

## *Cyperus entrierianus*: A Little Known Aggressive Sedge in the Southeastern United States<sup>1</sup>

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### INTRODUCTION

Four of the world's worst weeds are in the genus *Cyperus*. These are smallflower umbrella sedge (*C. difformis* L.), yellow nutsedge (*C. esculentus* L.), riceflatsedge (*C. iria* L.), and the world's worst weed, purple nutsedge (*C. rotundus* L.) (7). Fourteen additional *Cyperus* species are listed in the Composite List of Weeds<sup>3</sup>. *Cyperus* is in the sedge family (Cyperaceae) which consists of about 600 species found mostly in tropical to warm-temperate regions around the world (9). *Cyperus entrierianus* Böckeler is an aggressive, robust, fast growing, tenacious pest that produces large numbers of seeds (4). Apparently, it was introduced into the southeastern United States from temperate South America or Mexico (2). Presently, it is found in the southeastern United States from southeastern Texas to southern Georgia (4). The senior author has observed severe infestations of this weed in ditches, pastures, and fallow fields in southwestern Louisiana and southeastern Texas. Our objectives are to alert weed scientists, agronomists, and others concerned to the potential of this species and to discuss its biology, distribution, ecology, and taxonomy.

### DESCRIPTION

*Cyperus entrierianus* is a robust perennial (7 to 11 dm tall) that typically grows in large, more-or-less loose clumps (Figure 1). Its tenacious base is deeply set in the substrate and consists of thickened culm bases connected by short, 5 to 7 mm thick rhizomes. Rhizomes, scale leaves, and leaf bases are dark purple to nearly black. Culms are 2 to 3.5 mm in diam (mid-culm), obtusely trigonous, and glabrous (or rarely sparsely scabrid toward apex). Leaves are basal; the lowermost are reduced and scale-like and grade into conspicuous leaves with elongate blades and

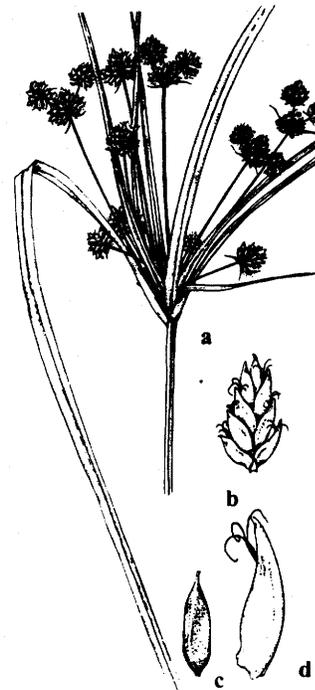


Figure 1. *Cyperus entrierianus* (based on Diaz Luna 426) reproduced from Denton (6) with the permission of the University of Michigan Herbarium. a, inflorescence; b, spikelet; c, achene; d, scale.

sheathing bases. The longest leaves are half to nearly as long as the culm (3.5 to 5.5 dm tall). Leaf blades are nearly flat to V-shaped in cross-section, 4 to 7 mm wide, glabrous, and shiny with sparsely scabrid margins and abaxial midribs.

The inflorescence is terminal, consisting of 5 to 11 elongate rays each subtended by an inflorescence bract. Inflorescence bracts are ascending at an angle  $\geq 45$  degrees and variable in length; the lowermost four to six are leafy, well developed, and equal to or several times longer than the longest ray. Rays vary in length up to 13 cm; each consists of an elongated, glabrous peduncle terminated by a dense, compound, more or less capitate spike of densely clustered spikelets. Spikelets are flattened with distichous scales and are 4 to 9 mm long and 1.5 to 2.3 mm wide.

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<sup>3</sup>Anonymous. 1989. Composite List of Weeds. Available from WSSA, 1508 West University Ave., Champaign, IL 61821-3133.

Table 1. Taxonomic features of closely related *Cyperus* species.

Feature	<i>Cyperus</i> sp.			
	<i>entrerianus</i>	<i>virens</i>	<i>pseudovegetus</i>	<i>surinamensis</i>
Plant bases	Deep-set in substrate, reddish-brown to black	Shallow-set in substrate, brown to purplish-brown	Shallow-set in substrate, greenish-brown to purplish-brown	Shallow-set in substrate, greenish-brown to purplish-brown
Clumps	Large	Small	Small	Small
Culms	Loosely associated; obtusely trigonous to rounded smooth	Closely associated; triquetrous; winged angles scabrid	Solitary or closely associated; obtusely trigonous to rounded smooth	Solitary or closely associated; obtusely trigonous to rounded; scabrid, rarely smooth
Leaves	Glossy green, margins sparsely scabrid	Dull green, margins scabrid	Dull green, margins sparsely scabrid	Yellow-green, margins sparsely scabrid
Inflorescence bracts	Ascending at $\geq 45$	Spreading	Spreading to ascending	Spreading to ascending
Spikelets	1.5 to 2.3 mm wide, 16 to 32 fertile scales	2.3 to 3.8 mm wide, 14 to 30 fertile scales	2.5 to 3.2 mm wide, 8 to 22 fertile scales	1.6 to 2.1 mm wide, 18 to 48 fertile scales
Scales	Pale green to yellowish green; maturing light brown, 1.3 to 1.8 mm long	Pale green sometimes reddish-brown sides, 2.0 to 2.2 mm long	Greenish-brown sometimes with reddish-brown sides, 1.7 to 2.1 mm long	Yellow with translucent sides, 1.2 to 2.0 mm long
Anthers	0.6 to 0.7 mm long	1.0 to 1.2 mm long	0.7 to 0.8 mm long	0.6 to 0.7 mm long
Achenes	Narrowly elliptical, 0.9 to 1.1 mm long	Oblong to narrowly elliptical, 1.1 to 1.5 mm long	Narrowly lanceolate to linear, 1.2 to 1.5 mm long	Oblong to elliptical, 0.6 to 0.8 mm long

Scales are proximally two-keeled (i.e., with a median, dorsal groove), 1.3 to 1.8 mm long, pale green (sometimes yellowish green) maturing to light brown, and undergo abscission with the associated achenes gradually from the base to the apex of the spikelet. Each floret has one stamen, with anthers 0.6 to 0.7 mm long. The achenes are obtusely trigonous, narrowly elliptical, 0.9 to 1.1 mm long, and dark brown or nearly black at maturity.

*Cyperus entrerianus* is in the section *Luzuloidei* of subgenus *Cyperus* (8) and is characterized by Kranz anatomy and  $C_4$  photosynthesis. A comprehensive treatment of the *Luzuloidei* was compiled by Denton in 1978 (6), but *C. entrerianus* was not recognized. Table 1 compares *C. entrerianus* with closely related species of *Cyperus* that occur in the southeastern United States. Of these species, *C. entrerianus* most closely resembles the green sedge, *C. virens* Michx., in the field. A key for distinguishing United States members of section *Luzuloidei* was developed by Carter (4).

#### DISTRIBUTION, ECOLOGY, AND BIOLOGY

*Cyperus entrerianus* is apparently native to temperate South America (Argentina, Brazil, and Paraguay) (1, 8, 10); it is also reported from Mexico (8, 11). *C. entrerianus*

was first reported in the United States in 1990 where it is restricted to the outer Gulf and Atlantic coastal plains (4). The time of introduction is unknown. The earliest known United States collection of *C. entrerianus* was made in 1974 from Escambia County, Florida (4). Although its vector is unknown, the distribution and abundance of *C. entrerianus* in the rice (*Oryza sativa* L.) belt of eastern Texas and southwestern Louisiana suggest an initial point introduction there, perhaps as a rice seed contaminant or by migratory birds. In the United States, *C. entrerianus* ranges from southeastern Texas through the southern portions of Louisiana, Mississippi, Alabama, and Georgia into northern Florida (3, 4, 5).

The distribution of *C. entrerianus* within the United States by county is shown in Figure 2. Numerous populations of *C. entrerianus* have been found along or within a few miles of Interstate Highway 10 from Texas into Florida. This could be explained in part by more intensive sampling along this major thoroughfare by field botanists; however, surveys by the authors seem to indicate that *C. entrerianus* is being dispersed along Interstate 10 and other major highways near Interstate 10, by mowing, soil moving and construction equipment, and other forms of traffic common to roadways. It is likely that this weed will

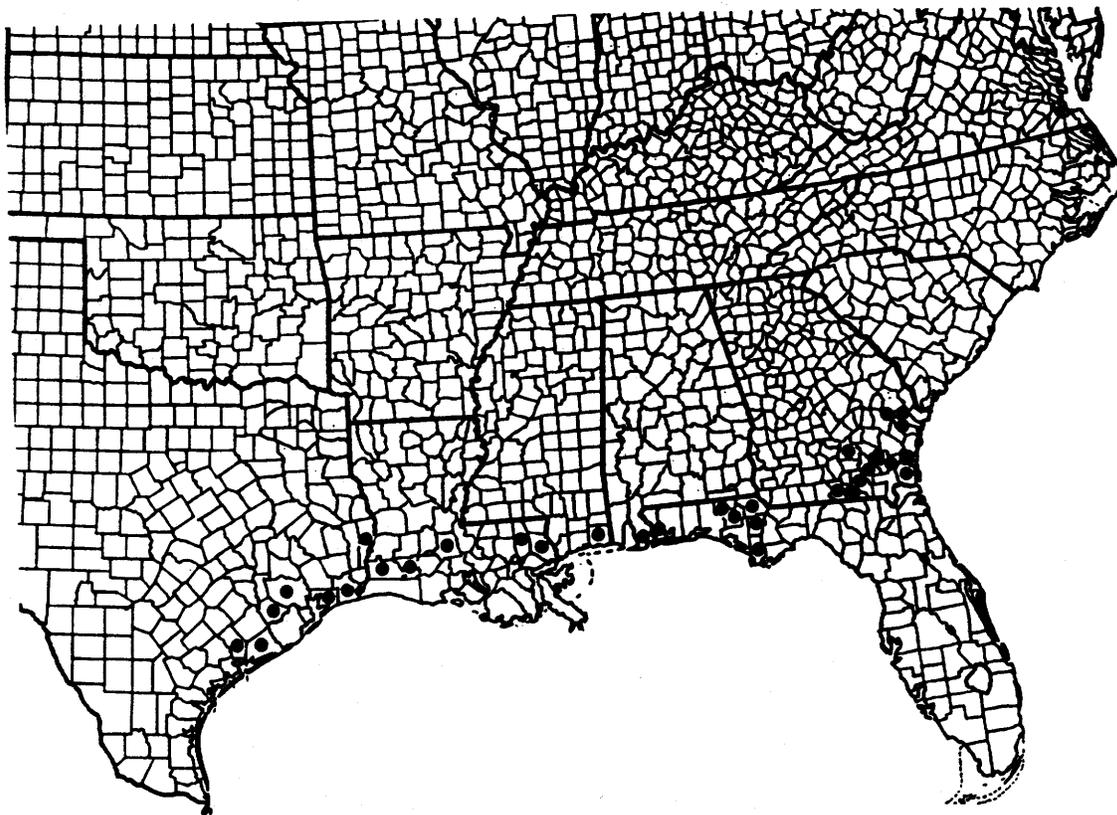


Figure 2. Distribution of *Cyperus entrianus* in the United States. Each dot represents one or more herbarium specimens collected per county.

continue to spread along highways and subsequently infest adjacent fields as it has in Louisiana and Texas (4).

*Cyperus entrianus* has been observed in open, disturbed habitats including roadsides, ditches, fallow fields, pastures, edges of rice fields, and edges of salt marshes, where it is typically found in poorly drained, mucky, loamy or clayey soils (3, 4). At several locations, *C. entrianus* was observed as a primary invader of disturbed soil at construction sites, new road construction, land fills, and dredge spoil areas (3, 4, 5). Although it is presently known only from low elevations in the outer coastal plain of the southeastern United States, it has been observed far inland in temperate South America at elevations to 410 m (4).

*Cyperus entrianus* reproduces sexually by seeds and asexually by fragmentation of rhizomes upon which buds have developed. *C. entrianus* is a prolific seed producer, with an estimated average of 18 000 seeds per culm (range 7300 to 32 400). Culm number ranges from several up to 100, typically with 10 to 20. Preliminary seed germination studies indicate moderate to high seed viability levels (55 to 95%). In the southeastern United States, *C. entrianus*

flowers and fruits from June until frost (November or December) (3, 4, 5).

*Cyperus entrianus* is locally abundant and is an aggressive weed in the rice producing areas of southwestern Louisiana and eastern Texas (4, 5). *C. entrianus* is a weed of rice in Paraguay (4). Its present distribution and association with high hydroperiod soils suggest that it could become a serious pest of rice in southeastern United States.

Additional research is needed to determine the potential of this pernicious weed to extend its range in the United States, especially in the outer Gulf and Atlantic coastal plains and into the peninsula of Florida. If additional populations are found from outside the existing range, please contact the authors, the U.S. Department of Animal and Plant Health Inspection Service, or the appropriate state agency.

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