

**KEYS TO THE FLORA OF FLORIDA - 26,
CENCHRUS (GRAMINEAE)**

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ABSTRACT

Cenchrus (Gramineae) is represented in Florida by 8 species. All appear to be native, with *C. gracillimus* effectively endemic. The *C. incertus* complex is treated as of three recognizable species, but with significant questions unanswered. Range of *C. tribuloides* is restricted to northern Florida, with plants of the southern peninsula bearing that name being the little-recognized *C. bambusoides*. Nomenclatural history relating to *C. caroliniana* is reviewed. The early but unidentifiable name *C. spinifex* is rejected. One species reported for Florida is excluded. An amplified key is given to the Florida taxa. *Phytologia* 92(3): 442-450 (December 1, 2010).

KEY WORDS: *Cenchrus*, Gramineae, Florida flora.

"Rating weeds in order of badness, I would give the Sandspurs the first place. They are bitter grasses eaten only as a last resort by cattle, and all other weeds in the State combined do not cause as much pain, profanity and danger to life, as these worthless grasses."

J. C. Neal. Florida Agricultural Experiment
Station, 2nd. annual report. 1890.

Botanical purists have for generations attempted to lead the public into calling species of *Cenchrus* (Gramineae) either "sand-burs" or "bur-grasses." But with the unlettered common man, they are invariably known as "sandspurs." Here, an effort is made to guide

needful persons to the correct scientific names of these "worthless grasses."

The most recent -- and thus the most predictably followed -- treatment of large scope was a world monograph of *Cenchrus* by Donald G. DeLisle (Iowa State Jour. of Science 37: 259-351. 1963). His work has tended to eclipse the findings of an earlier, admirable study of North American species by Agnes Chase (Contr. U.S. Nat. Herb. 22: 45-77. 1920). Two regional but significant studies were by Lloyd H. Shinnars (Rhodora 56: 35. 1954; Field & Lab. 24: 73-74. 1956) of Texan species, and Jose A. Caro & Evangelina Sanchez (Kurtziana 4: 39-50; 95-129. 1967) of (mostly) Argentine species. American species have again been treated by M. T. Stieber & J. K. Wipff (Flora N. Amer. 25: 529-536. 2003). Since the *Cenchrus* species of greatest taxonomic and nomenclatural interest are wide ranging, all of these studies have bearing on the species to be recognized in Florida and the names they should carry.

The characteristic burs of the *Cenchrus* plant cannot be interpreted easily. The stem and leaves are not special within the grasses. The spikelets (within the bur) are of typical panicoid form, each spikelet with two glumes and two florets, the lower sterile, and each floret enclosed by a lemma and palea. It is the inflorescence that challenges understanding. The entire inflorescence is believed to be a panicle, condensed and reduced to the appearance of a spike. It is further reduced (in most species, not *C. myosuroides*) by lateral branchlets that are much diminished and have coalesced to form indurated spines. These highly modified branchlets enclose one or more spikelets, and form the "bur." In some species, long bristles develop on the lower portions of these spines. In all species, both spines and bristles are retrorsely barbed and non-plumose.

A commentary of the species reported for Florida: *Cenchrus myosuroides* HBK. differs quite markedly from its congeners. It is readily recognized by its many small bur-like heads on a long axis. The spikelets are surrounded by numerous stout bristles fused only at their base. It is by far the most robust of the Florida species, often reaching

1.5 m. or more, in dense growths that exclude competitors. Though tropical, it has a toe-hold on a rocky island in north peninsular Florida off the Levy County coast. It is just as well it is rare, for reports from the Everglades (Wm. Robertson, pers. comm., Dec 1969) that once it gets in one's shirt, the detached prickly bristles persist through two washing and three wearings.

Cenchrus echinatus L. is common, always weedy. Its ruderal habit suggests it may be a recent introduction, but it was often found by early collectors, so must be accepted as native. *Cenchrus brownii* Roem. & Schult., its close ally, is quite rare, presently known from only one or two small, apparently ephemeral populations on the upper Keys. But it is common in the American tropics and has surely washed ashore many times over the years. It also was found by early collectors (e.g. Blodgett, Rugel, on Key West, 1840s), and thus also must be treated as native. Both species are distinguished by the considerable number of flexible bristles on each bur, in addition to the stout spines.

The fearsome *Cenchrus tribuloides* L. is the outstanding species of the entire genus, at least as far as bur size is concerned. [It is surpassed in size, certainly in spine length, by an uncommon species of northwest Mexico, *Cenchrus palmeri* Vasey.] Burs of *C. tribuloides* are the size of grapes, with stout spines extending in all directions. On bur size alone, this species is unmistakable. But its relative rarity and thus unfamiliarity has permitted its name by misunderstanding to be assigned to other, more common species (usually *C. incertus* or *C. pauciflorus*) or to an uncommon tropical species (*C. bambusoides*).

Cenchrus gracillimus Nash, though structurally similar to the others, usually presents no problem in identification. Its narrow leaves are nearly definitive. The Sandhill Sandspur for all practical purposes is a Florida endemic (found only once or twice in southern Georgia). It is almost the only sand-spur to be found in undisturbed "high pine," with wiregrass and other natives. Its Florida range is, in fact, very similar to that of wiregrass (*Aristida stricta*) and longleaf pine (*Pinus palustris*), though these species extend well into Georgia and the Carolinas.

The remaining taxa -- *Cenchrus incertus* M. A. Curtis (1837), *C. pauciflorus* Benth. (1844), *C. longispinus* (Hack.) Fern. (1943; basionym 1903), and *C. bambusoides* Caro & Sanchez (1967) -- represent at least two or perhaps as many as 4 species, with 3 occurring in Florida. Older treatments, both before Chase (1920) and following, usually recognized two species in this group -- *C. incertus* of the eastern United States, and *C. pauciflorus* of the west. Since, limited by early knowledge, only one of these species was to be expected in each region, descriptions tended to be too brief to be diagnostic. Chase (1920; Hitchcock & Chase, 1951), with her wider perspective, believed them to be different, but her separation was unclear since she confounded them with *C. longispinus*, a then-poorly recognized species of the midwest and northeast. DeLisle (1963) recognized *C. longispinus* as distinct, but he did not distinguish between the perennial, mostly coastal *C. incertus* and the annual, widespread *C. pauciflorus*. This judgment, uncritically followed, has been the origin of much of the apparently confusing variability found among the sandspurs.

The northern *Cenchrus longispinus* was distinguished by M. L. Fernald (Rhodora 45: 387. 1943) who believed a long-spined, annual plant common in mid-continent could be seen as distinct. This plant is now generally accepted as a species, but appears not to occur in Florida. [Distribution of *C. longispinus* has been mapped by DeLisle (1963, fig. 10). Though some reports are from isolated sites in Florida and it is not unreasonable that this weedy species should have reached the state, all Florida specimens seen bearing this name appear to be misidentified.]

With *Cenchrus longispinus* excluded, taxonomic problems among these related sandspurs are somewhat narrowed but far from resolved. In Argentina, Caro & Sanchez (1967) recognized *Cenchrus incertus* and *C. pauciflorus* (as well as *C. echinatus* and *C. longispinus*). But they also described and named still another species, *Cenchrus bambusoides*, restricted (by their data) to southernmost Florida. Their study relied heavily on foliar anatomy, with clear drawings provided for each species.

Here, *Cenchrus incertus*, *C. pauciflorus*, and, *C. bambusoides*, are all recognized as Florida species. [DeLisle (1963), as noted, recognized only *C. incertus*.] The position of Shinnery, who distinguished *C. incertus* (perennial, decumbent) and *C. pauciflorus* (annual, erect), seems sound, though with enough intermediates to compel caution. Plants corresponding to *C. incertus* are largely coastal, often on dunes, and plants here called *C. pauciflorus* are much more weedy, mostly inland. But frequently plants are found that seem intermediate. Either these species produce (apparently) fertile hybrids where they meet, or other distinguishing characters need be found.

But *Cenchrus bambusoides* represents a still higher level of uncertainty. Caro & Sanchez (1967) gave evidence that this species differed markedly in leaf anatomy. By their careful drawings, *C. incertus* and *C. pauciflorus* are shown to have rather large bulliform cells just below the upper epidermis, on either side of the blade midline, while *C. bambusoides* has small bulliform cells below the upper epidermis, distributed evenly across the blade. This cellular structure is found throughout the grasses. As the leaf tissues dry with age or drought, the bulliform cells collapse. Their diminished volume causes distortion of the blade. In species where the bulliform cells are restricted to near the midline, the flat (=plane) blade folds longitudinally, with the cross-section becoming V-shaped (=conduplicate). And where the bulliform cells are evenly distributed across the width of the blade, drying causes the blade to distort from flat (=plane) to rolled (=inrolled). Especially in *C. pauciflorus*, a moderately large midvein produces a distinct keel along the ventral surface.

Plants with the foliar characteristics ascribed to *Cenchrus bambusoides* are found in south peninsular Florida, apparently restricted to sandy soils near the shore. But this is also the habitat of *C. incertus* and -- other than the rolled leaves -- Caro & Sanchez's plant is very similar to that species. Also unsettling is the absence of reports of this plant from elsewhere, especially the Caribbean from which have come innumerable other tropical species. The present "best estimate"

(an appropriate statistical term), subject to verification, is that *C. bambusoides* is a recognizable distinct species.

Cenchrus spinifex Cav. (1799), though prior to *C. incertus* and other possible names, is not accepted here. This name was based by A. J. Cavanille on collections from two well-separated South American locations, Longavi [southern Chile] and Montevideo [Uruguay]. Though the description was given in exquisite detail (82 words), it lacks those key phrases that would match it with modern South American species. Chase (1920: 69) rejected the name, stating the leaf blades were not of *C. pauciflorus* and the description and figure of the bur "does not correspond to any known species of *Cenchrus*." DeLisle (1963: 313) stated he had seen a possible isotype (F) that "closely resembles" his all-inclusive *C. incertus*, but rejected Cavanille's name until the isotype label has been verified and the type and isotype have been further studied. Cavanille's name was not recognized or used by Caro & Sanchez (1967). Without comment and without synonymy, Stieber & Wipff (2003: 533) use *C. spinifex* Cav. (perhaps the basis for the appearance of the name in recent floristic publications). However, if DeLisle's tentative acceptance of *C. incertus* were to be reversed, and if Stieber & Wipff's use of *C. spinifex* were to be followed, the meaning of *C. spinifex* would still be subject to uncertainty. As viewed by others, *C. incertus* s.lat. is believed to represent not only *C. incertus* s.str., but a complex of related species, including *C. pauciflorus*, *C. longispinus*, and *C. bambusoides* (even *C. humilis* Hitchc., another South American species). Acceptance of *C. spinifex* would require rejection of the views of Chase (1920), Shinnars (1954), DeLisle (1963, tentatively), and Caro & Sanchez (1967), that more than one species is represented by a too-broad interpretation of *C. incertus*. No argument has been seen in support of *C. spinifex*. Certainly acceptance of *C. spinifex* demands a substantial justification.

Without reference to *Cenchrus spinifex*, J. Reveal (Taxon 39: 353-355. 1990) neotypified *C. carolinianus* Walt. (1788) by material currently known as *C. incertus* M. A. Curtis (1837), thereby displacing that name. His intent was to request the Special Committee (of the Int'l Assoc. for Plant Taxonomy) to declare the name formally rejected (thus

invalid and no longer a threat to *C. incertus*). But the Committee declined to act, citing a restriction in the I.C.B.N., thus leaving *C. carolinianus* the earliest valid name, the very opposite of the goal sought by Reveal. Then in 1994, by revision of the I.C.B.N., the restriction was lifted. The Committee again addressed the issue, and the vote was unanimous that *C. carolinianus* be rejected. Without the larger world being aware that a nomenclatural catastrophe had been so narrowly averted, the legitimacy of *C. incertus* was restored.

CENCHRUS L. Sandspurs ¹

1. Burs small, 1.5-2.5 mm. thick, very numerous (>100) per rachis, compactly spaced, forming a long (8-20 cm.) slender spike; bristles of bur connate only at base, thus forming no hard involucre (without stout spines, the bur scarcely bur-like). Perennial grass, to 2 m. Coastal shores. Southwest peninsula (Monroe, Collier cos.); disjunct to upper peninsula (Levy Co.); rare (but forbiddingly dense where found). Summer-fall. **Cenchrus myosuroides** HBK.
1. Burs larger, 3-10 mm. thick, few to several (<20) per rachis, compactly (in *C. brownii*, *C. pauciflorus*) or loosely spaced, forming a stout spike; inner spines of bur connate above base, forming a hard involucre around spikelets; inner spines stout (outer spines often bristle-like).
2. Burs large, 6-10 mm. thick; spines hirsute toward base. Annual grass, to 0.5 m. Coastal dunes. Florida coastline: panhandle (Santa Rosa, Bay, Gulf, Franklin cos.); south peninsula (Palm Beach, Collier, Dade, Monroe cos.); northeast peninsula (Duval Co.); rare. Summer-fall. The terror of the unshod!
DUNE SANDSPUR. **Cenchrus tribuloides** L.
2. Burs moderate-sized, 3-7 mm. thick (excluding protruding spines); spines glabrous or sparsely pubescent.
3. Bur with many fine bristles encircling base, and a single inner whorl of stout flattened spines; plants annual.
4. Outer spines usually purplish toward tip, 1/2 length of inner ones; burs loosely spaced, with rachis apparent; peduncle of bur stout, 2.0-2.5 mm. thick. Decumbent annual grass. Roadsides, fields, waste areas. Throughout; common. Spring-

summer-fall.

SOUTHERN SANDSPUR.

Cenchrus echinatus L.

4. Outer spines uniformly tan, \pm equal inner ones; burs closely crowded, with rachis largely concealed; peduncle of bur relatively slender, ± 2.0 mm. thick. Annual grass. Waste areas, open hammocks, usually near shores. South peninsula (Dade, Monroe cos.); rare. Winter-spring. [*Cenchrus viridis*, misapplied.] **Cenchrus brownii** Roem. & Schult.

3. Bur with few or no bristles, but with several whorls of stout spines, the inner progressively larger; plants perennial or annual.

5. Leaves narrow, 1.5-3.0 mm. wide; spines very slender, only slightly thicker toward base, 3.5-5.5 mm. long. Perennial grass. High pinelands, with wiregrass (*Aristida stricta*), longleaf pine (*Pinus palustris*). Peninsula (Suwannee, Baker, to Dade Co.); frequent. Summer. Nearly endemic.

SANDHILLS SANDSPUR. **Cenchrus gracillimus** Nash

5. Leaves broader, 2.5-7.5 mm. wide, spines appreciably thicker toward base, 2.0-4.5 mm. long; plants perennial or annual.

6. Plants annual; leaves plane or folded along a noticeable keel; stems somewhat gracile, ascending to erect, usually solitary or few; burs closely crowded. Annual grass. Sandy or loamy soils of roadsides, lawns, waste areas, sometimes dunes. Throughout; common (less so in panhandle). Summer-fall. [*Cenchrus incertus*, misapplied.]

FIELD SANDSPUR. **Cenchrus pauciflorus** Benth.

6. Plants perennial; leaves plane or inrolled, with a scarcely evident keel; stems robust; burs uncrowded.

7. Burs maturing to dark brown or purple; blades not abscising from sheath; stems decumbent, often with several from a single base, forming loose mats. Perennial grass. Coastal dunes, shelly shores, sandy disturbed soils inland. Throughout; common (less so inland). All year. [*Cenchrus carolinianus* Walt.; *Cenchrus spinifex*, misapplied; *Cenchrus strictus* Chapm.]

BEACH SANDSPUR. **Cenchrus incertus** M. A. Curtis

7. Burs tan; blades abscising at summit of sheath; stems one or few from a single base, ascending to sub-erect. Perennial grass. Sandy shores. South peninsula (Palm

Beach, Collier, Dade, Monroe cos.); infrequent. All year.

Cenchrus bambusoides Caro & Sanchez

Excluded names:

Cenchrus longispinus (Hack. in Kneuck.) Fern.

Cenchrus pauciflorus, misapplied

Northern. DeLisle (1963) cited several scattered spms. from Florida. But when borrowed and examined (FLAS, 1972) they were found to be mostly *C. incertus* in north Florida and *C. bambusoides* in south Florida. None, apparently, were true *C. longispinus*.

¹ This paper is a continuation of a series begun in 1977. The "amplified key" format employed here is designed to present in compact form the basic morphological framework of a conventional dichotomous key, as well as data on habitat, range, and frequency. Amplified keys are being prepared for all genera of the Florida vascular flora; the present series is restricted to genera where a new combination is required or a special situation merits extended discussion.

This study has proceeded by fits and starts over four decades. I am grateful to J. A. Caro, D. G. DeLisle, and L. H. Shinnars for their correspondence and willingness to discuss various aspects of *Cenchrus* taxonomy and nomenclature. I thank FSU, ISC, and MO for the loan of specimens to FLAS, and to MEXU for giving me direct access to their collections. David W. Hall, as always, has advised me of problems and possible solutions as he saw them. Scott Forrest, under my direction at FLAS, and Donald R. Deis, under the direction of Daniel F. Austin at FAU, were of significant help on separate but related sandspur projects.

"Jas. C. Neal, M. D." author of the quotation cited above, was recorded as "Entomologist" in the 1889 first annual report of the Florida Agricultural Experiment Station, Lake City, Florida. In the 1890 second annual report he carried the title of "Entomologist and Botanist." He then disappeared from subsequent reports, and from history. Dr. Neal merits commemoration in that he apparently was Florida's first salaried botanist. It wasn't until passage of the Hatch Act in 1887, establishing the nation's agricultural experiment stations, that Florida could support a botanist. Earlier persons with botanical skills were amateur or professional collectors, or supported themselves as physicians or in other ways (see "Botanical Exploration in Florida," by R. P. Wunderlin, B. F. Hansen & J. Beckner, in *Flora of Florida*, vol. 1. 2000).



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