stiffly ascending; **blades** 2 – 4 mm wide, elongate; **basal sheaths** purplish to brownish red, older sheaths becoming fibrous at base of stem; **inflorescence** of two to five spikes, the terminal spike staminate at base, pistillate above; other spikes pistillate; spikes 8 – 15 mm long, 5 – 7 mm thick, the terminal spike usually longest; **flowers** subtended by lanceolate, scarious-margined bracts; **staminate flowers** with three stamens; **pistillate flowers** with an ovary enclosed in a beakless, flattened, ovoid perigynium about 2 mm long; **fruit** an achene 1.5 – 2.0 mm long, triangular in dorsal outline, acute-ellipsoid in lateral outline.



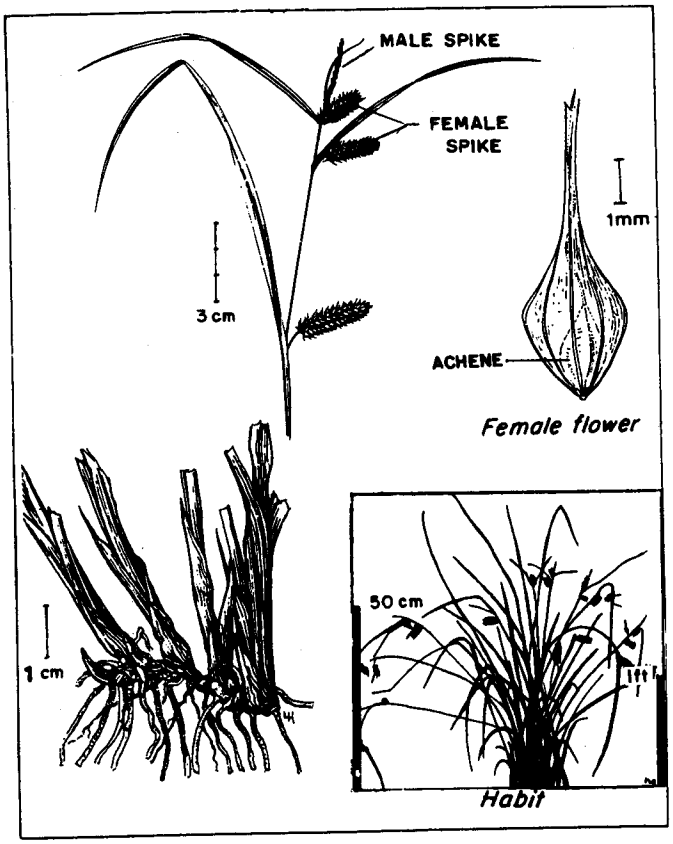
Lurid Sedge—*Carex lurida* Wahl.

Lurid sedge grows 1 to 3 feet tall in wet woods or swampy sites, forming dense clumps from stout scaly rhizomes. The inflorescence consists of two to five spikes, the uppermost with male flowers and those below with female flowers. Both male and female spikes are ½ to 3 inches long. Male spikes are only about ⅛ inch in diameter, while the female spikes exceed ½ inch. Flowers appear early in spring, the spikes persisting through the growing season.

Leaves are about ¼ inch wide and 15 inches long. Stems are leafy throughout. The upper leaves, as well as the leaflike bract below the inflorescence, usually exceed the inflorescence in height. Leaf blades are yellow green; basal parts of the lowest leaf sheaths are purplish.

Individual clumps of lurid sedge produce as much herbage as many of the grasses. Because plants are seldom abundant, except on very wet sites, this species is not important for forage.

Range: Texas to Florida, extending north to Canada.



Perennial. **Stems** glabrous, 20 – 100 cm tall, in dense clumps from short, stout rhizomes, usually bending somewhat under the weight of the spikes; **leaves** 2 – 7 mm wide, 30 – 40 cm long, pale green or yellow green, glabrous, upper leaves exceeding inflorescence; **inflorescence** a terminal staminate spike with one to four pistillate spikes below; **staminate spikes** 1 – 7 cm long and 2 – 3 mm thick; **pistillate** spikes burlike, 1 – 7 cm long, 1.5 – 2.0 cm thick; **individual flowers** subtended by lanceolate bracts; **staminate flowers** with three stamens; **pistillate flowers** with ovary enclosed in ovoid, beaked perigynium 6 – 9 mm long, 2.5 – 3.0 mm thick; **fruit** an obovoid, 3-angled achene 2.0 – 2.5 mm long.

Green Flatsedge—*Cyperus virens* Michx.

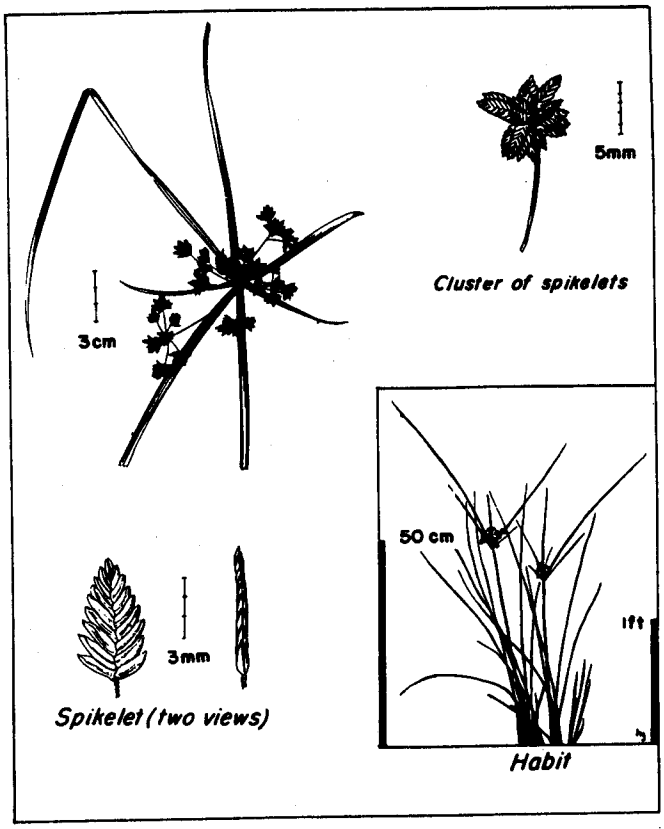
Green flatsedge often grows in small colonies on wet sites and in small low areas on otherwise well-drained soils. Plants spread vigorously from long, thick rhizomes, normally reaching about 2 feet in height but sometimes exceeding 3 feet.

As in all *Cyperus* species, a whorl of leafy bracts subtends the green flatsedge inflorescence, exceeding it in height. In the immature inflorescence, flatness of the individual spikelets is obscured by the density of the clusters. As the spikelets develop, however, new flowers form at the tips, and the lower, mature flowers fall. Thus, by midsummer the inflorescence consists of loose clusters of distinctly flat spikelets borne on naked stalks. Mature spikelets are about ⅛ inch wide and less than 1/32 inch thick. Spikelet length depends on maturity, ranging from about ¼ inch in young inflorescences to ½ inch at maturity. Each flower of the spikelet produces a straight, narrow achene about 1/16 inch long.

Leaves are all basal. They are about ¼ inch wide at the base, abruptly narrowing to about ⅛ inch, then tapering gradually to a fine point. Blades ascend stiffly, reaching 2 feet or more in length. Near their bases, leaves are loosely coated with a mat of fine hairs; otherwise, plants are hairless. Small warty lumps often appear between veins of the blades, giving the leaves a knotty appearance.

Although green flatsedge is common, it is unimportant as forage. The foliage is not readily eaten by cattle, and the seed apparently has little value for wildlife.

Range: Texas to Florida, extending north to Kansas, Missouri, Illinois, and New Jersey.



Perennial. **Scapes** to 1 m tall, forming clumps or colonies from stout rhizomes; **leaves** basal, ascending, elongate, usually exceeding the inflorescence, the base 4 – 7 mm wide and woolly-pubescent; **blade** glabrous on upper surface, 1 – 2 mm wide, gradually narrowing to tip; **inflorescence** an umbel of spikelet clusters, subtended by an involucre of leaflike bracts, peduncles unequal in length; **spikelets** 3 – 4 mm wide, up to 14 mm long; **fruit** a linear achene up to 1 mm in length.

Annual Spikesedge—*Eleocharis microcarpa* Torr.

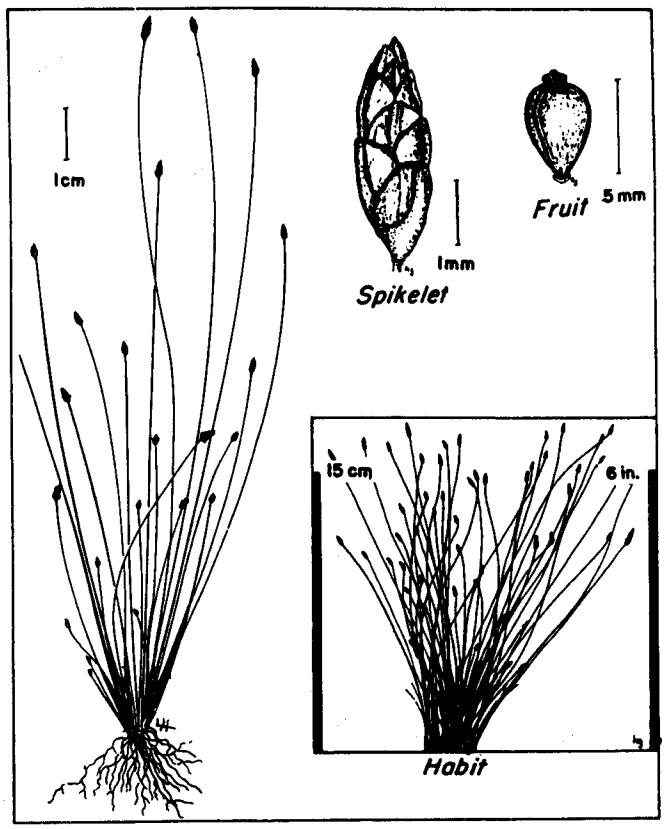
Annual spikesedge inhabits wet meadows and swampy areas. It grows in small clumps with many hairlike flower stalks averaging 6 inches high. Each stalk ends in a single ovoid, several-flowered spikelet about ⅛ inch long. Spikelet scales are pale with a papery texture. The inconspicuous basal leaves resemble the flower stalks but are usally shorter.

The fruits are barely visible to the naked eye. With magnification, they appear ovate in outline. They are three-angled in cross section, with prominent ribs. The persistent base of the style forms a green cap (tubercle) at the apex.

Flowers appear in spring and seeds mature in early summer. Seeds germinate in late winter, and plants begin growth before most grasses. Cattle may graze this early herbage; otherwise annual spikesedge has little forage value.

Another annual, conecap spikesedge, *Eleocharis tuberculosa* (Michx.) R. & S., resembles annual spikesedge in size and general appearance, but is distinguishable by its large tubercle, which equals the seed in size. Hairsedge, *Bulbostylis capillaris* (L.) C. B. Clarke, another small fine-stemmed annual, is recognizable by its cluster of brown ovoid spikelets at the branch tips.

Range: Coastal Plain, Louisiana to Florida and Virginia.



Annual. **Stems** slender, 4-angled, 5 – 30 cm tall, in small, many-stemmed tufts; **leaves** reduced to slender basal sheaths around the flower stalks; **inflorescence** a terminal spikelet, lanceolate to oblong or ovate, 2 – 7 mm long, 1.0 – 1.5 mm thick, several-flowered, lower flowers falling when mature; **flowers** enclosed by scarious-margined scales; **fruit** a 3-angled, obovoid achene, 0.5 mm in diameter with a minute warty tubercle at the top.

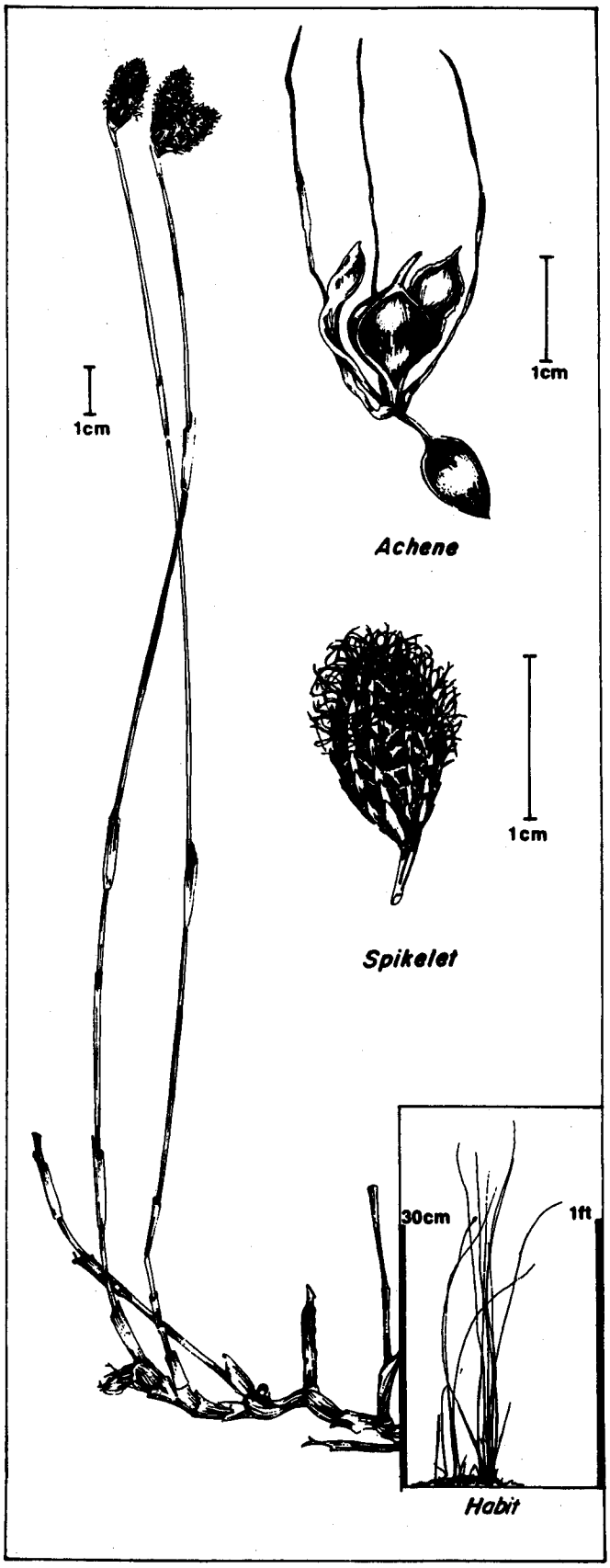
Common Umbrella-Grass—*Fuirena scirpoidea* Michx.

Common umbrella-grass, or umbrella-sedge, is a perennial sedge found on lake shores, low pinelands, and fresh water marshes of the Coastal Plain. Stalks about 1 foot tall arise in early spring from slender rootstocks, usually forming colonies. Stalks are unbranched and leaves are few and reduced to sheaths only. From one to four bristly spikelets terminate each stalk. Hairy umbrella-grass, *Fuirena squarrosa* Michx., occurs southwide in ditches and marshes. It is hairy, not strongly rhizomatous, and, unlike common umbrella-grass, has leaf blades.

Although cattle graze the young growth of common umbrella-grass readily, the scant foliage provides little forage for grazing animals.

Range: Coastal Plain, Louisiana to Florida and Georgia.

Perennial. Stems 20 – 60 cm tall, unbranched, rhizomatous; leaves reduced to sheaths only, with oblique margins; spikelets solitary or in clusters of two to four, 8 – 12 mm long, scales pubescent, 3 – 4 mm long with a short subulate tip, blades of the perianth scales ovate, about 1 mm long rounded at base; fruit an oval-rhombic or somewhat obovoid achene, about 1 mm long.



Pinehill Beakrush—*Rhynchospora globularis* (Chapm.) Small

Pinehill beakrush may be the most common sedge on southern pine-bluestem range. It grows most abundantly on poorly drained flatwoods or other wet sites but is also a common associate of bluestem grasses on drier soils. Its brown seed heads often dominate the landscape in late spring or early summer before most grasses produce seedstalks.

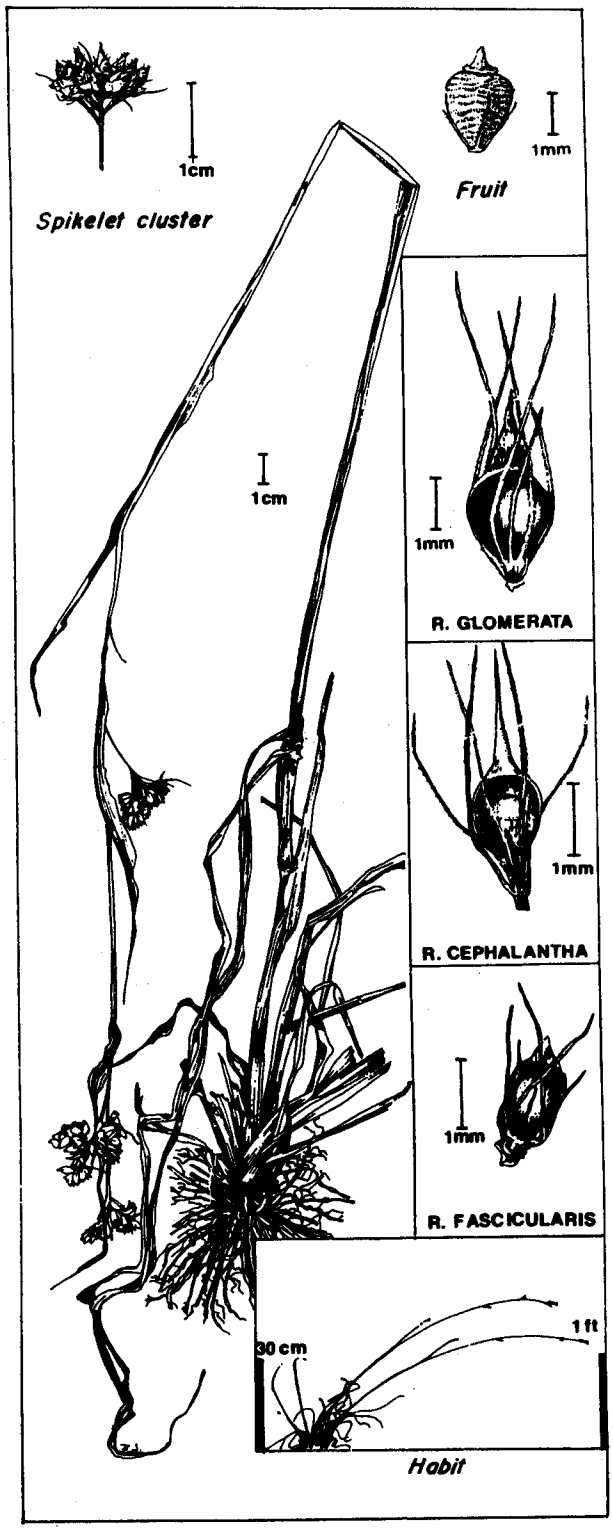
Plants grow in small tufts with erect basal leaves 4 to 12 inches long and 1/16 to 1/8 inch wide. There are one to several seedstalks per plant, and the range in height is from 6 inches to over 3 feet. Leaves are mainly basal, but a few reduced leaves are borne on the stalk up to the base of the inflorescence. Stalks, erect when young, recline as plants mature.

The inflorescence consists of spikelet clusters on branches arising from the axils of upper leaves. Each branch divides into a compound head, with each branchlet supporting a compact cluster of spikelets. Although a spikelet has several flowers, seldom will more than one fruit mature. Spikelets are rusty brown and about 1/8 inch long. The fruit, about 1/16 inch long, is a hard, oval, wrinkled achene, slightly flattened, with the remnant of the style forming a pointed cap or "beak." A whorl of bristles, somewhat shorter than the fruit, arises from the base of the achene.

On some sites, pinehill beakrush provides up to 3 percent of the annual cattle diet. Beakrush seeds are considered good quail food.

Other common beakrushes on southern pine range are cluster beakrush, *Rhynchospora glomerata* (L.) Vahl, common beakrush, *R. fascicularis* (Michx.) Vahl, and big beakrush, *R. cephalantha* Gray. All are widely distributed in the Gulf and Atlantic Coastal Plains, where they are found on wet or moist sandy sites. They can be separated from pinehill beakrush and from each other by glomerule and spikelet characteristics as shown in the accompanying illustrations. Nodding beakrush, *R. inexpansa* (Michx.) Vahl, another common species across the South, has spikelets in loose, nodding clusters. Horned beakrush, *R. corniculata* (Lam.) Gray, is a common large plant growing in ditches or other wet sites. The inflorescence is profusely branched, with few spikelets in each of numerous clusters. The brown spikelets are narrow, tapering to a bristle-tipped apex. The fruit has a beak that is commonly longer than the body of the fruit.

Range: Coastal Plain, New Jersey to Florida and east Texas, extending inland to Tennessee, Missouri, and Oklahoma.



Perennial. **Culms** glabrous, to 1 m tall, reclining as flowers mature; **leaves** glabrous, mainly basal, 2–5 mm wide, up to 35 cm long; cauline leaves reduced, the uppermost bractlike, subtending and exceeding inflorescence branches; **inflorescence** a terminal cyme and one to six lateral, often distant, cymes; **cymes** 1.0–3.5 cm in diameter, branches terminating in glomerules of many crowded spikelets; **spikelets** 2.5–4.0 mm long, broadly ovoid to subrotund, several-flowered but maturing only one or two fruits; **fruit** an achene, 1.3–1.6 mm long, 1.2–1.5 mm wide; **tubercle** 0.3–0.6 mm high, deltoid-conical; **bristles** one-half to three-fourths as long as achene.

Fringed Razorsedge—*Scleria ciliata* Michx.

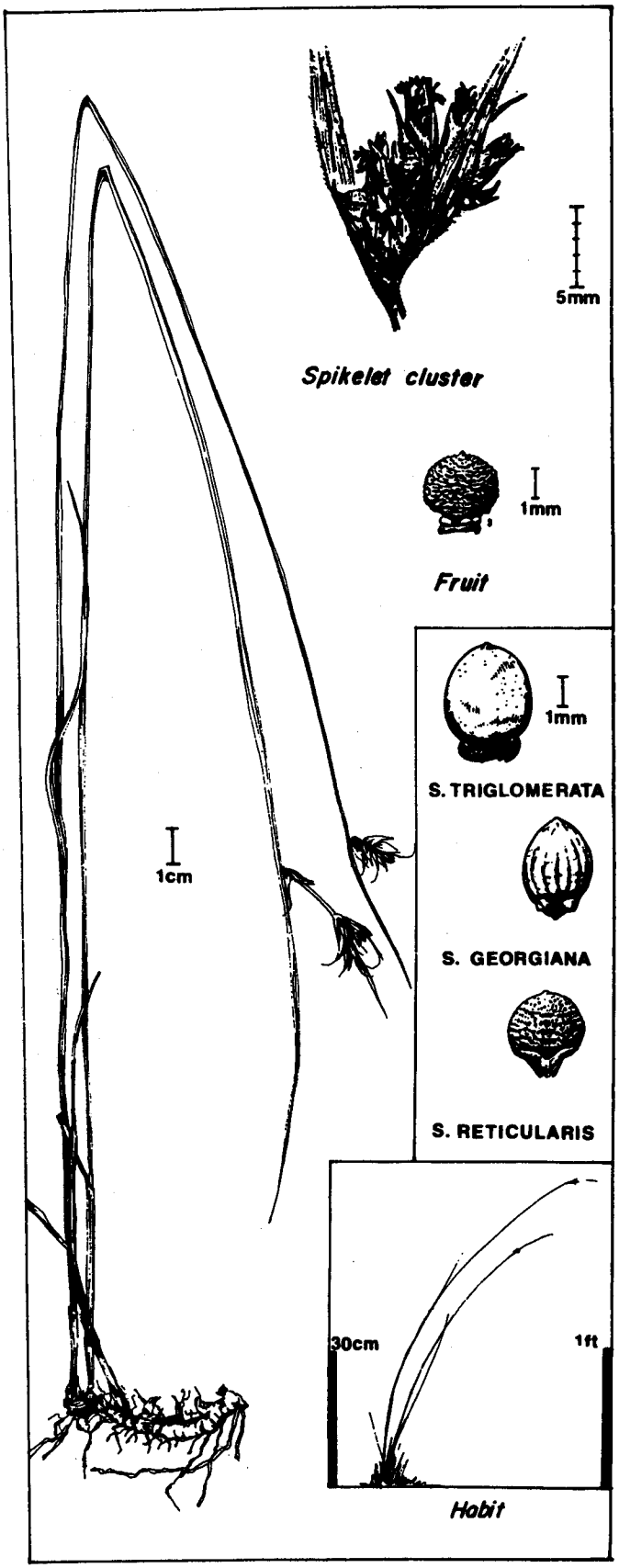
Fringed razorsedge is a common but seldom abundant sedge found on sandy pinelands of the Coastal Plain. It is a perennial, with stems 10 to 25 inches long arising from knotty rhizomes, nodding at maturity under the weight of the terminal inflorescence. Stems are triangular with several leaves arising from the base and lower half of the stem. The inflorescence consists of one to three clusters of spikelets; clusters may consist of staminate or pistillate flowers, or both. The white, bony, naked fruit is a distinguishing characteristic of the razorsedges. The fruit of fringed razorsedge is globose, about 1/16 inch in diameter, and roughened with bony ridges.

Other razorsedges with wide distribution in coastal states are little razorsedge, *Scleria georgiana* Core, whip razorsedge, *S. triglomerata* Michx., and annual razorsedge, *S. reticularis* Michaux. Vegetatively, these other razorsedges resemble fringed razorsedge, although sizes vary. Little razorsedge is similar in size, but the fruits are smooth with longitudinal ridges; viable fruits are dark and sterile fruit are white. Whip and annual razorsedges are more robust plants. Fruits of whip razorsedge are smooth, shiny, and bright white; those of annual razorsedge may be hairy.

Razorsedge fruits are generally classed as desirable food for quail, doves, and other birds. Fringed razorsedge fruit is considered an important quail food across the South. Annual razorsedge fruit is a preferred food of bobwhite quail and mourning doves in southern Florida. Plants of all species are generally too sparse to be valuable as forage for deer or livestock.

Range: Texas and Missouri, extending east to Florida and Virginia.

Perennial. Culms tufted, from knotty rhizomes, 3-angled, 30 – 60 cm long; leaves glabrous or pubescent, to 20 cm long, 1 – 7 mm wide; inflorescence of two to three terminal or axillary cymes, each with few spikelets 1 – 3 cm long; spikelets unisexual, few-flowered; achenes globose, white, verrucose, 2 – 3 mm in diameter.



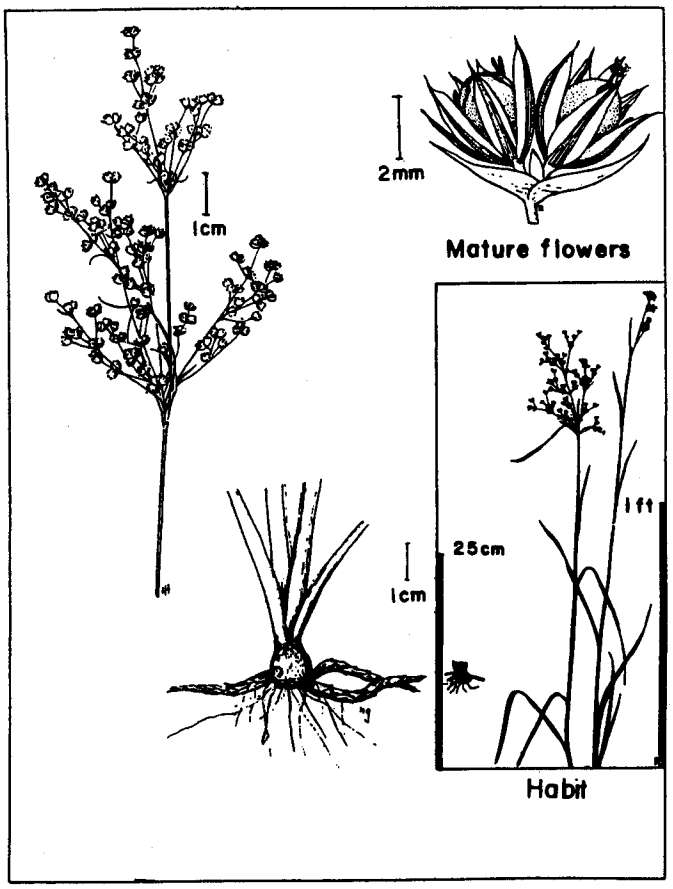
Twinflower Rush—*Juncus biflorus* Ell.—(included with *J. marginatus* Rostk. by some recent authors)

Although not abundant, twinflower rush is conspicuous at maturity because of its tall flower stalks and large brown seed heads. It grows mainly in ditches, along shores, or in other low, wet, usually sandy, open sites. Flower stalks 2 to 4 feet tall are produced in spring from coarse rhizomes. Inflorescences, appearing almost simultaneously with the stalks, are 2 to 8 inches long, but usually about 4 inches. They are profusely branched, the branches ascending at angles of 45° or less. Flowers are numerous, small, and brown. Usually two or more are borne at each branch tip and in the axil of each branch. At maturity, normally in May, seed capsules are spherical. Authors who list both *Juncus biflorus* and *J. marginatus* consider *J. marginatus* a less robust form without rhizomes.

Basal leaves are about ¼ inch wide and up to 12 inches long. Upper leaves are somewhat reduced. Lower leaves usually turn brown before seeds mature.

Young leaves provide some early green forage for cattle, but the plant is not abundant enough to contribute appreciably to the diet.

Range: Texas to Florida, extending north to Massachusetts, southern Michigan, Illinois, Missouri, and Oklahoma.



Perennial. **Stem** 60 – 130 cm tall, forming loose clumps from scaly rhizomes; **leaves** of lower stems 4 – 7 mm wide and 15 – 30 cm long, the upper about half the size of the lower; **inflorescence** a cyme 5 – 20 cm long, branches ascending; **flowers** 1.5 – 3.0 mm in diameter, in clusters of two to several at tips and in axils of inflorescence branches; **sepals** three, acuminate; **petals** three, blunt, scarious-margined; **fruit** a capsule, equaling the perianth.

Common Rush—*Juncus effusus* var. *solutus* Fern. & Wieg.

Common rush, also called rice rush and soft rush, grows in swamps, along stream banks, or on other wet sites. It is represented by several varieties throughout the United States, but only the variety *solutus* occurs in the South.

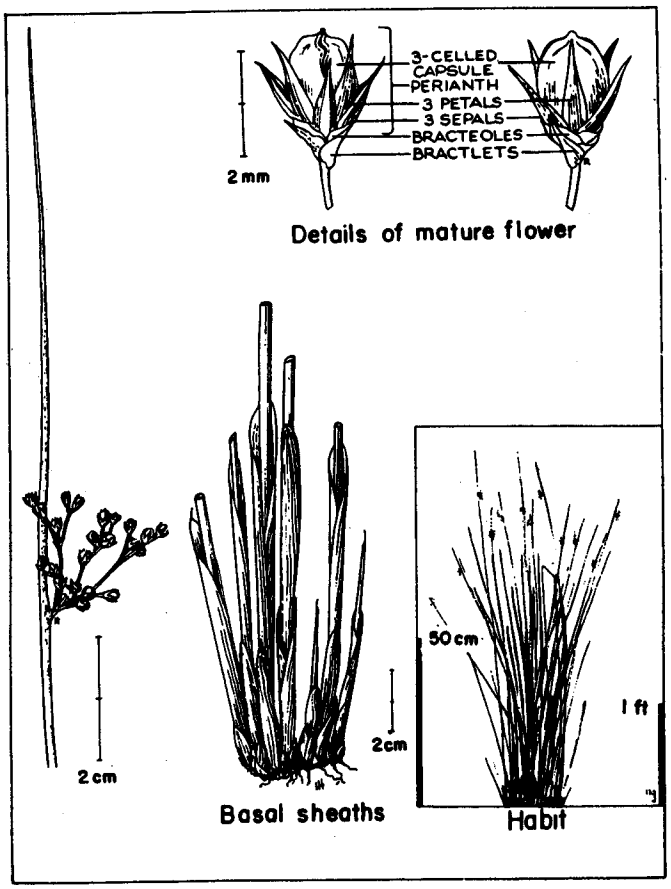
Plant height averages 3 feet, but may reach 6 feet. Numerous round seedstalks arise from a stout rhizome to form dense clumps. The leaf is a brown sheath that encircles the seedstalk to a height of about 5 inches. The blade is reduced to a minute bristle at the sheath tip. Leathery rush, *Juncus coriaceus* MacKenzie, which is also common southwide, has elongate leaf blades terminating some sheaths and a few-flowered, usually branched, inflorescence.

Flower clusters appear to emerge from one side of the flower stalk. Actually, the inflorescence is terminal, subtended by a single, erect bract that may be misidentified as a continuation of the stalk. Common rush is apparently the only southern freshwater rush with this characteristic.

When fully expanded, usually by May 1, the freely branching inflorescence is about 5 inches long. The many small flowers are single, each producing a capsular fruit that yields many tiny seeds.

New leaves and stalks of common rush are nutritious and palatable, but because of its scant foliage, this species provides little forage.

Range: Throughout the United States and Canada.



Perennial. **Stems** to 2 m tall, from stout rhizomes, forming dense clumps; **leaves**, the lower reduced to reddish brown basal sheaths, the upper including a slender scalelike blade 1 mm long; **inflorescence** a terminal cyme 1 – 12 cm in diameter; **flowers** borne singly on cyme branches; **sepals** three, acuminate, about 2 mm long; **petals** three, acuminate, approximately equaling sepals; **fruit** a capsule, equaling or slightly shorter than the perianth.

Needlepod Rush—*Juncus scirpoides* Lam.

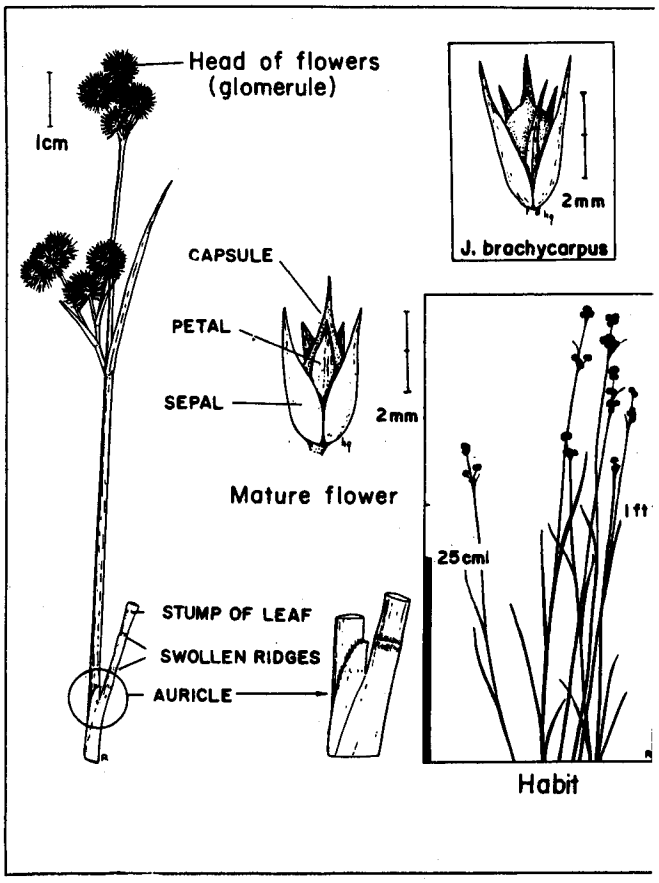
Needlepod rush grows on riverbanks and in shallow ponds, swamps, and wet pinelands. It forms open clumps of slender stalks 1 to 3 feet tall, arising from thick, whitish rhizomes. Two or three leaves are spaced along the stalk, the uppermost subtending the inflorescence. Leaf sheaths, about 1 inch long, are split throughout their length. Blades are round in cross section, with hollow cores divided into chambers by regularly spaced partitions that impart a ribbed appearance to the surface. Leaves are about 4 inches long. They drop early, leaving a short stub.

Inflorescences, when fully expanded, are about 3 inches long and 1 inch wide. Flowers are in heads that may be arranged in either a terminal cluster or in two distinct clusters, one terminal and the other 2 to 3 inches lower on the stem. Heads are each about ¼ inch in diameter and number up to five per cluster. One head per cluster is attached directly to the stem; the others are on short stalks.

Needlepod rush resembles whiteroot rush, *Juncus brachycarpus* Engelm., and the two frequently occur together. The seed capsule of needlepod rush ends in a sharp beak that extends beyond the tips of the flower petals and sepals; the short-beaked capsule of whiteroot rush is exceeded by the floral bracts.

Because of its dearth of foliage, needlepod rush has little forage value.

Range: Texas to Florida, extending north to Oklahoma, Missouri, Illinois, and New York.



Perennial. **Stems** erect, 30 – 80 cm tall, from stout rhizomes; **leaves** terete, 1 – 2 mm in diameter, 5 – 15 cm long, conspicuously septate; **sheaths** open and slightly inflated, with a conspicuous auricle; **inflorescence** a cyme 3 – 15 cm long by 2 cm wide, with 4 to 15 spherical heads, each 5 – 12 mm in diameter, 15- to 40-flowered; **sepals** three, rigid, lance-subulate, about 3 mm long; **petals** three, similar to sepals but slightly shorter; **fruit** a subulate capsule, equaling or usually exceeding the perianth.

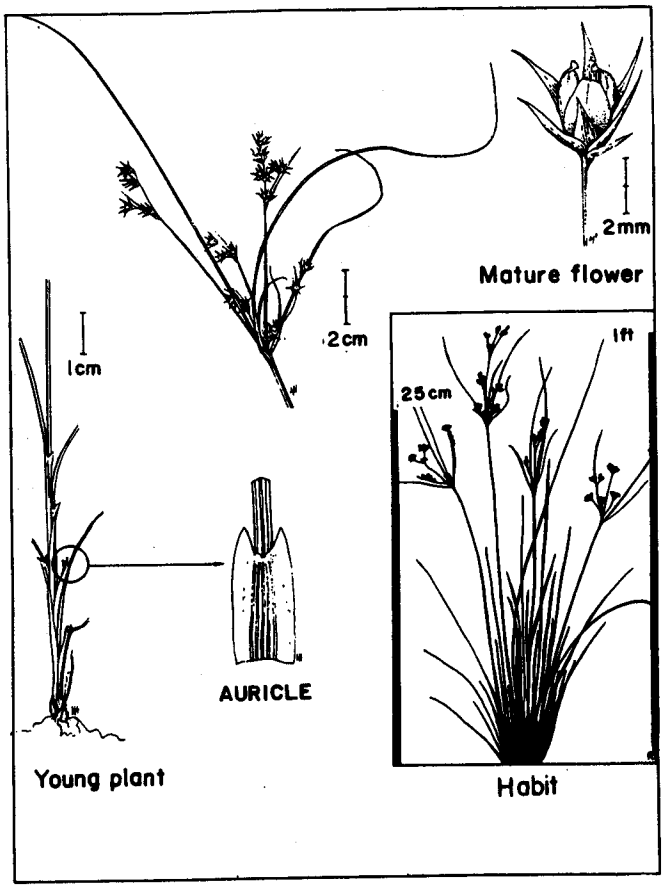
Poverty Rush—*Juncus tenuis* Willd.

Poverty rush, known also as hemp rush and wiregrass rush, grows along trails, in yards, and in other places with heavy traffic. It starts growth in late winter, producing small, dense clumps. Mature stalks reach about 2 feet in height. Leaves are mostly basal, usually less than 1/32 inch wide and about half as tall as the flower stalks. Flowers appear in early spring and seeds mature in April or May. Inflorescences rarely exceed 3 inches in length and 1 inch in width. Flowers, about 1/8 to 3/16 inch in diameter, are borne singly. Leaflike bracts subtend the inflorescence. They are long and narrow, extending above the uppermost flower.

Poverty rush resembles another low-growing rush, *Juncus dichotomus* Ell., which grows mainly on undisturbed sandy sites. Whereas leaves of poverty rush are flattened, those of *J. dichotomus* are almost cylindrical. In poverty rush, a membranous auricle extends beyond the summit of the leaf sheath; the short, rounded auricle of *J. dichotomus* is barely perceptible. Because the leaves of both species are narrow, magnification helps in detecting these differences.

Poverty rush is seldom grazed except in winter when better herbage is unavailable. It supplies little forage on most sites.

Range: Throughout most of North America.



Perennial. **Stems** in clumps, 10 – 60 cm tall; **leaves** basal, about one-half the height of stems, 0.5 – 1.0 mm wide; **sheath** with scarious margin; **auricle** scarious, 1 – 3 mm long; **inflorescence** a cyme 1.5 – 15.0 cm long, subtended by involucral bracts that often exceed the cyme; **flowers** 3 – 5 mm in diameter, borne singly at tips and in axils of ascending branches of cymes; **sepals** and **petals** lance-subulate, scarious-margined, equal in size; **fruit** a capsule, usually exceeded by the perianth.

Roundhead Rush—*Juncus validus* Coville

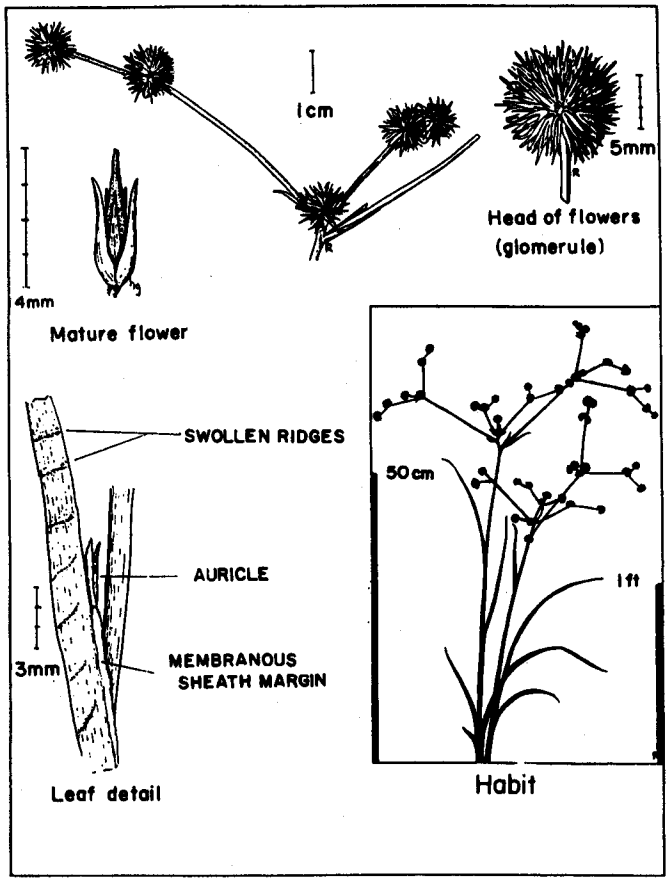
Roundhead rush grows mainly in swales, drainages, and sandy flatwoods. It forms loose, leafy clumps of stems 2 to 3 feet tall. Although it is not generally abundant, its large, stiff inflorescence is conspicuous.

Flower stalks emerge in midspring and seeds mature by early summer. The inflorescence branches as it grows, often spreading to a foot or more at maturity. Spherical flower heads, about ½ inch in diameter, are scattered throughout the inflorescence.

Leaves are mostly basal, the largest about 12 inches long and ¼ inch wide. They are slightly flattened, hollow, and segmented by internal partitions that impart a knotty feel to the surface. This "knot-leaf" characteristic is common to several species, however, including needlepod rush. The flattened leaves of roundhead rush superficially resemble those of blue-eyed-grass, *Sisyrinchium* spp., but the knotty blades are useful in distinguishing the species before flower stalks appear. The larger but closely related flatleaf rush, *Juncus polycephalus* Michx., has strongly flattened leaves and its capsules are capped by a solid beak, not split at the tip as in roundhead rush.

Cattle graze roundhead rush in late winter and early spring, but rushes generally provide little forage.

Range: Texas to Mississippi and Missouri.



Perennial. **Stems** erect, 30 – 80 cm tall, from short, knotty rhizomes; **leaves** 2 – 7 mm wide, up to 40 cm long, conspicuously septate; **sheaths** scarious-margined, terminated by lanceolate auricles 2 – 4 cm long; **inflorescence** an open, widely branching cyme up to 50 cm wide, with spherical, many-flowered heads at branch tips and in axils; **heads** 1.0 – 1.5 cm in diameter; **flowers** with sepals and petals equal, lance-subulate, 4 – 6 mm long; **fruit** a lance-subulate capsule, exceeding the perianth.

FORBS

The term "forb" as used in this handbook and in range management generally, refers to herbaceous plants other than grasses (family Gramineae) and grasslike plants (families Cyperaceae and Juncaceae). Some use the term "weed" for such plants, but the word has a noxious connotation; a forb (or grass or grasslike plant) becomes a weed where its presence is not welcome, as in a lawn, garden, flower bed, or soybean field.

Forbs are numerous on southern pine ranges, occasionally comprising up to 20 percent of the ground cover. They may add variety to the forage supply, provide food and cover for wildlife, and improve the soil. Some are more tolerant of shade or plant competition than others. On the average, forbs furnish about 4 percent of the cattle diet. Because many species surpass grasses in protein, phosphorus, and calcium content, the quantity consumed is not a reliable indication of their contribution to cattle nutrition.

Several forbs are toxic, but cattle poisoning is infrequent. These toxic plants are usually unpalatable; moreover, they seldom are abundant enough to cause trouble. With rare exceptions, cattle consume poisonous species in lethal quantities only on overgrazed ranges.

Although forbs representing dozens of plant families are found in the South, the most common species on longleaf pine-bluestem range are legumes (Leguminosae) and composites (Compositae).

Legumes

The legume family (Leguminosae) is economically one of the world's most important plant families. It includes peas, beans, peanuts, and many valuable pasture plants—especially the clovers (*Trifolium* spp., *Medicago* spp., *Melilotus* spp.). Legumes vary widely in life form, from annual forbs to trees over 100 feet tall. Although they are generally characterized by compound leaves, irregular pealike flowers, and seed pods that split longitudinally when ripe, these features are far from universal. Some legumes have simple leaves, several have symmetrical flowers, and pods of some species remain closed at maturity.

Native legumes are numerous on southern pine ranges but usually comprise a small part of the total forage. Legume herbage is rich in protein; thus, small quantities may appreciably improve the diet. Most herbaceous legumes are palatable to cattle, but a few species—Nuttall wildindigo, for example—are grazed sparingly, if ever.

Seeds of many legumes are favorite foods of wildlife. Several species are grown in cultivated food patches to improve quail habitat.

Nuttall Wildindigo—*Baptisia nuttalliana* Small

Nuttall wildindigo is a bushy, herbaceous perennial growing from large woody rootstocks. It is most common in south-central Louisiana and southeastern Texas. Mature plants are usually 2 to 3 feet tall. On dry sites that are heavily grazed and frequently burned, Nuttall wildindigo is often an abundant understory plant. It seldom occurs on open cutover sites, probably because of grass competition.

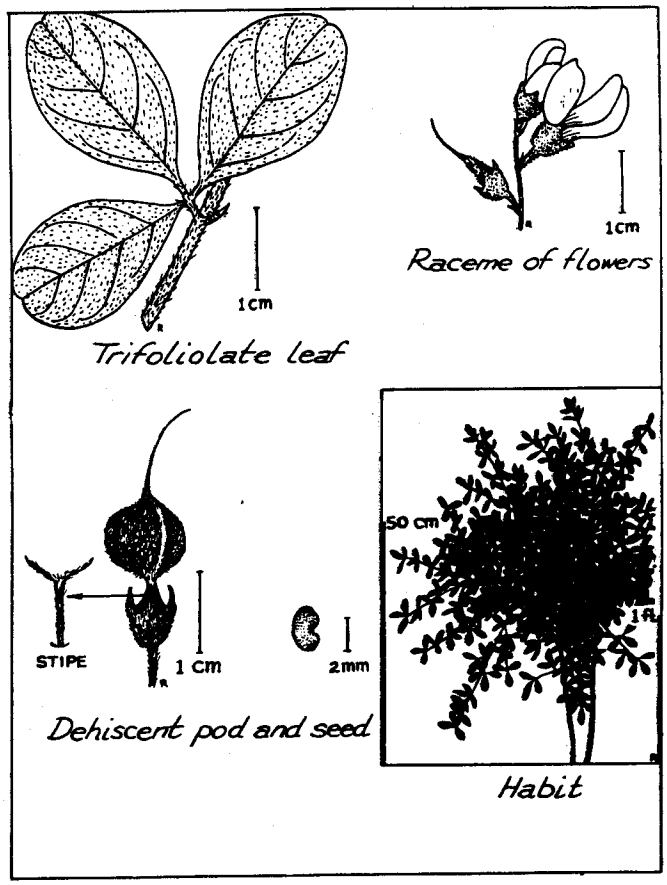
New growth emerges in late winter while most other forbs are dormant. Plants bloom in the spring and mature in early summer, turning blue black (indigo) at maturity. Pale yellow flowers are in terminal racemes or solitary in leaf axils; commonly, these arrangements are mixed. Leaves are palmately compound with three oblanceolate or elliptical leaflets 1 to 3 inches long.

Several other wildindigos, also called false-indigos, occur throughout the South but most have limited distribution. Others with ranges extending west of the Mississippi River and which apparently intergrade with *Baptisia nuttalliana* and each other are: whitestem wildindigo, *B. bracteata* var. *laevicaulis* (Gray ex Canby) Isely—a low-growing plant with drooping terminal racemes of yellow flowers; round wildindigo, *B. sphaerocarpa* Nutt.-an upright branching plant with several to many erect terminal racemes of yellow flowers; and Atlantic wildindigo, *B. lactea* (Raf.) Thieret—(*B. leucantha* T. & G.) an upright branching plant with an elongated terminal raceme of white flowers.

Species whose ranges are east of the Mississippi River include pineland wildindigo, *B. lanceolata* (Walt.) Ell., with leaflets 2 to 4 inches long and single yellow flowers in the upper leaf axils, and yellow wildindigo, *B. tinctoria* (L.) R. Br., a small-leaved, erect, often bushy plant with yellow flowers terminating the tallest branches. *B. tinctoria* has been used for medicinal purposes in the Appalachian region as a tonic or purgative.

Only one species, Atlantic wildindigo, is reported as poisonous to livestock, but any species should be suspect if abundant. The seeds of *Baptisia* have limited value for wildlife food.

Range: East Texas, Louisiana, Arkansas, and western Mississippi.



Perennial. **Stems** 40 – 100 cm tall, much branched from thick rhizomes; **leaves** trifoliolate, stipulate; **leaflets** 2 – 6 cm long, cuneate to obovate-cuneate, rounded or notched at the apex, glossy above, dull beneath, with scattered pubescence; **flowers** papilionaceous, solitary in upper leaf axils or 1 to 12 in racemes at the tips of leafy branches; **calyx** 8 – 10 mm long, campanulate, silky pubescent; **corolla** pale yellow; **keel** about 15 mm long; **standard** with reniform blade 1.2 – 1.8 cm broad; **legume** pubescent, subglobose, long-stipitate, thickwalled and woody with a long, slender beak (style), the body 1.0 – 1.7 cm long; **seeds** many, about 2.5 mm long, bean shaped, yellow brown, smooth.

Showy Partridgepea—*Cassia fasciculata* Michx.

Showy partridgepea is an annual that grows on a variety of sites throughout the eastern United States. It is common on disturbed areas, often forming extensive colonies along firelines, roadside ditches, and in old fields.

Height is usually about 2 feet, but ranges from 6 inches to 3 feet. In years of normal rainfall, the bright yellow flowers appear continuously through most of the growing season. The leaves are pinnately compound, usually with 10 to 15 pairs of leaflets. A small, dark, saucer-shaped nectary, or honey gland, is located on the leaf petiole slightly below the lowest pair of leaflets. Seed pods are less than 3 inches long.

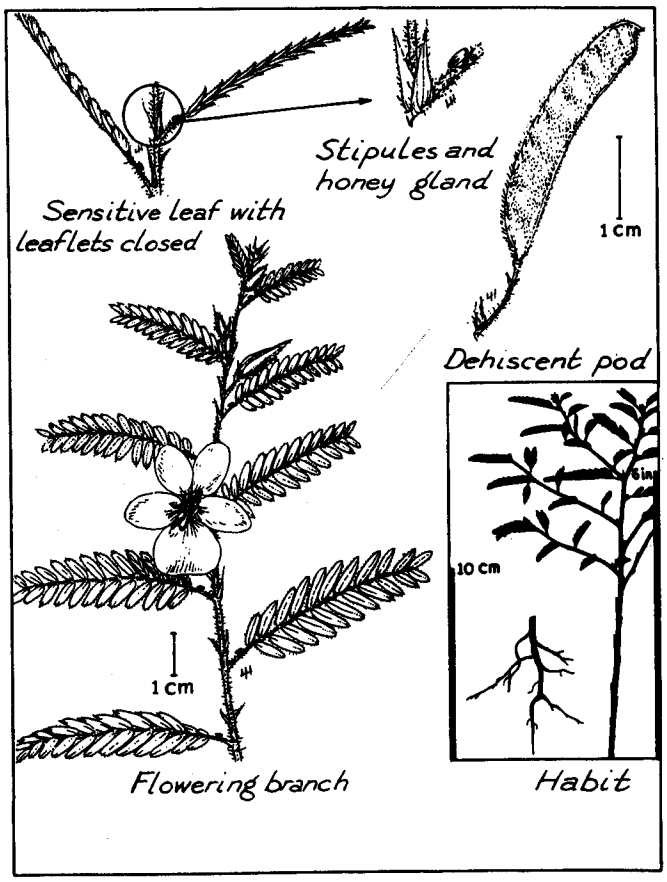
Plants differ widely in several characters, particularly size and pubescence, and several varieties have been named. *Cassia fasciculata* var. *brachiata* (Pollard) Pullen ex Isely, grows on wet sandy flats and other moist pinelands of south Alabama and Florida. Largest plants reach 8 feet in height, leaves have up to 25 pairs of leaflets, and the pod may be 4 inches long.

Sensitive partridgepea, *C. nictitans* L., a smooth small-flowered species, is common throughout the Gulf Coastal Plain. It resembles showy partridgepea, but the flowers are much smaller and have 5 stamens compared to 10 in showy partridgepea. *Cassia aspera* Muhl. is a small-flowered partridgepea common on sandy pine sites of the Atlantic Coastal Plain from Florida to South Carolina.

Cassia deeringiana (Small and Pennell) J.F. Macbr., a perennial partridgepea with long horizontal rootstocks, is found on sandy scrub oak sites in Florida, southern Alabama, and southwestern Georgia. The perennial plant is similar to, and may be mistaken for, showy partridgepea. *C. deeringiana* is essentially hairless, and the annual *C. fasciculata* is usually noticeably hairy; the rootstock on *C. deeringiana*, however, is the most reliable distinguishing character.

Although showy partridgepea foliage is highly nutritious, it is listed as a poisonous plant and should be considered potentially dangerous to cattle (Kingsbury 1964). The seeds are readily eaten by quail and patches are widely cultivated in the South to augment natural food supplies. Periodic burning favors all partridgepeas.

Range: Texas to Florida, extending north to South Dakota, southern Ontario and Massachusetts.



Annual. **Stems** 15 – 100 cm tall, from a taproot, glabrous to densely puberulent to villous; **leaves** even-pinnate, sensitive, with nectaries near the middle of the petiole; **leaflets** 12 to 36, linear-oblong, 1.0 – 2.5 cm long, 2 – 6 mm wide, inequilateral; **stipules** persistent, striate; **inflorescence** a 1- to 6-flowered axillary fascicle; **pedicels** 1 – 2 cm long; **sepals** lanceolate, 9 – 12 mm long, acute; **petals** bright yellow, almost equal, 1 – 2 cm long; **stamens** 10, unequal, 10 – 13 mm long; **legume** elastically dehiscent, 3 – 7 cm long, 5 – 7 cm broad, glabrate or appressed-puberulent to villous.

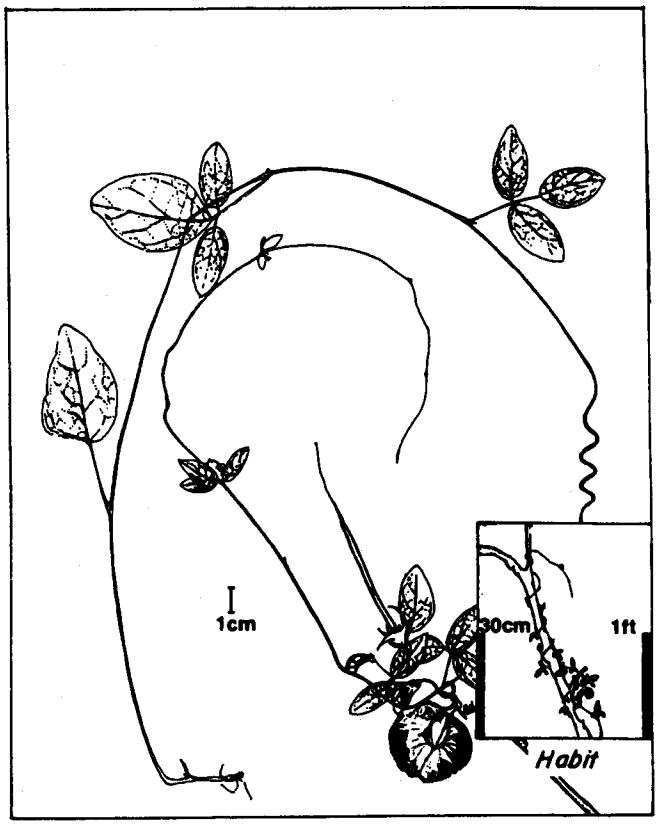
Butterflypea—*Centrosema virginianum* (L.) Benth.

This showy, twining, herbaceous legume is common on well-drained sites throughout the southern states. The flowers are flattened, almost circular, pink, and about 1 inch wide. The slender pods, averaging about 4 inches long, are produced throughout the summer. Leaves are pinnately compound with three, usually ovate, leaflets up to 3 inches long. Upper surfaces of leaflets are reticulately divided by veins paler in color than areas between the veins.

Butterflypea is closely related to Atlantic pigeonwings, which is also called butterflypea in some plant books. Flowers of both differ from the typical legume flower by having the larger petal (standard) beneath the other flower parts. The two can be separated by calyx (sepal) characteristics; the calyx tube of *Centrosema virginianum* is shorter than the lobes, while that of *Clitoria mariana* is longer than the lobes. The twining habit of butterflypea can also be used to distinguish the two. While foliage of both may appear hairless, butterflypea usually has fine short white hairs on stems, petioles, and upper leaf surfaces.

Because of its limited abundance, butterflypea has essentially no value as forage for livestock and deer. The seeds are eaten readily by bobwhite quail and other birds and small mammals.

Range: Texas and Arkansas, extending east to Florida, then north to Tennessee and New Jersey.



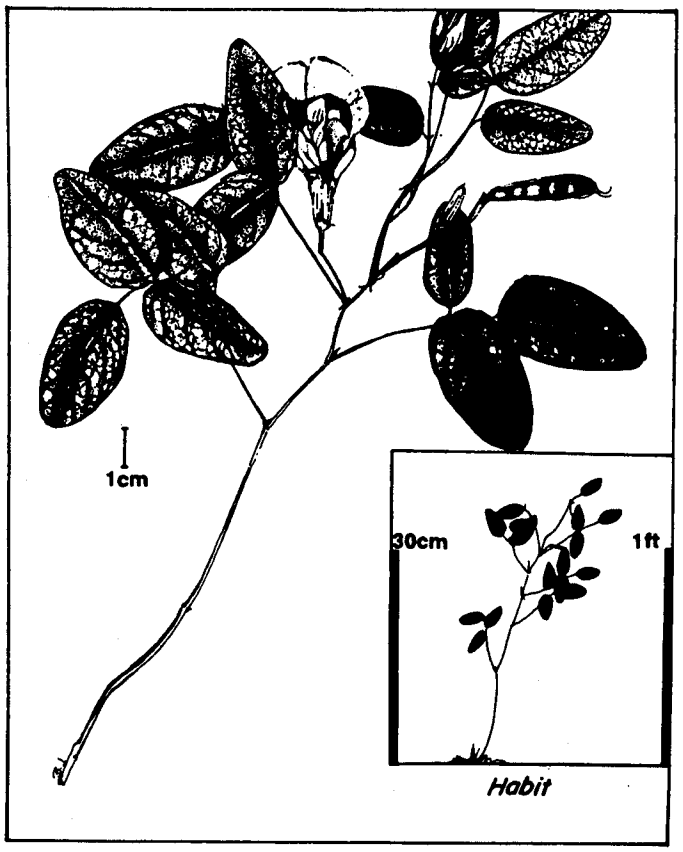
Perennial. **Stems** herbaceous, trailing or twining, to 1.5 m long, minutely pubescent throughout; **leaves** trifoliolate, leaflets ovate to oblong or elliptic, reticulate, 2 – 7 cm long and 0.5 – 3.0 cm wide, stipellate; **stipules** ovate-lanceolate to lanceolate, striate, 1.5 – 4.0 mm long, persistent; **inflorescences** axilliary; on peduncles 2 – 4 cm long, flowers one to three, pedicellate, pedicels and flowers subtended by stipule-like bracts; **calyx** tube broadly hemispheric, 4 – 5 mm long, lobes linear-subulate, 0.6 – 1.4 cm long; **corolla** pale blue violet to lavender, the standard 2 – 4 cm long, spurred near base; **legume** linear, flattened, 7 – 14 cm long, 0.3 – 4.0 mm broad, 10- to 20-seeded, with a persistent, beak-like style; **seeds** black, 2 – 3 mm long.

Atlantic Pigeonwings—*Clitoria mariana* L.

Closely related and similar to butterflypea, Atlantic pigeonwings occurs on dry sites throughout the South, often in association with butterflypea and various tickclovers *(Desmodium* spp.). Early vegetative growth of *Clitoria, Centrosema,* and several of the larger, ovate-leaved tickclovers require careful scrutiny. All have stipels; *Clitoria* and *Centrosema* also have conspicuous stipules. Growth form as expressed in later growth is useful for separation: *Clitoria* is erect or trailing, *Centrosema* is twining, and *Desmodium* is usually erect. Both *Clitoria* and *Centrosema* have showy flowers ranging from blue to purplish or sometimes almost white.

Although Atlantic pigeonwings is not generally abundant enough to be considered a valuable forage or wildlife food source, quail, turkeys, doves, and other birds use the seed for food.

Range: Arizona to Florida, extending north to New York, West Virginia, Ohio, Indiana, Illinois, and Iowa.



Perennial. **Stems** erect or trailing, glabrous to short-pubescent; **leaves** pinnately 3-foliolate; **leaflets** entire, ovate, lanceolate, ovate-oblong, or elliptic, 2 – 7 cm long, glabrous above and glabrous or occasionally short-pubescent beneath, stipellate; **stipules** ovate-lanceolate to lanceolate, 2 – 4 mm long, tardily deciduous, striate; **racemes** axillary, peduncles 0.5 – 4.0 cm long, 1- to 3-flowered; **pedicels** glabrous or rarely short-pubescent, 4 – 10 mm long, each subtended by a triangular to lanceolate, striate bract 1 – 3 mm long and with a pair of linear bractlets 3 – 6 mm long at or near the summits; **calyx** usually glabrous or rarely short-pubescent, somewhat bilabiate, tube cylindric, 1 – 2 cm long, upper lobes widely triangular, acute, 4 – 6 mm long, lateral lobes ovate-lanceolate, acuminate, 5 – 7 mm long, lowermost lobe lanceolate, acuminate, 6 – 8 mm long; **petals** pale blue or lavender, the standard spurless, 4 – 6 cm long, 3 – 4 cm wide; **stamens** monadelphous; **legume** flattened, oblong-linear, 3 – 6 cm long; **stipe** elongate, 1 – 2 cm long; **seeds** sticky.

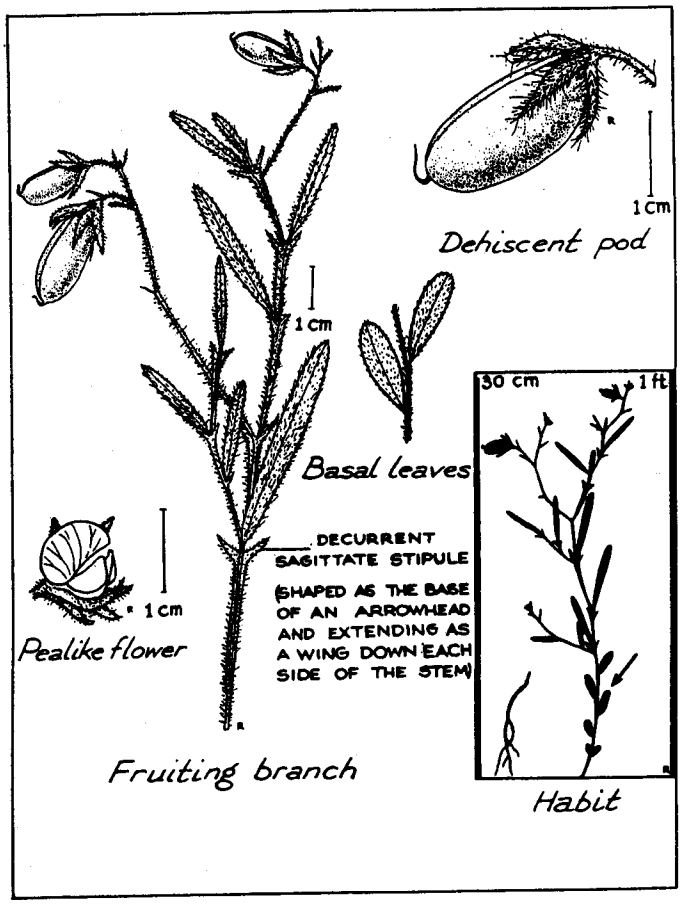
Arrow Crotalaria—*Crotalaria sagittalis* L.

Arrow crotalaria is an annual or a short-lived perennial seldom more than 15 inches tall. It is most common on dry sandy or gravelly soils, especially on disturbed sites. The lower leaves are elliptical and about 1 inch long, whereas upper leaves are lanceolate and up to 3 inches long. Arrowhead-shaped stipules give stems a winged appearance. Flowers, which usually appear from June through September, are small and yellow, resembling those of garden peas. The inflated pods are about 1 inch long and half as broad.

Several other crotalarias resemble arrow crotalaria in flower and pod characteristics, but only *Crotalaria purshii* DC. has the same long narrow leaves. The principal difference between the two is that stems and sepals of arrow crotalaria have conspicuous spreading hairs, while those of *C. purshii* have obscure hairs pressed flat against the stem or sepal. Some taxonomists consider *C. purshii* a regional variety of arrow crotalaria. The crotalarias are often called rattleboxes, since the loose seeds rattle in the mature pod. Showy crotalaria, *C. spectabilis* Roth, and slenderleaf crotalaria, *C. brevidens* Benth. (formerly *C. intermedia* Kotschy), are two robust annual weeds on agricultural lands. Showy crotalaria has wide simple leaves and slenderleaf has trifoliolate leaves with narrow leaflets.

Arrow crotalaria is poisonous to livestock. Because plants are usually scarce, however, they rarely constitute a threat to cattle.

Range: Texas to Florida, extending north to South Dakota and Massachusetts.



Annual or weak perennial. **Stems** 10 – 40 cm tall, simple to bushy branched, loosely villous to hirsute; **basal leaves** simple, small, oval; **upper leaves** linear-oblong to lanceolate, the larger 3 – 7 cm long, 8 – 15 mm wide; **stipules** inversely sagittate, decurrent; **flowers** papilionaceous, two to four on terminal or axillary peduncles 1 – 4 cm long; **calyx** 10 – 12 mm long, 5-cleft, loosely villous or hirsute; **corolla** 8 – 10 mm long, yellow; **legume** 1.5 – 3.0 cm long, about 1 cm thick, strongly inflated, dull brown; **seeds** 2.3 – 3.0 mm broad, obliquely reniform.

Tickclovers—*Desmodium* spp.

The tickclovers, also called beggarlice, sticktights, or ticktrefoils, are so named because the flat, minutely bristled fruits stick to clothing and animal hair. About 15 species, all perennials, occur throughout the South. Leaflet length of southern tickclovers varies from less than ½ inch to 6 inches, and leaflet shape varies from narrowly linear to ovate or round. Flowers are similar among most species and fruits are necessary for identification. Flowers are pealike, less than ½ inch long, and pink to purple (some white). The fruit is a flat jointed pod that may remain intact at maturity or break apart to become the familiar "ticks" or "beggarlice."

Desmodium may be confused with *Lespedeza* in the vegetative state, but the two are readily distinguishable when in the flower or fruit stages. Tickclovers have a pair of stipels at the base of the terminal leaflet and a single stipel at the base of each lateral leaflet. Stipels are lacking in lespedezas.

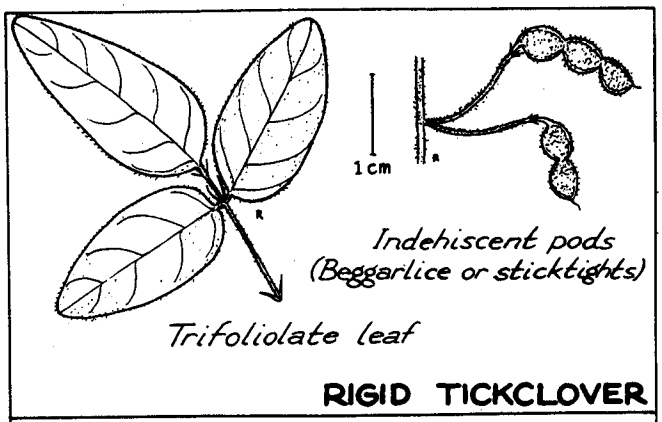
Although tickclovers are nutritious and palatable, the plants are seldom abundant enough to yield much livestock forage, although most are high-use deer food plants. Seeds are valuable quail food.

Littleleaf tickclover, *Desmodium ciliare* (Muhl. ex Willd.) DC., probably the most common and thus most important tickclover in the South, is illustrated as an example and described below.

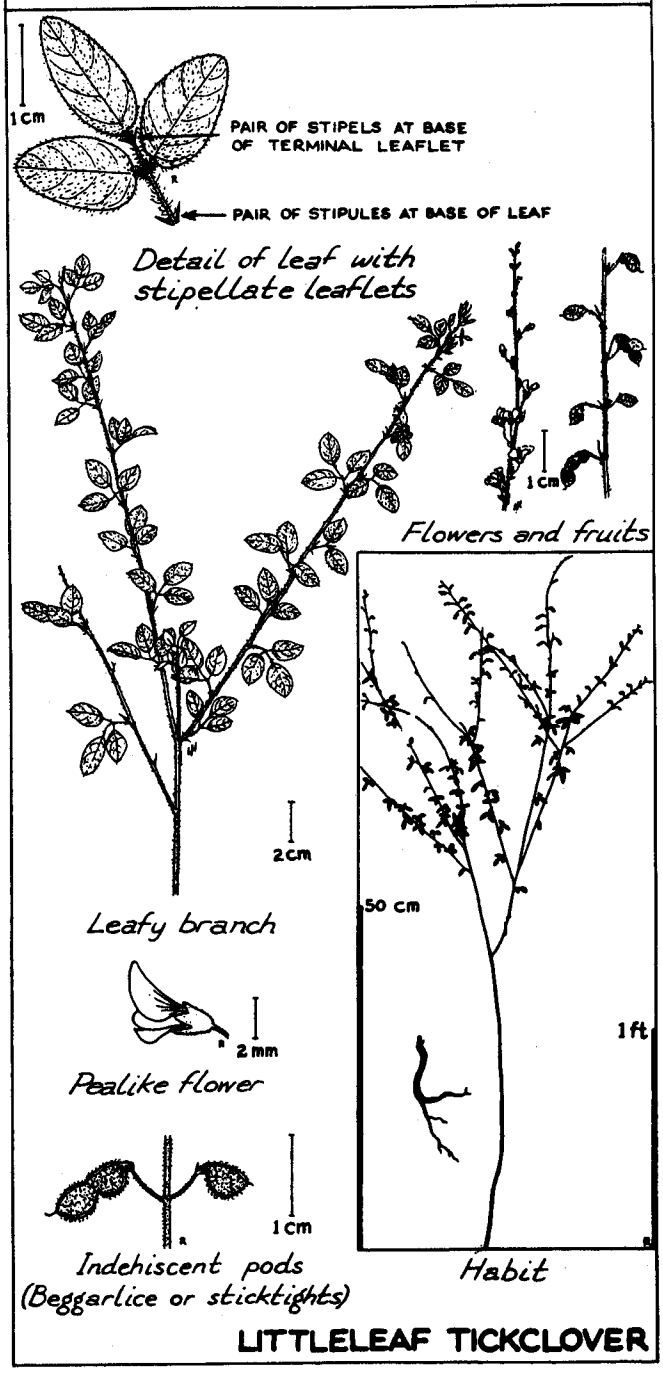
The similar rigid tickclover, *D. rigidum* (E11.) DC., also grows southwide. It can be distinguished by its leaflets, which are long-ovate instead of blunt-tipped, and unequal in size, the terminal longer than the laterals. Roundleaf tickclover, *D. rotundifolium* DC., and sand tickclover, *D. lineatum* DC., are prostrate, trailing species common on dry pinelands throughout the South. Other species common southwide are smooth tickclover, *D. laevigatum* (Nutt.) DC., Maryland tickclover, *D. marilandicum* (L.) DC., panicled tickclover, *D. paniculatum* (L.) DC., and velvetleaf tickclover, *D. viridifolium* (L.) DC.

Range (Littleleaf tickclover): Texas and Nebraska to Florida and Michigan.

Perennial. Stems 40 – 100 cm tall, slender, usually spreading-pilose; leaves trifoliolate; stipules linear-subulate, 2 – 4 mm long, quickly deciduous; leaflets ovate to orbicular, pilose, terminal leaflet 1 – 3 cm long; stipels apiculate; flowers papilionaceous, small, rose purple, in large terminal racemes; fruit a loment with one to three articles, 4.0 – 5.5 mm long, 2.7 – 4.0 mm wide, covered with short, stout hooks.



RIGID TICKCLOVER



LITTLELEAF TICKCLOVER

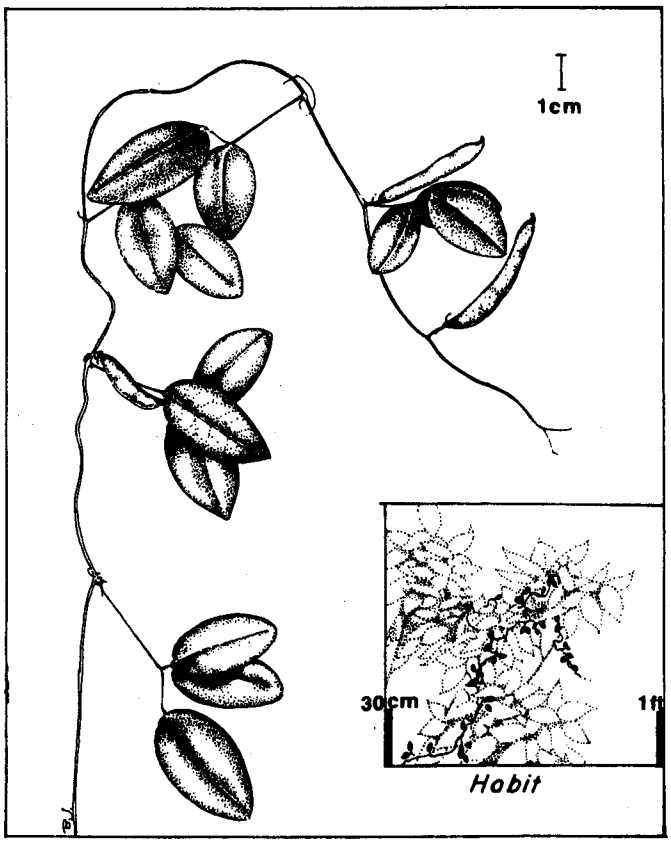
Downy Milkpea—*Galactia volubilis* (L.) Britt.

The milkpeas, like the tickclovers, are a group of legumes whose seeds are recognized as choice food for the bobwhite quail. Downy milkpea is fairly common southwide. Shapely milkpea, *Galactia regularis* (L.) BSP., a trailing plant, and erect milkpea, *G. erecta* (Walt.) Vail, the only species that is not trailing or twining, are also found on sandy sites throughout the South. Leaves of most species are pinnately compound with three leaflets, although *G. elliottii* Nutt., a species of the Atlantic Coastal Plain, has five to nine leaflets.

Downy milkpea is a twining or climbing herbaceous vine with sparsely to densely pubescent stems. Leaflets are ovate, ½ inch to 1½ inches long. Flowers are pealike, pink to rose, less than ½ inch long. The fruit is a flattened seed pod, up to 2 inches long and ¼ inch wide, covered with short white hairs.

The species is variable throughout its range, and the separation of *G. volubilis* and *G. regularis* is difficult in some areas, leading some botanists to suspect that the two belong together in one widespread, variable species. *Galactia macreei* M. A. Curtis, a southwide milkpea, is similar and possibly not distinct from downy milkpea. While the latter usually has spreading hairs on the stems and fruit, *G. macreei* has appressed, short pubescence.

Range: Eastern Texas and southern Kansas to Florida and Long Island.



Perennial. **Stems** twining or climbing, sparsely to densely spreading-pubescent; **leaves** pinnately trifoliolate rachis 2 – 18 mm long; **leaflets** oblong, oblong-ovate or elliptic, 2 – 4 cm long, glabrous or nearly so above, and glabrate to spreading pilose beneath; **racemes** with peduncles and rachises sparsely to densely spreading short-pubescent, 3 – 15 cm long; **calyx** tube 2.0 – 2.5 mm long, lobes 2.0 – 3.5 mm long; **petals** pink to roseate, the standard 7 – 10 mm long; **legume** 2.0 – 5.5 cm long, 4 – 5 mm broad, spreading short-pubescent; **seed** mottled, 2 – 3 mm long.

Common Lespedeza—*Lespedeza striata* (Thunb.) H. & A.

Common lespedeza, or Japanese clover, is an annual forage legume native to Asia. Following its introduction into Georgia more than 100 years ago, it escaped cultivation and spread rapidly across the South. Now it is common on dry, open, closely grazed range and rarely found under timber stands. Several other Asian lespedezas have been introduced into the United States, particularly in the South, for forage, erosion control, and wildlife food plantings. Shrubby species like bicolor lespedeza, *Lespedeza bicolor* Turcz., are widely planted for bobwhite quail food.

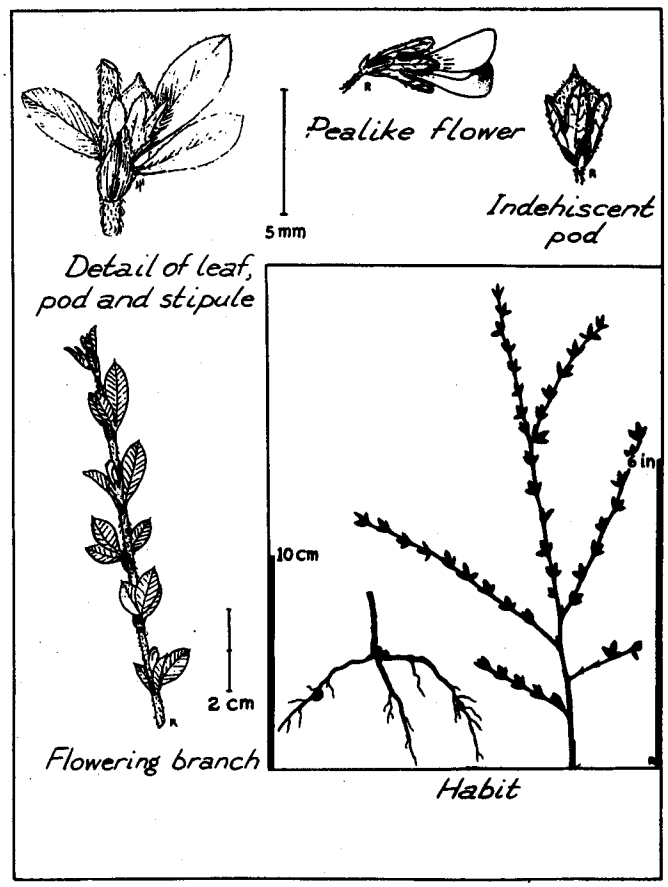
Plants of common lespedeza are usually less than 1 foot tall. Stems are many-branched and decumbent, or they may be prostrate if grazed closely. Leaves are trifoliolate, the obovate to nearly elliptical leaflets ⅓ to 1 inch long. Leaflet veins are conspicuous, with straight, parallel laterals extending outward at about 45° from the midrib. Flowers are of two kinds, with and without corolla, and are borne singly or in clusters of two to four in upper leaf axils. Corollas of complete flowers are pinkish and about ¼ inch long.

Several native lespedezas also grow on sandy pine sites. Among the most common are hairy lespedeza, *L. hirta* (L.) Hornem., and slender lespedeza, *L. virginica* (L.) Britt. Hairy lespedeza is distinguishable by its height, which reaches 4 feet, and its large leaflets —up to 2 inches long and an inch wide. Slender lespedeza is a slender, usually unbranched plant with small, narrow, crowded leaves. A prostrate species, creeping lespedeza, *L. repens* (L.) Bart., is common on sandy sites throughout the South. All native species are perennial but collectively make up only a small percentage of the forage available.

Lespedezas may be confused with tickclovers. Both have trifoliolate leaves subtended by stipules and their flowers are similar. They can be distinguished readily by their seed pods. Lespedeza pods are short, oval, usually one-seeded, and intact at maturity, while those of tickclover are elongate and break into two or more one-seeded segments at maturity. Lespedezas also lack the stipels that subtend tickclover leaflets. Separation by vegetative characteristics is described under the discussion of *Desmodium*.

Like most pasture legumes, common lespedeza is nutritious and palatable but seldom abundant in range vegetation. It is often an important constituent of seeded firebreaks on forest ranges. The ability to produce seeds under close grazing makes common lespedeza a reliable source of food for quail, which eat both seeds and spring leaves.

Range: Texas and Florida, extending north to Kansas and Pennsylvania.



Annual. Stems decumbent, 10 – 40 cm tall, diffusely branched, retrorsely pubescent; leaves pinnately trifoliolate; stipules 4 – 6 mm long; leaflets short-petioled, oblong-obovate, 1 – 2 cm long, striate; flowers of two kinds, apetalous ones mixed with complete pinkish ones in axils, one to four on short peduncles; legume a flat, 1-seeded pod barely exceeding the persistent calyx.

Hairy Rhynchosia—*Rhynchosia difformis* (Ell.) DC.

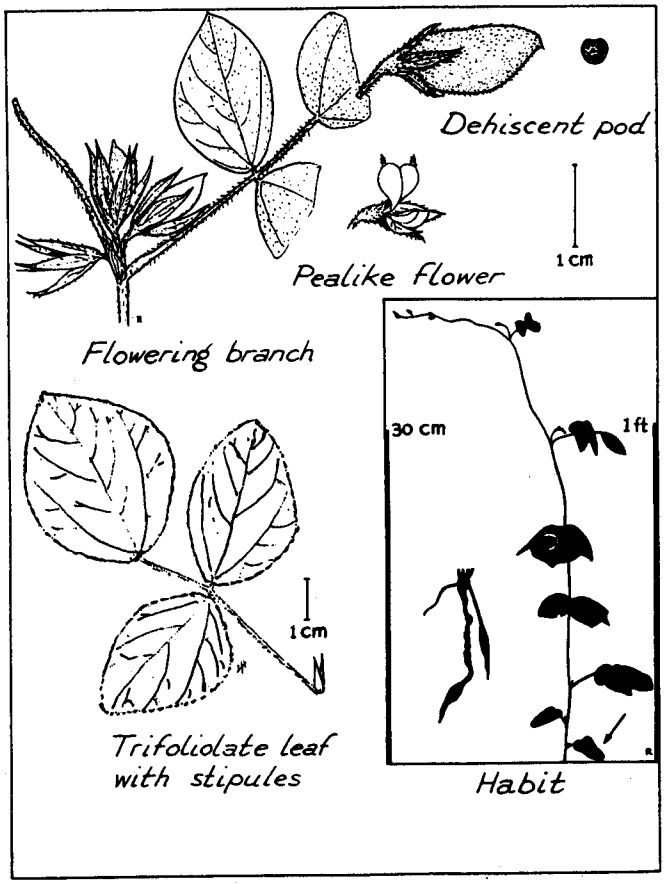
Hairy rhynchosia, or hairy snoutbean, is a trailing or twining perennial herbaceous vine with ovate leaflets. Most leaves are trifoliolate with terminal leaflets about 1½ inches long and almost round. Lateral leaflets are smaller, and length exceeds width. Basal leaves often develop only a single leaflet. Although differences among leaves are alluded to in its specific name *difformis,* meaning "two forms," several rhynchosias have this character.

Stems arise from tuberous rootstocks and may reach 3 feet. They are erect when young but become trailing or twining as they elongate. Inconspicuous yellow flowers about ½ inch long are in short-stemmed axillary clusters.

Species that may associate and intergrade with hairy rhynchosia include broadleaf rhynchosia, *Rhynchosia latifolia* Nutt. ex Torr. & Gray—found only west of the Mississippi River—and erect rhynchosia, *R. tomentosa* (L.) H. & A. Whereas the axillary racemes of hairy rhynchosia are about 2 inches long, those of broadleaf rhynchosia may be up to 12 inches. Erect rhynchosia, which grows southwide, is upright and has only trifoliolate leaves, with softly pubescent, ovate to elliptic leaflets. Least rhynchosia, *R. minima* (L.) DC., a trailing, twining plant with small flowers and usually small leaflets, is common on silty-clay alluvial soils of the lower Coastal Plain from Texas to Georgia.

Although hairy rhynchosia is abundant, the plants are too scattered to produce much forage. Quail, doves, and other birds eat the seeds.

Range: Texas to Florida, extending north to Missouri and Virginia.



Perennial. **Stems** from long tuberous roots, erect at first, then trailing and twining, to 1 m long, densely retrorse-hirsute on the angles, lightly pubescent between; **leaves** of two kinds, the basal ones simple, reniform, those above trifoliolate; **leaflets** elliptic to broadly ovate, 2 – 5 cm long, the terminal larger, sparingly pubescent on both sides; **flowers** in short, dense, axillary racemes, 2 – 4 cm long; **corollas** yellow, 5 – 11 mm long; **legume** 1.5 – 2.0 cm long, 8 mm wide; **seeds** lenticular, 2.5 – 3.0 mm in diameter, dark brown.

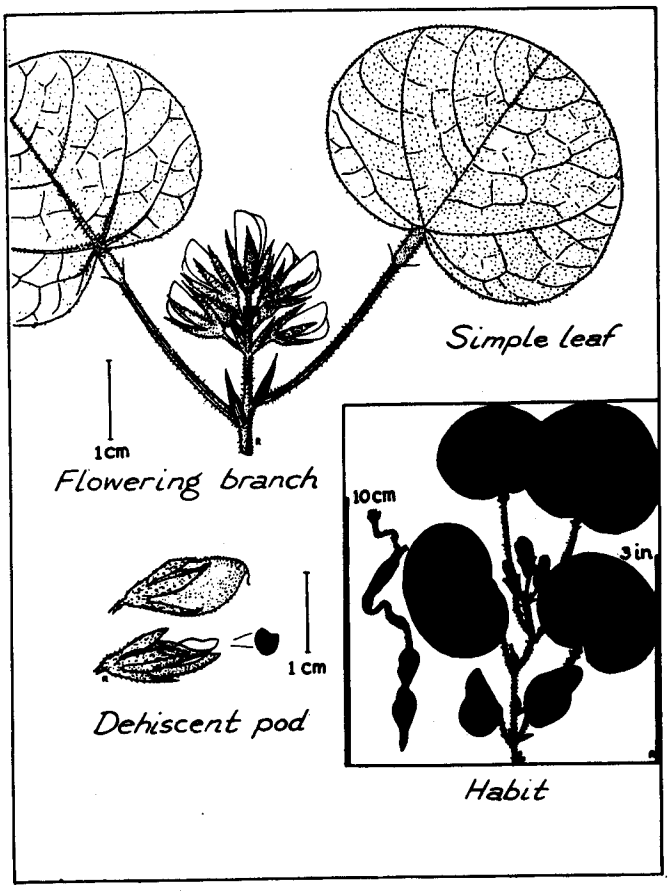
Dollarleaf Rhynchosia—*Rhynchosia reniformis* DC.

Dollarleaf rhynchosia is a small, erect perennial found throughout the Gulf Coastal Plain. It is most abundant on sandy sites. Stems are 3 to 9 inches tall, growing from slender, woody rhizomes. Leaves are simple or rarely trifoliolate, round to kidney shaped, and average 2 inches in diameter. Both surfaces are sparsely to densely pubescent. Small, yellow, pealike flowers are borne in both terminal and axillary clusters. Pods are about ½ inch long and densely hairy.

Dollarleaf rhynchosia is readily distinguishable from related species and most other plants by its large, round, simple leaves. Young plants are grazed by cattle, and seeds are eaten by quail and other birds.

Range: Texas to Florida, extending north to North Carolina.

Perennial. **Stems** erect, densely pubescent, from long slender rhizomes, 5 – 25 cm tall, hirsute on the angles with spreading or reflexed hairs; **leaves** simple, the blades 2 – 5 cm long, 2 – 8 cm broad, orbicular to reniform, strongly reticulate, resin-dotted with appressed pubescence on veins; **flowers** in short, dense axillary or terminal racemes 2 – 3 cm long; **calyx** 8 – 10 cm long; **corolla** yellow, about 7 mm long; **legume** flat, oblong, about 1.5 cm long, and 6 mm wide, obscurely falcate, pubescent, resin-dotted; **seeds** lenticular, about 3 mm broad, brownish, mottled with black.



Catclaw Sensitivebrier—*Schrankia uncinata* Willd.—(*S. nuttallii* (DC.) Standl.)

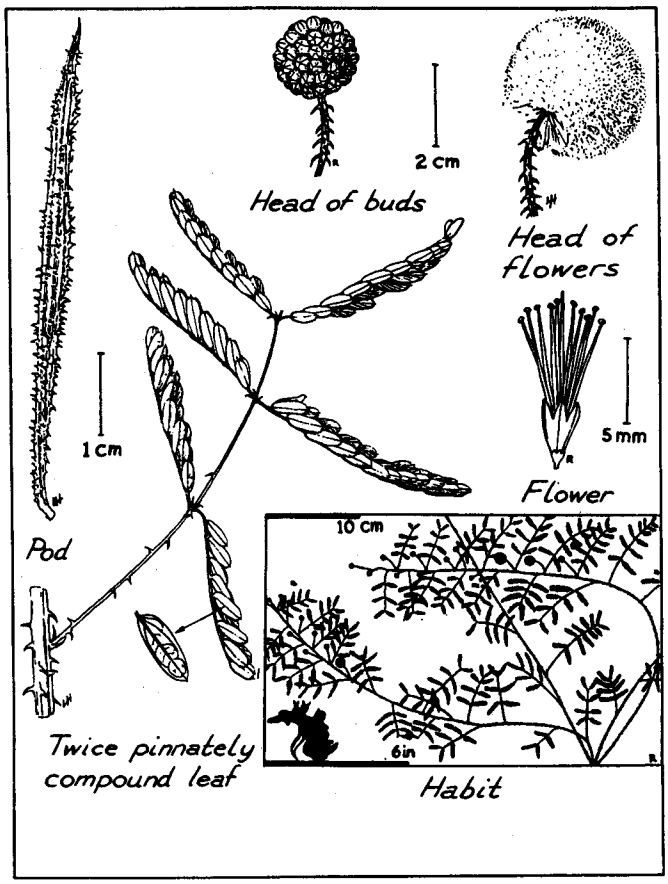
Catclaw sensitivebrier is a close relative of the silktree, *Albizia julibrissin* Duraz., commonly called "mimosa," and the acacias. Its spherical rose pink flower heads resemble miniature silktree heads.

Catclaw sensitivebrier is a spiny, sprawling, perennial herb usually found on dry sandy soils west of the Mississippi River. Many prostrate stems 3 to 4 feet long arise from a large woody rootstock. Flowering begins in late spring and continues through the summer, or as long as stem growth continues. Leaves are bipinnately compound, with four to eight pairs of first-division units, called pinnae. Each pinna has 8 to 15 pairs of oblong to elliptical leaflets ⅛ inch to over ¼ inch long which fold when touched.

A similar species, *Schrankia hystricina* (Britt. & Rose) Standl., with a stout, bristly pod no longer than 1½ inches, apparently replaces catclaw sensitivebrier in east Texas and southwest Louisiana. Another sensitivebrier likely to be encountered southwide is littleleaf sensitivebrier, *S. microphylla* (Dryand.) Macbr. These species differ primarily in leaflet venation: both *S. uncinata* and *S. hystricina* have conspicuous lateral veins, but littleleaf appears to have only a midrib.

Cattle graze the tender twigs in early spring before the spines harden. Nutritive value is high; protein content of new growth reportedly reaches 45 percent. Plants are seldom abundant enough to contribute greatly to the cattle diet. This species is generally considered more important as an indicator of good or improving range condition than as a forage producer. Deer browse the stems and leaves, and quail eat the seeds.

Range: Texas to Alabama, extending north to Nebraska, Illinois, and North Carolina.



Perennial. **Stems** elongate, decumbent, angled, prickly, to 1 m long; **leaves** bipinnate, 6 – 15 cm long, sensitive; **pinnae** 4 to 8 pairs, 2 – 5 cm long; **leaflets** 8 to 15 pairs, oblong-elliptic, 3.5 – 9.0 mm long, veins prominent; **flowers** in spherical, long-peduncled, axillary heads 2.0 – 2.5 cm in diameter; **pods** linear, strongly thorny-ribbed, 4 – 12 cm long, with a slender beak at the apex.

Perennial Wildbean—*Strophostyles umbellata* (Muhl. ex Willd.) Britt.

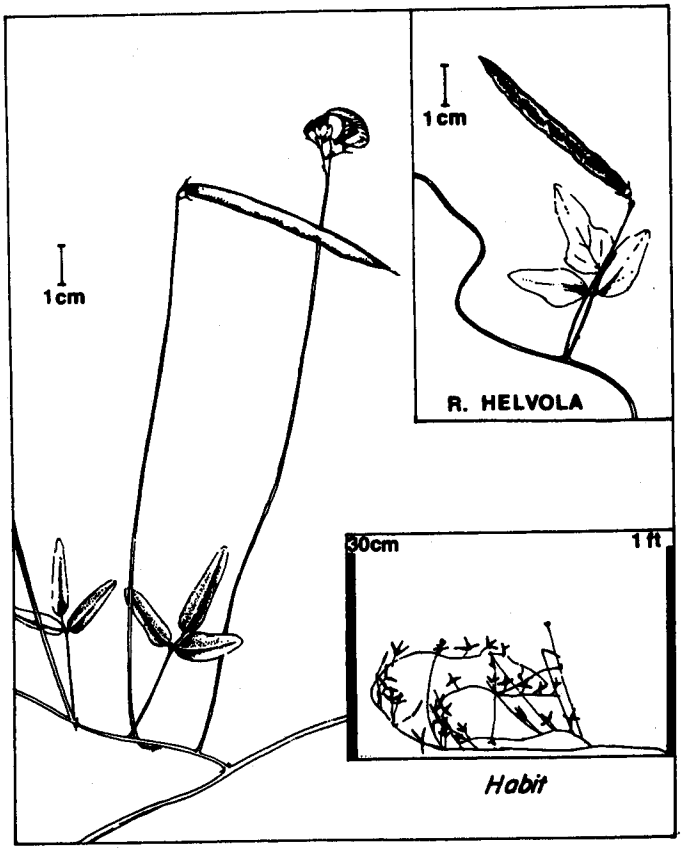
The wildbeans are trailing herbaceous vines whose seeds are considered desirable wildlife food, especially for bobwhite quail and turkey. Perennial wildbean is classified as a choice wildlife food plant. Two annual species, trailing wildbean, or amberique bean, *Strophostyles helvola* (L.) Ell., and slickseed wildbean, *S. leiosperma* (T. & G.) Piper, are not as highly valued, perhaps due to a general lack of abundance.

Perennial wildbean grows on sandy soils of the pineywoods, usually twining among the grasses and other ground vegetation. It is conspicuous by its unlobed trifoliolate leaves with narrowly ovate to lanceolate or oblong leaflets and elongate inflorescence stalks, which exceed the leaves. Flowers have a short ribbed bractlet at the base of the calyx.

Trailing wildbean has broader leaflets, usually with basal lobes. It commonly grows on open sites along rivers but may be found growing with perennial wildbean. The inflorescence stalks, similar to those of perennial wildbean, are usually longer than 6 inches. The floral bractlet is about equal in length to the calyx.

Slickseed wildbean is a smaller, hairier species found from Alabama westward to the plains of Texas and northward to Colorado, Minnesota, and Indiana. Inflorescence stalks are less than 4 inches long.

Range: Texas and Oklahoma to Florida, extending north to southern New York.



Perennial. **Stems** trailing or twining, to 2 m long, the younger portion densely pubescent; **leaflets** ovate, lanceolate to elliptic or oblong, unlobed, 2 – 5 cm long, glabrous or nearly so; **racemes** axillary, peduncles 10 – 25 cm long with few to several capitately clustered flowers; **calyx tube** 2.0 – 2.5 mm long, subtended by obtuse, striate bracts 0.1 mm long or less; **corolla** pink or pale purple, often fading yellowish, the standard 1.0 – 1.4 cm long; **legume** sparsely appressed-pubescent, 3.0 – 6.5 cm long, about 4 mm broad; **seeds** 3 – 6 mm long.

Pencilflower—*Stylosanthes biflora* (L.) BSP.

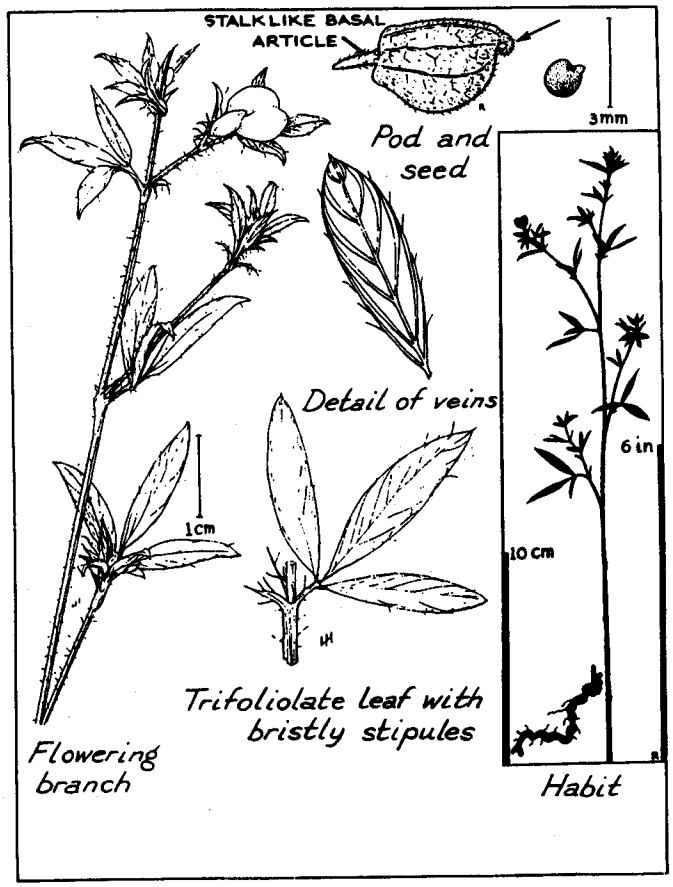
Pencilflower is a small perennial, common on well-drained sites throughout the South. Plants vary widely in height, branching habit, size and shape of leaflets, and hairiness.

Plants seldom exceed 12 inches in height, and are inconspicuous except for the pencil-yellow pealike flowers that appear throughout the growing season. Flowers, ¼ to ½ inch long, are in short, tight spikes at branch tips. Pods are small and inflated, with a sterile, stalklike basal article. Leaves are trifoliolate with elliptical leaflets about ¾ inch long.

Without flowers, pencilflower resembles other small-leaved legumes, especially lespedezas and tickclovers. It is distinguishable, however, by leaf characters, the veins on the underside of the leaflets being distinctly lighter in color than the blade and conspicuously thickened. Veins of lespedezas and tickclovers are relatively slender, and their color resembles that of the blade.

The seeds are eaten by quail and turkey. The leaves and stems are nutritious and palatable to cattle, but plants are small and usually widely scattered, and forage yield thus is negligible.

Range: Texas to Florida, extending north to Kansas, Illinois, Indiana, and New York.



Perennial. **Stems** 10 – 40 cm tall, stiff, erect, branching or unbranched, finely pubescent to long-hirsute, often bristly at the summit; **leaves** trifoliolate; **stipules** sparsely to densely bristly, narrow, united with the petiole for about two-thirds of their length; **leaflets** narrowly lanceolate to elliptic, subulate-tipped, 1.5 – 4.0 cm long, margins entire to bristly ciliate; **flowers** papilionaceous, on a stalklike hypanthium; **calyx** glabrous, early falling; **corolla** yellow with pink veins on the back; **fruit** a loment, 4 – 5 mm long with one to two articles, the terminal one turgid, thinly hairy, reticulate with an incurved beak (style), the basal one undeveloped, stalklike.

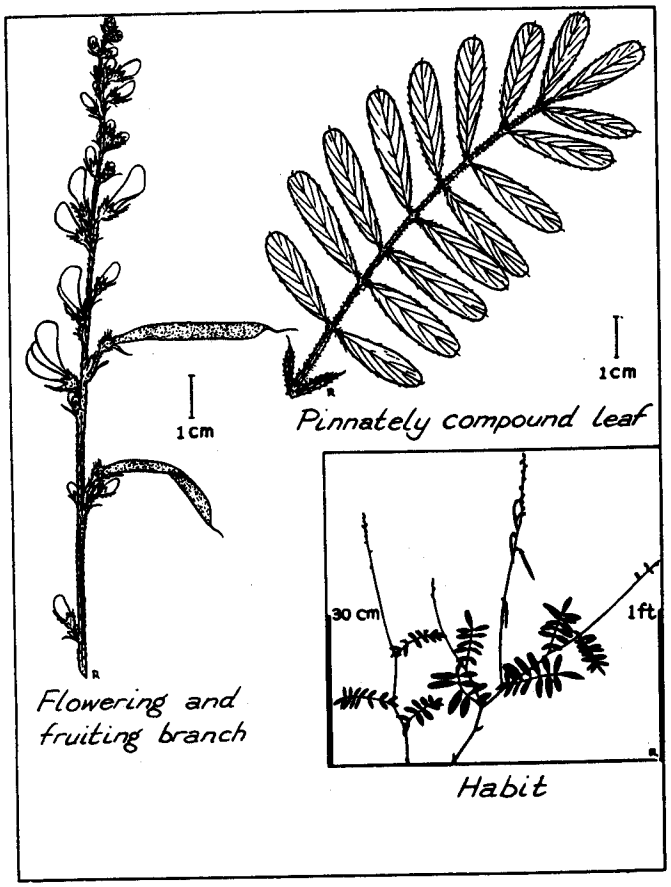
Weak Tephrosia—*Tephrosia onobrychoides* Nutt.

Weak tephrosia is a reclining perennial that grows from a woody rootstock. It is common on sandy soils of the western Gulf Coastal Plain. Stems may branch several times, with each branch terminated by an elongate stalk of white to reddish-purple flowers. The upper half of the stalk is leafless. Flowers normally appear in May or June, and continue flowering into August if rainfall is adequate. The flat, hairy pods, 2 inches long or less, have up to 10 small black seeds. Leaves are pinnately compound with 11 to 25 linear-oblanceolate leaflets.

Weak tephrosia's range overlaps that of brownhair tephrosia from southeast Louisiana to Alabama. Foliage of weak tephrosia is grayish green in color and the "weak" flower stalks do not stand stiffly erect as do those of brownhair tephrosia. As its name implies, the pubescence of brownhair tephrosia is noticeably more rust colored, and the leaves average fewer (9 to 17) leaflets.

Cattle graze young growth on recently burned or heavily used range, but older foliage is usually rejected. Seeds are eaten by quail.

Range: Texas to Oklahoma to southern Missouri and Alabama.



Perennial. **Stems** pubescent to strigose with rusty hairs, erect to decumbent from a stout, woody crown and woody taproot; **leaves** odd-pinnate, 8 – 22 cm long, on a petiole 7 – 35 mm long; **leaflets** of the principal leaves 11 to 25, linear-oblanceolate and slightly broadened upward, 1.5 – 5.5 cm long, 4 – 16 mm wide, the apex obtuse, rounded or truncate, emarginate, glabrous to pubescent above, more or less silky-pilose with gray to rusty hairs beneath; **flowers** 15 – 20 mm long in long terminal or axillary racemes much exceeding the foliage; **corolla** white, becoming crimson in age, pink or purple upon drying; **legumes** straight or slightly curved downward, 3.5 – 5.0 cm long, 4 – 5 mm wide, pubescent; **seeds** 3 to 10, 3 – 5 mm long, smooth and mottled with black.

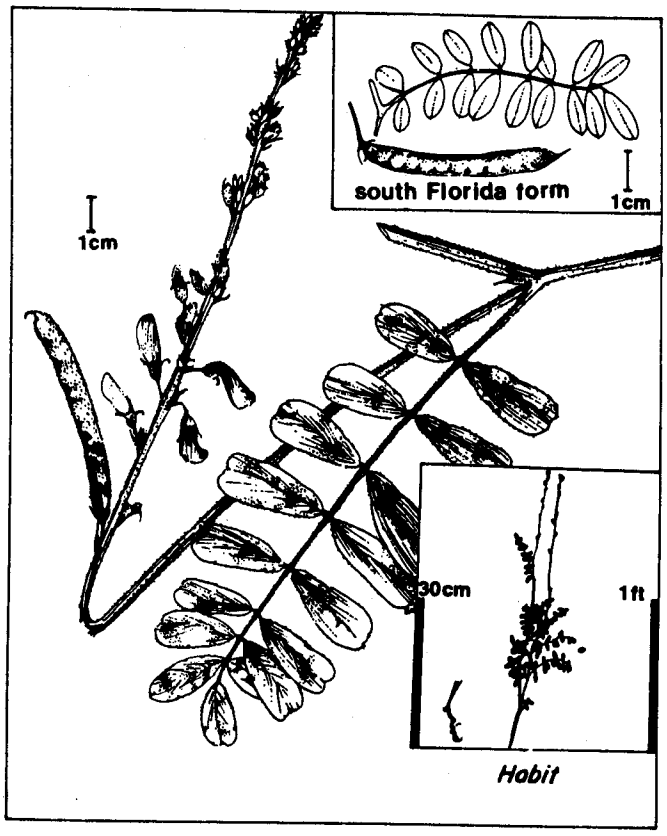
Brownhair Tephrosia—*Tephrosia spicata* (Walt.) T. & G.

Stems of brownhair tephrosia arise from a woody taproot and may be erect to 2 feet tall, or they may be sprawling. Stems and leaflet lower surfaces are rust colored and covered with spreading tawny hairs. Like other tephrosias, brownhair is not classed as valuable forage or wildlife food; bobwhite quail and other birds eat the seeds, but its general lack of abundance limits its value.

Brownhair tephrosia is most common east of the Mississippi River. Although its geographic range overlaps that of weak tephrosia, the two species are seldom found growing together. Leaflets of brownhair are generally larger and fewer in number than those of weak tephrosia. The reddish-brown color of the stem and lower leaf surface is more pronounced in brownhair tephrosia.

In south Florida, brownhair tephrosia grows in dwarf clumps about 1 foot in diameter. Leaves and leaflets are about half the size of those of typical plants, and lower leaf surfaces are reddish brown in color, although plants of the south Florida form are generally less hairy. This form was formerly separated as var. *semitonsa* Fern. by some authors.

Range: Louisiana, eastern Tennessee, and Kentucky to southern Delaware, southeastern Virginia, and Florida.



Perennial. **Stems** 30 – 60 cm long, decumbent to erect from a cylindric taproot, densely pilose or occasionally sparsely appressed-pubescent; **leaves** 4 – 12 cm long; **leaflets** 9 to 17, oblong-obovate to obovate or elliptic, 1 – 3 cm long, 6 – 14 mm wide, glabrous to finely pilose above, somewhat appressed pubescent to pilose below; **inflorescences** appearing opposite the leaf or terminal, 4 – 60 cm long, usually longer than the nearest leaf, erect or upwardly curving, pedicels 1 – 8 mm long; **calyx** 6 – 7 mm long, sparsely pilose to villous; **petals** at first white, turning pink and then carmine, 1.2 – 1.7 cm long; **stamens** diadelphous; **legumes** 3 – 5 cm long, 4 – 6 mm broad, sparsely to moderately pubescent.

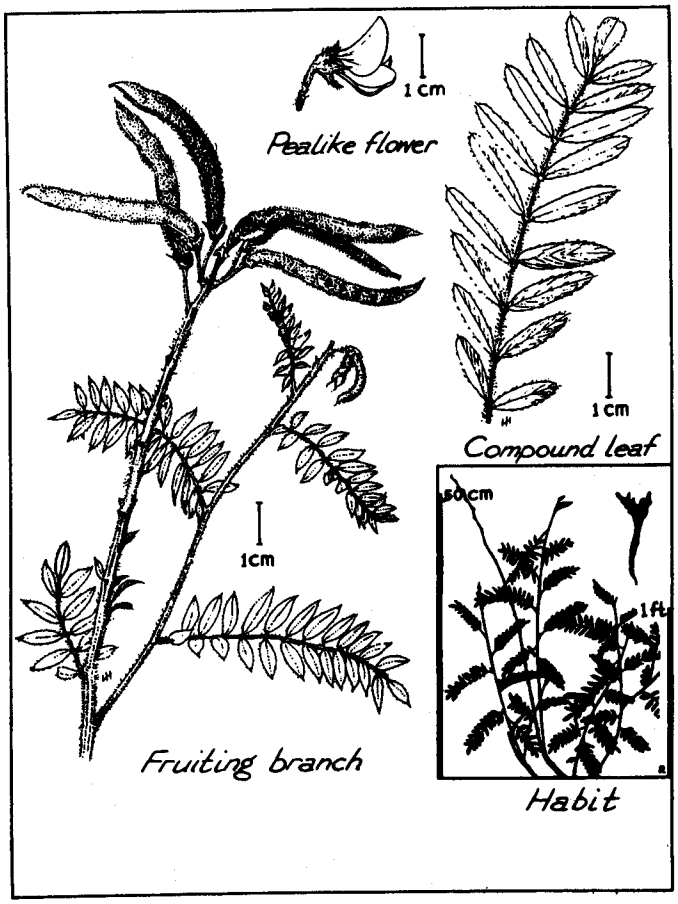
Virginia Tephrosia—*Tephrosia virginiana* (L.) Pers.

Virginia tephrosia—also called catgut, goatsrue, or devils-shoestring—is often the most abundant forb on dry sandy sites that are periodically burned. Following fire, new shoots grow rapidly from woody rootstocks. Although leaves are similar to those of the partridgepeas, pinnate with from 11 to 27 leaflets, they end in a single leaflet (odd-pinnate), while partridgepea leaflets are evenly paired throughout (even-pinnate). Stems and the undersides of leaflets, especially on new growth, are densely coated with gray hairs. Plants may reach 20 inches in height and often grow in clumps up to 30 inches in diameter. Flowers are produced in terminal clusters in spring, but spring or summer burning may prolong flowering. The corolla of the pealike blossom consists of one cream to yellow petal and three rose petals. Pods are about 2 inches long and covered with gray hair.

Virginia tephrosia often grows in association with weak or brownhair tephrosia, or one of the other eight species recognized across the South. It is the only species, however, with erect simple stems and terminal inflorescences, and is usually found on drier sites than most other tephrosias.

Cattle rarely eat Virginia tephrosia, even on heavily grazed range. The seeds rate fair as quail food, being taken mainly when other food is scarce.

Range: Texas to Florida, extending north to Minnesota and Massachusetts.



Perennial. **Stems** 30 – 60 cm tall, pubescent to villous, erect or ascending from a branched woody crown and long woody roots; **leaves** odd-pinnate, 6 – 10 cm long, nearly sessile; **leaflets** 11 to 27, elliptic to linear-oblong, 1 – 3 cm long, 4 – 8 mm wide, apex mucronate; **flowers** papilionaceous, bicolored; **racemes** compact, 4 – 8 cm long, leafy in the lower flowering nodes; **standard** 14 – 21 mm long, lemon yellow to cream, wings and keel rose; **legumes** 3 – 5 cm long, straight to slightly curved, sparsely to densely strigose; **seeds** 6 to 11, bean shaped, 3.2 – 4.2 mm long, brown variegated with black.

Composites

The composites—plants of the family Compositae (or Asteraceae)—are well known for their showy flowers. Chrysanthemums, asters, daisies, and zinnias are among the popular ornamentals. Many native composites—sunflowers, goldenrods, and coneflowers, for example—are also colorful. Although composites are mainly herbaceous, the family includes several woody species. These are represented in the South by the shrubby genus *Baccharis*.

The characteristic composite "flower" is actually a compact head of small, sessile flowers crowded on a common receptacle and surrounded by overlapping bracts. The corollas are of two general types: the five-lobed tubular type, or disk flower; and the flat, ligulate type, or ray flower. Singly, or in combination, disk and ray flowers produce three types of heads: the **discoid**, with only tubular or disk flowers, represented by the gayfeathers; the **ligulate**, with only ligulate or ray flowers (usually with a "milky" sap), such as the dandelions; and the **radiate**, with a central disk of tubular flowers surrounded by a radiating ring of ray flowers, exemplified by the sunflower or coneflower head.

Composites are prolific seeders, and the seeds or fruits of many are easily transported by the wind. Hence, these plants are generally more abundant than other forbs, especially on denuded sites where seeds easily reach mineral soil.

On open pine-bluestem range, composites contribute up to 3 percent of the yearlong diet of cattle. While several species are valuable as forage, many are worthless. A few species, such as bitter sneezeweed, are poisonous.

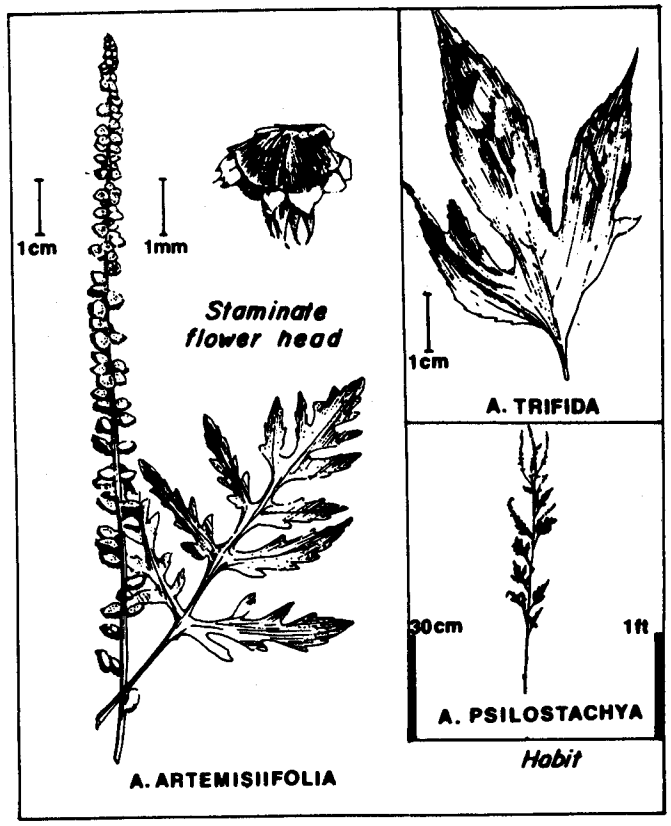
Ragweeds—*Ambrosia* spp.

On moist sites throughout the South, especially road ditches, annual plants of common ragweed, *Ambrosia artemisiifolia* L., may form dense stands with stems up to 8 feet tall. Foliage, especially when crushed, is very pungent. Lower leaves are opposite, becoming alternate above; blades are ovate in general outline but deeply twice- or thrice-divided. Flowers and seeds are produced on stalks arising from upper leaf axils from late summer until frost. Staminate flowers in numerous saucer-shaped heads about ⅛ inch wide terminate the flower stalks. Pistillate heads, fewer in number and below the staminate heads, are enclosed in foliaceous bracts. Fruits are about ⅛ inch long.

Western ragweed, *A. psilostachya* DC., a smaller perennial of drier sites in the western gulf coast and prairies, is similar, but the leaves are thicker and only once-divided. Giant ragweed, or richweed, *A. trifida* L., similar to and as widespread as common ragweed, is also an annual, usually on wetter sites than other ragweeds, and may grow 20 feet tall. Its opposite, palmately three- to five-lobed leaves distinguish it from all other ragweeds. Lanceleaf ragweed, *A. bidentata* Michx., another annual found on pinelands, has narrow leaves with a broad base and two lateral lobes, each terminated by a tooth.

Ragweed foliage is normally unpalatable to cattle, but when forage is scarce, it is sometimes eaten, producing a bitter taste in the milk. Plants sprayed with 2,4-D become palatable and accumulate nitrates in toxic amounts (Kingsbury 1964). Common ragweed is a high-use forage plant for white-tailed deer in spring and summer. Deer also eat the leaves of giant ragweed, and seeds of all three species discussed above are eaten by wild turkey and other birds. Ragweed seeds are one of the most important quail foods in volume consumed.

All ragweeds are considered principal contributors to hay fever suffering throughout the South.



Plantainleaf Pussytoes—*Antennaria plantaginifolia* (L.) Richardson

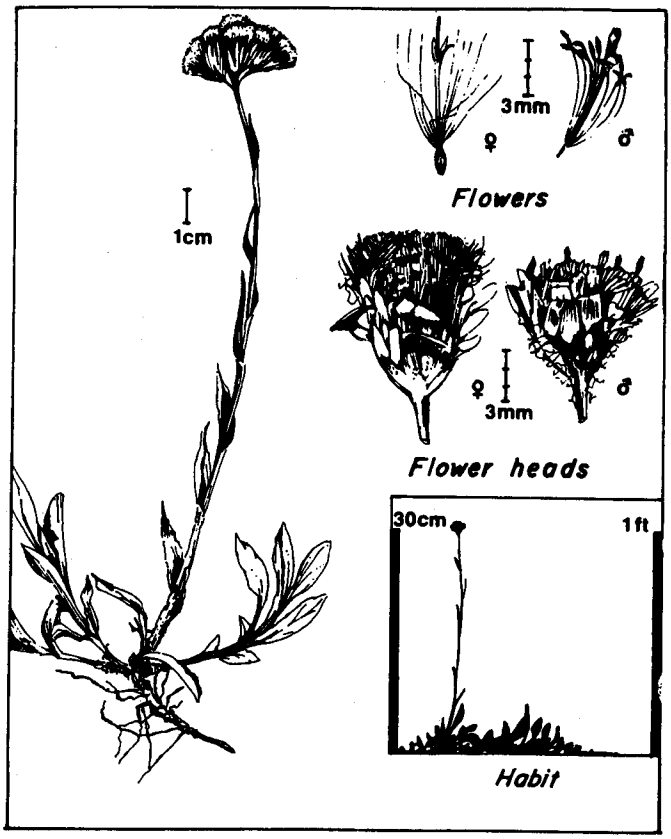
Other names for this small attractive composite are ladies-tobacco and indian-tobacco. It is similar and closely related to the cudweeds *(Gnaphalium* spp.). Plants are most common on dry sandy or rocky soils in open woods or thickets. Runners just below the soil surface produce a loose clump of stems 4 to 15 inches tall. Male and female flowers are borne on separate plants; female plants are taller than male plants. When all stems in a clump arise from runners of a single plant, all flowers are of the same sex.

Except for a basal whorl of paddle-shaped leaves about 2 inches long and 1 inch wide, foliage is scant. Leaves on the stalk are about 1¼ inches long and ¼ inch wide near the base, becoming gradually smaller up the stalk. Stem and leaves are coated with short gray hair.

Stalks are unbranched and terminated by a cluster of many-flowered heads, each about ¼ inch in diameter. White-tipped bracts, resembling petals, surround each head. Pappus bristles surrounding each flower are also white-fringed. Floral parts and involucral bracts often add a reddish or purplish tinge to the otherwise white flower head.

Seeds of plantainleaf pussytoes are small and of little value to wildlife. The rosette leaves, which form in the fall and remain green through the winter, are eaten by deer. Of several species occuring in the South, plantainleaf is the most common and the only one recognized valuable to wildlife.

Range: Texas to Minnesota and eastward.



Perennial. **Stems** from stolons; **pistillate stems** 10 – 40 cm tall, **staminate stems** about 15 cm tall; **basal leaves** 5 – 9 cm long, obovate, mucronate, minutely canescent above, densely so below, 3- to 7-nerved; **cauline leaves** alternate, spatulate below, lanceolate or linear above, crowded below and about 4 cm long, becoming remote above and less than 2 cm long; **flower heads** 3 to 30, corymbose to glomerulate, 10 mm or less in diameter; **pistillate flowers** about 7 mm high with glands on corolla tube; **staminate flowers** less than 5 mm, staminate pappus with white, thickened tips; mature **achenes** 4.0 – 5.5 mm long.

Asters—*Aster* spp.

With approximately 100 species, the asters comprise the largest southern genera of composites. Most are perennials, blooming in late summer and fall; some produce flowers until the first frost. Though seldom found growing in profusion, the asters provide rich fall color to the southern woodlands.

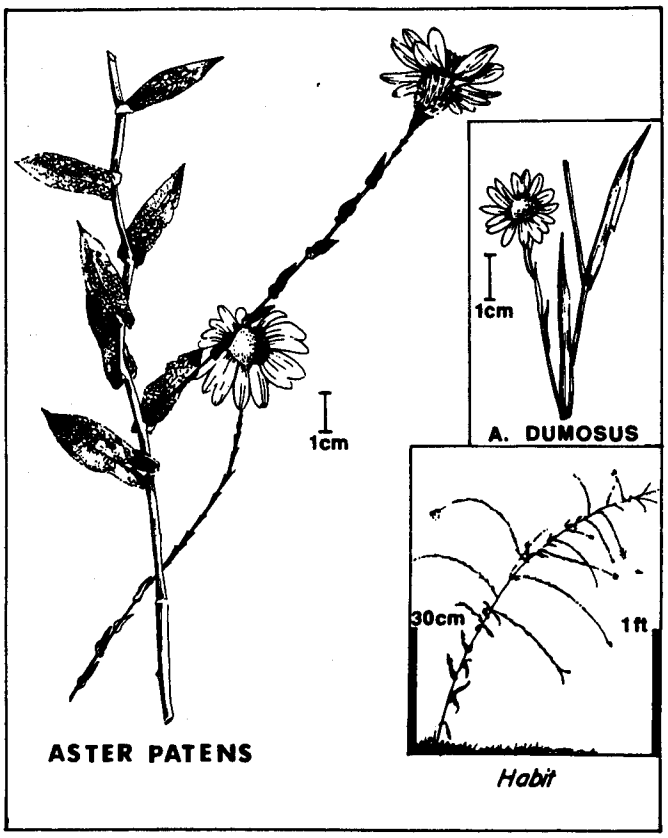
Characteristic flower heads consist of a central disk of tubular yellow flowers surrounded by a whorl of white, blue, or pink to purple ray flowers. The base of the flower head is enclosed by several overlapping whorls of bracts. Several of the most common southern asters are described below.

Skydrop aster, *Aster patens* Dryand. in Ait., is common in dry open woodlands and clearings from Texas and Florida to Minnesota and Maine. Height is 3 feet or less. The main stalk of the plant has ovate-elliptical leaves 1 to 2 inches long, with bases clasping the stem. Lateral branches, arising from upper leaf axils, have leaves much smaller than those of the main stalk. Flower heads are about 1 inch wide, with purplish rays.

Silver aster, *A. concolor* L., inhabits sandy pinelands east of the Mississippi River and inland to Kentucky. Its flowers are similar to those of skydrop aster but are arranged in racemes terminating ends of unbranched stems. Plants are seldom more than 2 feet tall. Leaves are elliptic-oblong to lanceolate, up to 1½ inches long. Stems and leaves are somewhat silky pubescent.

Bushy aster, *A. dumosus* L., grows to a height of about 3 feet on a wide range of soils from Louisiana north to Missouri and Maine. Flower heads are ½ to ¾ inch wide, white to pale purple, scattered on the profuse branches of the upper stem.

Because they are not generally abundant, asters are practically worthless as cattle forage. As a group, however, they are preferred food for deer, which eat the basal rosettes from autumn into spring and the stems and flowerheads in summer and early autumn. Although most abundant and robust on disturbed sites, asters are not uncommon in stable plant communities on both timbered and cutover range.

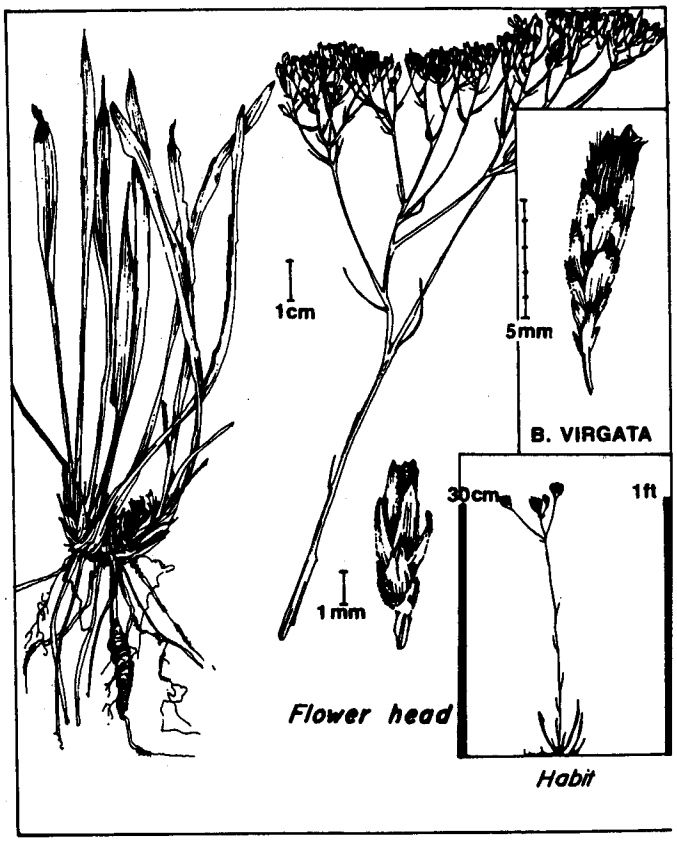


Yellowhead—*Bigelowia nudata* (Michx.) DC.—*(Chondrophora nudata* (Michx.) Britt.)

Also called rayless goldenrod and naked chondrophora, this plant occurs on a wide range of soils and sites, from deep acid sands to shallow calcareous soils. It is most abundant on wet prairies of the pine-wiregrass flatwoods. On sandy pine uplands, it occurs infrequently, but is found in colonies, spreading by rhizomes. Yellowhead is a slender perennial 1 to 2 feet tall with alternate, spatulate leaves 2 to 3 inches long and 1/16 inch or less wide. Basal leaves may form an early rosette or whorl, and may be slightly longer and wider than stem leaves, which decrease in size going up the stem. By flowering time, however, the outer portions of leaves usually break off, leaving only narrow petiolar stubs. Stems are unbranched below the flat-topped inflorescence. The narrow, essentially bare stems, topped by greenish-yellow heads of flowers, give this plant a conspicuous and unique appearance.

A closely related species, *Bigelowia nuttallii* L. C. Anderson *(B. virgata* (Nutt.) DC.), is similar but has much finer, almost hairlike, leaves. Neither plant is valuable as livestock forage or wildlife food.

Range: Coastal Plain, Texas to Florida and Virginia.



Perennial. **Stems** from woody caudex or rhizome, glabrous, 20 – 80 cm tall; **basal leaves** spatulate to linear-spatulate, 3 – 12 cm long, 2 – 6 mm wide at widest point; **stem leaves** few, alternate, smaller than basal leaves, reduced upward, blades early-deciduous; **inflorescence** a flat-topped corymb of numerous flower heads (involucres); **heads** cylindrical, 3- to 5-flowered, 5 – 6 mm long, 1 – 2 mm broad, flowers all discoid, yellow; **achenes** turgid, tapered from base to apex, 1.2 – 1.5 mm long, pubescent.

Thickleaf Coreopsis—*Coreopsis lanceolata* L.

Thickleaf coreopsis, or "tickseed" as all species of *Coreopsis* are also called, grows on a wide variety of sites. Though rarely abundant, plants are conspicuous by their naked flower stalks and bright yellow flowers.

Mature stems are usually less than 15 inches tall. Stems and leaves are generally covered with downy to stiff hairs. Leaves are opposite, narrow to broadly lance shaped, and largely confined to the lower half of the stalk. Early leaves form a basal rosette; with their long, slender petioles, they often exceed 6 inches in length. Upper leaves are without petioles and are distinctly smaller than the lower.

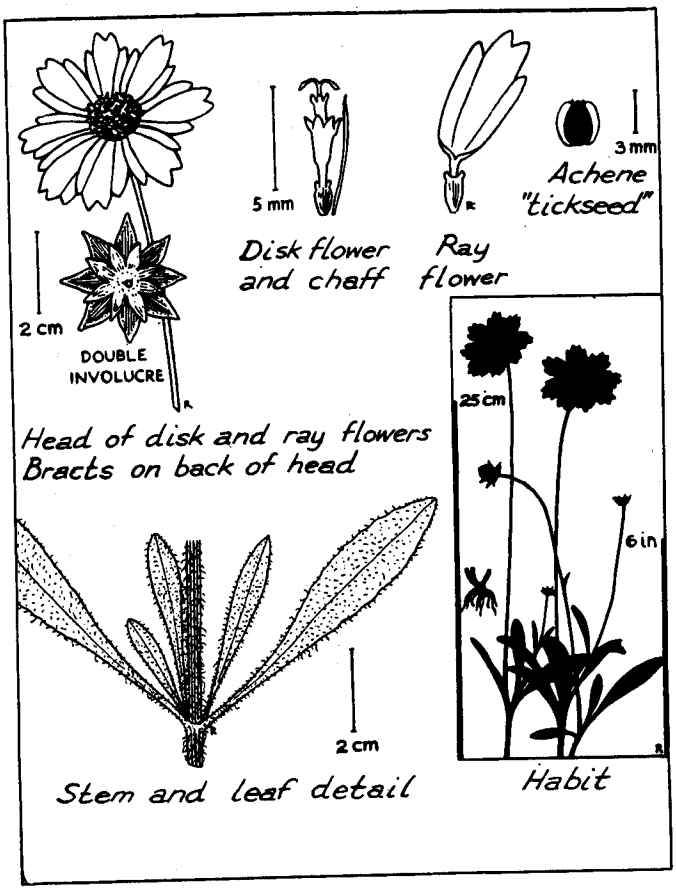
Flowering begins in April and continues through the growing season. Heads have yellow disk and ray flowers and are about 2 inches in diameter. The toothed ray flowers are about ¾ inch long.

Immature plants of lanceleaf gaillardia, *Gaillardia aestivalis* (Walt.) H. Rock, resemble those of thickleaf coreopsis, but are distinguishable by their alternate leaves. After flowers appear, differentiation is easy, as the disks of lanceleaf gaillardia are reddish purple.

Thickleaf coreopsis is of little value to livestock or game animals. Other species common on southern pine range include *C. gladiata* Walt., with narrow oblanceolate leaves associated with wet sandy sites; *C. major* Walt., with opposite, sessile, ternately divided leaves appearing as whorls of leaves at the upper nodes; and *C. tripteris* L., with three to five palmately divided leaves on petioles about 1 inch long.

Range: Texas and Louisiana to Florida, extending north to Wisconsin, Michigan, and Virginia.

Perennial. **Stems** 20 – 60 cm tall, from a woody caudex, branching near the base, glabrous, pubescent, or villous; **leaves** mostly basal and petiolate, 5 – 20 cm long, 10 – 17 mm wide, lance-linear to spatulate, entire, opposite, glabrous to villous; **heads** 4 – 6 cm broad, radiate, solitary, on elongate, naked peduncles; **involucre** double, the outer bracts linear-lanceolate, 6 – 8 mm long, the inner ovate, 0.8 – 1.3 cm long; **disk** 1 – 2 cm broad, deep yellow orange, slightly convex; **disk flowers** on a flat, chaffy receptacle, 5 – 7 mm long, fertile; **rays** eight, 15 – 30 mm long, 5 – 10 mm wide, cuneate to obovate, deeply 4-toothed, brilliant yellow, sterile; **achenes** 2.5 – 3.0 mm long, compressed, orbicular, with thin, flat wings; **pappus** of two minute, chaffy teeth.



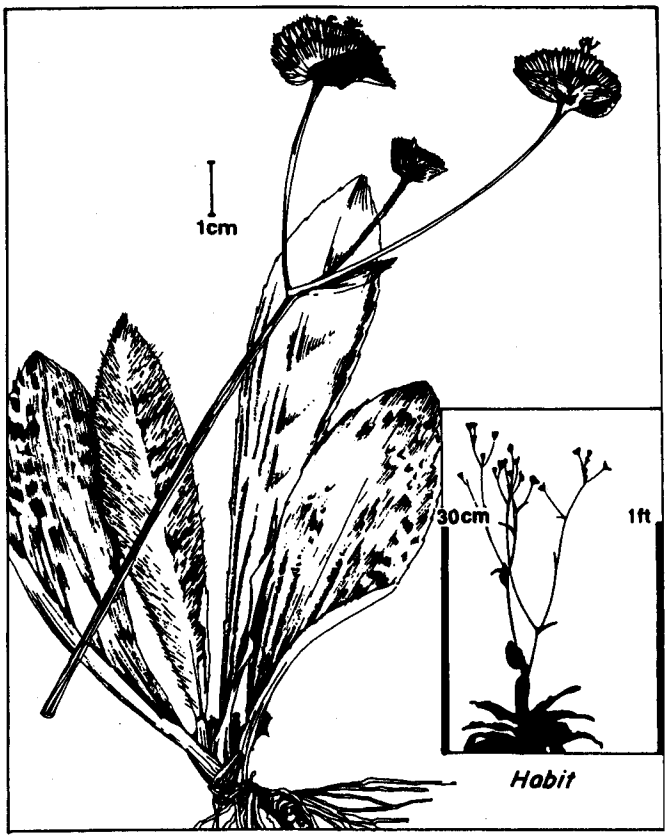
Hairy Elephantfoot—*Elephantopus tomentosus* L.

The name of this plant was inspired by a fancied similarity of the large, prostrate basal leaves to an elephant footprint. Basal leaves, which are elliptic to obovate and up to 12 inches long and 4 inches wide, are produced in early spring from a woody root crown. Essentially leafless, branched flower stalks up to 2 feet tall are produced from mid-summer to early fall. Not more than one node and leaf is produced on a stalk above the basal leaves. The entire plant is densely hairy. The stalk is terminated by a branching inflorescence, each branch with a terminal cluster of purplish tubular flowers. Flower clusters are subtended by three ovate leaf-like bracts, and small bracts subtend each branch of the inflorescence.

Hairy elephantfoot is common throughout the Piedmont and Coastal Plain on a wide range of sites, from bottomlands to sandhills. It is perhaps most important as forage in open pine forests on flatwoods sites of the longleaf-slash pine wiregrass type, but is rated only fair at best. Because most of its foliage is at ground level, it can tolerate heavy grazing.

Leafy elephantfoot, *Elephantopus carolinianus* Raeusch., is common throughout the range of hairy elephantfoot but is usually on wetter sites. Unlike hairy elephantfoot, it has stem leaves and no basal leaves. *Elephantopus nudatus* Gray and *E. elatus* Bertol, are also common, resembling hairy elephantfoot but with somewhat smaller flowers and flower heads.

Range: Texas to Florida, Tennessee, and Virginia.



Perennial. **Stems** one to five, from a woody crown, 20 – 90 cm tall, hirsute, subscapose, nodeless, or one node below the first inflorescence branch; **leaves** mostly basal, elliptic to obovate, densely pilose to tomentose, 3.0 – 10.5 cm wide, 8 – 22 cm long, **inflorescence** a loosely branched corymb, involucres cylindric, 10 – 14 mm long, densely pubescent, subtended by three ovate foliar bracts; **flowers** all discoid, three to four per head, pinkish to purple.

Daisy Fleabane—*Erigeron strigosus* Muhl. ex Willd. var. *beyrichii* (Fisch. & Mey.) T. & G. ex Gray

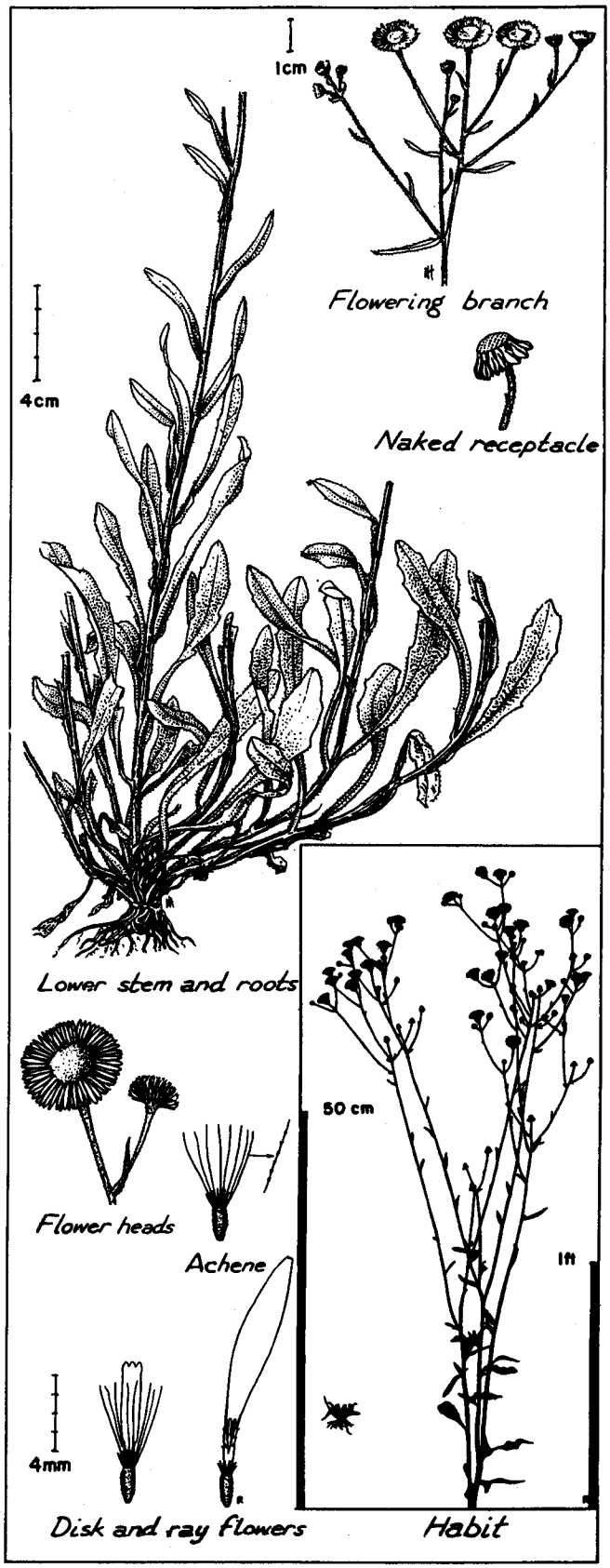
Like most annual composites, daisy fleabane is most abundant on old fields, roadsides, firelines, and other open, disturbed areas. It is common on undisturbed range, however, even under moderately dense timber. Sandy soils apparently provide the best habitat.

Plants may reach a height of 3 feet or more where competition is light, but where grass is dense, height seldom exceeds 2 feet. Early spring leaves, which form a basal rosette, are coarsely toothed. They are 6 inches long and 1 inch wide, with the greatest width in the upper one-third. Leaves on the upper stem are smaller—1 to 3 inches long and less than ½ inch wide—and without toothed margins. Leaves and stems are sparsely covered with short, stiff, ascending hairs that make plants rough to the touch.

The inflorescence consists of several to many daisylike flower heads, ⅝ inch or less in diameter. Each head has an outer ring of ray flowers and an inner disk of tubular flowers. The ligules of the ray flowers are about ¼ inch long and usually white, though occasionally the outer may be bluish or pink. Yellow flowers make up the central disk, which is about ⅜ inch in diameter. Flowering may begin in mid-April and continues through midsummer. Both ray and disk flowers produce a two-nerved achene less than 1/16 inch long.

Prairie fleabane, *Erigeron strigosus* Muhl. ex Willd. var. *strigosus*, is also an annual, rarely a biennial. It is a larger plant with larger, more showy flower heads, but is seldom found on grazed southern forest range. Several recent authors "lump" both varieties under *E. strigosus* Muhl. (Radford and others 1968, Correll and Johnson 1970). Other spring-flowering biennial or perennial fleabanes common southwide include *E. philadelphicus* L., a robust plant with toothed or divided, oblanceolate lower leaves, and *E. pulchellus* Michx., with mostly basal leaves and the few stem leaves reduced in size toward the tip of the usually unbranched stem, which is terminated by one to several showy flower heads. *Erigeron tenuis* T. & G., which is not found east of the Mississippi River, is a slender plant with oblanceolate, shallowly lobed leaves and several branches forming a more or less flat-topped inflorescence.

The annual horseweed, or horsetail conyza, *Conyza canadensis* var. *pusilla* (Nutt.) Cronq. (*E. pusillus* Nutt.), is a common roadside weed throughout the South. It has numerous narrow leaves gradually reduced in size going up the usually unbranched stem, with the lower, broader leaves falling early. Flower heads are small, numerous, and in a long, open



Daisy Fleabane—(Continued)

inflorescence. Plant height may exceed 6 feet on disturbed sites. *Conyza canadensis* (L.) Cronq. var. *canadensis (E. canadensis* L.) is widespread in the eastern U.S. but is not common on the Coastal Plain.

Cattle graze daisy fleabane in the spring before flowers form. On some sites, plants are abundant enough to contribute considerable forage. Nutritive value of young plants is high. In summer, deer may browse the flowers and upper stems of several fleabanes.

Range: Texas to Florida, extending north to Rhode Island, then west to Washington.

Annual. **Stems** strigose, 20 – 100 cm tall; **basal leaves** oblanceolate to elliptic, entire or toothed, petiolate, up to 15 cm long and 2.5 cm wide; **upper leaves** linear to lanceolate, minutely strigose to glabrous, entire, alternate, sessile; **inflorescence** corymbose, of few to many heads; **heads** 5 – 15 mm in diameter; **bracts** 2 – 3 mm long, linear-lanceolate, scarious margined; **disk** 9 mm or less in diameter, flowers perfect; **ray flowers** pistillate, rays 6 mm long or less, white to bluish or pink; **achene** 2-nerved, angled, about 1 mm long.

Eupatoriums—*Eupatorium* spp.

The eupatoriums, along with asters and goldenrods, are the most common composites in the southern United States. Several species grow on ranges in good condition; others occur mainly as invaders of disturbed sites. In general, eupatoriums have little grazing value; at least one species, white snakeroot, is poisonous to livestock. The seeds of several eupatoriums are eaten by birds.

The many-branched inflorescence is composed of numerous heads in flat-topped, rounded, or conical arrangements. In the most common species on southern pine forest range, flowers are tubular, white, and about ¼ inch long. Heads are enclosed at the base by a whorl of greenish bracts, which in some species have whitish margins and tips. Most eupatoriums have fewer than 10 flowers per head, but some have up to 70. Each corolla is surrounded and almost hidden by an early developing ring of hairs, or pappus, which acts like a parachute to aid in wind dissemination of the fruit (achene).

Most eupatoriums flower in late summer or fall; hence recognition during most of the growing season must depend on vegetative differences. Intergradation is common among associated species. The following key may aid in the identification of several common species by foliage characteristics. All plants are perennials and flower color is white unless another color is specified. Descriptions of four species follow the key. The four species, which illustrate the range in leaf shapes and inflorescence types in *Eupatorium*, are white eupatorium, *E. album* L.; dogfennel, *E. capillifolium* (Lam.) Small; hyssopleaf eupatorium, *E. hyssopifolium* L.; and roundleaf eupatorium, *E. rotundifolium* L.

Key to Eupatoriums

1. Leaves dissected into narrow segments, opposite and alternate on same plant; inflorescence conical 2
1. Leaf margins toothed but not dissected, leaves opposite; inflorescence more or less flat topped 3
   2. Leaf segments hairlike; plant tops lax, slightly drooping ..... *E. capillifolium* (Lam.) Small, dogfennel (page 100)
   2. Leaf segments flat, often ⅛ – ¼ inch (3 – 6 mm) wide; plant tops erect ..... *E. compositifolium* Walt., yankeeweed
3. Length of typical leaf blade less than twice the width 4
3. Length of blade 2 or more times the width 5
   4. Blades ovate to broadly rounded, sessile; flowers white ..... *E. rotundifolium* L., roundleaf eupatorium (page 101)
   4. Blades triangular, veiny, on petioles ⅓ to ½ blade length; flowers blue[1] ..... *E. coelestinum* L. *(Conoclinium coelestinum* (L.) DC.)[2], mist-flower
5. Blades attached directly to stem; no obvious leaf stalk (petiole) 6
5. Blades with conspicuous petioles 10
   6. Leaf bases of opposite pair of leaves joining around stem ..... *E. perfoliatum* L., boneset
   6. Leaves merely sessile or essentially so 7
7. Blade margins toothed on upper half only ..... *E. semiserratum* DC., smallflower eupatorium
7. Blade margins toothed below the middle or leaves linear 8
   8. Larger leaves less than ½ inch (1.3 cm) wide 9
   8. Larger leaves more than ½ inch (1.3 cm) wide ..... *E. album* L., white eupatorium (page 100)
9. Leaves narrow with reduced axillary branches, appearing whorled ..... *E. hyssopifolium* L., hyssopleaf eupatorium (page 100)
9. Leaves without axillary branches, toothed or entire ..... *E. leucolepis* (DC.) T. & G., hoarscale eupatorium
   10. Length of typical blade at least 3 times the width ..... *E. serotinum* Michx., late eupatorium
   10. Length of typical blade 2 – 2½ times width ..... *E. rugosum* Houtt. *(Ageratina altissima* (L.) R. M. King & H. Rob.), white snakeroot (mistflower fits here also)

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[1] Another blue-flowered eupatorium, ivyleaf eupatorium, *E. ivifolium* L. *(Chromolaena ivifolia* (L.) R. M. King & H. Rob.), is found in southern Louisiana and Mississippi. It is a freely branching, often sprawling plant, with narrow, sessile, sparsely toothed leaves.

[2] Names in parenthesis are indicated as preferred in NLSPN (USDA 1982).

White Eupatorium—*Eupatorium album* L.

White eupatorium, named for the whitish membranous margins of the bracts surrounding the flower heads, is common on periodically burned, open, sandy longleaf-slash pine range.

Mature plants are about 2 feet tall and conspicuously hairy. The leaves are opposite, elliptical, coarse toothed, and without petioles. Blades may be up to 5 inches long and 1 inch wide, but they are commonly about 2 inches long and ½ inch wide. Flat-topped inflorescences appear in midsummer, and flowering continues until frost.

Although boneset, *Eupatorium perfoliatum* L., and smallflower eupatorium, *E. semiserratum* DC. *(E. glaucescens* Ell.) resemble white eupatorium slightly, they are usually confined to wetter sites. Other differences are noted in the key. Late eupatorium, *E. serotinum* Michx., is very common on a wide range of sites. Its leaf blades are about as broad as white eupatorium, but leaves are on petioles about 1 inch long. Late eupatorium may be mistaken for white snakeroot (see key).

Cattle occasionally graze the tender spring leaves of white eupatorium, but the coarse, stiff foliage of older growth is unpalatable.

Range: Louisiana to Florida, extending north to Arkansas, Ohio, and New York.

Perennial. **Stems** 20 – 90 cm tall, harshly pubescent; **leaves** simple, opposite, glandular-punctate, elliptic to lanceolate, serrate, sessile, pilose to scabrous or almost glabrous, 3 – 10 cm long, 1 – 3 cm wide; **inflorescence** a corymb 10 – 25 cm broad, ultimate branchlets terminated by a head of three to five tubular flowers; **heads** 8 – 11 mm long; **bracts** imbricate, lanceolate, white-scarious-margined, glandular-punctate, exceeding the corolla; **corolla** white, tubular, glandular-punctate, 3 – 5 mm long; **fruit** an achene, 3 – 5 mm long.

Dogfennel—*Eupatorium capillifolium* (Lam.) Small

Dogfennel and its close relative, yankeeweed, *Eupatorium compositifolium* Walt., invade abandoned fields, disturbed or overgrazed pastures and forests, and roadsides, especially on dry sandy soils. Dogfennel grows in colonies from a thick, woody, underground base. Plants average 4 to 5 feet in height, but on moist fertile sites they may reach 9 feet. On dry sandy soils, yankeeweed is usually the more abundant of the two.

Dogfennel leaves are deeply dissected into fine, hairlike lobes that give the foliage a needlelike appearance and soft feel. Yankeeweed leaves are also divided, but segments are broader.

The dogfennel inflorescence is a long, conical panicle, usually somewhat lax or nodding. Only yankeeweed has a similar inflorescence, and it is erect. Other eupatoriums are flat-topped. Dogfennel and yankeeweed flower in the fall, later than most associated plants. They emit a pleasing fragrance when in full bloom.

Dogfennel is scarce on forest range in good condition. It has no value as forage or wildlife food. Cattle graze it sparingly, if at all, even where other herbage is scarce.

Range: Texas to Florida, extending north to Tennessee and New Jersey.

Perennial. **Stems** several, from a stout woody caudex, 1 – 3 m tall, pubescent or puberulent, upper stem lax, nodding; **leaves** pinnately dissected into filiform divisions, 2 – 10 cm long, glabrous, glandular-punctate, often with axillary fascicles; **inflorescence** a lax, elongate, conical panicle; **heads** 3- to 5-flowered, 3 – 5 mm long; **flowers** 2 – 3 mm long, corolla white, tubular; **achene** about 1 mm long, smooth.

Hyssopleaf Eupatorium—*Eupatorium hyssopifolium* L.

This eupatorium grows on drainageways and poorly drained flats throughout the longleaf-slash-pine type. Although rarely abundant, plants are conspicuous when flowering in late summer.

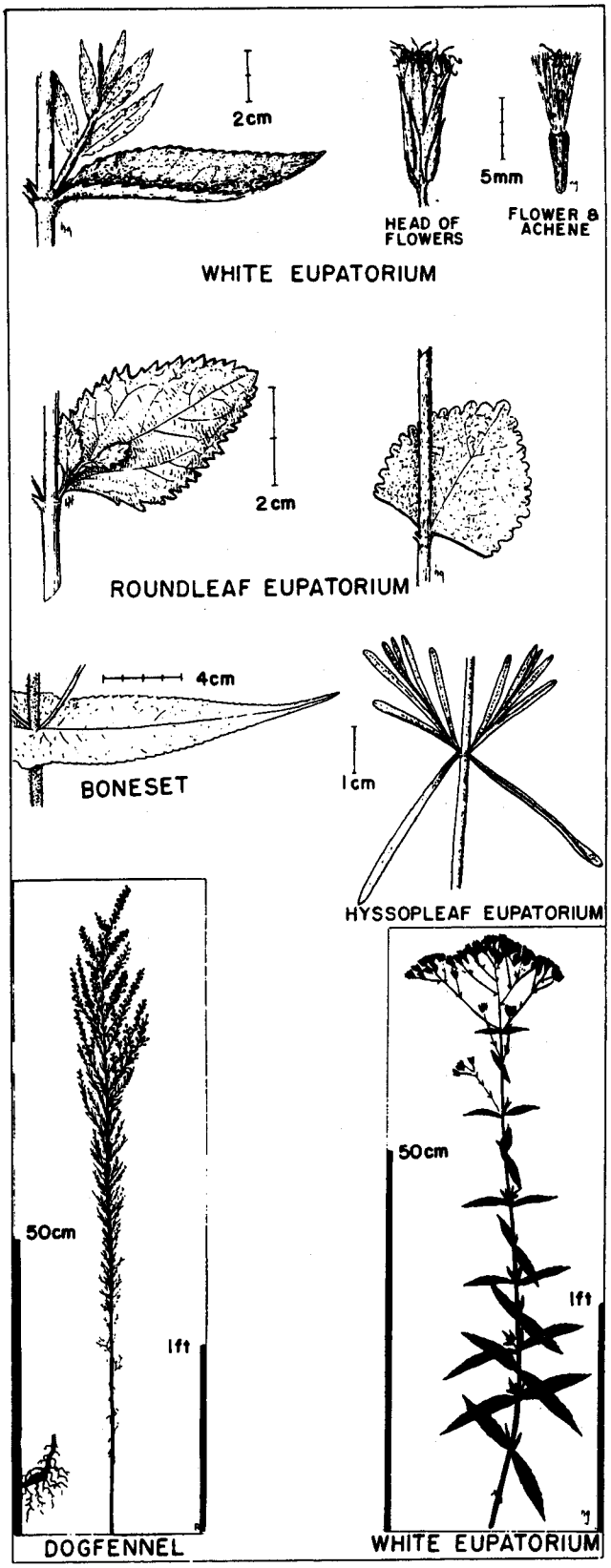
Mature plants may reach 3 feet in height, but average about 2 feet. Primary leaves are about 1½ inches long and ½ inch or less in width. Their sparsely toothed or entire margins frequently roll inward along the lower surface; thus, blades may appear threadlike, resembling those of dogfennel. Hyssopleaf eupatorium is distinguishable by the reduced leafy branches arising from leaf axils. These branches cause leaves, which are generally paired and opposite, to appear numerous and whorled. In some specimens, however, three or four leaves may occur at each node.

Leaves of hoarscale eupatorium, *Eupatorium leucolepis* (DC.) T. & G., are narrow, like those of hyssopleaf eupatorium, and the two species inhabit similar sites. But because hoarscale eupatorium is without branches in the leaf axils, its leaves are distinctly opposite.

Cattle rarely graze either eupatorium.

Range: Texas to Florida, extending north to Rhode Island.

Perennial. **Stems** 30 – 100 cm tall, puberulent or strigose; **leaves** simple, linear, 1 – 10 mm wide, 2 – 6 cm long, opposite or sometimes three to four verticillate, appearing whorled because of axillary leafy branches, upper leaves often alternate, margins entire or few-toothed; **inflorescence** a corymb, 8 – 20 cm wide; **heads** 6 – 9 mm long; **bracts** 4 – 7 mm long, canescent-pilose, scarious-margined; **corolla** white, 3 – 4 mm long; **achene** about 2 mm long, ribbed.



Roundleaf Eupatorium—*Eupatorium rotundifolium* L.

Roundleaf eupatorium is common on poorly drained uplands. It grows as scattered individuals about 2 feet tall. Leaves are ovate with regular, blunt teeth. Leaf blades, attached directly to the stem, are 1 to 2 inches long and about the same in width.

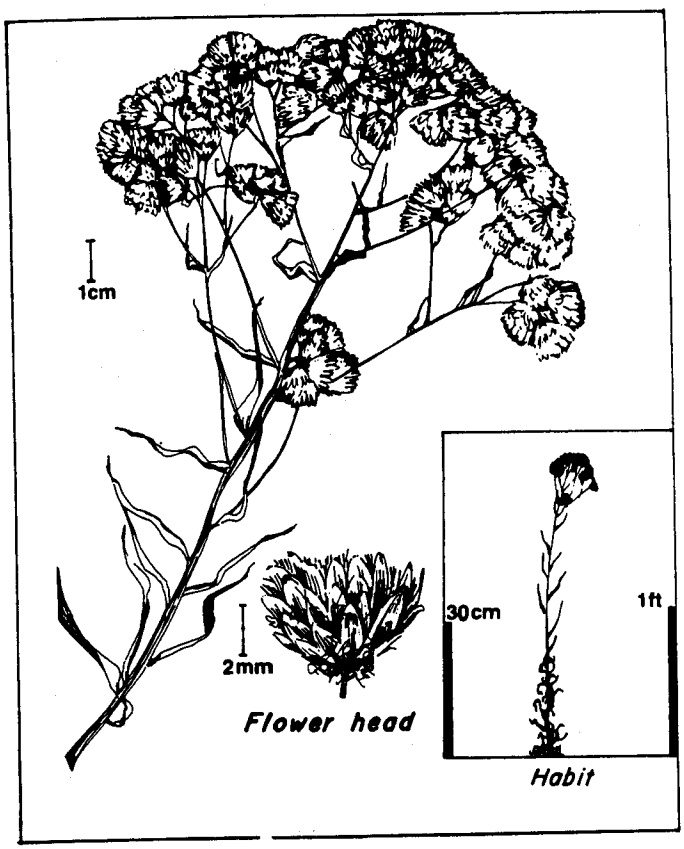
Roundleaf is the most common eupatorium with leaves about as broad as long. In this treatment it includes those plants with typical ovate leaves and truncate bases *(Eupatorium rotundifolium* L. var. *rotundifolium* of some authors) and also those with wedge-shaped bases *(E. rotundifolium* var. *ovatum* (Bigel.) Torr. or *E. pubescens* Muhl. of some authors).

Eupatorium pilosum Walt. is listed in some books as *E. rotundifolium* var. *saundersii* (Porter) Cronq. It is common on a variety of sites throughout the Coastal Plain from southeastern Louisiana to New York. Leaf blades are generally longer than broad, coarsely and irregularly toothed, and without petioles.

Range: Texas to Florida, extending north to Tennessee and New York.

Perennial. **Stems** 30 – 120 cm tall, tomentulose; **leaves** simple, opposite, sessile, ovate to subrotund, crenate or crenate-dentate, with straight, entire, subtruncate, cordate to broadly cuneate bases, scabrous above, pilose and rugose-veiny beneath, 2 – 7 cm long, width approximately equaling length; **corymb** 10 – 20 cm wide; **heads** 5 – 7 mm long, inner bracts pilose, white-scarious-margined, 3 – 5 mm long; **corolla** white, tubular; **achene** 2 – 3 mm long.

Fragrant Cudweed—*Gnaphalium obtusifolium* L.



This annual or biennial weed is better known across the South as rabbit-tobacco. It is found throughout the eastern half of the nation but is especially common on the sandy Coastal Plains soils of the South. Other names are catfoot, sweet-everlasting, and old-field-balsam. Like most annual composites, it grows best where competition from perennial grasses is light. Common sites include firelines, overgrazed ranges, and burned areas, especially on dry sandy soils under an open pine canopy. Fragrant cudweed usually grows in clusters of unbranched stems 2 to 3 feet tall. Leaves are lance-shaped, commonly about 3 inches long and ⅛ inch wide. Upper leaf surfaces are green and almost hairless; stems and lower leaf surfaces are woolly with grayish hair. A showy, branched inflorescence terminates each stalk. Flowers are in clusters of constricted, white woolly heads, each about ¼ inch high and opening to about as wide at maturity. Like flowers of the pussytoes, *Antennaria* spp., they lack the conspicuous rays typical of showier composites such as the sunflowers, *Helianthus* spp.

A closely related annual species, *Gnaphalium helleri* Britt., considered a variety of *G. obtusifolium* by Fernald (1950), has glandular-hairy stems that are green in color. The two species are often found growing on the same site.

A common relative of fragrant cudweed is purple cudweed, *Gamochaeta purpurea* (L.) Cabrera, *(Gnaphalium purpureum* L.), a much smaller annual with blunt leaves broadest above the middle. Flower heads sometimes turn purplish at maturity. Like fragrant cudweed, it is found most often on dry, disturbed sites but is frequently found on undisturbed sites. A basal rosette of leaves is formed in late winter and provides some early feed for deer and turkey. Neither fragrant nor purple cudweed is desirable forage for cattle. Purple cudweed occurs in several forms throughout the South; these forms are considered varieties by some authors and separate species by others.

Range: Texas to Florida, extending north to Canada.

Annual or biennial. **Stems** 20 – 150 cm tall, unbranched except in inflorescence; **leaves** alternate, elliptic-linear-lanceolate, 2 – 10 cm long, 2 – 10 mm wide, upper surface green and glabrate to papillate, lower surface gray-woolly; **inflorescence** corymbose; **involucres** in loose clusters at tips of corymb branches, 6 – 7 mm high; **phyllaries** whitish and scarious, in three to five different lengths, pilose on lower half, outer with rounded tips, inner acute, equaling or exceeding flowers; **flowers** all tubular, outer pistillate, inner perfect; **achenes** flat and glabrous.

Bitter Sneezeweed—*Helenium amarum* (Raf.) Rock

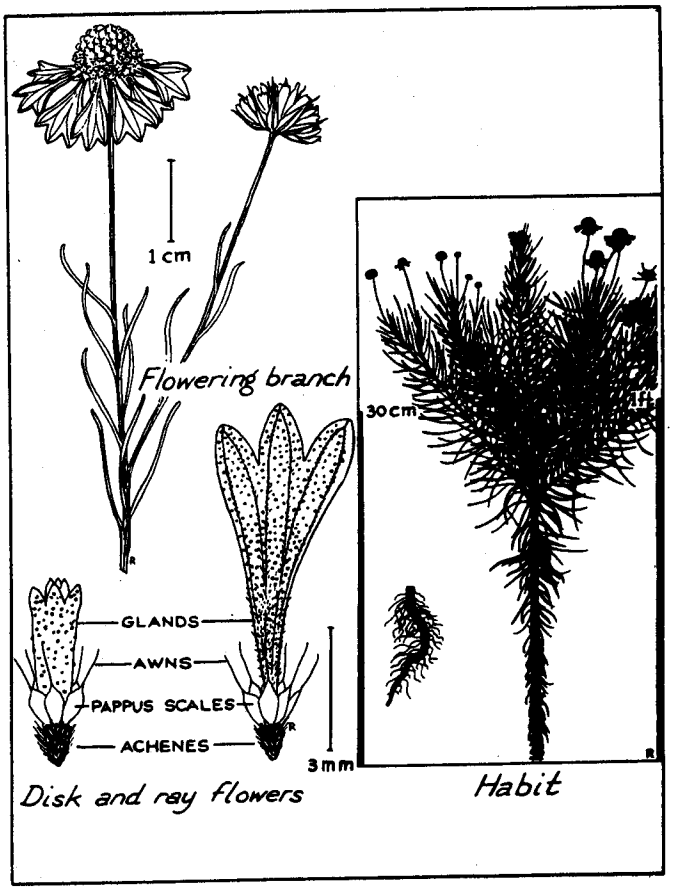
Bitter sneezeweed, like most annuals, is a prolific seeder. It aggressively invades denuded areas, appearing prominently along roadsides, in old fields, and on overgrazed grasslands. It tolerates all but very wet or heavily shaded sites.

Height rarely exceeds 2 feet. Stems vary from simple to profusely branched. Leaves are numerous, threadlike, and up to 3 inches long. Each stem or branch produces many flower heads, which average about an inch in diameter. Collectively, these form a flat-topped cluster. The central disk of the head, consisting of tubular flowers, is surrounded by drooping, three-lobed, yellow ray flowers. Flowering begins in the spring and continues through the growing season.

Bitter sneezeweed is low in palatability. Although it is reportedly toxic to livestock, cattle rarely consume enough to develop serious symptoms. When grazed by dairy cows, a bitter taste is transmitted to the milk.

Purplehead sneezeweed, *Helenium flexuosum* Raf. (*H. nudiflorum* Nutt.), with broader leaves and winged stems, has flower heads resembling those of bitter sneezeweed; disks are purple and rays may be yellow or purplish. Common sneezeweed, *H. autumnale* L., is similar to purplehead except that the central disk is yellow.

Range: Texas to Florida, extending north to Kansas, Missouri, Illinois, and Virginia.



Annual. **Stems** 20 – 50 cm tall, very leafy, simple to corymbosely branched above the middle; **leaves** 1 – 8 cm long, alternate, 1 – 2 mm broad, filiform to linear, densely glandular-punctate, glabrous; **heads** several to numerous, 1.5 – 2.5 cm broad, radiate, solitary on slender, naked peduncles, disk ocher yellow, globular, 6 – 12 mm broad; **disk flowers** 4 – 5 mm long, on a globular, naked receptacle; **ray flowers** 5 – 10, pistillate; **ligules** cadmium yellow, 3-toothed, 5 – 12 mm long, spreading to reflexed, glandular on the back; **achenes** about 1 mm long, brown, hairy; **pappus** scales hyaline, with an awn as long as the body.

Swamp Sunflower—*Helianthus angustifolius* L.

Its name is misleading, for swamp sunflower is the most common of the perennial forbs on a variety of upland range sites, including dry sandy ridges. It occurs also on low, open flatwoods and other wet sites.

Like most sunflowers, stems and leaves are rough to the touch. In dense grass, stems seldom exceed 2 or 3 feet in height, the plants usually being inconspicuous until the flower heads appear. On firelines or other clearings, this species may grow more than 6 feet tall. The lower stem is covered with short, stiff hairs.

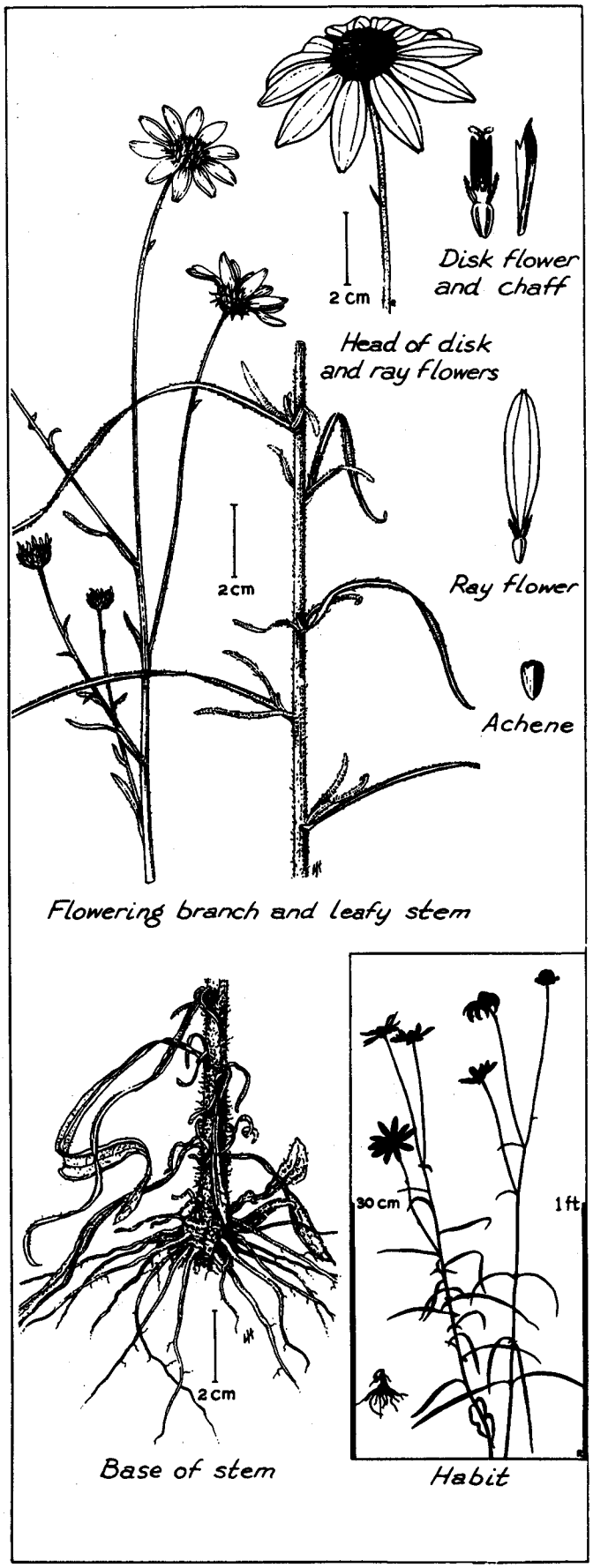
On open sites the leaves average 2½ inches long and less than ⅛ inch wide. They appear even narrower because their margins roll under. Under timber, leaves may be flat and up to ¾ inch wide. Heads, 1½ to 2 inches broad, appear by early October. Each has a purplish central disk about ½ inch in diameter and an outer ring of yellow ray flowers. Leaves, though slender, are almost fleshy. They are covered throughout with short, stiff hairs that project from small conical bases.

Although early growth of Texas ironweed resembles swamp sunflower, it is easily distinguished when its flower heads appear in early summer. Its inward-rolled leaves are strongly lance shaped; those of swamp sunflower are almost linear. Swamp sunflower intergrades with *Helianthus floridanus* Gray ex Chapm. in south Georgia and east Florida to produce plants with flowers having yellow disks (Godfrey and Wooten 1981).

Swamp sunflower is the most valuable forage forb on longleaf-slash pine-bluestem range. It is high in protein, often containing more than 10 percent in the full-leaf stage. Cattle eat it throughout the growing season. Grazing causes plants to branch freely. Site preparation, such as disking for direct seeding, causes swamp sunflower to increase. Deer eat the leaves and young stems, and the seeds provide food for quail and doves.

Range: Texas to Florida and New York, extending inland to Kentucky, Indiana, and Missouri.

Perennial. **Stems** 50 – 150 cm tall, branched above, arising from a short, erect crown; **leaves** 8 – 20 cm long, 0.3 – 1.5 cm wide, simple, sparse to numerous, sessile, alternate (basal sometimes opposite), attenuate, the margins revolute in the very narrow leaves; **heads** many, radiate, 3 – 7 cm broad, **involucral bracts** 8 – 12 mm long, subulate; **disks** dark purple, 10 – 15 mm long, fertile; **chaff** about 7 mm long, red-violet tipped, 3-toothed; **rays** 10 to 13, neuter, bright yellow orange, 1 – 3 cm long, 5 – 6 mm broad; **achenes** 3 – 4 mm long, flattened, dull black, mottled with tan; **pappus** of two caducous scales.



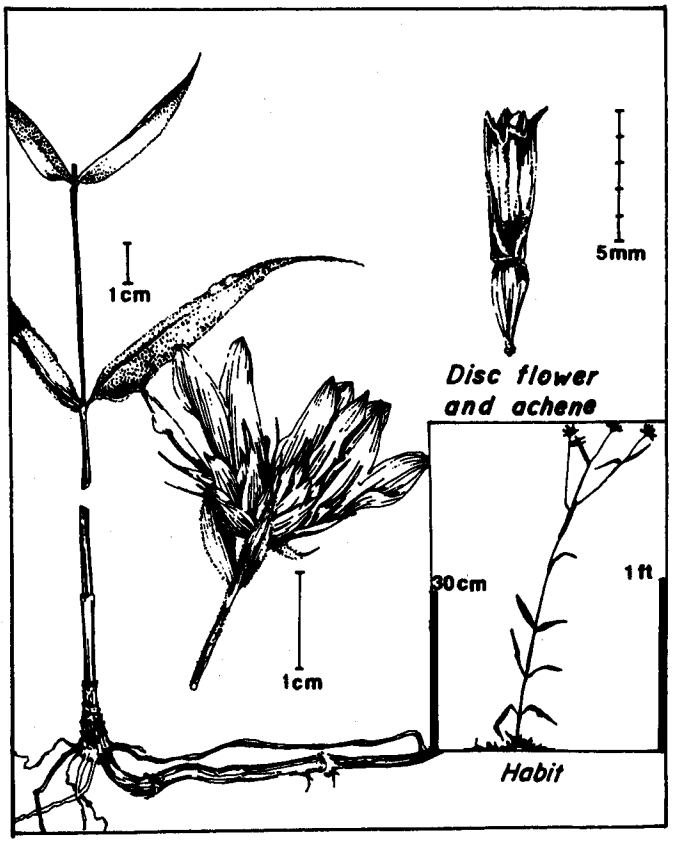
Hairy Sunflower—*Helianthus hirsutus* Raf.

Hairy sunflower is common across the South but is not as abundant as swamp sunflower. It occurs on sandy sites and seems to be fairly shade tolerant.

Plants are 2 to 4 feet tall, branching from the axils of the upper leaves. A single flowerhead, about 2 inches in diameter, terminates the main stem and lateral branches. Disk flowers as well as rays are yellow. Leaves are lance shaped and opposite, although uppermost leaves may be alternate. Usually gray green in color, leaves may be ¼ to ½ inch wide and up to 7 inches long. As in many sunflowers, short, stiff, glandular hairs make leaves and stems rough to the touch. Stem hairs, however, may be longer and softer than those of the leaves.

Cattle eat the immature foliage, but on forested range, plants are seldom abundant enough to provide a significant amount of forage. It is not recognized as a valuable livestock or wildlife food plant.

Range: East Texas, Oklahoma, and Arkansas to Georgia, extending north to Minnesota and Pennsylvania.



Perennial. **Stems** erect, from stout rhizomes, 50 to 170 cm tall, internodes hirsute or scabrous; **leaves** opposite (uppermost may be alternate), sessile or on petioles up to 15 mm long, blades ovate to lanceolate, up to 7 cm broad and 18 cm long, lower surface hirsute or scabrous; **flower heads** solitary at ends of main stem and lateral branches; **disk** 1 – 2 cm broad, flowers yellow; **rays** yellow, 15 – 35 mm long; **involucral bracts** lancolate, long-tapering, exceeding the disk; **achene** about 4 mm long, winged.

Grassleaf Goldaster—*Heterotheca graminifolia* (Michx.) Shinners—*(Chrysopsis graminifolia* (Michx.) Ell.)

Grassleaf goldaster grows on a variety of sites but is most common on sandy soils. Until the inflorescences appear in summer, the plants superficially resemble grasses. The elongate leaves measure up to 10 inches and have prominent longitudinal veins. Long silky hairs paralleling the veins lie flat against the leaf; they produce a silvery sheen, which the dead leaves retain through the winter.

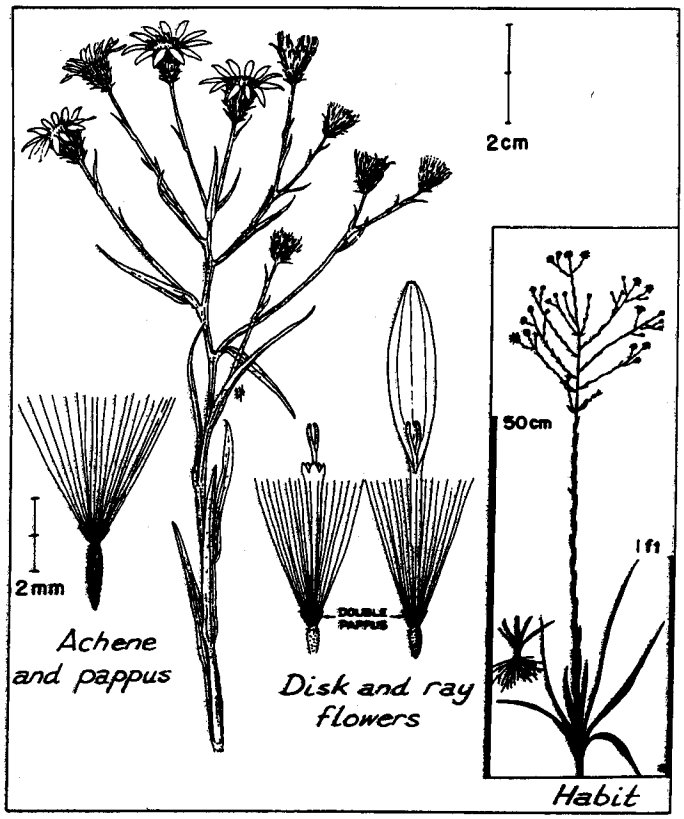
Plants, including the profusely branched inflorescence, grow to 3 feet tall. The asterlike flower heads are about ⅝ inch in diameter, with golden-yellow ray flowers. Several rows of overlapping, narrow bracts enclose the bases.

Soft goldaster, *Heterotheca pilosa* (Nutt.) Shinners, is a common taprooted annual on sandy sites from Texas and Mississippi to Kansas and Missouri. It occurs less commonly in Tennessee and North Carolina. Flower heads are similar to those of grassleaf goldaster, but larger. Foliage of soft goldaster lacks the silky hairs and parallel venation of grassleaf. Lower stem leaves are toothed and semi-clasping. Leaves on branches are reduced in size, and entire. Leaves and stems have spreading white hairs of varying length and density. Like most annual forbs, soft goldaster is most abundant on roadsides, firelines, and other disturbed sites.

Maryland goldaster, *H. mariana* (L.) Shinners, a perennial with long, cobwebby hairs on stems and leaves of young growth, resembles soft goldaster and grows on the same sites. Camphorweed, *H. subaxillaris* (Lam.) Britt. & Rusby, is a weedy, almost woody, goldaster with rough, coarsely toothed leaves, that may grow unbranched to a height of 8 feet or may form bushy branched plants about 3 feet tall.

Because of its scattered distribution, grassleaf goldaster contributes only a small part of the cattle diet. Nutritive value exceeds that of most grasses but palatability is only fair. Cattle graze it mainly in the spring when plants are young and succulent.

Range: Louisiana to Florida and Virginia.



Perennial. **Stems** 30 – 90 cm tall; **basal leaves** 10 – 30 cm long, 0.2 – 1.0 cm broad, veins parallel; **cauline leaves** appressed, alternate, decreasing in size up the stem; **inflorescence** irregularly corymbose; **heads** turbinate, yellow, radiate, solitary at the ends of elongate ascending peduncles; **involucres** 7 – 11 mm high; **phyllaries** in several series, loosely white-hairy to glandular; **disk flowers** 7 – 8 mm long, numerous, fertile; **ray flowers** fertile, the narrow ligule 8 – 12 mm long; **pappus** double; **achene** about 3 mm long, linear, dark brown, hairy.

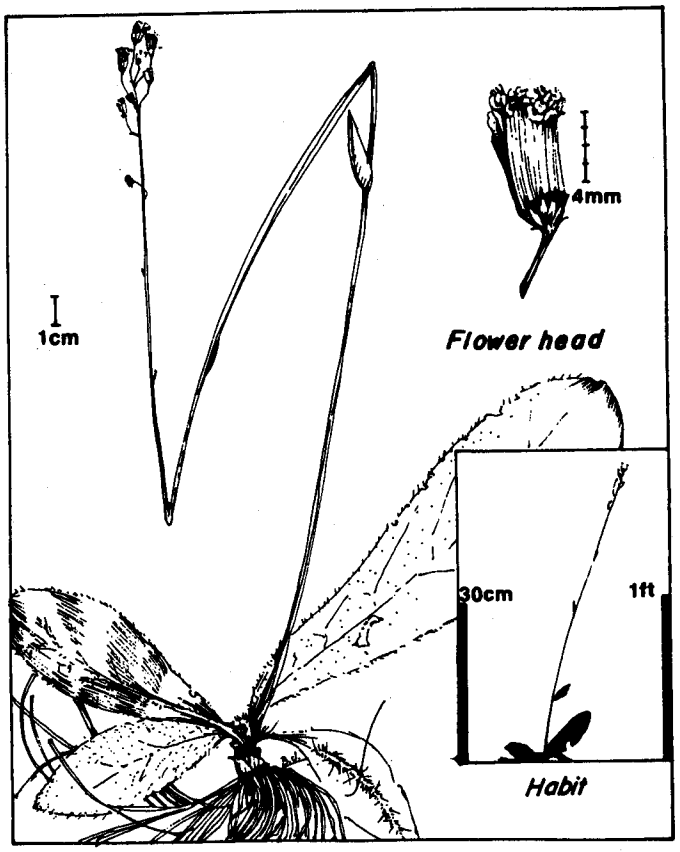
Hawkweed—*Hieracium gronovii* L.

This southern species represents a group of native hawkweeds whose primary ranges are mainly in the northern or mountainous parts of the United States. Numerous species are introduced weeds from Europe. *Hieracium gronovii* has hairy stems and oblanceolate basal leaves up to 7 inches long. Flower stalks are 2 to 3 feet tall, with several reduced leaves, and are terminated by an erect panicle of flower heads. Flower heads are about ¼ inch long with no disk flowers. The yellow ray flowers are barely visible behind the almost tubular outer ring of greenish bracts. *H. gronovii* occurs most frequently in open sandy woodlands, although it is seldom found on burned and grazed range. It is a common weed of roadsides and lawns.

Other species of *Hieracium* that range into the South occur in the Piedmont and adjacent areas of the Coastal Plain. Western species are found in Arkansas and Missouri. Several are common weeds of pastures. Most have yellow flowers and hairy stems and leaves, and all have milky sap.

Hawkweed is a palatable forage plant for livestock, and deer eat flower heads and stem tips in summer. It is seldom abundant enough, however, to be considered a valuable forage component of the range.

Range: Texas to Florida, extending north to Michigan and Massachusetts.



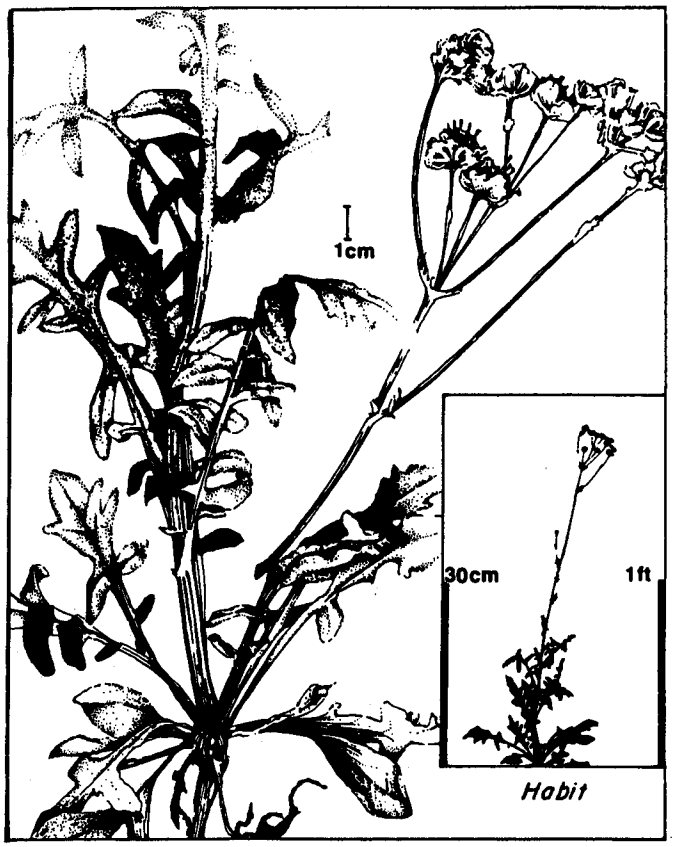
Perennial. **Stems** erect, to 1 m tall, pilose to pubescent; **leaves** mostly basal, oblanceolate to elliptic, 8 – 17 cm long, to 5 cm wide, abruptly reduced up the stem, pilose; **inflorescence** a narrow, erect panicle; **involucres** 6 – 8 mm long, bracts acute to acuminate, **heads** 20- to 40-flowered, all ray flowers; **rays** yellow; **nutlets** fusiform, 3 – 4 mm long; **pappus** tan.

Ragweed Woollywhite—*Hymenopappus artemisiifolius* DC.

Ragweed woollywhite is conspicuous from April through June on roadsides through sandy open woodlands of east Texas and southwestern Louisiana. It is a biennial, about 3 feet tall when mature, with a basal rosette of leaves and a thick taproot. Basal leaves are entire or once-divided, green on the upper surface and "woolly-white" below; stem leaves are deeply lobed and reduced in size up the stem. Flower heads are in axillary and terminal clusters in a stiffy branched inflorescence. Membranaceous bracts enclosing the flower heads are whitish, often tinged with red or purple. Another species, flattop woollywhite, *Hymenopappus scabiosaeus* L'Her., grows southwide on dry sandy or clayey soils. Leaves of flattop woollywhite are more finely divided than those of ragweed woollywhite, and flowers are completely white.

Basal leaves of ragweed woollywhite are eaten by cattle and deer in early spring when other green forage is scarce. Flowers appear by the first of May and mature plants are not grazed under moderate utilization.

Range: Texas and Louisiana.

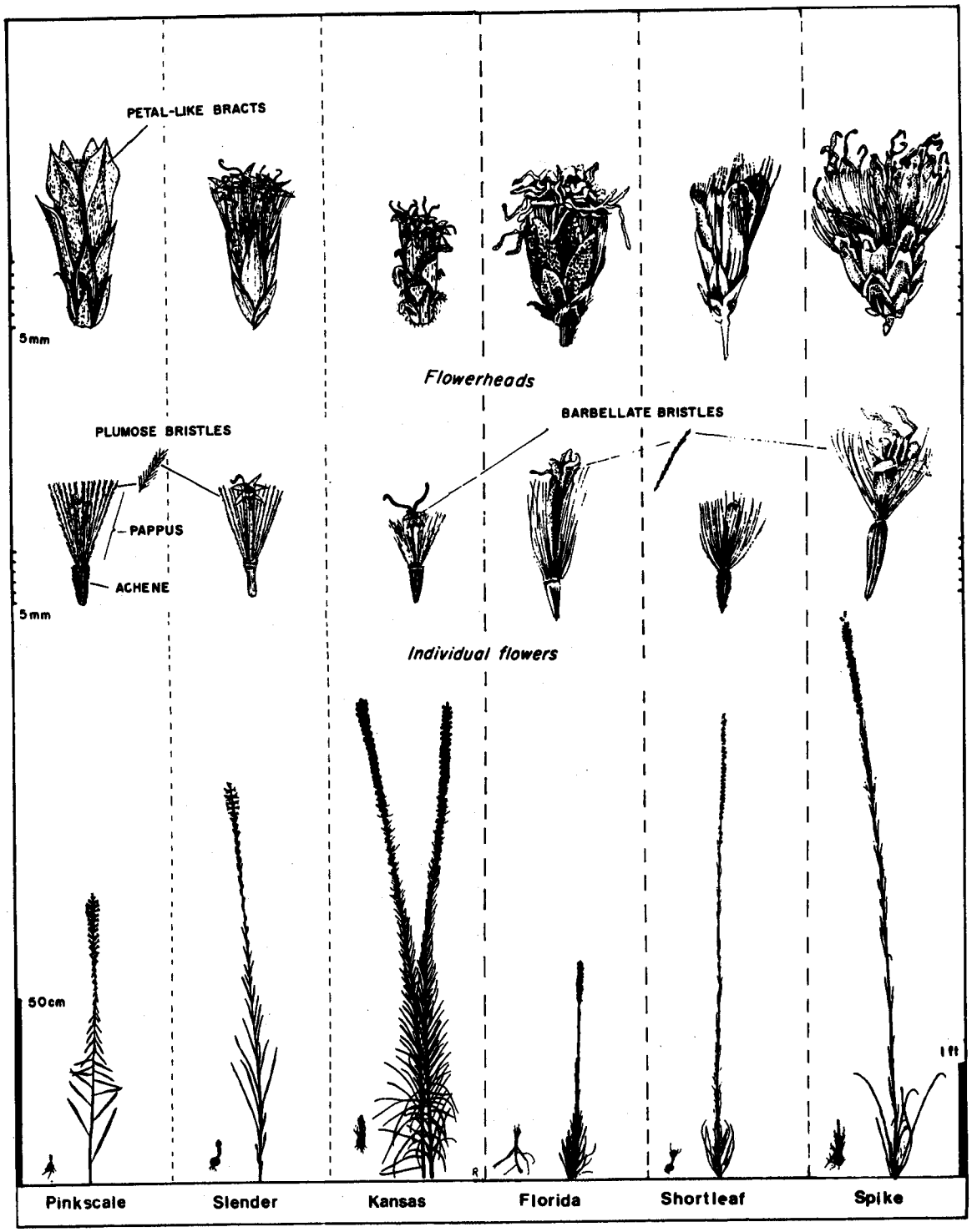


Biennial. **Stems** to 90 cm tall; **leaves** of basal rosette 8 to 18 cm long, entire or pinnatifid, upper leaves reduced and pinnatifid; **inflorescence** cymose, involucres campanulate, about 15 mm wide; **phyllaries** white or tinged with red, heads with disk flowers only; **corollas** funnel shaped, rose colored, 3.5 – 5 mm long; **pappus** of 16 – 18 scales about 1 mm long; **achenes** 4-sided, 3 – 4 mm long.

Gayfeathers—*Liatris* spp.

About 20 gayfeathers, or blazing-stars, are found in southern pine forests. Several are found southwide, while others have limited distributions. Most are showy, slender, erect, narrow-leaved perennials, with stems arising from a bulblike base. Leaves are generally longest at the base of the plant and decrease in length up the stem. The basal leaves form a rosette in the spring before stalks begin growth.

The gayfeathers inhabit open to moderately timbered sites. Most grow best on sandy soils, although some require fairly wet sites. Cattle may eat new growth but generally reject older herbage. Gayfeathers are moderately resistant to grazing, but disappear on heavily used areas. Thus, an abundance of gayfeathers indicates that the range is not being overgrazed.



Slender Gayfeather—*Liatris acidota* Engelm. & Gray

Slender gayfeather grows on moist, well-drained soils of the Coastal Plain in Louisiana and east Texas. Plants are usually most abundant on sandy ridges and on pimple mounds in areas that are otherwise wet.

Stems grow about 2 feet tall from bulblike corms. Leaves are gray-green and hairless, 1/16 to ⅛ inch wide. Lower leaves are up to 8 inches long, but at about 6 inches above the ground, leaf length abruptly diminishes to about 1 inch. The uppermost leaves are even shorter—less than ¼ inch long.

Flower heads, averaging ½ inch long and short stalked, are spaced about ¼ inch apart. Rose-purple flowers, two to four per head, are surrounded by a loose whorl of stiff, sharp-pointed bracts. The bracts are green at first, turning dark purple at flowering. They vary in length, but the longest are shorter than the flowers. The inflorescence comprises about ⅓ of the plant height. Heads at the summit begin maturing in midsummer; flowering continues downward, with the lowermost heads maturing last.

Young plants are occasionally grazed by cattle, but older herbage is rejected unless better forage is scarce.

A similar but taller species, shortleaf gayfeather, *Liatris tenuifolia* Nutt., is common on dry sandhills from Florida to South Carolina. Average height is 3 to 4 feet, but plants up to 6 feet tall are common. Stems of the tallest plants measure only about ⅛ inch in diameter near ground level.

Range: Coastal Plain of Texas and Louisiana.

Perennial. **Stems** glabrous, 30 – 70 cm tall, from corms; **leaves** linear, alternate, the lower 1 – 3 mm wide, 10 – 18 cm long, the upper less than 1 mm wide and 2 cm long, ascending, glabrous but obscurely white-scurfy; **inflorescence** slender, spikelike, 10 – 25 cm long; **heads** sparse, about 1 cm long, 3- to 5-flowered; **bracts** of mature flowers few, the inner 6 – 7 mm long, purple, stiff, acuminate, not scarious-margined nor petaloid; **flowers**, including the mature achene, about 10 mm long, exceeding the bracts; **corolla** equaling the plumose **pappus**, rose-magenta.

Pinkscale Gayfeather—*Liatris elegans* (Walt.) Michx.

This gayfeather usually grows 2 to 3 feet tall. It flowers in late summer or fall, and the pink or rose-colored floral bracts provide color long after flowers have withered.

Lower leaves are generally less than 6 inches long and up to ⅜ inch wide. Leaf size gradually diminishes up the stalk. The upper leaves point downward at about 45°.

The inflorescence is 4 to 6 inches long and about 1 inch in diameter. Sometimes, however, stalks of the lower heads elongate, producing a cone-shaped inflorescence. Color is provided mostly by the floral bracts, which extend beyond the flowers, obscuring the petals. These colorful bracts and the downward pointing leaves are reliable distinguishing characteristics of pinkscale gayfeather. The inflorescence is less densely flowered than that of Kansas gayfeather, but denser than in slender gayfeather. Floral bracts (except the tips) and stems are loosely coated with short, stiff, white hairs.

Although cattle may occasionally graze young growth, pinkscale gayfeather is not a valuable forage plant. Deer eat the foliage in spring and summer.

Range: Texas and Oklahoma to Florida and South Carolina.

Perennial. **Stems** 30 – 100 cm tall, pubescent, leafy, unbranched, from corm; **leaves** linear-spatulate to lanceolate, alternate, sessile, punctate, acute; **basal leaves** ascending, to 12 cm long and 7 mm wide; **upper leaves** decurrent, diminishing in length to 1 cm among the heads; **inflorescence** 10 – 40 cm long, 3 – 6 cm broad, cylindrical, spikelike, with many elongate sessile heads, or pedicellate heads on short, branched peduncles; **heads** slender, 1.5 – 2.5 cm long; **tubular flowers**, white to lavender, three to five per head, 9 – 11 mm long; **involucral bracts** in several series, the outer green, punctate, pubescent, various lengths, the inner 10 – 18 mm long, 2 – 3 mm wide, green, punctate and pubescent below, with rose-magenta to white, serrulate, petaloid tips; **achenes** 4 – 6 mm long, cylindrical, pointed, ribbed, pubescent; **pappus** long-plumose, 9 – 11 mm long.

Florida Gayfeather—*Liatris garberi* A. Gray

Florida gayfeather, a slender, erect perennial 6 to 24 inches tall, occurs only in peninsular Florida. It is most common on open to moderately stocked pine stands or sandy flatwoods soils in the pine-wiregrass type. It is similar to other gayfeathers in its rose-purple spike of flowers but is unique in having fleshy roots rather than a bulblike base found in most other gayfeathers.

Cattle graze new growth in spring and early summer and deer eat the leaves. Like other gayfeathers, it is not abundant enough to be considered a valuable forage plant.

Range: Central and southern peninsular Florida.

Perennial. **Stems** erect, 20 – 50 cm tall, hirsute; **leaves** linear, at base of plant 10 – 30 cm long, abruptly reduced upward, those of upper stalk less than 1 cm

long, ascending; **inflorescence** a spicate raceme; **heads** 10 – 12 mm long, 8- to 10-flowered, **involucral** bracts broadly elliptic, ciliate, and mucronate; **corolla** rose purple, tube 6 – 8 mm long, glandular-punctate; **pappus** tan, bristles barbellate, as long as the corolla tube; **achene** 2 – 3 mm long, ribbed, pubescent.

Kansas Gayfeather—*Liatris pycnostachya* Michx.

This large gayfeather is found only in the western end of the southern pine belt, on the edge of its preferred prairie habitat. Plants may reach 5 feet in height, growing mainly on well-drained sandy soils in forest openings. A striking plant, it is planted as an ornamental in the northeastern states.

Plants are hairy throughout. Lower leaves, up to a foot long and ⅜ inch wide, generally droop. Leaf size gradually diminishes up the stem, the smaller upper leaves pointing stiffly skyward.

The dense, spikelike inflorescences are 6 inches to a foot long. Heads are about ⅜ inch long, with 5 to 12 flowers per head. Floral bracts are numerous; their tips, which curl away from the head, are purple tinged.

Cattle graze Kansas gayfeather sparingly. Deer eat spring and summer foliage.

Range: Texas and Louisiana to South Dakota and Indiana.

Perennial. **Stems** several, 60 – 120 cm tall, stiff, hirsute, from corm; **leaves** 10 – 30 cm long, alternate, 4 – 10 mm wide below, mostly ascending, much reduced above, pubescent, punctate; **inflorescence** 15 – 30 cm long, about 2 cm wide, cylindrical, spikelike; **heads** 5- to 12-flowered, about 1 cm long, cylindrical, sessile; **flowers** 10 – 11 mm long, rose magenta; **involucral** bracts in several series, green or purplish, pubescent, lanceolate-acuminate, the acute tips squarrose, reflexed or spreading; **achene** 4 – 6 mm long, ribbed, pubescent; **pappus** with barbellate bristles.

Spike Gayfeather—*Liatris spicata* (L.) Willd. var. *spicata*

This gayfeather is common on moist or marshy sites throughout most of the eastern United States. It extends into the mountains of West Virginia and Tennessee. As the name indicates, flowers are in a fairly dense spike terminating a stalk 2 to 6 feet tall. Stems of the largest plants may be ¼ inch in diameter.

As with other gayfeathers, the main value of this plant is in the beauty of its spike of lavender flowers. Early leaves and immature flower stalks may be grazed by livestock or deer, but after flowers form, plants are not eaten.

Although most gayfeathers are superficially similar, spike gayfeather can usually be distinguished by its large size and hairless stems and leaves. Rootstocks are round in young plants but develop into elongated taprootlike masses in older plants that can be separated for vegetative propagation. Basal leaves are long and narrow, and remnants form a fibrous tuft at the base of mature plants.

Typical spike gayfeather, with thick stems and dense spikes, is found in the northern portion of the range and around bays and lakes in the southern Appalachians; the more slender variety, *Liatris spicata* var. *resinosa* (Nutt.) Gaiser, with a loosely spicate inflorescence, is most common on Coastal Plains pinelands.

Range: East of the Mississippi River, from the Gulf of Mexico to Ontario and New York.

Perennial. **Stems** stiffly erect to 2 m tall, from a thick round or elongated rootstock, glabrous or rarely hirsute; **leaves** numerous, linear or linear-lanceolate, basal 10 – 40 cm long, 5 – 20 mm wide, gradually shorter up the stem; **inflorescence** a spike 30 – 70 cm long; **heads** subcylindrical, 4- to 18-flowered, 8 – 15 mm long and 5 – 10 mm thick when flowering, phyllaries appressed, mostly obtuse but sometimes slightly acuminate, with narrow scarious margins turning purplish at flowering; **achene** 4 – 7 mm long; **pappus** 5 – 7 mm long, barbellate, setose.

Rough Coneflower—*Rudbeckia grandiflora* var. *alismatifolia* (T. &. G.) Cronq.

Rough coneflower, or plantainleaf coneflower, as variety *alismatifolia* is also called, is a perennial with thick, fleshy rootstocks, common on well-drained Coastal Plains pinelands west of the Mississippi River. Mature plants are 16 inches to more than 3½ feet in height.

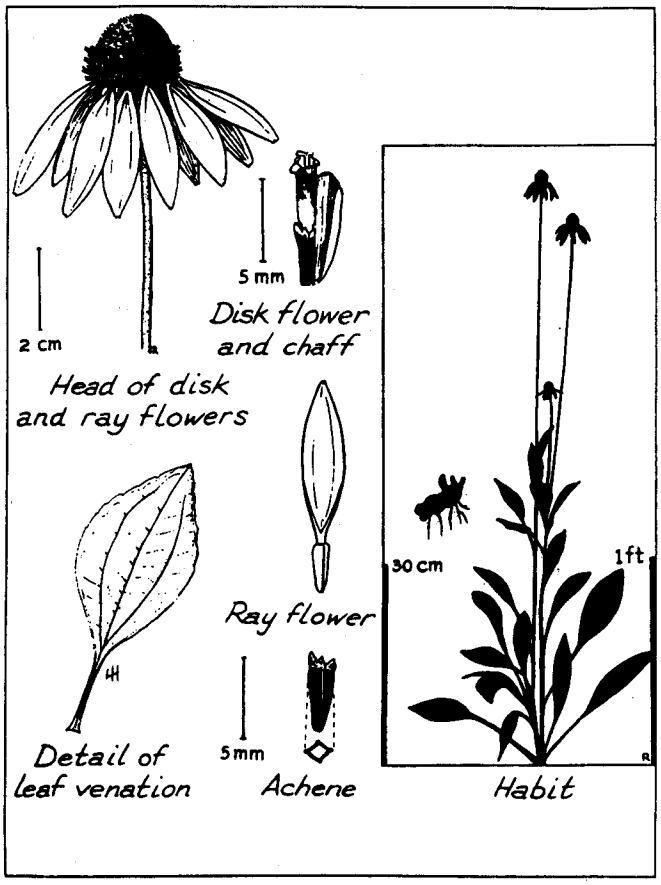
Foliage is useful in identifying the species before flowering. Basal leaves are paddle shaped, resembling leaves of water-plantain *(Alisma* spp.). In large specimens, petioles may reach 10 inches, with blades 5 inches long and 2 inches wide. Leaf size diminishes up the stem. Blade margins are sparingly toothed or wavy. Often the upper half of the plant is leafless.

The name "coneflower" refers to the prominent, cone-shaped central disk of brownish-purple flowers, averaging ¾ inch in diameter. Yellow ray flowers, 10 to 15 per head and an inch or more long, droop from the base of the cone. They fall when the head is mature, leaving the persistent cone and its subtending bracts.

Typical rough coneflower, *Rudbeckia grandiflora* (Sweet) DC. var. *grandiflora*, whose stems and foliage are hairier then those of var. *alismatifolia*, has a more nothern range, although the species is restricted to an area west of the Mississippi River from east Texas and Louisiana to Missouri. A small and highly variable coneflower, common southwide, is black-eyed-susan, *R. hirta* L. It is distinguishable from rough coneflower by its basal leaves, which are usually 2 to 3 inches long and lance shaped.

Pale echinacea, *Echinacea pallida* (Nutt.) Nutt., a close relative of the coneflowers, with pink to purple ray flowers, is common on sandy pinelands of Arkansas and western Louisiana.

Range: East Texas to central Arkansas and Louisiana.



Perennial. **Stems** 50 – 90 cm tall, from a woody rhizome, usually simple, slender, glabrous to slightly scabrous above; **basal leaves** long-petioled, the blade 5 – 12 cm long, 3- to 5-ribbed, scabrous, punctate; **upper leaves** similar, but smaller and sessile, alternate; **heads** 3 – 5 cm broad (rays reflexed), radiate, solitary on elongate, leafless peduncles; **involucral bracts** linear, reflexed, scabrous; **disks** 1.5 – 2 cm broad, dark brownish purple, subglobose; **disk flowers** on a conical, chaffy receptacle, 8 – 9 mm long, fertile, dull purple-black tipped, petals reflexed, stigmas bright yellow; **chaff** 4 – 5 mm long, enclosing the disk flower; **rays** 10 to 15, 3 – 4 cm long, neuter, yellow; **achene** about 5 mm long, 4-angled; **pappus** a crown of uneven, deltoid teeth.

Slender Rosinweed—*Silphium gracile* Gray

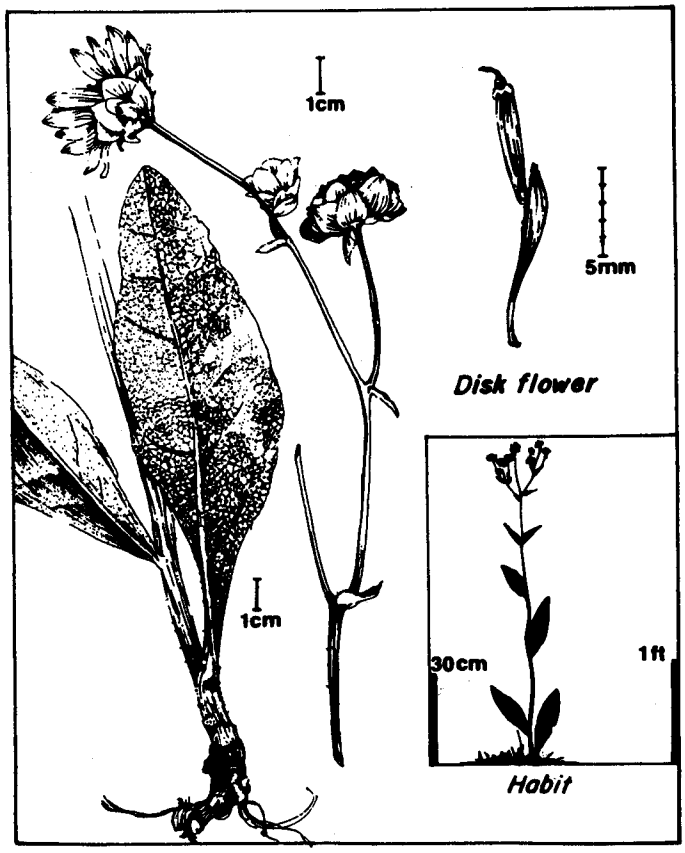
The rosinweeds, like the sunflowers, have yellow flower heads and rough leaves and stems. Most have several series of broad greenish bracts at the base of each flower head, making the heads denser than those of most sunflowers and other composites.

Slender rosinweed is found in sandy or gravelly soils of the Gulf Coastal Plain. Flowering plants are from less than 2 feet to over 4 feet tall. Flower heads are about 2 inches broad with ovate bracts. Stems and leaves are rough with bristly hairs. Bracts of the flower heads are hairless except for a fringe of short bristles around the outer margins. Basal and lowest stem leaves are elliptical or lance shaped with definite petioles; upper stem leaves are gradually reduced in length, ovate, and sessile. Lower stem leaves are often opposite and upper leaves are alternate, but leaf arrangement is apparently variable.

Immature flower stalks of slender rosinweed are eaten by cattle in the spring. Although fairly common on sandy pinelands, it is seldom abundant.

Other rosinweeds common through most of the South include compassplant, *Silphium laciniatum* L., which has deeply pinnately divided basal leaves; wholeleaf rosinweed, *S. integrifolium* Michx., with opposite, entire, stem leaves; and sand rosinweed, *S. asteriscus* L., which has alternate or opposite leaves. *Silphium compositum* ssp. *ovatifolium* (T. & G.) Sween. & T. R. Fisher is common on southeastern sandy pinelands and flatwoods. The large basal leaves have long petioles, are ovate in outline, and may be coarsely serrate or deeply cleft.

Range: Coastal Plain, Texas to Alabama.



Perennial. **Stems** 30 – 90 cm tall from a woody base, scabrous to spreading-pubescent; **leaves** near base petiolate, elliptic-lanceolate, 10 – 30 cm long, 5 – 10 cm wide, entire to remotely dentate-serrate or lacerate; **upper leaves** sessile, gradually reduced up the stem to remotely alternate bracts; **heads** at anthesis 3 – 5 cm wide, solitary and terminal at tip of stalk or at end of few inflorescence branches; **involucral bracts** ovate to orbicular-ovate, glabrous except for ciliate margins; **ray flowers** yellow, fertile, rays 1 – 3 cm long; **disk flowers** dark purple or brown, sterile; **achenes** about 1 cm long, orbicular-oval, broadly winged with notch at apex, glabrous.

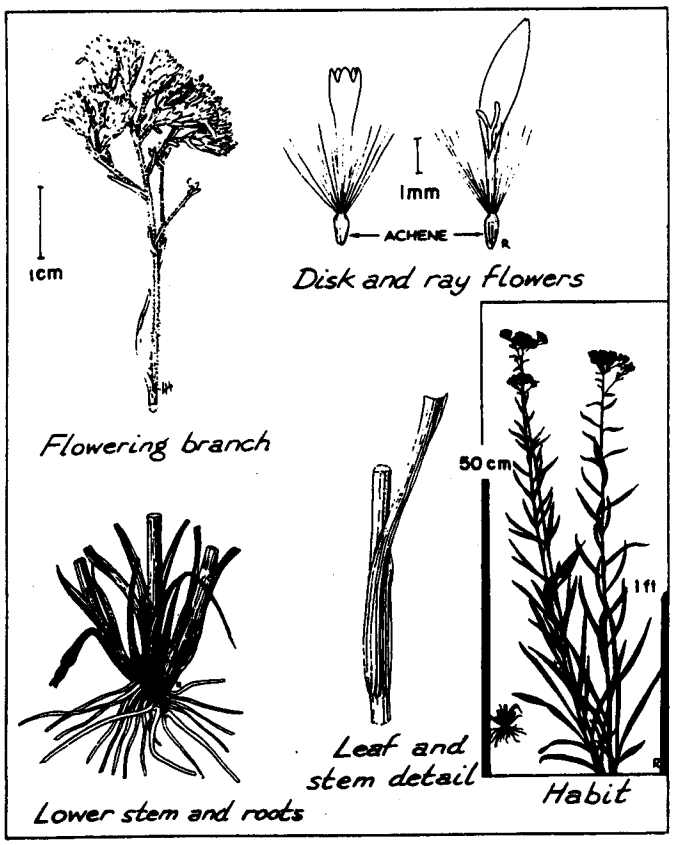
Shiny Goldenrod—*Solidago nitida* T. & G.

Shiny goldenrod inhabits dry upland sites, both open and timbered. Stems arise from rootstocks to a height of 2 to 2½ feet. The inflorescence, though yellow flowered and late blooming, is flat-topped rather than conical, making mature plants easy to distinguish from those of most other goldenrods. The alternate leaves are similar in texture and venation to those of fragrant goldenrod but much larger. Lower leaves are 4 to 5 inches long, and occasionally up to 12 inches long. The leaves decrease in size going up the stem, with those subtending the inflorescence only 1 to 2 inches long. Blades are narrowly lance shaped and entire, except for sparse, obscure teeth on the lower leaves. Width ranges from about ⅜ inch in the lower leaves to 1/16 inch in the uppermost. Thin, almost imperceptible hairs coat the upper stem and inflorescence branches; otherwise, plants are hairless.

Flower heads, about ¼ inch long, are much larger than those of most goldenrods. Each flower produces an achene about 1/16 inch long.

Slimhead goldenrod, *Euthamia leptocephala* (T. & G.) Greene *(Solidago leptocephala* T. & G.), is a similar plant found on a variety of sites throughout the Southeast. Like shiny goldenrod, it is practically hairless, with a flat-topped inflorescence and lustrous leaves. Lower leaves are only about half as long as those of shiny goldenrod, and length reduction in upper leaves is less pronounced.

Range: Texas, Oklahoma, and Louisiana.



Perennial. **Stems** 40 – 90 cm tall, smooth and glabrous below inflorescence, striate-ribbed; **leaves** numerous, alternate, entire, or obscurely serrate, coriaceous, glabrous and somewhat lustrous, linear or narrowly linear-elliptic, lower leaves 7 – 30 cm long and 5 – 10 mm wide, gradually reduced going up the stem to 3 – 5 cm long below inflorescences, 1 – 2 cm long in inflorescence branches; **inflorescence** corymbose with finely pubescent branches; **heads** 6 – 8 mm long, narrowly campanulate, 7- to 12-flowered, bracts obtuse, scarious-margined, yellowish; **ray flowers** three to four per head, pistillate, yellow; **disk flowers** perfect, yellowish; **achene** glabrous, 10-ribbed, about 1.5 mm long.

Fragrant Goldenrod—*Solidago odora* Ait.

Fragrant goldenrod is the most common goldenrod on southern pine range. It is named for the spicy, aniselike fragrance of the crushed leaves. This character is not dependable, however, as some plants emit little or no odor.

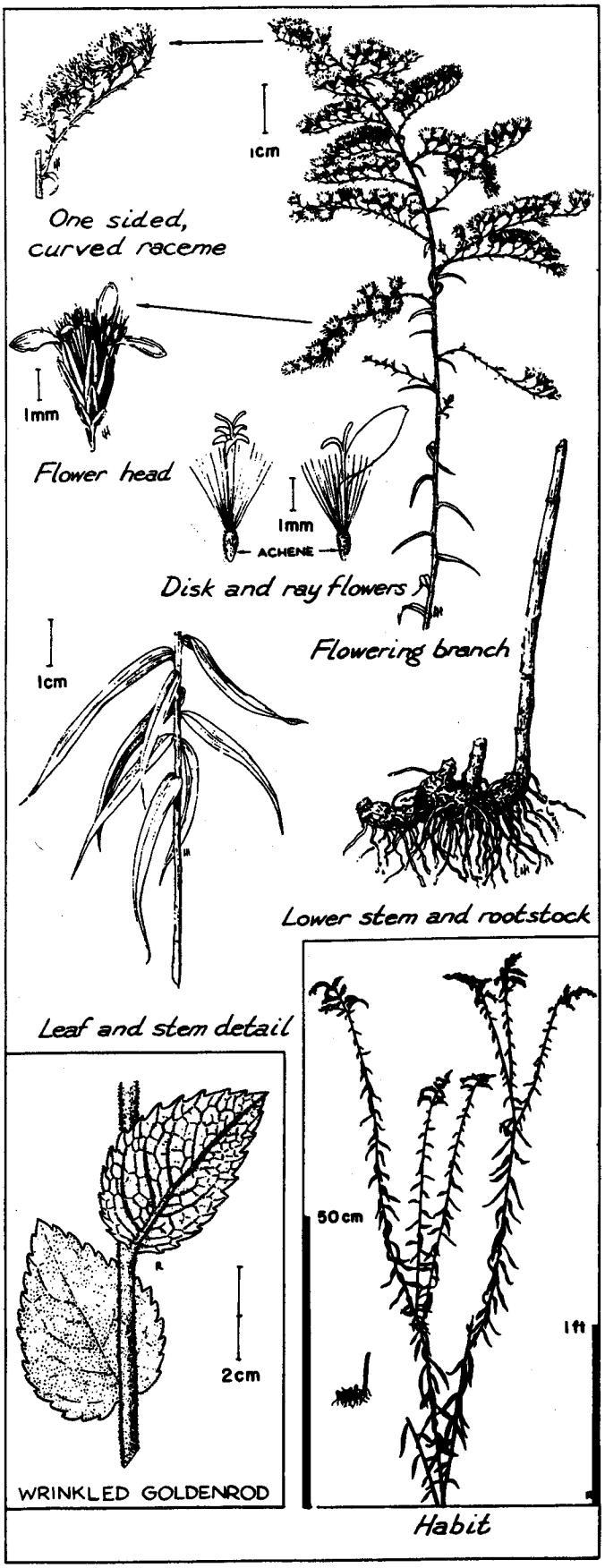
Fragrant goldenrod grows mainly on dry sandy sites, especially in cutover timberlands, pastures, and abandoned fields. Where competition is light, plants may reach a height of 5 feet. In dense grass, height rarely exceeds 2 feet. Stems, arising from thick rootstocks, are hairless and usually reddish brown. The hairless, lance-shaped leaves are up to 4 inches long and ½ inch wide. They generally point downward, and those of the upper stem are greatly reduced. Heads of the golden-yellow flowers are less than ¼ inch long and about 1/16 inch wide.

Although cattle occasionally graze young growth, fragrant goldenrod is not a valuable forage plant. Deer eat the immature inflorescences as well as the young shoots. Goldenrods are best known for the suffering they cause in the fall among persons prone to hay fever.

Tall goldenrod, *Solidago altissima* L. (*S. canadensis* var. *scabra* (Muhl.) T. & G.) is a common roadside weed throughout the Gulf Coastal Plain. Also common throughout the South is wrinkled goldenrod, *S. rugosa* Miller. Its inflorescence is very similar to that of fragrant goldenrod, but its leaves are ovate and have prominent veins that lend a wrinkled appearance to the blades. Rough goldenrod, *S. radula* Nutt., occurs on prairies, open rocky plains, and dry woods, especially in calcareous soils, from central and east Texas to Illinois and occasionally in Louisiana. Leaves are obovate to elliptic-obovate, 1½ to 2 inches long at midstem, and stems and leaves are rough with microscopic barbs. The inflorescence is similar to that of fragrant goldenrod. It is reported to be good deer forage.

Range: Eastern Texas and eastern Oklahoma to Florida, extending north to southern Ohio, Vermont, and New Hampshire.

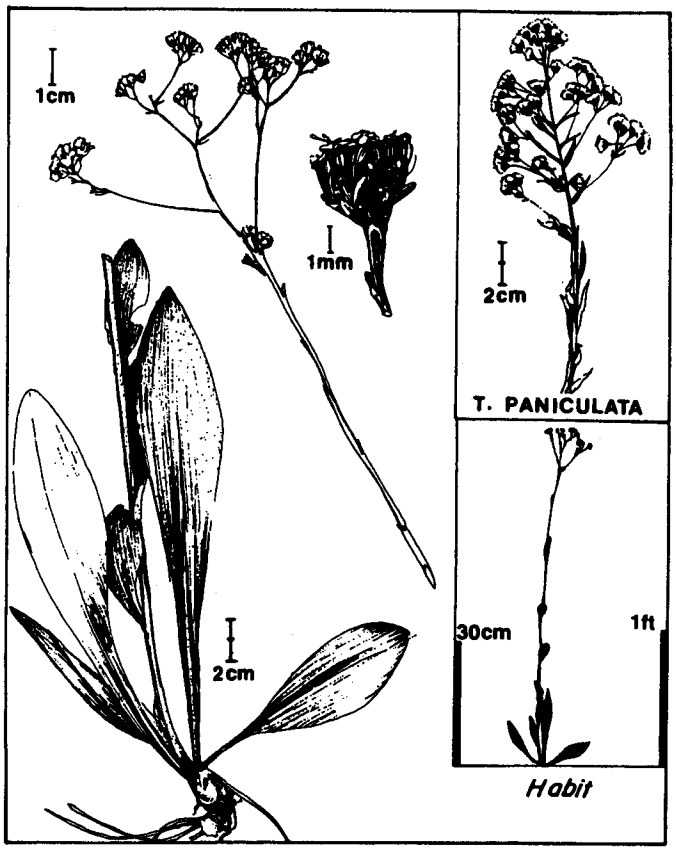
Perennial. **Stems** 50 – 150 cm tall, glabrous or pilose in lines; **leaves** simple, alternate, entire or sparsely serrate, glabrous except for ciliolate or scabrous margins, linear-lanceolate, reticulate-veined, 4 – 16 cm long, 5 – 15 mm wide, gradually reduced up the stem; **inflorescence** variable, but usually a conical panicle of numerous racemes; **racemes** bracteolate; **heads** secund along upper side of raceme, 6- to 8-flowered, 4.0 – 4.5 mm long, **bracts** greenish yellow, 2.3 mm long; **flowers** with both tubular and ligulate corollas, rays yellow, conspicuous; **achene** setose.



Vanilla Trilisa—*Trilisa odoratissima* (Walt. ex J. F. Gmel.) Cass—*(Carphephorus odoratissimus* (Walt. ex J. F. Gmel.) Hebert)

This plant, perhaps better known as deers-tongue, is an erect, stout perennial growing 2 to 5 feet tall on low open pine forests east of the Mississippi River. Its stems and leaves are hairless and its purple flowers are in a flat-topped terminal cluster. Although the leaves have the scent of vanilla, the plant is not the source of true vanilla. The leaves contain coumarin which is used as a flavoring agent in tobacco and various medicinal compounds. Vanilla trilisa is nutritious and palatable to livestock during spring and early summer. In south Georgia grazing trials, it was relatively high in protein and phosphorus content during the spring and higher in calcium than any of the grasses. Hairy trilisa, *Trilisa paniculata* (Walt. ex J. F. Gmel.) Cass., occurs throughout the range of vanilla trilisa, but has a more compact purple-flowered inflorescence and is hairy throughout. The trilisas are most abundant on the sandy pine flatwoods sites of Florida and Georgia, but are not abundant enough to contribute more than a minor part of the cattle diet.

Range: Southeastern Louisiana to Florida and North Carolina.



Perennial. **Stems** 80 – 200 cm tall, glabrous; **basal leaves** elliptic to oblanceolate, 1.0 – 3.5 dm long, 2 – 7 cm wide, obtuse, crenate to entire, base attenuate; **stem leaves** alternate, usually fewer than 30, ovate to elliptic, half clasping; **heads** in corymbs, the lateral branches usually overtopping the terminal; **corollas** rose purple, 4 – 5 mm long; **pappus** tawny to purplish, 3 – 4 mm long; **achene** about 2 mm long, 10-ribbed, dark brown or black.

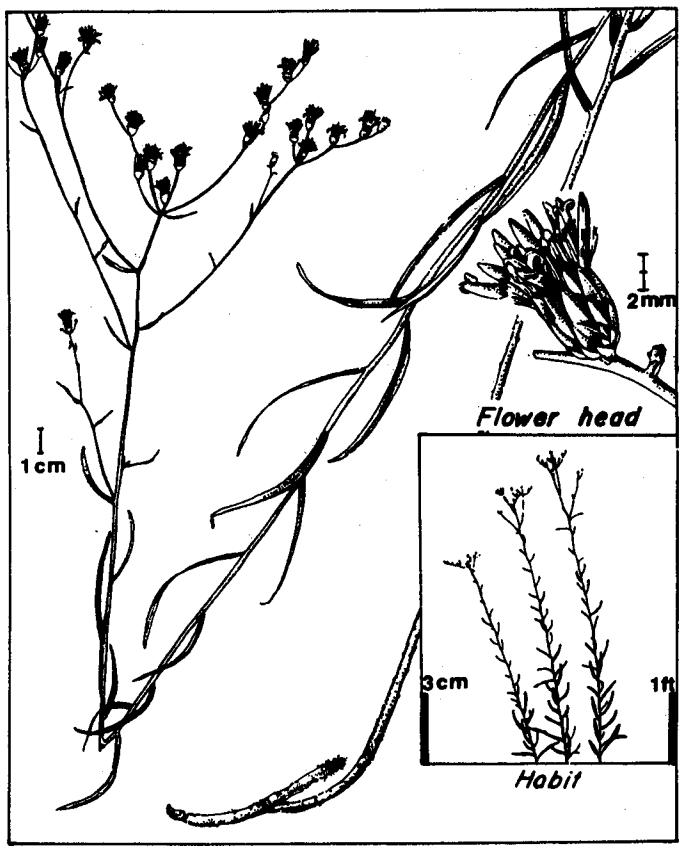
Texas Ironweed—*Vernonia texana* (Gray) Small

Several ironweeds occur across the southern states. The most common are robust showy weeds with purple flowers growing in roadside ditches and other disturbed moist habitats. Texas ironweed is not usually robust and is apparently the only narrow-leaved ironweed on well-drained southern pine sites west of the Mississippi River. Early leaves resemble those of swamp sunflower, with which it is often confused. Stems of ironweed are glabrous; those of swamp sunflower are hairy. Also, ironweed flowers by midsummer; swamp sunflower does not bloom until fall. While the larger, weedy ironweeds are undersirable as livestock forage, Texas ironweed may be grazed occasionally by cattle and deer in the spring. However, the plant seldom occurs in abundance.

Pinebarrens ironweed, *Vernonia angustifolia* Michx., occurs on sandy well-drained pine sites from southeast Mississippi to North Carolina. Three varieties of pinebarrens ironweed are recognized, based mainly on the shape of the floral bract tips. Both Texas and pinebarrens ironweeds hybridize with several other species of *Vernonia*.

Range: Texas and Oklahoma to southwest Mississippi and southwest Arkansas.

Perennial. **Stems** erect, 40 – 100 cm tall, glabrate to puberulent; **leaves** cauline, scattered, linear to linear-lanceolate, 6 – 13 cm long, 0.2 – 1.4 cm broad, acute, remotely serrate (sometimes prominently toothed), attenuate to a short petiole, scabrous above, scabrous to puberulent beneath, margins revolute; **inflorescence** loose and open; **heads** 15- to 25-flowered, involucre broadly campanulate, 4 – 6 mm high, 5 – 7 mm wide; **phyllaries** imbricate, greenish purple, ciliate, tips acute to short-acuminate; **pappus** brownish to straw colored, often tinged with purple; **corollas** 9 – 11 mm long; **achenes** 1.5 – 3.0 mm long.



Miscellaneous Forbs

Although the most abundant and important forbs on southern forest range are in the composite and legume families, many other families are represented. These miscellaneous forbs vary in size, form, appearance, and habitat. They range from insectivorous sundews, *Drosera* spp., scarcely larger than a dime, to the robust pokeweed, with specimens occasionally attaining 10 feet. Some—such as butterfly milkweed—have brilliantly colored flowers, while many are drab and inconspicuous. Numerous species inhabit only open land; others tolerate heavy shade.

Few are important as forage for cattle; the majority rarely grow in quantity. Many contribute to a diversity of food plants for deer and other wildlife, especially birds. All are fire tolerant and most of those that compete successfully on undisturbed native range are perennials. Descriptions of several of the most common follow. Southern bracken, though not a flowering plant, is included in this group.

Slender Copperleaf—*Acalypha gracilens* Gray

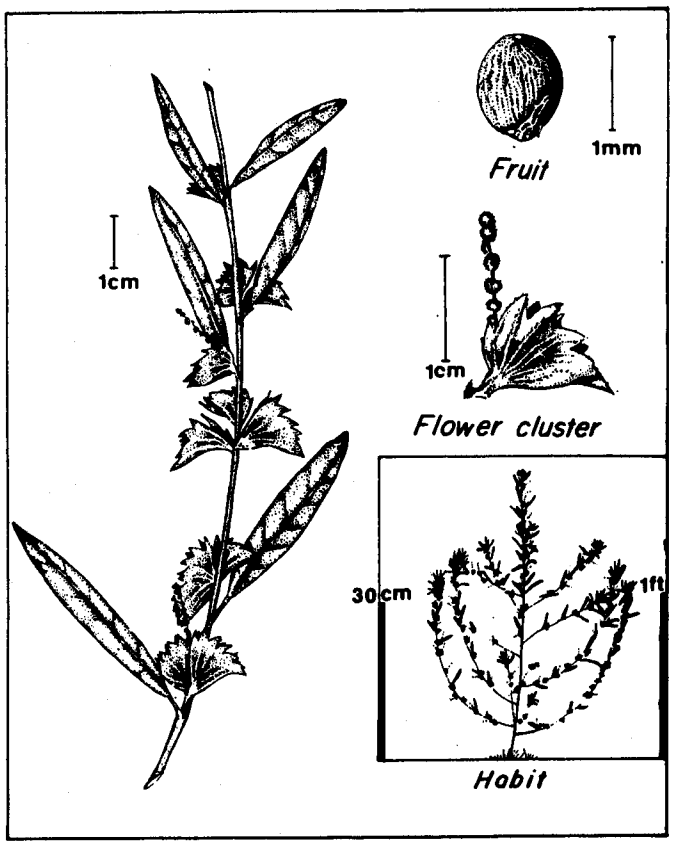
The copperleafs, also known as three-seeded mercuries, are annuals of the spurge family (Euphorbiaceae). Slender copperleaf occurs throughout most of the eastern United States. Like most annuals, it attains greater abundance and larger plant size on sites with little or no competition from perennial plants. Plants on undisturbed sites may have simple stems no more than 6 inches tall, while on firelines, roadsides, and other relatively bare sites, plant height may reach 2 feet, and stems may have many lateral branches.

A distinguishing characteristic of slender copperleaf, and copperleafs generally, is the peculiar leaf-like pistillate flower bracts in the axil of almost every leaf on the plant. Separate male and female flowers are produced, with the female flowers at the base of a spike of male flowers. The coarsely toothed bract conceals the female flowers and the three-seeded fruit it produces. Male flower spikes protrude from the bract and may be as long as half the length of the subtended leaf. Largest leaves are about 1½ inches long and less than ¼ inch wide, with petioles less than one-fourth the length of the blades.

Under average range conditions, slender copperleaf produces little herbage and is not considered valuable as livestock forage, although it is a high-use deer food plant. Seeds are eaten by doves, quail, and other birds, but it is not considered an important wildlife food plant except on disturbed areas where slender copperleaf plants are abundant and well developed.

Other southern copperleafs include Virginia copperleaf, *Acalypha virginica* L., a common agricultural weed that looks like slender copperleaf but has petioles one-fourth to one-half the length of the leaf blades, and hophornbean copperleaf, *A. ostryifolia* Riddell, which has staminate flowers in leaf axils and pistillate flowers in terminal spikes. Both may reach 1½ feet in height and have finely toothed leaf margins.

Range: Texas to Florida, extending north to Wisconsin, Indiana, and New Hampshire.



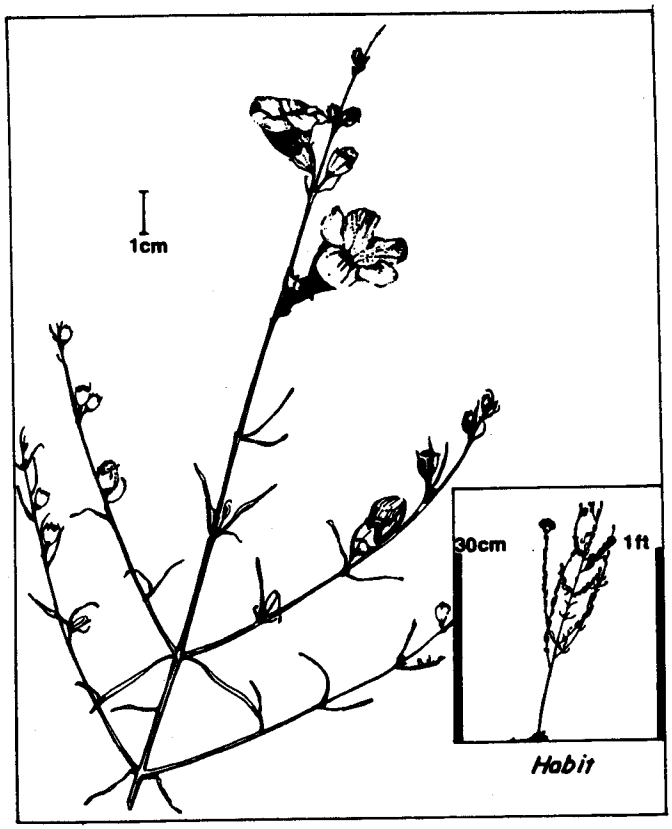
Annual. **Stems** to 80 cm tall, simple or branched, with short ascending-appressed pubescence; **leaves** elliptic to elliptic-lanceolate, 2 – 6 cm long, 0.5 – 2.0 cm wide, petioles of principal leaves 0.4 – 1.5 cm long; **flowers** in axillary spikes with one to five pistillate flowers near the base, and staminate flowers above; **pistillate bracts** with 5 to 13 triangular teeth; **capsule** about 2 mm in diameter, 3-seeded, pubescent; **seeds** reddish to black, ovoid, 1.2 – 1.8 mm long.

Purple Gerardia—*Agalinis purpurea* (L.) Pennell—*(Gerardia purpurea* L.)

The large pink to rose-purple flowers of purple gerardia add color variation to the dominant yellows of the fall-blooming sunflowers on open sandy pinelands. The showy flowers alone make the gerardias noteworthy on southern pine ranges. Several species of *Agalinis* occur throughout the South, but none exceed purple gerardia in general abundance. The gerardias, along with many other plants of the figwort family (Scrophulariaceae), are parasitic on the roots of various plants.

With the exception of perennial gerardia, *A. tenuifolia* (Vahl.) Raf., which has slender rhizomes, all gerardias are slender annuals with narrow, opposite leaves. Seed are minute and not important as wildlife food; forage value for deer and livestock is poor.

Range: Texas to Florida, extending north to Nebraska, Minnesota, and southern New England.



Annual. **Stems** puberulent or scabridulous, striate-angled, 40 – 120 cm tall, profusely branched from upper one-half to two-thirds, the branches spreading; **leaves** opposite, linear to narrowly linear-lanceolate, 1 – 4 cm long, 0.5 – 2.0 mm wide, hispidulous above; **flowers** in axils of upper leaves, forming indistinct racemes; **pedicels** 1 – 4 mm long, usually shorter than the calyx tube; **calyx** tube 3 – 4 mm long, truncate or nearly so, the lobes reduced to minute subulate teeth 0.3 – 2.0 mm long; **corolla** 1.8 – 3.8 cm long, puberulent, the throat lined with yellow, spotted with purple, lanose at the base of the two upper corolla lobes; **capsule** subglobose, 4 – 6 mm in diameter.

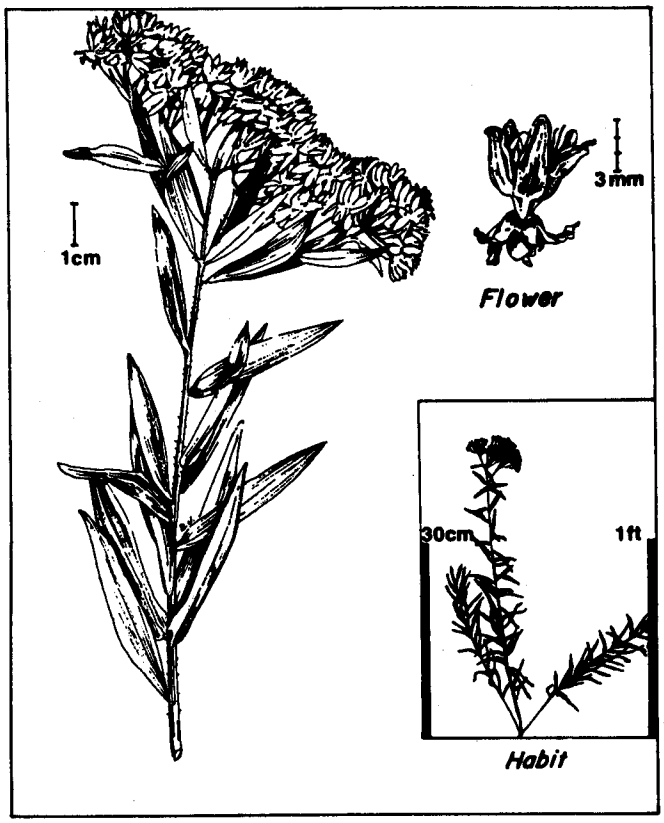
Butterfly Milkweed—*Asclepias tuberosa* L.

The bright orange flowers of this milkweed seem out of place on the dry sandy sites it inhabits. The color is not common among native plants, and butterfly milkweed is often transplanted to home flower gardens. Flower color varies from red to yellow, leaves are alternately arranged, and the plant does not contain the milky sap generally common to milkweeds. Leaves are numerous, from 1½ to 4 inches long and ⅛ to 1 inch wide, and stems and leaves are coated with white hair.

Red milkweed, *Asclepias lanceolata* Walt., may have flowers of similar color, but it grows on wet sites. About a dozen milkweeds have southwide distribution, but none are generally abundant. Other common milkweeds include: sandhill milkweed, *A. humistrata* Walt., on sandhills and in dry woods; spider milkweed, *A. viridis* Walt., and green milkweed, *A. obovata* Ell., with greenish flowers on dry sites; white milkweed, *A. variegata* L., with white flowers; and broadleaf milkweed, *A. latifolia* (Torr.) Raf., which occurs in open upland woods.

Like other milkweeds, butterfly milkweed is poisonous to livestock, although it is seldom abundant enough to be considered a hazard. The plant has been used in Appalachia to treat rheumatism and as an emetic. Colloquial names include "swallow-wort," "pleurisy-root," and "chigger-weed."

Range: Arizona to Texas and Florida, extending north to Colorado, Nebraska, and Minnesota.



Perennial. Stems 20 – 80 cm tall, stout, usually solitary from a thick root crown, branching from the upper nodes, hirsute to hispid, sap not milky; **leaves** numerous, alternate, linear to elliptic, obovate, oblanceolate, or hastate, 4 – 10 cm long, 3 – 25 mm wide, pilose or hispid, especially beneath; **inflorescence** consisting of terminal and axillary hemispherical umbels 2 – 5 cm broad; **corolla** red to yellow, the lobes reflexed, 6.5 – 8.0 mm long; **corona** 4 – 6 mm in diameter, lateral hood margins not toothed, horns shorter than hoods; **follicles** erect, 8 – 15 cm long, 1.0 – 1.5 cm broad.

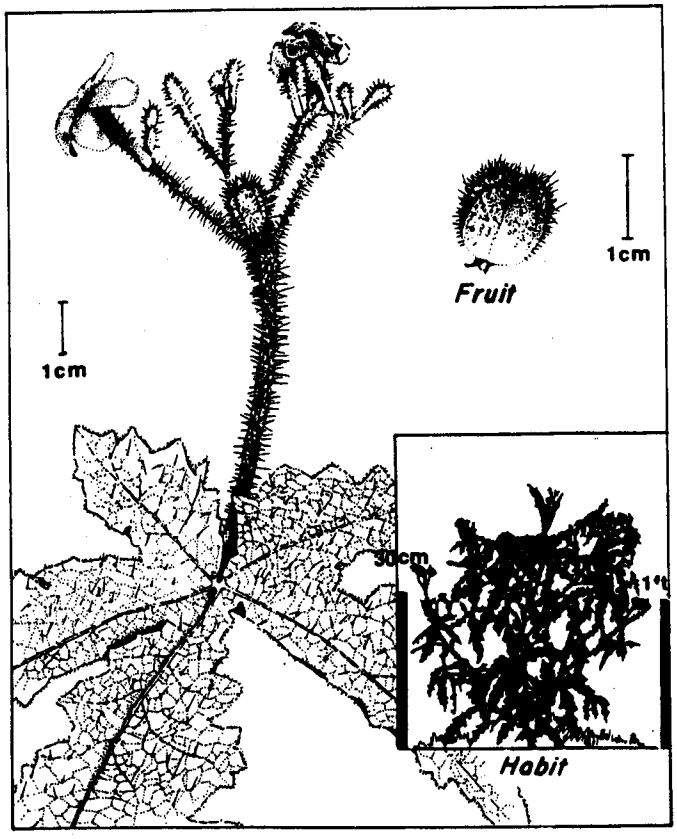
Bullnettle—*Cnidoscolus stimulosus* (Michx.) Engelm. & Gray

One encounter with this viciously stinging plant should provide an indelible mental picture of bullnettle for future recognition. It is found on most deep sandy soils throughout the South, often growing with other members of the spurge family (Euphorbiaceae) such as queensdelight and flowering spurge. Plant height is often less than 1 foot in undisturbed pine understories but may reach 3 feet or more on firelines or other disturbed sites.

Leaves are palmately three- to five-lobed on petioles about as long as the blades. The entire plant is covered with stinging hairs. Flowers are produced in branched clusters at the apex of the main stem and branch tips. Separate male and female flowers are produced in every cluster with each female flower producing a three-seeded capsule. Seeds are about ⅜ inch long and are eaten by bobwhite quail and other birds.

Bullnettle, known as "treadsoftly" or "risky bullnettle" is found east of the Mississippi River. West of the Mississippi River, plants are referred to as Texas bullnettle, *Cnidoscolus texanus* (Muell. Arg.) Small. Texas bullnettle is a coarser, more virulent plant with larger flowers and seeds than the eastern species. Its range extends from Texas into Oklahoma, southwest Arkansas, and central Louisiana. The ranges of the two species are separated by the Mississippi River and a gap of approximately 150 miles in Louisiana.

Range: Southeast Louisiana to Florida and Virginia.



Perennial. **Stems** much-branched, 40 – 100 cm tall, about as wide as tall, hispid with pale aciculate stinging hairs; **leaves** alternate, blades suborbicular in outline, 6 – 15 cm broad, palmately deeply 3- to 5-lobed, hispid with stinging hairs; **petioles** about equal to their blades, hispid; **stipules** inconspicuous, 3 – 4 mm long, deeply 3- to 4-toothed; **inflorescences** terminal, cymose, pedunculate, determinate, the central flower usually pistillate, the lateral staminate; **staminate flowers** with 9 to 10 stamens; **pistillate flowers** with single lobed stigmas; **calyx** of both type flowers 5-lobed, white, tube 1 cm or less long; **corolla** absent; **capsules** 3-locular, oblong, 15 – 20 mm long, hispid; **seeds** three, oblong, 9 mm or less in length, brown.

Woolly Croton—*Croton capitatus* Michx. var. *capitatus*

Woolly croton, an annual of the spurge family, is commonly found on sandy soils throughout the South. It grows sparingly on grazed range unless the range is severely overgrazed. Plants are often abundant along roads and other disturbed sites.

Stems average 2 to 3 feet tall but occasionally exceed 6 feet. The upper one-half to one-third is branched, the branches ascending at 45° or less. Young plants are thickly coated throughout with short brownish or dirty-gray hairs. Toward maturity, the lower stems shed this coating. Hairs divide at the tip into 8 to 10 radiating branches. This starlike (stellate) construction can be seen with low magnification.

Upper leaves are lance shaped with rounded bases. They are 1 to 3 inches long and blades are ¼ to ¾ inch wide. Petioles are one-fourth to one-half the length of the blades. Lower leaves are frequently longer and more oval than the upper.

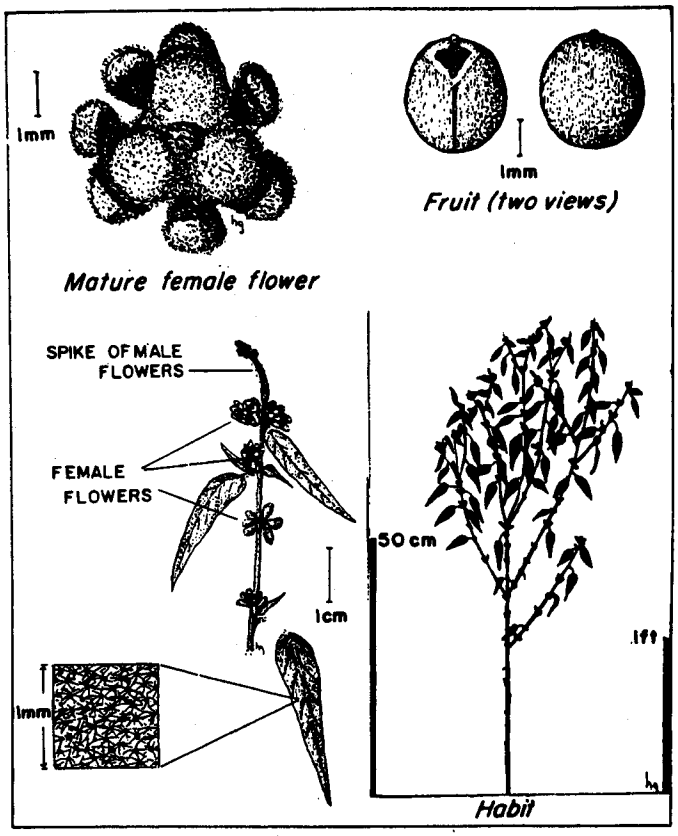
The camouflaging effect of the woolly coating renders flowers and fruits inconspicuous. Flower clusters are terminal or in axils of upper leaves. Each cluster has a spike of male flowers subtended by several female flowers. At least one female flower in each cluster matures into a three-seeded capsule about ¼ inch in diameter. At maturity, the capsule splits suddenly, ejecting seeds with much force. Seeds are about 3/16 inch long, oval, and slightly flattened.

A variety of woolly croton, *Croton capitatus* var. *lindheimeri* (Englem. & Gray) Muell. Arg., is also common southwide. It is distinguishable by its broader leaves with heart-shaped bases and petioles which may be from one-half to as long as the blades. The hair coating is reddish brown—much brighter than that of typical woolly croton.

Woolly croton is toxic to livestock; other species are probably poisonous also. The poisonous substance is croton oil, a violent cathartic. Because cattle usually reject woolly croton, even when better foods are scarce, poisoning is rare. The seeds are a choice food for doves and quail.

Other species with wide distribution are one-seed croton, *C. monanthogynus* Michx., northern croton, *C. glandulosus* var. *septentrionalis* Muell. Arg., and silver croton, *C. argyranthemus* Michx. One-seed croton grows on calcareous soils and develops only one seed per capsule. Northern croton is the only croton with toothed leaves. Silver croton is a perennial with silvery scales on the leaves and other plant parts and is common on loose sandy soils of the lower Gulf Coastal Plain.

Range: Texas to Georgia, extending north to Iowa and New York.



Annual. Stems erect to 150 cm tall, branched, thickly coated with short brownish, stellate pubescence; leaves 2.5 – 7.5 cm long, 5 – 20 mm wide, petiole 5 – 25 mm long, simple, alternate, entire, lanceolate, tapering to sharp point, base rounded; flowers in compact terminal and axillary clusters; staminate flowers in a spike above pistillate cluster, pedicellate with five sepals, five petals, 7 – 12 stamens; pistillate flowers sessile, apetalous, with six to eight sepals, ovary 3-celled, each cell with a style; fruit a globular dehiscent capsule, about 5 mm long and 7 mm wide; seeds three per capsule, oval in outline, somewhat flattened.

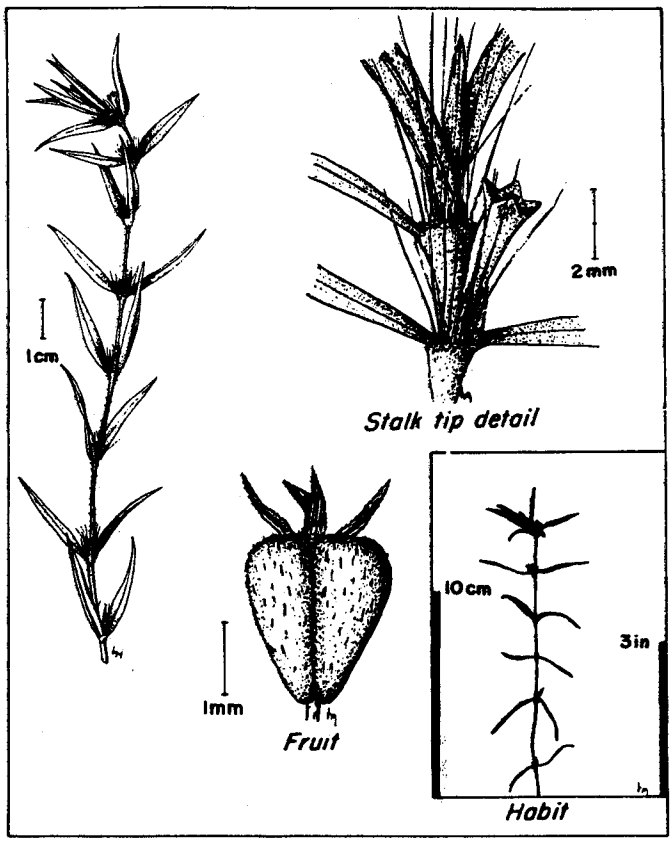
Rough Buttonweed—*Diodia teres* Walt.

Better known as poor-joe, this slender annual is usually present but inconspicuous on sandy pine-bluestem range. In competition with better range plants, poor-joe usually grows as scattered single stems about 4 inches tall. On old fields, firelines, overgrazed range, and other disturbed sites, plants branch profusely, often forming dense, low-growing colonies up to 4 feet in diameter. The opposite leaves are narrowly lanceolate, about 1 inch long and 3/16 inch wide, sometimes folded and appearing linear. Small, tubular, white or pinkish flowers are borne singly in leaf axils. Bristles arising from the stipules between the opposite leaves provide a distinguishing characteristic. The clusters of bristles persist after fruit and leaves fall.

On freshly burned range, cattle eat young plants along with grass herbage. As plants mature, palatability declines rapidly. Deer eat the foliage, and turkey, quail, and other birds eat the seeds.

Several varieties of rough buttonweed are recognized in the Southeast, based on length of stipular and leaf-tip bristles and nature of stem pubescence. Virginia buttonweed, *Diodia virginiana* L., is a spreading perennial common on poorly drained sites. Cattle eat it readily, and its prostrate habit enables plants to stand heavy grazing. A fleshy taproot allows survival during drought. Although its flowers and fruits resemble those of rough buttonweed, its leaves are elliptical with width about one-third the length.

Range: Texas to Florida, extending north to Kansas, Michigan, and Connecticut.



Annual. **Stems** to 30 cm tall, pubescent, simple or branched, erect to spreading; **leaves** simple, opposite, entire, linear or linear-lanceolate, 1 – 4 cm long, 2 – 3 mm wide, scabrous; **stipules** membranous, with marginal bristles longer than fruit; **flowers** solitary in upper leaf axils, 4-merous; **corolla** white to pink, gamopetalous, 4 – 5 mm long, **calyx** about 2 mm long, sepals acute; **fruit** a 2- or rarely 3-locular capsule 4 – 5 mm long, individual carpels hard and indehiscent.

Button-Snakeroot—*Eryngium yuccifolium* Michx.

Button-snakeroot is a member of the parsley family (Umbelliferae) which includes carrots, celery, and parsnips as well as the deadly water-hemlock, *Cicuta maculata* L., and poison-hemlock, *Conium maculatum* L. It is a deep-rooted perennial, found in open woodlands on a wide range of sites, spreading by short rootstocks. Stems reach 3 feet in height.

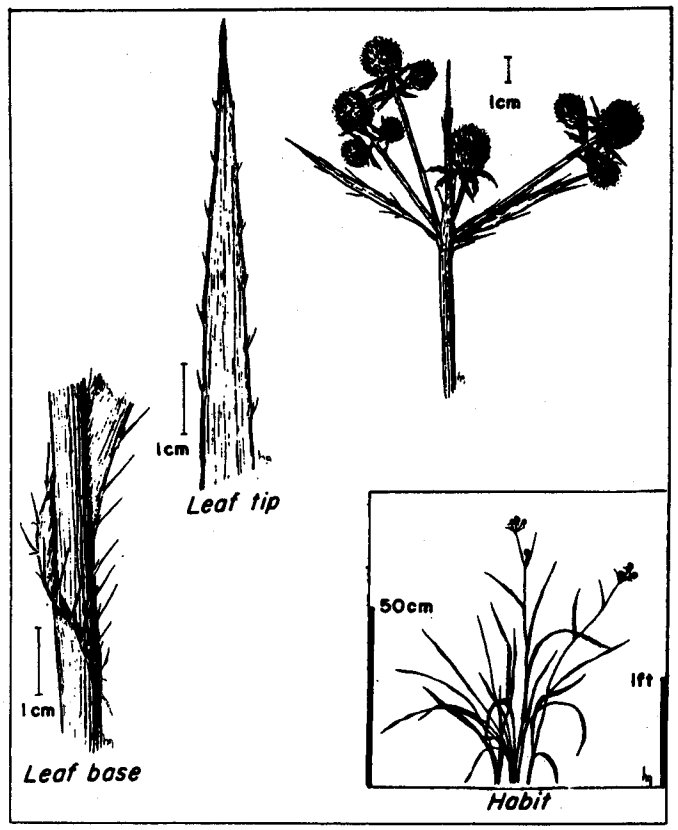
Unlike most members of the parsley family, button-snakeroot has neither divided leaves nor a flat-topped inflorescence. The parallel-veined leaves resemble those of yucca, and the prickly flower heads appear thistlelike. Basal leaves may reach 18 inches in length, but upper leaves are shorter. Blades, ½ to 1½ inches wide at the base, taper gradually to a sharp point. On early leaves, bristles may exceed an inch in length, but on later (upper) leaves, they average less than ½ inch.

The inflorescence consists of round, many-flowered heads, from ½ to more than 1 inch in diameter. Each head terminates a stout branch of the sparsely branched inflorescence. Individual flowers have five inconspicuous white, or sometimes bluish, petals. Because of sharp scales and harsh, persistent styles, the heads appear and feel bristly. Dry inflorescences and leaves persist through the winter.

Cattle graze the leaves before flower stalks emerge, but palatability declines sharply toward maturity. Although this species decreases under heavy use, it rates only fair in forage value.

Although several other *Eryngium* species grow in the South, none has the long, bristled, parallel-veined leaves of button-snakeroot. Simpleleaf eryngo, *E. integrifolium* Walt., is a wet-site species with short, narrow, toothed leaves and blue flowers. Another common blue-flowered species, creeping eryngo, *E. prostratum* Nutt. ex DC., is a low plant of moist sites, with toothed, ovate leaves on petioles about as long as the blades.

Range: Texas to Florida, extending north to Kansas, Minnesota, and New Jersey.



Perennial. **Stems** 30 – 100 cm tall, stiffly erect and solitary from woody root crown, glabrous; **leaves** linear, parallel-veined, stiff, with one to three linear spines at regularly spaced intervals along each margin; **basal blades** 15 – 90 cm long, 1 – 3 cm broad, upper blades reduced; **inflorescence** a terminal cyme with one to several flower branches in axils of upper leaves, each branch terminated by a long-peduncled ovate head, usually with two smaller heads below, their peduncles opposite and subtended by leaflike bracts; **heads** many-flowered, each flower above a stiff, sharp bract, terminal head 1 – 3 cm long, 1 – 2 cm wide, subtended by whorl of linear-lanceolate bracts; **flowers** 5-merous, sepals acute, stiff, persistent, shorter than floral bract, petals deciduous, styles two, persistent on fruit, exceeding all other floral parts and bract; **fruit** an oblong cremocarp, 2 – 3 mm long.

Flowering Spurge—*Euphorbia corollata* L.

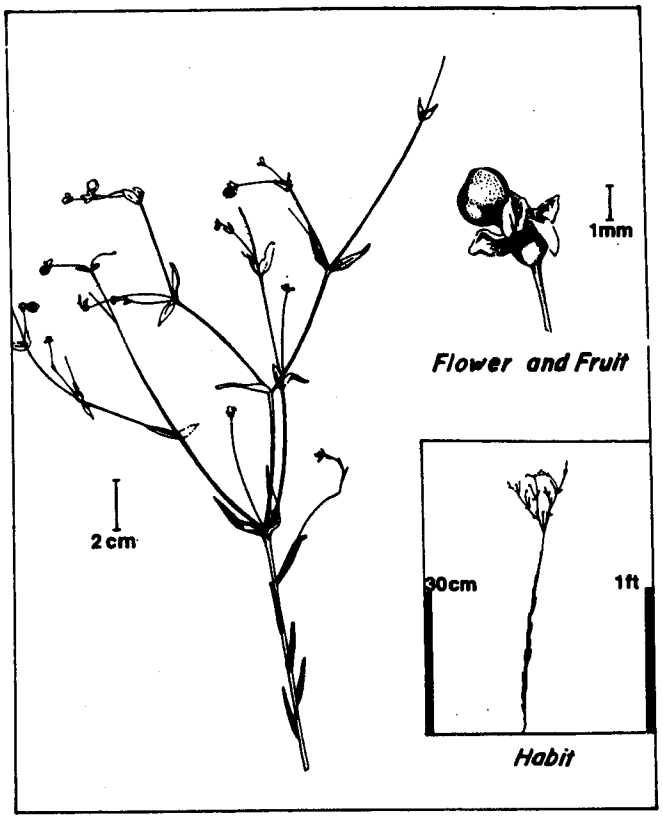
This slender, somewhat showy plant is one of the most common members of the spurge family in the southeastern United States. Like many spurges, it occurs most commonly on dry sandy soils but may be found on any upland pine site. Flowering spurge is a variable species representing a very variable group within the Euphorbiaceae. Some populations may be hairless, others extremely hairy.

Flowers are produced throughout the growing season. The four or five white "petals" that give the plant its showy appearance are actually the bracts of a cup (cyathium) in which the separate male and female flowers are borne. No true sepals or petals are produced. The male flower consists of a single stamen and there are 10 to 15 in each cyathium; the female flower is a single pistil which produces a three-seeded capsule; seeds are ⅛ to 1/16 inch long.

Most species of *Euphorbia* are poisonous, and flowering spurge has a history of livestock poisoning. Animals do not seek out the green plants, which have milky juice, but will take young plants along with other green forage. Toxicity is not destroyed by drying, and hay containing flowering spurge is palatable to livestock. Seeds are eaten by doves, turkey, quail, and other birds. The plant is rated a high-use plant for white-tailed deer.

Several closely related spurges have petal-like bracts surrounding the flowers but bracts are smaller and may be pink, red, greenish, or white. *Euphorbia zinniiflora* Small has leaves subtending inflorescences about as large as regular stem leaves; flowering spurge has subtending leaves greatly reduced.

Range: Texas to Florida, extending north to Nebraska, Minnesota, and New York.



Perennial. **Stems** 10 – 80 cm tall, from stout rootstock; **leaves** alternate below, whorled at base of inflorescence branches, mostly opposite in the inflorescences, entire, linear, oblong, elliptic or oblanceolate, 2 – 7 cm long, 0.3 – 3.5 cm wide, often revolute, sessile or petiolate, glaucous or lighter green beneath; **peduncles** 0.2 – 5.0 mm long; **cyathia** 3 – 10 mm wide; petaloid appendages white, 1 – 5 mm long, longer than wide; **capsule** glabrous, 2 – 3 mm long, pedicels 3 – 4 mm long; **seeds** 2.2 – 2.5 mm long.

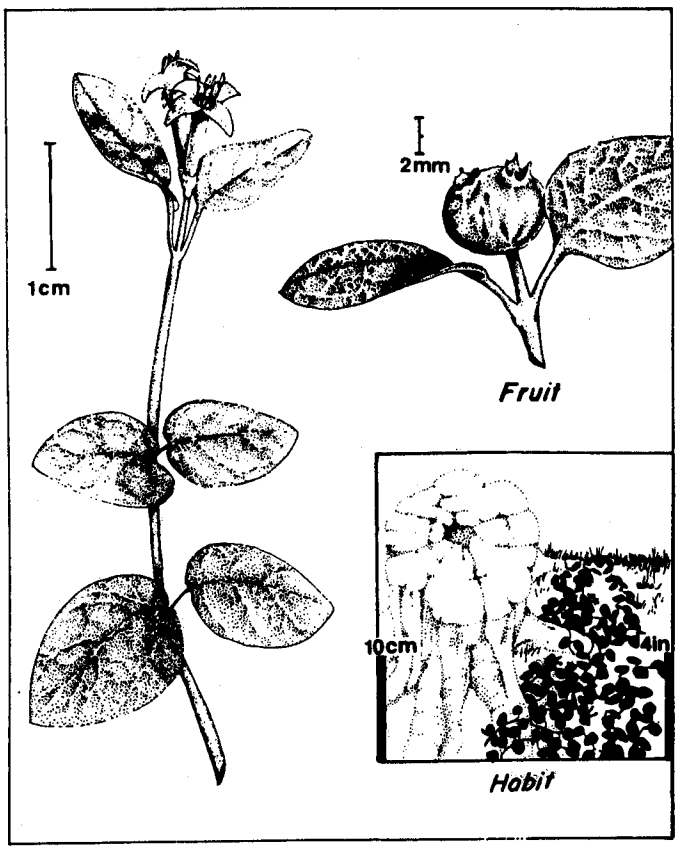
Partridgeberry—*Mitchella repens* L.

This attractive, evergreen, trailing herb is found throughout the southeastern states. It is most abundant in low moist woods, such as stream bottoms, and thrives in fairly dense hardwood shade. A pair of white (or sometimes pinkish) tubular, fragrant flowers about ½ inch long produce a red, fused, double berry about ⅜ inch in diameter. Both flowers and berries are aromatic.

Partridgeberry is in the madder family (Rubiaceae), which includes the ubiquitous annual, rough buttonweed. The attractive foliage of partridgeberry is used for decoration; its small leaves and ease of rooting make it a desirable terrarium plant. Deer eat the foliage, and berries are eaten by bobwhite quail, other birds, and small mammals.

Range: Texas to Florida, extending north to Minnesota and southwest Newfoundland.

Perennial. **Stems** prostrate, puberulent or glabrate; **leaves** opposite, ovate, 8 – 20 mm long, glabrous, leathery; **flowers** in pairs on a short terminal peduncle, the bases of the two calyces usually fused; **calyx** 3 – 4 mm long, lobes minute; **corolla** white or tinged with pink, tube 9 – 14 mm long, lobes ovate, 3 – 4 mm long, pubescent on the inner surface; **stamens** four, well exserted; **berry** red (rarely white), paired, fused, 7 – 10 mm broad, aromatic.



Pokeweed—*Phytolacca americana* L.

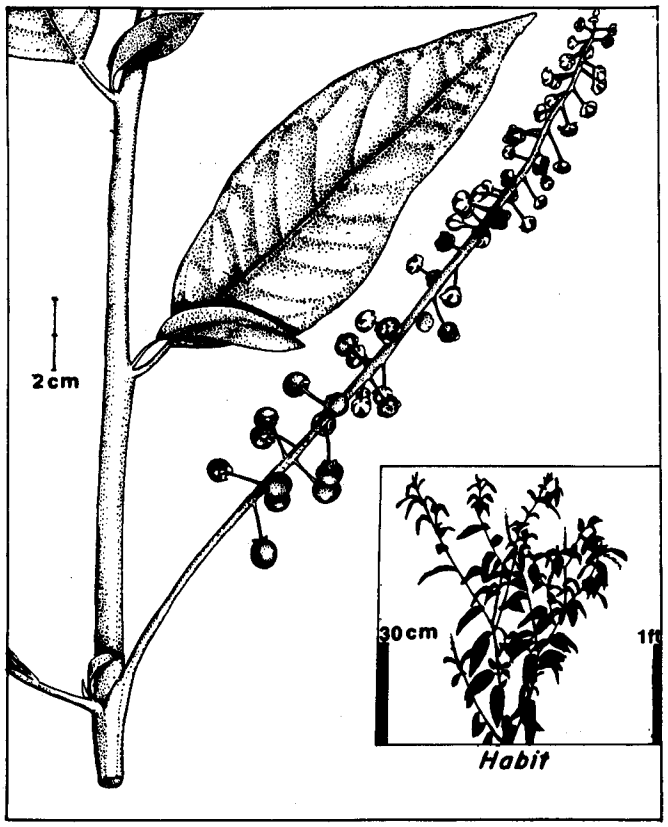
Pokeweed is a common "barn-yard" plant throughout the eastern one-third of the United States and adjacent Canada. On forest range it is found primarily along fence rows and on disturbed site such as windrows on recently cleared areas. Height is commonly 6 feet or less, but on cleared, productive sites with little competition plants may grow to a height of 10 feet.

The broad, smooth leaves are from 3 – 12 inches long. Flowers are produced from May until the first frost, and the shiny, dark purple berries hang in 2- to 6-inch long clusters attached opposite the upper leaves on each stem and branch. Stems and flower stalks are purplish.

Although pokeweed can be poisonous to humans and livestock, poisoning is rare. Young shoots, when properly prepared, are safe for human consumption. The plant has an unpleasant smell and is unpalatable to grazing animals. The large fleshy taproot is the most poisonous part, and pigs have been poisoned by eating the roots. Deer eat the plant during spring and early summer, and several species of birds and small mammals utilize the berries. Mature berries are slightly flattened, about ⅜ inch in diameter, and each normally contains 10 seeds.

A form of pokeweed with erect rather than drooping flower stalks has been separated as *Phytolacca rigida* Small in some books, but is included in *P. americana* in NLSPN (USDA 1982). The form is apparently common throughout the range of pokeweed, but is not considered a distinct taxon.

Range: Texas to Florida, extending north to southern Ontario and New England.



Perennial. **Stems** 1 – 3 m tall from large fleshy rootstock; **leaves** alternate, glabrous, lanceolate to elliptic-lanceolate, entire, 8 – 30 cm long, 3 – 12 cm wide, acute, base rounded to cuneate, petioles 1 – 5 cm long; **racemes** 5 – 20 cm long, erect to nodding, pedicels bracteate; **flowers** perfect; **sepals** five, green to whitish, 2 – 3 mm long, persistent in fruit; **corolla** absent, stamens 5 to 30, ovary superior; **berry** 5- to 12-carpellate, purplish black, 4 – 6 mm long, 7 – 10 mm in diameter; **seeds** 2.5 – 3.0 mm long, flattened.

Southern Bracken—*Pteridium aquilinum* (L.) Kuhn var. *pseudocaudatum* (Clute) Heller

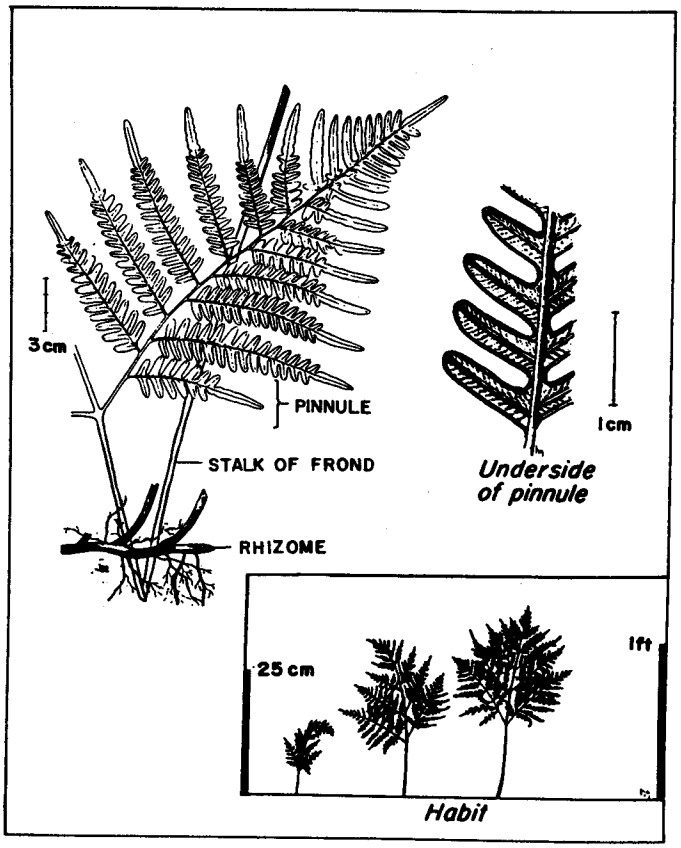
Southern bracken, a fern of the family Polypodiaceae, is one of the few conspicuous nonflowering plants on pine ranges. It is common on various sites across the South, but is most abundant on well-drained sandy soils under an open pine canopy.

Bracken lacks vertical stems. Coarse, stiffly erect fronds rise to a height of 1 to 5 feet from hairy, underground stems. The frond blade, broadly triangular in shape, consists of opposite, finely divided segments. Fronds usually mature and die before the first frost and the dead fronds stand throughout the winter. Bracken not only spreads by rhizomes, often covering extensive areas, but also reproduces by spores.

Southern bracken is toxic to livestock, with horses more susceptible than cattle. Because fronds are apparently unpalatable except in early spring, and a great quantity must be eaten to produce toxicity symptoms, losses are infrequent. Poisoning has occurred when cattle previously unexposed to bracken were moved in spring to an area with an abundance of bracken. Regular observation of animal condition and forage utilization level should detect bracken utilization in time to prevent losses. Toxicity is apparently due to the breakdown of thiamine in the blood. With yearlong moderate grazing, infested areas normally can be safely grazed, but familiarity with the plant and its toxicity may save cattlemen from severe losses. Utilization of new fronds following a prescribed burn or wildfire in midspring or later should be monitored frequently.

Cattle and deer may graze early growth in spring along with new grass, but as fronds mature, animals normally reject bracken for more palatable species. It is rated a low-use plant for deer.

Range: Texas to Florida, extending north to Massachusetts, then inland to Oklahoma, Missouri, Indiana, and Ohio.



Perennial. **Rhizomes** horizontal, hairy, black, elongate, forking, and extensively creeping; **fronds** tripinnately compound, 30 – 150 cm tall, coarse, upright, borne singly and alternately near ends of rhizomes; **stipes** continuous with the rhizome, base dark brown, with scattered hairs, upper stipe straw colored, glabrous; **blades** 20 – 50 cm long, tripinnate, broadly triangular in outline with three main divisions; **pinnules** oblong to linear, entire to pinnate, the terminal segments conspicuously elongate, 7 – 15 times longer than broad, margins revolute to entire or undulate; **sori** marginal, mostly continuous; **sporangia** borne between the modified inrolled margin of the pinnule segment (outer indusium) and the indefinite inner indusium; **spores** minute.

Narrowleaf Mountainmint—*Pycnanthemum tenuifolium* Schrad.

This aromatic member of the mint family (Labiatae) is common throughout the South, growing in roadside ditches, firelines, stump holes, and other moist places, as well as dry prairies and upland forests. Like many other members of the mint family, it has four-angled stems, opposite leaves, and small tubular two-lipped flowers. Leaves are about 1/16 inch wide and ½ inch to 2 inches long. Small heads of white to pinkish, purple-dotted flowers are in terminal clusters at the tip of each branch. The entire plant is hairless.

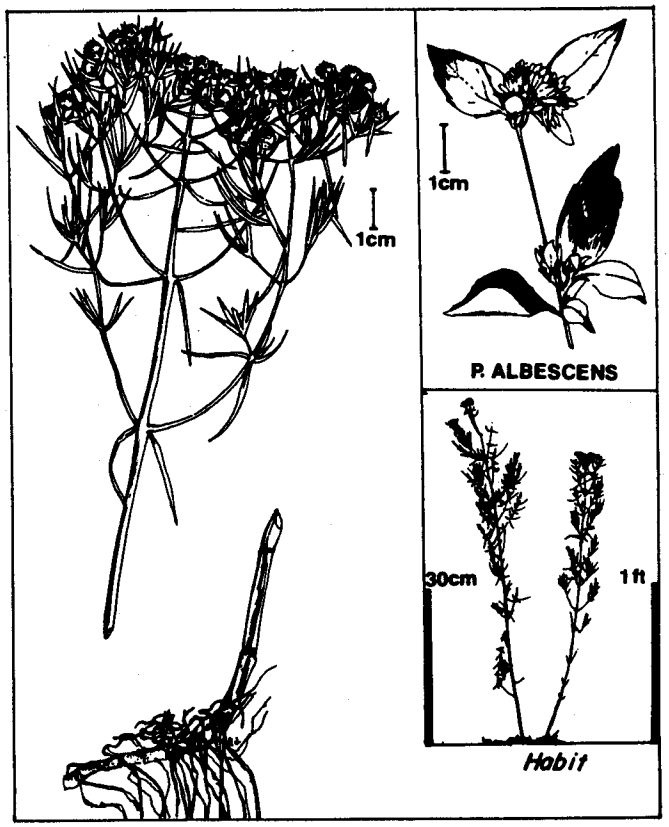
Slender mountainmint, *Pycnanthemum flexuosum* (Walt.) BSP., has been confused with narrowleaf mountainmint; in several books, the two species names are shown to be synonymous. However, *P. flexuosum* has broader leaves—to over ½ inch—and has fine grayish hairs on all surfaces or at least on stem angles and midribs of leaves. Whereas narrowleaf mountainmint is found southwide, *P. flexuosum* does not occur west of Alabama.

Whiteleaf mountainmint, *P. albescens* T. & G., is almost as common as narrowleaf mountainmint from east Texas and Missouri to Florida. Leaves of whiteleaf average about 1½ inches long and ½ inch wide, widest near the middle or slightly below. The terminal one-half to two-thirds of each margin has six to eight widely spaced shallow teeth. Upper leaf surfaces of lower leaves are dull olive green and lower surfaces are greenish gray. Upper leaves and inflorescence bracts are conspicuously whitened with a dense but thin coating of grayish-white hair. Cluster mountainmint, *P. muticum* (Michx.) Pers., similar to whiteleaf, grows in low pinewoods.

Prairie bluet, *Houstonia nigricans* (Lam.) Fern.—which is not in the mint family—has small, narrow leaves, four-angled stems, and flower clusters that resemble those of narrowleaf mountainmint. Early stem leaves of prairie bluet may be 1½ inches long and ¼ inch wide, although later leaves of the upper stem and branches resemble the needle-like leaves of narrowleaf mountainmint. The tubular corolla of prairie bluet flowers is terminated by four small, regular lobes, while narrowleaf mountainmint has a two-lipped corolla typical of the mints.

Mountainmints are not considered valuable as forage for livestock, although they are rated as good deer-food plants and as seed producers for wildlife.

Range: Texas to Georgia, extending north to Minnesota and New England.



Perennial. **Stems** 40 – 120 cm tall, 4-angled, glabrous; **leaves** linear to linear-elliptic, 2 – 5 cm long, 1 – 4 mm wide, acute, entire, glabrous; **inflorescence** headlike in flat or concave corymbs, each cymule 5 – 10 mm broad; **bracts** pubescent, acute; **calyx** pubescent, actinomorphic to slightly zygomorphic, tube 2.5 – 3.0 mm long, teeth lanceolate, 1.0 – 1.5 mm long, acute; **corolla** bilabiate, white to pinkish, often purple-dotted-pubescent, 3 – 5 mm long; **seeds** black, oblong, 0.9 – 1.0 mm long, short-pubescent at apex.

Maryland Meadowbeauty—*Rhexia mariana* L.

The meadowbeauties provide color on low, open pinelands during the period of relatively few blooms between the spring and fall flowering peaks. *Rhexia* is the only herbaceous genus of the tropical melastoma family (Melastomataceae) native to the United States. All species have opposite, mainly three-nerved leaves and showy, four-petaled flowers with large yellow stamens. Flower color of the more common species is rose to purple; several species have white-flowered forms, and one species has yellow flowers.

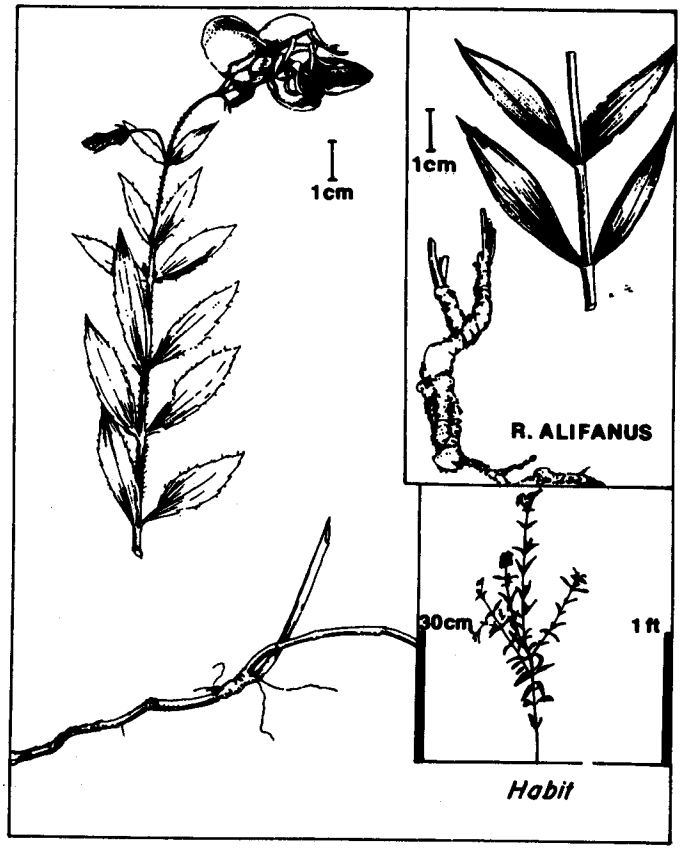
Maryland meadowbeauty, which is one of the most abundant species southwide, grows 1 to 3 feet tall from underground rootstocks. It has lavender, rose-purple, or white petals and hairy stems and leaves. Leaves are up to 2½ inches long. Most leaves are elliptic in outline, but leaf shape is highly variable. Flowers are about 1½ inches wide.

Yellow meadowbeauty, *Rhexia lutea* Walt., has about the same geographic range as Maryland meadowbeauty but is confined to wet pinelands, prairie, or bogs of the lower Coastal Plain. It is slightly smaller than Maryland meadowbeauty, has narrowly elliptic to oblanceolate or obovate leaves and hairy stems and leaves, and is the only *Rhexia* species with yellow flowers. *Rhexia petiolata* Walt. is a slender, often unbranched meadowbeauty with hairless stems and petals about the color of Maryland meadowbeauty. It is frequently associated with yellow meadowbeauty on bogs and wet flatwoods sites.

The largest species, which may reach 40 inches tall on wet Coastal Plain pinelands from North Carolina to Louisiana, is *R. alifanus* Walt. It is a smooth, hairless plant with a thick spongy root and larger darker-colored flowers than Maryland meadowbeauty. Leaf margins of *R. alifanus* are not toothed, but another species about equal in size, common meadowbeauty, *R. virginica* L., has sharply toothed margins on elliptic to ovate leaves.

The meadowbeauties are not considered valuable as forage for livestock, although deer eat Maryland meadowbeauty in the spring and summer. The tiny seeds are not important as food for wildlife.

Range: Texas to Florida, extending north to Oklahoma, Kentucky, and Massachusetts.



Perennial. Stems frequently colonial from elongate, horizontal roots, to 80 cm tall, hirsute; leaves linear, elliptic, lanceolate, ovate, or obovate, to 6.5 cm long and 2 cm wide, sparsely hirsute, 3-nerved, acute, ciliate-serrate, base rounded to attenuate; sepals linear, 1.0 – 2.5 mm long; petals purplish to white, 10 – 25 mm long; anthers 6 – 10 mm long; capsule 4.5 – 7.0 mm in diameter, hypanthium 6 – 10 mm long, glandular-hirsute or glabrous, neck about as long as body.

Ruellia—*Ruellia humilis* Nutt.

Several species of *Ruellia* grow throughout the South, and flowers of all are similar: showy violet or purple trumpets with five spreading lobes. Leaves are opposite and in most species broad and attractive, reflecting the characteristics of its tropical family, Acanthaceae, from which come several attractive house plants, including the zebra-plant, *Aphelandra squarrosa* Nees. The native species of *Ruellia* are known by some as "wild-petunias."

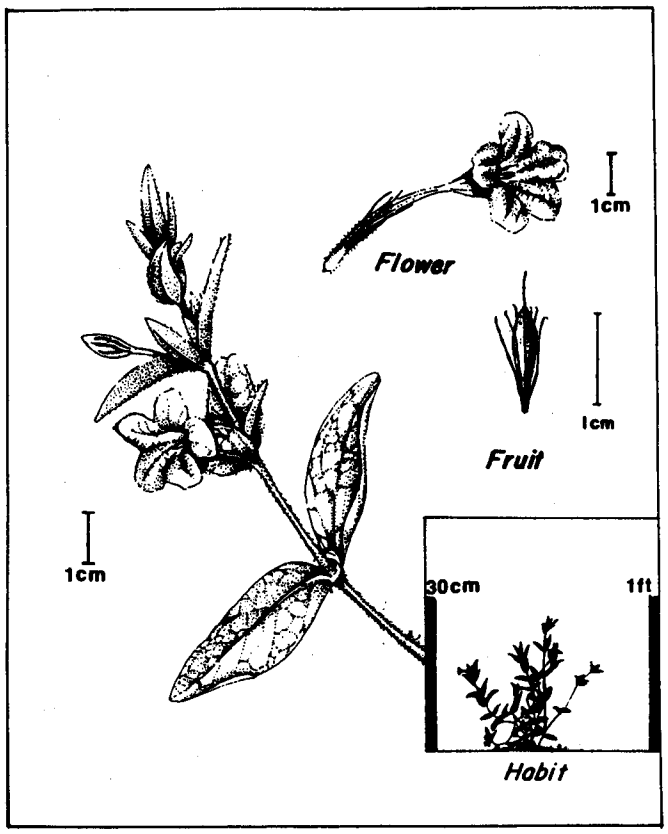
Ruellia humilis is found throughout most of the eastern half of the United States. In the South it occurs in dry open woods, prairies, or on rocky hillsides. It differs from another common species, *R. caroliniensis* (Walt. ex J.F. Gmel.) Steud., mainly in the presence or absence of leaf petioles; leaves of *R. humilis* are sessile while those of *R. caroliniensis* have distinct petioles. Moreover, the latter is found in bottomlands and other generally wetter sites than the former.

Stems may be 3 feet tall and branched where herbaceous competition is light, but in fairly heavy herbaceous ground cover, such as found on open longleaf pine sites, stems are 1 foot or less and unbranched. Leaves may be up to 4 inches long and 2 inches wide. Stem and leaves appear bristly with dense white hairs, although hairiness, like other plant characters, is variable. Flowers are up to 2½ inches long, without stalks, with the corolla tube about two-thirds the length, and five broad lobes. The calyx is about 1 inch long, separated almost to the base into five persistent narrow lobes. The slender brownish capsule is only slightly longer than the calyx lobes.

Ruellia ciliosa (Pursh) Long is a dwarf plant on dry sandy soils from Louisiana along the Coastal Plain to South Carolina. Leaves have definite petioles and often form a rosette at ground level. *Ruellia pedunculata* Torr. ex Gray is found on pinelands west of the Mississippi River. Flowers are solitary to several in leaf axils or on axillary branches. Each flower is on a stalk as long as the flower.

Although ruellia seeds have been found in bobwhite quail crops, and deer graze the leaves in the spring, wildlife food value of the genera is limited by its lack of abundance. Its greatest value may be for its showy flowers.

Range: Texas to Florida, extending north to Iowa and Pennsylvania.



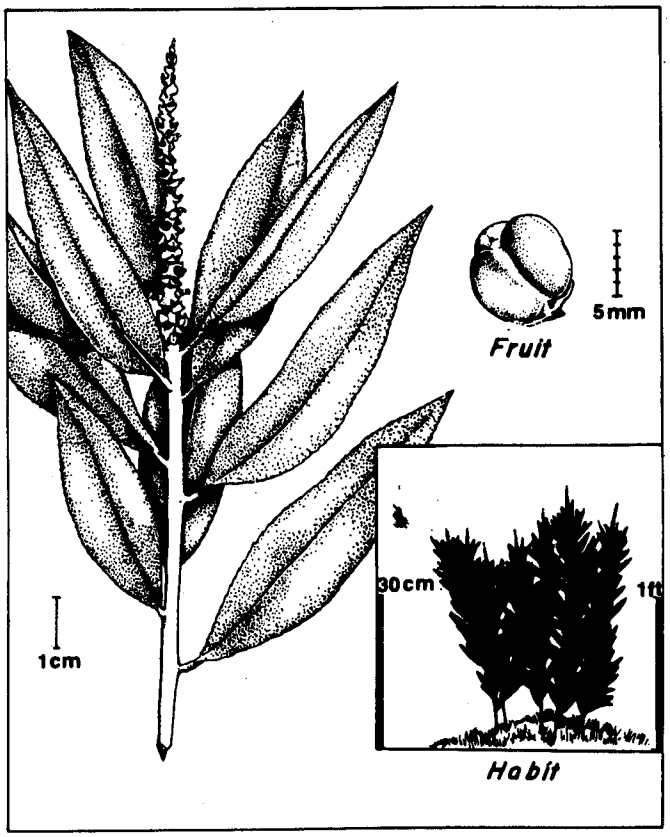
Perennial. Stems to 1 m tall, pubescent, branching; leaves ovate, elliptic or lanceolate, pubescent, to 6 cm long and 3 cm wide, sessile or subsessile; flowers in sessile or subsessile axillary glomerules; calyx lobes linear-setaceous, 15–25 cm long; corolla 2–3 cm long, lobes to 1.5 cm long; capsule glabrous, 12–15 mm long, about 4 mm broad; seeds pale, 2–3 mm broad.

Queensdelight—*Stillingia sylvatica* L.

This coarse perennial of the spurge family (Euphorbiaceae) grows on dry or well-drained sites throughout the Southeast and as far west as New Mexico. Several stems, up to 32 inches tall, arise from a woody root crown. Each stem is unbranched or may have a whorl of branches below the terminal inflorescence. Pistillate flowers, which produce three-seeded capsules about ⅜ inch in diameter, are borne near the base of a spike of male flowers that may be as long as 5 inches. Leaves are elliptical to lance shaped, about 2 inches long and ½ inch wide, with fine blunt teeth on the margins.

Queensdelight, like other milky-juiced members of this family, normally is not eaten by livestock. *Stillingia treculiana* (Muell. Arg.) I. M. Johnst., a species of west Texas and Mexico, is recognized as poisonous, thus queensdelight should be suspect. Seeds are eaten by bobwhite quail and other birds and small mammals, but because of limited plant distribution and low seed production per plant, queensdelight is not considered a valuable source of wildlife food.

Range: Texas to Florida, extending north to Missouri and Virginia.



Perennial. **Stems** several to many from a woody crown, to 80 cm tall, branching immediately below terminal inflorescences; **leaves** alternate, elliptic to lanceolate or oblanceolate, 3.5 – 9.0 cm long, 1.0 – 4.5 cm wide, margins serrulate or crenulate; **inflorescence** a terminal spike 5 – 12 cm long, pistillate flowers basal, staminate above, conspicuous saucer-shaped glands at base of flower; **capsule** 2- to 3-seeded, 8 – 10 mm long; **seed** 5 – 9 mm long.

Nettleleaf Noseburn—*Tragia urticifolia* Michx.

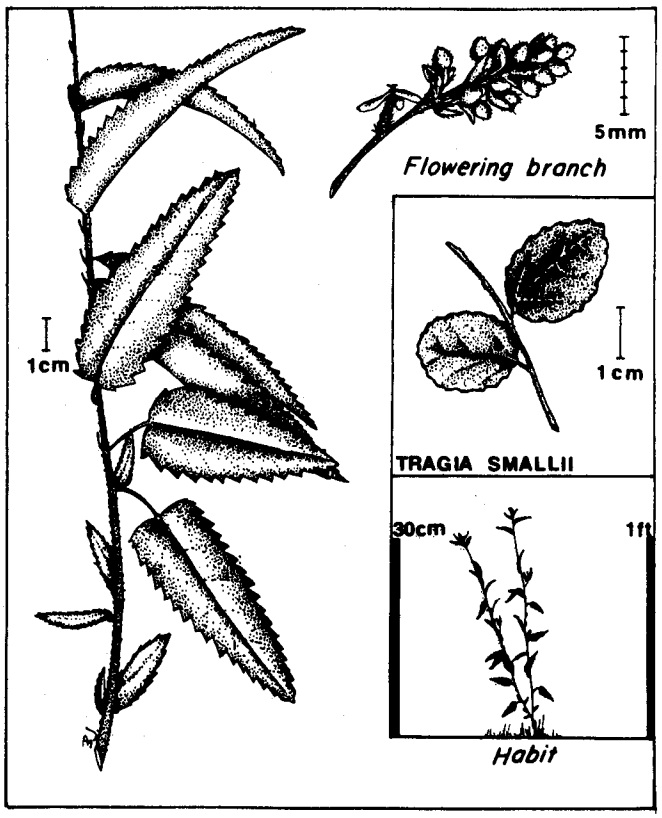
This stinging plant of the spurge family is common in sandy fields and open forests throughout the South. It does not sting as viciously as bullnettle but is much more common. Stems are normally 1 to 2 feet tall, often longer and reclining on more shaded sites. Leaves are alternate and may be less than 1 inch to 3 inches long; width is slightly less than half the length. Width is greatest near the base, and the straight or shallowly heart-shaped base and the straight but abruptly converging margins produce a long-triangular leaf shape. Leaf margins are coarsely toothed.

All above-ground plant parts are coated with soft white hairs intermixed with stiff, white, stinging hairs. Like most members of the spurge family, noseburns have separate male and female flowers on the same plant. In nettleleaf noseburn, one or two female (seed-producing) flowers are borne below numerous male flowers in spikes produced in the axils of upper leaves.

Several other noseburns are common within the range of nettleleaf. Wavyleaf noseburn, *Tragia urens* L., is a slightly smaller plant than nettleleaf, with leaves about the same length but narrow, with smooth, almost imperceptibly wavy margins. Leaves are widest near the middle and taper toward both ends. Plant hairs are sparse with no stinging hairs. Small noseburn, *T. smallii* Shinners, is another non-stinging plant common on sandy soils across the South. It is usually 5 to 10 inches tall and leaves are broadly oval to elliptic, with coarsely toothed margins. Heartleaf noseburn, *T. cordata* Michx., is a stinging, trailing or twining plant with heart-shaped leaves whose petioles are about as long as the blade.

Seeds of the noseburns, like those of most members of the spurge family, are excellent wildlife food. Because of low plant densities and low seed production per plant, however, noseburns are seldom listed as valuable food plants.

Range: Texas and Arkansas to Florida and North Carolina.

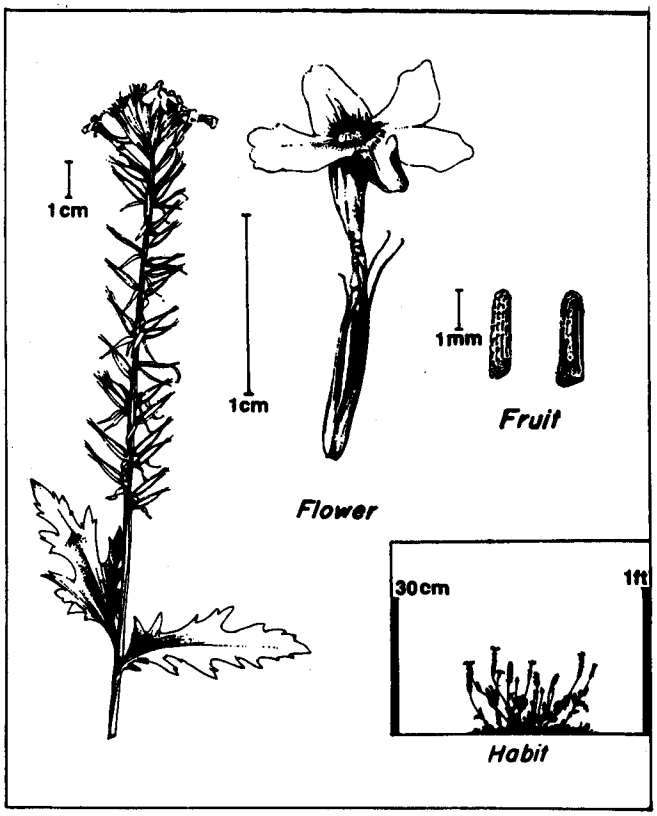


Perennial. **Stems** 20 – 70 cm tall, erect to decumbent; **leaves** triangular-lanceolate to narrowly ovate, 2 – 6 cm long, 0.5 – 4.0 cm wide, margins simply or doubly serrate, base truncate to cordate, petioles 5 – 15 mm long; **racemes** 1 – 4 cm long in axils of upper leaves, with one to two pistillate flowers below 11 to 40 staminate flowers, staminate bracts shorter than persistent bases of staminate pedicels; **fruit** about 4 mm long and 8 mm broad; **seed** 3 – 4 mm long.

Rose Verbena—*Verbena canadensis* (L.) Britton

The verbenas or vervains of the Verbenaceae family are represented across the South by approximately 20 species. Several, like rose verbena, are low, prostrate to ascending perennial plants with showy pink to purple (sometimes white) flowers. Others are erect, weedy annual or perennial plants with inconspicuous flowers. The verbenas are close taxonomically to the mint family (Labiatae) and have opposite leaves and four-angled stems, as do many members of the mint family. The two families differ in the following characteristics:

	Verbenaceae	Labiatae
inflorescence	spike or raceme; pedicels less than 1 mm long; calyx less than 5 mm long	not a spike or raceme (if so, pedicels more than 1 mm and calyx more than 5 mm)
flowers	weakly, if at all, zygomorphic	strongly zygomorphic
ovary	lobeless, style apical	4-lobed; style arising between lobes



Leaves of rose verbena are triangular-ovate to lanceolate in outline, although they may be lobed or divided. The hybrid garden verbena, *Verbena hybrida* Hort. ex Vilm., which may escape from cultivation, resembles rose verbena. Its leaves, however, are toothed but not divided, and its flowers may be one of several colors. Moss verbena, *V. tenuisecta* Briq., is a prostrate mat former with finely divided leaves and showy flowers. A tall, unattractive, weedy verbena, *V. brasiliensis* Vell., is common on roadsides throughout the South. There are several attractive verbenas other than the prostrate species; slender verbena, *V. halei* Small, is an example.

Several of the tall weedy verbenas are listed as medium-to-high-use food plants for white-tailed deer in Mississippi. Although other verbenas provide forage for livestock and deer, and seeds are eaten by birds, verbenas are not generally abundant on undisturbed range and are not considered valuable food plants. Rose verbena is included here because of its showy flowers.

The flowers of several species of phlox, *Phlox* spp., resemble those of rose verbena. Although leaves of both phlox and verbena are opposite, phlox leaves have entire margins, while those of verbena are toothed or divided.

Range: Texas to Florida, extending north to Colorado, Kansas, Iowa, and Illinois.

Perennial. Stems decumbent or ascending, pilose, 10 – 40 cm long; leaves triangular-ovate to lanceolate, pinnately dissected or lobed, petioles 0.5 – 2.5 cm long; inflorescence a single spike terminating each branch, erect or ascending, 2 – 15 cm long, densely many flowered; calyx 10 – 13 mm long, lobes subulate-setaceous; bracts shorter than or equalling calyx; corolla tube twice the length of calyx, pink to purple; seed cylindrical, about 3 mm long and 0.5 mm broad, surface reticulate-ridged.

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GLOSSARY

achene. A small, dry, one-seeded fruit with a tight, thin, indehiscent ovary wall. Seed attached to ovary wall at one point only.

acicular, aciculate. Needlelike.

actinomorphic. Capable of being divided into equal and similar halves along two or more planes; radially symmetrical (see **zygomorphic**).

acuminate. Tapering gradually to a point.

alternate. Leaves or other parts placed singly at different levels on a stem or axis.

annual. A plant that completes its life cycle in 1 year or less.

anther. The pollen-bearing part of the stamen.

anthesis. The period when anthers disseminate pollen or stigmas are receptive to pollen.

apetalous. Without petals.

apical. At the tip.

apiculate. Ending abruptly in a short, sharp point.

appressed. Closely pressed against.

article. A section of a fruit separated from adjacent sections by a constriction or joint, as in *Desmodium.*

attenuate. Tapering gradually; more gradual than acuminate.

auricle. An ear-shaped projection or appendage.

awn. A bristlelike appendage, often the extension of nerves or veins in floral bracts.

axil. The upper angle between a leaf or branch and the stem to which it is attached.

barbellate. Finely barbed.

beak. A slender, pointed tip sometimes double; appearing as an open or gaping beak.

berry. A fleshy, indehiscent fruit with one to many seeds.

bipinnate. Twice pinnate.

blade. The upper expanded part of a leaf or petal.

bract. A reduced or modified leaf subtending a flower or flower cluster. **bractlet.** Small bract.

bracteate. Having bracts.

bracteole. A secondary bract or bractlet.

bunchgrass. A grass that habitually grows in a well-defined tuft, as opposed to those spreading by stolons or rhizomes.

caducous. Falling early.

callus. The hard, sharp-pointed base of certain grass spikelets or florets.

calyx. The sepals, collectively.

campanulate. Bell shaped.

canescent. Coated with gray pubescence.

capillary. Hairlike.

capitate. Forming a dense or compact cluster; in heads.

capsule. A dry, dehiscent, usually many-seeded fruit, with two or more carpels.

carpel. A simple pistil or a division of a compound pistil.

caryopsis. The one-seeded, indehiscent fruit or grain of a grass, with seedcoat fused to ovary wall.

catkin. A dry, scaly, pendulous spike, usually unisexual, commonly staminate.

caudex. The persistent base of a perennial forb.

cauline. Attached directly to the main stem.

cespitose. In tufts or clumps.

chaff. Small, thin scales or bracts, becoming dry and membranous.

ciliate. Fringed with marginal hairs.

ciliolate. Minutely ciliate.

clavate. Clublike; gradually thickened toward the apex. **clavellate:** the diminutive.

cleistogamous. A type of self-pollinating, non-opening flower.

collar. The outer area of a grass leaf where blade and sheath join.

compound. Composed of two or more similar parts.

cordate. Heart shaped; used primarily to describe leaf bases with heartlike lobes.

coriaceous. Leathery in texture.

corm. A bulblike, but solid, base of a stem, often subterranean.

corolla. The petals, collectively.

corona. A crown-like structure in flowers of *Asclepias*, resulting from modification of the anthers.

corymb. A flat-topped, indeterminate inflorescence, with outer flowers maturing first.

cremocarp. The dry, dehiscent, two-seeded fruit of plants in the family Umbelliferae.

crenate. With coarse, rounded teeth.

culm. The stem of a grass or sedge.

cuneate. Wedge shaped or narrowly triangular, with the point downward.

cyathium. The specialized involucrate inflorescence of *Euphorbia.*

cyme. A flat-topped determinate inflorescence, with the central flowers opening first. **cymule:** a small or few-flowered cyme.

decumbent. Reclining, but with apices ascending.

decurrent. Pointing downward.

dehiscent. Opening at maturity by slits or valves to discharge the contents.

deltoid. Triangular.

dentate. Toothed, with sharp, spreading, coarse indentations perpendicular to the margin.

diadelphous. Having stamens with filaments united in two, often unequal, clusters.

digitate. Handlike; compound, with members arising from one point.

dioecious. Bearing unisexual flowers, with the staminate and pistillate borne on different plants.

discoid. Having only disk flowers.

disk flower. The tubular, regular flowers usually crowded in the center of the flower head in Compositae, as distinguished from the outer, ligulate, ray flowers.

drupe. A fleshy fruit with the inner ovary wall hardened around the one or more seeds in the center.

ellipsoid. Elliptical in outline; three dimensional.

emarginate. Shallow-notched at the tip.

entire. Without marginal teeth or lobes.

equitant. Leaves alternate in two ranks, each leaf overlapping the leaf above.

exserted. Projecting beyond; not included.

fascicle. A close cluster of flowers, leaves, stems, or roots.

filiform. Threadlike.

fimbriate. Fringed.

flabellate. Fan shaped.

floret. A small flower, usually one of a dense cluster, in grasses and sedges; the unit of a spikelet.

follicle. A dry fruit developed from a single ovary, dehiscing along one suture.

forb. A herb other than a grass, sedge, or rush.

frond. The leaf of ferns and fern allies, usually pinnately lobed or divided.

fusiform. Spindle-shaped, broadest in the middle and tapering towards both ends.

gamopetalous. With the petals at least partially joined together.

gamosepalous. With sepals united.

geniculate. Bent abruptly.

glabrous. Devoid of hairs.

glaucous. Whitened with a waxy bloom.

globose. Spherical.

glomerule. A cyme condensed into a headlike cluster.

glume. A chafflike bract, subtending a grass spikelet.

habit. The general appearance of a plant.

hastate. Arrowhead shaped, with basal lobes pointing outward.

head. A dense cluster of stalkless flowers.

herb. A plant that does not develop a persistent above-ground stem.

hirsute. Covered with long, stiff hairs.

hispid. Stiff, bristly pubescent. **hispidulous:** the diminutive.

hyaline. Transparent or translucent.

hypanthium. Floral cup formed by fusion of stamens, sepals and petals.

imbricate. Overlapping, either spirally or vertically.

indehiscent. Not opening at maturity.

indument. Any hairy covering or pubescence.

indusium. Covering of a sorus (in ferns).

inflorescence. The flowering part of a plant.

innovation. A basal shoot of a perennial grass.

internode. The part of the stem between two successive nodes or joints.

involucre. The whorl of leaflike bracts surrounding a flower or flower cluster at its base.

irregular. Having flowers with petals or sepals unequal in size or shape.

keel. The two lower united petals of a papilionaceous legume flower. Also, the projecting midrib on the underside of a laterally compressed grass leaf, glume, or lemma.

lanceolate. Lance shaped; several times longer than broad, broadest below the middle and tapered toward the apex.

lanose. Woolly.

leaflet. A single division of a compound leaf.

legume. A plant of the family Leguminosae; the fruit or pod of such plants that is one-carpelled, dehiscent, usually several-seeded.

lemma. The lower, outermost of the two bracts of the grass floret.

lenticular. Lens shaped; biconvex.

ligule. In grasses a thin, membranous, hairy, or ridgelike appendage on the inside of the leaf where blade and sheath join; in composites the flattened, straplike corolla of the ray flowers.

liliaceous. Possessing characteristics typical of Liliaceae.

linear. Long and narrow, with parallel sides.

locule. One of the chambers in a compound ovary or in the fruit; also applied to the cavities of an anther.

loment. A legume fruit, flattened and strongly constricted between seeds, usually breaking at maturity into one-seeded segments or articles.

membranous. Parchmentlike.

-merous. A suffix indicating the number of parts present in each floral series; e.g., five-merous—a flower with 5 petals, 5 sepals, and 5 stamens.

midrib. The central vein of a leaf.

monoecious. Bearing only unisexual flowers, with the staminate and pistillate borne separately on the same plant.

mucronate. With a short, small, abrupt tip.

nectary. A small, nectar-secreting gland.

nerve. An unbranched, usually straight, vein or rib.

neuter. Without functional stamens or pistils.

node. A joint, especially of grass stems, giving rise to one or more leaves.

oblanceolate. Invert-lanceolate.

oblique. Slanting; attached at an angle.

obovate. Egg shaped with broadest portion at the top.

obovoid. Obovate in outline, three-dimensional.

obsolete. Rudimentary or not evident.

opposite. At the same level, on either side of a stem or axis.

orbicular. Circular.

ovary. The enlarged base of the pistil that encloses the ovules and later ripens into the fruit.

ovate. Egg shaped in outline, broadest below the middle.

ovoid. Ovate in outline, three-dimensional.

palea. The inner or upper bract of the grass floret.

palmate. Arising from a common point, as the fingers of a hand; digitate.

panicle. A compound indeterminate inflorescence of stalked flowers, with the longer, lower branches maturing flowers earlier than the short upper branches.

papilionaceous. Butterflylike; used to describe the irregular corolla in some members of Leguminosae.

papillose, papillate. Beset with tiny, pimple-like protuberances, or papillae.

pappus. A ring of plumose or capillary bristles, scales, spines, or teeth at the tip of the achene in Compositae.

pedicel. The stalk of an individual flower or fruit in a compound inflorescence or of a spikelet in grasses and grasslike plants.

peduncle. A flower stalk supporting either a cluster of flowers or a single-flowered inflorescence.

perennial. Producing above-ground parts from the same root system for at least three growing seasons.

perfect. Having functional stamens and pistil(s) in the same flower.

perianth. Collectively, the calyx and corolla.

perigynium. A flask-shaped sac enveloping the achene in *Carex.*

petal. One of the inner whorl of flower blades; a unit of the corolla.

petaloid. Resembling a petal.

petiole. The stalk by which a leaf, either simple or compound, is attached to the stem.

phyllary. A bract subtending the flower head in Compositae.

pilose. Covered with soft, straight, fine hair.

pinna. A main or primary division of a pinnately compound leaf.

pinnate. A featherlike arrangement; branches, leaflets, lobes, or veins arranged in one plane on two sides of a central axil. **even-pinnate:** with no single terminal leaflet. **odd-pinnate:** with a terminal leaflet.

pinnatifid. Pinnately lobed with clefts more than halfway to midrib.

pinnule. The secondary division of a bipinnate or tripinnate leaf or frond.

pistil. The seed-bearing organ of a flower, composed of stigma, style (when present), and ovary.

pistillate. Having functional pistil(s), but no functional stamens; female.

plumose. Having fine, elongate hairs in a single plane, on either side of a central axis; featherlike.

pod. A dehiscent dry fruit; see legume.

polygamodioecious. Polygamous, but predominantly dioecious.

polygamous. Bearing unisexual and perfect flowers on the same plant.

puberulent. Minutely pubescent.

pubescence. Short, soft hairs. **pubescent:** with pubescence.

punctate. Dotted with depressions, glands, or small colored spots.

raceme. A simple, elongate, indeterminate inflorescence, with stalked flowers.

rachilla. The axis of the spikelet in grasses and sedges.

rachis. The axis of an inflorescence or a pinnately compound leaf; the main axis of a fern frond.

radiate. Arranged around a common center; also said of flower heads in Compositae with ray flowers surrounding a central disk of tubular flowers.

ranked. Arranged in rows.

ray flower. A marginal flower with straplike corolla, in the head of most Compositae.

receptacle. The enlarged or expanded axis which bears either the organs of a flower or the collected flowers of a head.

reflexed. Angled downward.

regular flower. A flower with all members of each whorl similar in shape and size.

reniform. Kidney shaped.

reticulate. Net-veined.

retrorse. Pointed backward or downward.

revolute. With margins rolled under.

rhizome. An underground stem, distinguishable from a root by its nodes, buds, and scalelike leaves.

rootstock. A rhizome or underground stem.

rosette. A cluster of leaves radiating from a very short stem and growing close to the ground.

rotund. Round in outline.

rugose. Wrinkled.

sagittate. Shaped like an arrowhead, the basal lobes pointing downward or backward.

scabrous. Rough to the touch. **scabridulous:** slightly rough.

scale. A general term applied to a variety of small, usually dry, leaflike structures or bracts.

scape. A leafless flower stalk arising from an underground part.

scarious. Thin, dry, membranous; not green.

secund. Arising, or apparently arising, from one side of an axis.

seed. A ripened ovule.

sepal. One of the outer whorl of a flower perianth; a unit of the calyx.

septate. Divided by partitions.

serrate. With sharp, forward-pointing teeth.

serrulate. Finely serrate.

sessile. Not stalked.

setaceous. Bristlelike; bristle shaped.

setose. Having bristles.

sheath. The lower, tubular, stem-clasping part of leaves, especially in grasses, sedges, and rushes.

sinuous. Wavy.

sorus; pl. sori. A cluster of sporangia in nonflowering plants.

spathe. The sheathing bract of an inflorescence.

spatulate. Broad and rounded at the apex, with a short, narrowed base.

spike. A simple, elongated, indeterminate inflorescence with sessile flowers.

spikelet. The basic unit of the grass and sedge inflorescence, consisting of one or more florets and a pair of subtending glumes.

sporangium; pl. sporangia. The spore case of nonflowering plants.

squarrose. With spreading or recurved bracts or scales.

stamen. The pollen-bearing organ of a flower.

staminate. Having stamens and no functional pistil; male.

standard. The upper petal in pea and pea-like flowers of family Leguminosae.

stellate. Star-like, with radiating branches.

stigma. The pollen-receiving tip of a pistil.

stipe. The stalk of a pistil; the petiole of a fern frond.

stipel. A minute stipule at the base of leaflets of compound leaves in some plants.

stipule. One of a pair of usually foliaceous appendages found at the base of leaf petioles in many plants.

stolon. A horizontal, above-ground branch or runner that roots at nodes.

striate. Having fine longitudinal lines, ridges, or channels.

strigose. With sharp, stiff, straight, appressed hairs which are often basally swollen.

style. The portion of the pistil between the ovary and the stigma.

sub-. Prefix generally meaning "almost" or "about."

subulate. Awl shaped, tapering to apex.

symmetrical. Said of a regular flower having an equal number of petals, sepals, and stamens.

terete. Round in cross section.

throat. The junction of the tube and the expanded part of a united corolla; also the opening in a tubular corolla.

tiller. A shoot growing from the root or base of a stem. Also used as the verb.

tomentose. Densely woolly-pubescent.

tomentulose. Coated with a fine mat of woolly pubescence; finely tomentose.

trichome. Any hairlike outgrowth of the epidermis.

trifid. Split into three.

trifoliolate. Leaves with three leaflets.

trigonous. Three sided; triangular in cross section.

tripinnate. Thrice pinnate.

truncate. With the base or apex transversely straight, appearing cut off.

tuber. A short thickened, usually underground stem or shoot, with numerous buds ("eyes") in the axils of minute, scalelike leaves.

tubercle. A small tuberlike body or nodule.

turbinate. Inversely conical; top shaped.

umbel. A more or less flat-topped indeterminate inflorescence, with pedicels and peduncles arising from a common point.

undulate. Wavy margined or with a wavy surface.

unisexual. Of one sex; either staminate or pistillate.

verrucose. Warty.

verticillate. A whorled, or apparently whorled, arrangement of leaves, inflorescence branches, flowers, etc.

vesture. A term applied to all types of hairiness or coatings on plant surfaces.

villous. Bearing long, soft hairs.

vitreous. Transparent; glasslike.

viscid. Sticky.

whorl. A ring of similar parts around a point, as leaves around a node.

wing. One of a pair of lateral petals on a papilionaceous flower.

zygomorphic. Capable of being bisected by only one plane into equal and similar halves; bilaterally symmetrical (see **actinomorphic**).

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Illustrations and descriptions are given for approximately 125 species of grasses, grasslikes (sedges and rushes), and forbs representative of the pine and pine-hardwood forests of the southeastern United States.

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