

Invasion Alert

Spread of Cuban Club-Rush (*Oxycaryum cubense*) in the Southeastern United States

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Cuban club-rush is an invasive aquatic weed that is spreading northward in the southeastern United States. It is reported for the first time from Mississippi and from significantly farther northward in Alabama than was previously known. Cuban club-rush dissemination and rapid population growth are attributed to two types of reproduction: corky floating achenes and asexual reproduction by fragmentation. An illustration of Cuban club-rush and photos of its habit and habitat are provided.

Nomenclature: Cuban club-rush, *Oxycaryum cubense* (Poepp. & Kunth) Palla.

Key words: Aquatic, invasive, weed dispersal.

Oxycaryum is a monotypic genus widely distributed in the tropics and subtropics of Africa and the Americas (Bruhl 2002). *Oxycaryum cubense* (Poepp. & Kunth) Palla, Cuban club-rush, is known from the West Indies (Kunth 1837), South and Central America (Adams 1994; Nees von Esenbeck 1842; Tur 1971), the southeastern United States (Bryson et al. 1996; Chapman 1889; Clewell 1985; Correll and Johnston 1970; Godfrey and Wooten 1979; Hatch et al. 1990; Jones et al. 1997; Lelong 1988; Mallison et al. 2001; Mohr 1901; Small 1933; Thomas and Allen 1993; Tucker 1987; Turner et al. 2003; Wunderlin 1998), and tropical Africa (Haines and Lye 1983; Hooper and Napper 1972; Lye 1971; Okali and Hall 1974). In the southeastern United States, *O. cubense* is found sporadically in Florida (Anderson 2000, 2007; Chapman 1889; Clewell 1985; Mallison et al. 2001; Wunderlin 1998), southern Georgia (Bryson et al. 1996), southern Alabama (Lelong 1988; Mohr 1901), Louisiana (Thomas and Allen 1993), and coastal Texas (Correll and Johnston 1970; Hatch et al. 1990; Jones et al. 1997; Turner et al. 2003).

The taxonomic placement of *O. cubense* has been disputed.

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It possesses spirally arranged scales and thus has been treated as *Scirpus cubensis* Poepp. & Kunth (e.g., Correll and Johnston 1970; Godfrey and Wooten 1979; Wunderlin 1998). Molecular analysis by Muasya et al. (2002) supports classification of *Oxycaryum* in tribe Cypereae. Two forms of *O. cubense* are recognized and they differ from one another by inflorescence features (Figure 1). Plants with umbellate inflorescences are *O. cubense* forma *cubense*, while those with monocephalous inflorescences are *O. cubense* forma *paraguayense* (Maury) Pedersen (Barros 1960; Pedersen 1995).

Each of the *O. cubense* collections reported herewith possess monocephalous inflorescences and is *O. cubense* forma *paraguayense* (Figure 2). The Alabama record cited below is only the third collection from Alabama and circa (ca.) 310 km (190 mi) north of previously reported sites in Mobile County, Alabama (Bryson et al. 1996; LeLong 1988; Mohr 1901). The Mississippi records cited below are the first from the state, represent the most northern collections of *O. cubense* in the United States, and expand the range north from the initial Alabama collections by ca. 380 km. Surveys north of Monroe County, Mississippi, have not yielded *O. cubense* populations. Large floating rafts (in excess of 50 m long and 20 m wide [ca. 165 ft long and 65 ft wide]) of *O. cubense* in association with *Eichhornia crassipes* (Mart.) Solms and *Salvinia minima* Baker were observed in each of the counties reported below from 2004 to 2008. *Hydrilla verticillata* (L.f.) Royle, *Hydrocotyle ranunculoides* L.f., *Ludwigia leptocarpa* (Nutt.) H. Harra, *Myriophyllum aquaticum* (Vell.) Verdc., *M. spicatum* L., *Potamogeton nodosus* Poir., *Proserpinaca palustris* L., and *Utricularia gibba* L. were recorded in association with one or more populations of *O. cubense*.

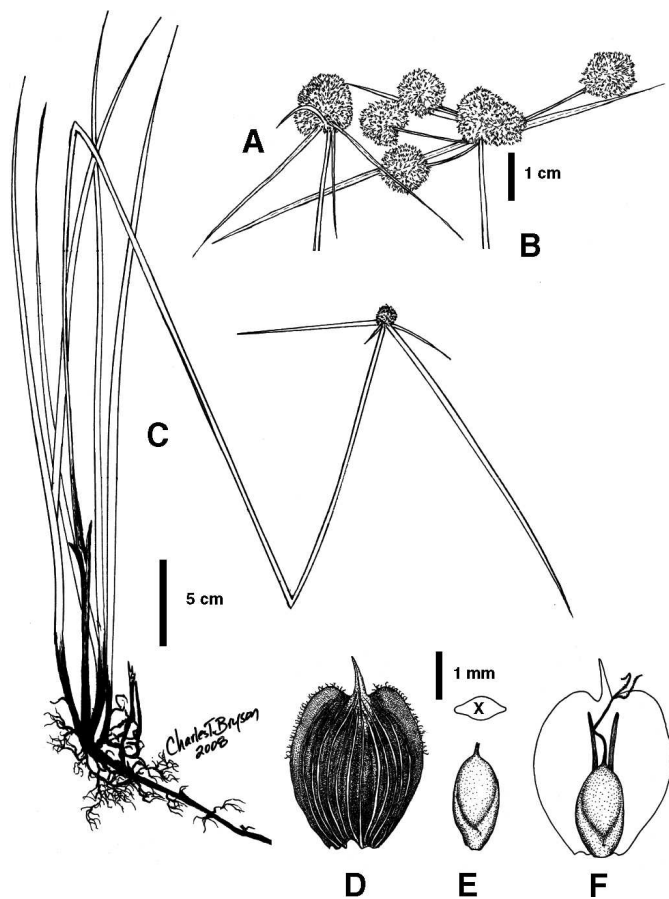


Figure 1. Illustration of *Oxycaryum cubense* (Poepp. & Kunth) Palla: (A) inflorescence of *O. cubense* (Poepp. & Kunth) Palla forma *cubense*; (B) inflorescence of *O. cubense* (Poepp. & Kunth) Palla forma *paraguayense* (Maury) Pedersen; (C) plant habit (culm folded); (D) abaxial view of scale; (E) abaxial and cross section view of achene; and (F) adaxial view of achene with stigma, style, and anthers attached within scale. (B) drawn from *Rosen 2362 & Lange* (herb. Bryson) and (A) and (C)–(F) drawn from *Bryson 20462 & Maddox* (herb. Bryson).

Voucher specimens. *United States, Alabama.*

Pickens County. Aliceville Lake adjacent to boat access off Hwy 86, E side of Tennessee-Tombigbee Waterway, 22 Oct 2004, *Maddox 3489* (herb. Maddox); W side of Pickensville Lock and Dam on Aliceville Lake along Tennessee-Tombigbee Waterway, 2 Nov 2004, *Bryson 20,462 & Maddox* (DAV, DOV, JSU, MISS, MISSA, MMNS, MO, SWSL, USMH, VDB, VSC, herb. Bryson); *Maddox 3495 & Bryson* (herb. Maddox).

United States, Mississippi.

Clay Co. Just N of Waverly Ferry boat ramp S of Hwy MS 50, 8 Nov 2004, *Maddox 3517* (herb. Maddox); *Maddox 3518* (SWSL); *Maddox 3519* (herb. Bryson).

Lowndes County. Ca. 5.5 mi. NW of Columbus; just E of Hwy MS 50 bridge over Tennessee-Tombigbee Waterway, 15 Oct 2004, *Maddox 3476* (herb. Maddox); 2 Nov 2004, *Bryson 20,453 & Maddox* (DAV, DOV, JSU, MISS, MISSA, MMNS, MO, SWSL, USMH, VDB, VSC, herb. Bryson).

Monroe County. Aberdeen Lake on Tennessee-Tombigbee Waterway just past lock and dam E bank access in pond, 8 Nov 2004, *Maddox 3526* (herb. Maddox); *Maddox 3527* (SWSL); *Maddox 3528* (herb. Bryson).

O. cubense is a vigorous invasive aquatic plant similar in vegetative reproductive capability to *Salvinia molesta*, *Pistia stratiotes* L., and other invasive aquatic weeds (Tur 1971). It forms transient floating mats and rafts in lakes in Africa (Holm et al. 1977; Okali and Hall 1974), Argentina (Tur 1971), and the United States (Mallison et al. 2001). Although not stated directly (Tur 1971), there are some implications of aquatic succession in mat or raft formation since *O. cubense* depends upon the preexistence of other aquatic species, such as *E. crassipes*, for establishment. These floating mats and rafts impede navigation and displace native organisms. In the southeastern United States and elsewhere, *O. cubense* appears to be extremely invasive, with extensive floating mats and rafts covering large areas in ditches, lakes, ponds, rivers, and impounded swamps to the exclusion of other aquatic vegetation (Bryson et al. 1996; Haines and Lye 1983; Mallison et al. 2001). It is reportedly highly competitive with other floating aquatic species including *Azolla* spp., *E. crassipes*, and *P. stratiotes* (Tur 1971). As suggested by Bryson and Carter (2008), the species is either in the lag phase, or the sporadic distribution of *O. cubense* in the United States suggests low fertility of achenes. Seed placement may be important in establishment. For example, seed germination has been observed in the leaf axils of other aquatic species such as *E. crassipes* (Tur 1971). This characteristic identified *O. cubense* as an aquatic epiphyte by Tur (1971). The corky, buoyant achenes of *O. cubense* are adapted to dispersal by moving water. Its mat-forming, floating habit facilitates asexual reproduction and transport of vegetative fragments by moving water (Haines and Lye 1983).

O. cubense has been in the southeastern United States for more than a century (Chapman 1889; Mohr 1901), and was possibly dispersed into North America from the West Indies or South America by migratory birds or with ship ballast (Bryson et al. 1996). In order to better understand its dispersal and potential to invade wetland habitats, additional research is needed on both its reproductive biology, to determine the extent to which *O. cubense* reproduces sexually and spreads from achenes, and its association with other aquatic weeds.

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Figure 2. *Oxycaryum cubense* (Poepp. & Kunth) Palla forma *paraguayense* (Maury) Pedersen, Cuban club-rush, from the Tennessee-Tombigbee Waterway near Columbus, Mississippi (A) inflorescence; (B) a raft of *O. cubense* growing with *Eichhornia crassipes*; and (C) large floating rafts of *O. cubense* alone or mixed with *E. crassipes* and other floating aquatic plants.

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