

CYPERUS SUBGENUS KYLLINGA (CYPERACEAE) IN THE CONTINENTAL UNITED STATES

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Six subgenera of *Cyperus* are recorded as occurring in the continental United States. Monographic studies including the United States species of three of these are available: *Eucyperus* (= *Cyperus*) (McGivney, 1938), *Mariscus* (Horvat, 1941), and *Pycneus* (Corcoran, 1941). We are preparing an account of the United States species of two additional subgenera, *Juncellus* and *Torulinum*. The present paper is a study of the remaining subgenus, *Kyllinga*, which is represented in the continental United States by four species, one (*C. brevifolioides*) being previously unreported for the New World. It is true, of course, that *Kyllinga* was studied in its entirety by Kükenthal (1936) in his voluminous work on *Cyperus* and that regional treatments of *Kyllinga* especially pertinent to our area have been published (Fernald, 1950; Gleason, 1952; Johnston, 1966; McLaughlin, 1944; Small, 1933). However, none of these works purports to cover adequately the taxonomy, variation, and distribution of United States *Kyllinga*.

The data presented in this paper are based upon field observations and upon study of about 1200 herbarium specimens. Our annotations on these specimens form a permanent record of our work. Our paper, therefore, contains only a very limited citation of specimens.

With the exception of that given for *C. brevifolioides*, synonymy is limited to those names that have been used for *Kyllinga* in certain major works directly applicable to continental United States. Full synonymy can be found in Kükenthal's monograph of *Cyperus* (Kükenthal, 1936). For *C. brevifolioides* we have given a full description, but for the other three species our descriptions are limited to those characteristics that we consider to be most diagnostic.

According to our field observations and to the many label data we have noted, the United States representatives of *Kyllinga* are somewhat weedy plants that occupy about the same wide range of habitats, including marshes, sand bars, swamp margins, pine savannas, low deciduous woods, lawns, gravel pits, mud flats, stream banks, pastures, lake shores, fallow or cultivated fields, and roadsides.

Illustrations of spikelets of our four species of *Kyllinga* are given in Figure 1; of achenes, in Figure 2. Distribution maps are given for all species.

We consider that mature achenes are necessary for critical determination of *Kyllinga*. The plants should be collected and mounted with their subterranean parts intact.

Cyperus L. subgenus *Kyllinga* (Rottb.) Suringar

Annuals or perennials; culms slender, leafy at the base; bracts usually 3-4, leaflike; heads of spikelets 1-3, terminal, sessile; spikelets many, deciduous from the rachis at maturity, consisting of 3 (-4) scales, the lowest 2 empty, the upper 1 (-2) fertile; scales 2-ranked; stamens 1-3; style bifid, deciduous from the achene; achenes usually lenticular but sometimes obscurely trigonous, 1 or occasionally 2 in a spikelet.

A. Plant rhizomatous B.

A. Plant caespitose, culms densely aggregated C.

B. Scale keel smooth; stamens 2-3 1. *C. brevifolioides*

B. Scale keel denticulate; stamen 1 2. *C. brevifolius*

C. Mature achene uniformly tan to light brown, oblong, 0.4-0.7 mm wide; scale keel denticulate 3. *C. tenuifolius*

C. Mature achene purple black, with stipe and apiculus contrastingly light, obovate, 0.8-0.9 mm wide; scale keel denticulate or smooth 4. *C. sesquiflorus*

1. **CYPERUS brevifolioides** Thieret et Delahoussaye, nom. nov.

Kyllinga monocephala Rottb. var. *leiolepis* Franch. et Sav., Enum. Pl. Japon. 2: 108. 1877.

Kyllinga gracillima Miquel, Ann. Mus. Bot. Lugd.-Batav. 2: 142. 1866; non *Cyperus gracillimus* (Chiovenda) Kükenth., 1936.

Kyllinga brevifolia Rottb. var. *gracillima* (Miquel) Kükenth., Meddel. Göteb. Bot. Trädg. 5: 107. 1929.

Cyperus brevifolius (Rottb.) Hassk. var. *gracillimus* (Miquel) Kükenth., Cyperaceae 603. 1936.

Kyllinga brevifolia (Rottb.) Hassk. var. *leiolepis* (Franch. et Sav.) Hara, Jour. Jap. Bot. 14: 339. 1938.

Cyperus brevifolius (Rottb.) Hassk. var. *leiolepis* (Franch. et Sav.) Koyama, Jour. Jap. Bot. 30: 126. 1955.

Similar in habit to *C. brevifolius*; rhizomatous perennial; roots fibrous, brown; rhizomes 1.0-1.5 mm thick, to at least 13 cm long, sheathed by overlapping, lanceolate, reddish scales ca. 13 mm long; culms 9-22 mm apart on the rhizome, 12.5-48.0 cm tall, slender, 0.5-1.0 mm broad at apex, 1-2 mm broad at base, triquetrous; leaves crowded at base of culm, 10-50 cm long, 1-3 mm wide; sheaths 1-3, usually reddish brown, 1-8 cm long; bracts 3-4, leaflike, 2-27 cm long; inflorescence a simple, compact, globular head of spikelets, 8-10 mm in diameter; spikelets 3.5-4.6 (mean 4.3) mm long, 1.2-1.3 (mean 1.22) mm wide; scale keel smooth, greenish to brown at maturity; stamens 2-3; anthers 0.8 mm long; filaments 2.3 mm long, hyaline when young, tan when mature; style ca. 2.1 mm long, the branches ca. 0.6 mm long; achene obovate, 1.5-1.8 mm long, 0.8-1.0 mm wide.



Figure 1. Spikelets of (left to right) *Cyperus brevifolioides*, *C. brevifolius*, *C. tenuifolius*, and *C. sesquiflorus*.

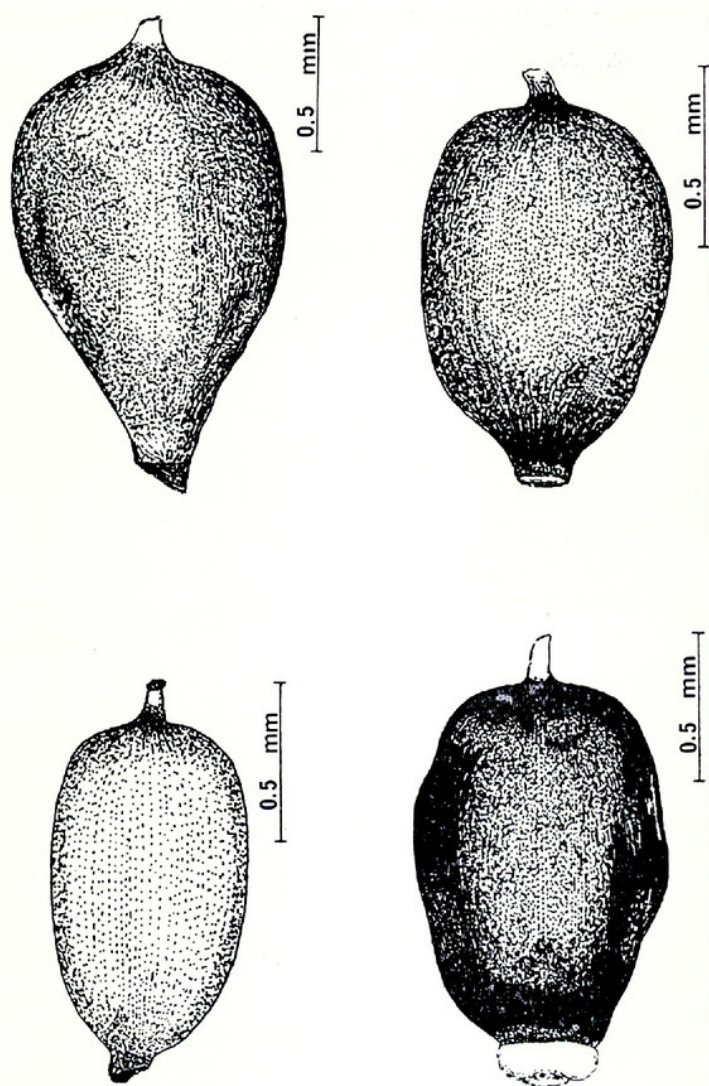


Figure 2. Achenes of *Cyperus brevifolioides* (top left), *C. brevifolius* (top right), *C. tenuifolius* (bottom left), and *C. sesquiflorus* (bottom right).

This is the taxon most recently known as *C. brevifolius* var. *leiolepis* and previously recorded only from far eastern Asia (Koyama, 1961; Ohwi, 1965). It is a well-marked taxon, one which we are most unwilling to accept as being only varietally distinguishable from *C. brevifolius* var. *brevifolius*. The choice of a name to designate it in its new rank has led us into quite unexpected byways. Eventually we concluded that no name in specific rank is available for it; we have chosen, therefore, to call it *C. brevifolioides*. Mention must be made here of the names *Kyllinga riederiana* Meinsh. ex Komar. (Fl. Penins. Kamtsch. 200. 1927.) and *K. kamtschatica* Meinsh. (Act. Hort. Petropol. 18: 229. 1901.) that are included by Koyama (1961) in synonymy under *C.*

brevifolius var. *leiolepis*. We cannot agree that these names are synonyms of *C. brevifolius* var. *leiolepis*. *Kyllinga riederiana* is a previously unpublished name that was merely cited by its author as a name *pro syn.* under *K. kamtschatica* and thus was not validly published. *Kyllinga kamtschatica* we regard as a synonym of *C. brevifolius* var. *brevifolius*, as borne out by the following statement from the original description of *K. kamtschatica*: "carina . . . spinoso-hispida." The "spinose-hispid" keel of *K. kamtschatica* excludes this taxon from consideration as a synonym of *C. brevifolius* var. *leiolepis*, a taxon distinguished by smooth scale keels.

Cyperus brevifolioides is, as its name implies, superficially quite similar to *C. brevifolius*. Indeed, all of the specimens of *C. brevifolioides* that we examined, except one, were misidentified as *C. brevifolius*; on one sheet, labelled *C. tenuifolius*, one plant of *C. brevifolioides* was mounted with one of *C. tenuifolius*. It is not at all surprising that New World *C. brevifolioides* has gone unnoticed for so long. In previously available keys to United States *Kyllinga*, *C. brevifolioides*, because of its long creeping rhizomes, runs immediately to *C. brevifolius*. Upon close inspection, however, the many differences between these two species become evident. The inflorescence of *C. brevifolioides* is round in outline, not oval or rectangular as in *C. brevifolius*, and it always consists of but a single head. The scale keels of *C. brevifolioides* are smooth, whereas those of *C. brevifolius* are denticulate. The spikelet of *C. brevifolius* has a maximum length of 3.2 mm and a mean length of 2.5 mm; that of *C. brevifolioides* has a *minimum* length of 3.5 mm. The achenes of the two species are both obovate, but the achene of *C. brevifolius* is 1.3 mm long (maximum) and that of *C. brevifolioides* is 1.5-1.8 mm long. *Cyperus brevifolius* has only a single stamen; *C. brevifolioides* has either 2 or 3.

We cite here all the New World specimens of *C. brevifolioides* that we have seen. Border of dredged sand over tidal marsh, s.e. along Delaware River, Eddington, Bucks Co., Pennsylvania, Bayard Long 38547, 24 Sept. 1932 (GH). Centennial Grounds, Philadelphia, Pennsylvania, I. Burk 17, 1878 (GH). Moist open field in clay soil, Audubon Nature Center, Greenwich, Fairfield Co., Connecticut, L. J. Bradley s.n., 4 July 1948 (GH); moist open field in clay soil, Audubon Nature Center, Greenwich, Fairfield Co., Connecticut, L. J. Bradley s.n. 2 Oct. 1948 (GH). Sand bar along the Potomac River on US Rt. 340, n. of Neersville, Loudon Co., Virginia, H. E. Ahles and F. James 61766, 11 Sept. 1965 (NCU, acc. no. 263428; lower specimen only, the upper one being *C. tenuifolius*); fresh tidal marsh of Chikahominy River, below Barrat's Bridge (or Ferry), James City Co., Virginia, M. L. Fernald and Bayard Long 11266, 19 Sept. 1939 (NY). Creek bottom, 1.5 miles north of Red Hill on NC 26, then 2.6 miles west on paved road, Mitchell Co., North Carolina, H. E. Ahles and J. A. Duke 47285, 23 July 1958

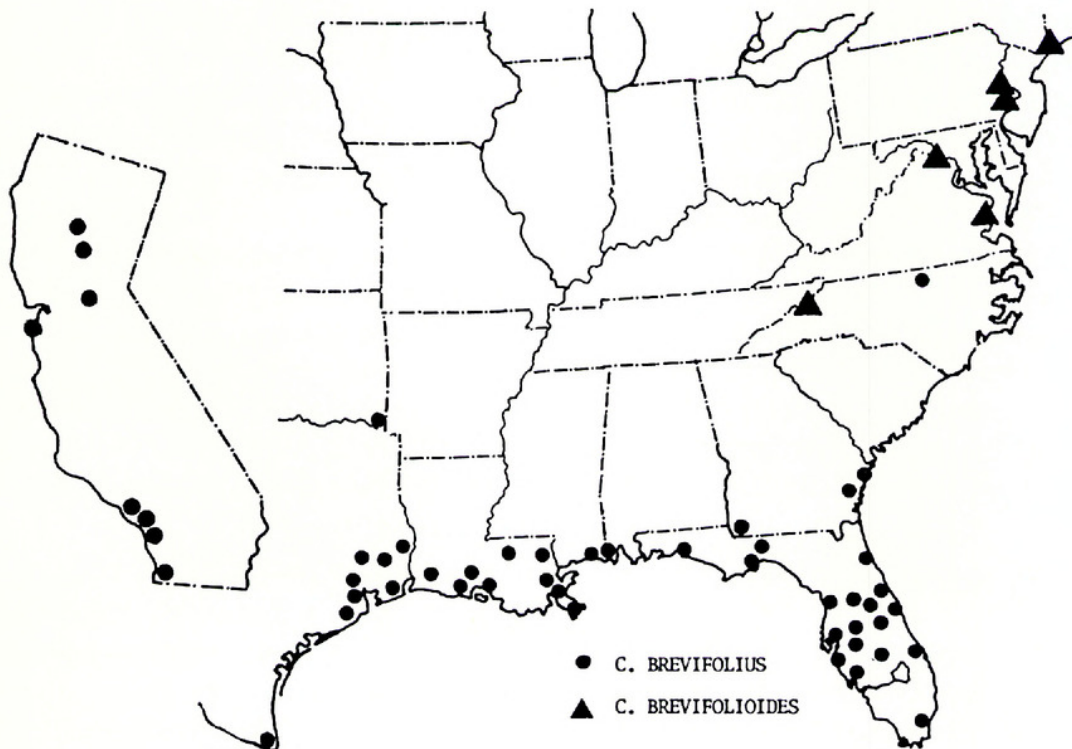
(NCU, acc. no. 136064; duplicate in FLAS, acc. no. 53264); pasture, 1.7 miles northwest of Tipton Hill on road to Hunt Dale, Mitchell Co., North Carolina, *H. E. Ahles and J. A. Duke* 49827, 25 Sept. 1958 (NCU, acc. no. 136063; duplicate in GH); roadside ditch, Unaka National Forest, near state line, Yancey Co., North Carolina, *E. C. Leonard and G. M. Leonard* 16515a, 17 Oct. 1933 (US).

2. *CYPERUS BREVIFOLIUS* (Rottb.) Hassk., Catal. Hort. Bogor. 24. 1844.

Kyllinga brevifolia Rottb.

Heads 1-3, 3-8 mm long, 3-7 mm wide; spikelets 2.1-3.2 (mean 2.5) mm long, 0.8-1.2 (mean 0.95) mm wide; scale keels denticulate; achenes 1.0-1.3 (mean 1.14) mm long, 0.6-0.8 (mean 0.72) mm wide, light tan to deep reddish brown, typically broadly obovate but extremely variable (obovate to oblong) even within one head.

Of all the *Kyllinga* specimens we examined we found only one collection (Pasadena, Los Angeles Co., California, *G. L. Skutt s.n.*, May 1935 [CAS, GH, US]) that we were unable to refer to species quickly and with certainty. Of the plants in this collection, some, possessing well developed rhizomes, are typical *C. brevifolius*. Others, however, are, for all practical purposes, cespitose. These cespitose plants possess the wide achene stipe that we regard as an earmark of *C. brevifolius*. Consequently we refer them to *C. brevifolius* even though, in vegetative characteristics, they are quite atypical of that taxon. We consider the



stipe characteristic as one of the best means to distinguish between *C. brevifolius* and *C. tenuifolius*, but it is, unfortunately, one that is difficult to express verbally and to use in a key. The achene of *C. brevifolius* has a broad stipe (ca. 0.15 mm wide); the achene of *C. tenuifolius* has a slender stipe (ca. 0.12 mm wide). This difference in stipe width is a small one but is, in our opinion, a valuable diagnostic feature.

The reports of *C. brevifolius* from Fairfield Co., Connecticut (Bradley, 1949); from "Del. R., Pa." and "Chickahominy R., Va." (Fernald, 1950); and from Mitchell Co., North Carolina (Radford, Ahles, and Bell, 1964) are based upon misidentification of specimens of *C. brevifolioides* (q.v.).

3. *CYPERUS TENUIFOLIUS* (Steud.) Dandy, Catal. Vasc. Pl. S. Tomé 363. 1944.

Kyllinga tenuifolia Steud.; *K. pumila* Michx.; *C. densicaespitosus* Mattf. et Kükenth.; *C. densicaespitosus* var. *major* (Nees) Kükenth.

Heads 1-3, 3-7 mm long, 3-6 mm wide; spikelets 1.8-3.3 (mean 2.3) mm long, 0.5-1.1 (mean 0.8) mm. wide; scale keel denticulate but sometimes only slightly so; achene tan at maturity, oblong to oblong truncate, 1.1-1.4 (mean 1.2) mm long, 0.4-0.7 (mean 0.6) mm wide.

This is the most widespread species of *Kyllinga* in continental United States. Some of the *C. tenuifolius* specimens seen by us (e.g., Alabama, Earle and Baker 1442, [NY]; Arkansas, Buchholz 324, [UARK]; Florida, Godfrey 55975, [FSU] are seemingly referable to var. *major* (Nees) Kükenth., which is described (Kükenth., 1936) as having spikelets to 3 mm long. In our specimens, some of the spikelets reach 3.3 mm. However, spikelet size in United States *C. tenuifolius* ranges, with an almost unbroken series of intermediates, from 1.8 to 3.3 mm. Consequently, we are unable to recognize var. *major* as a valid taxon.

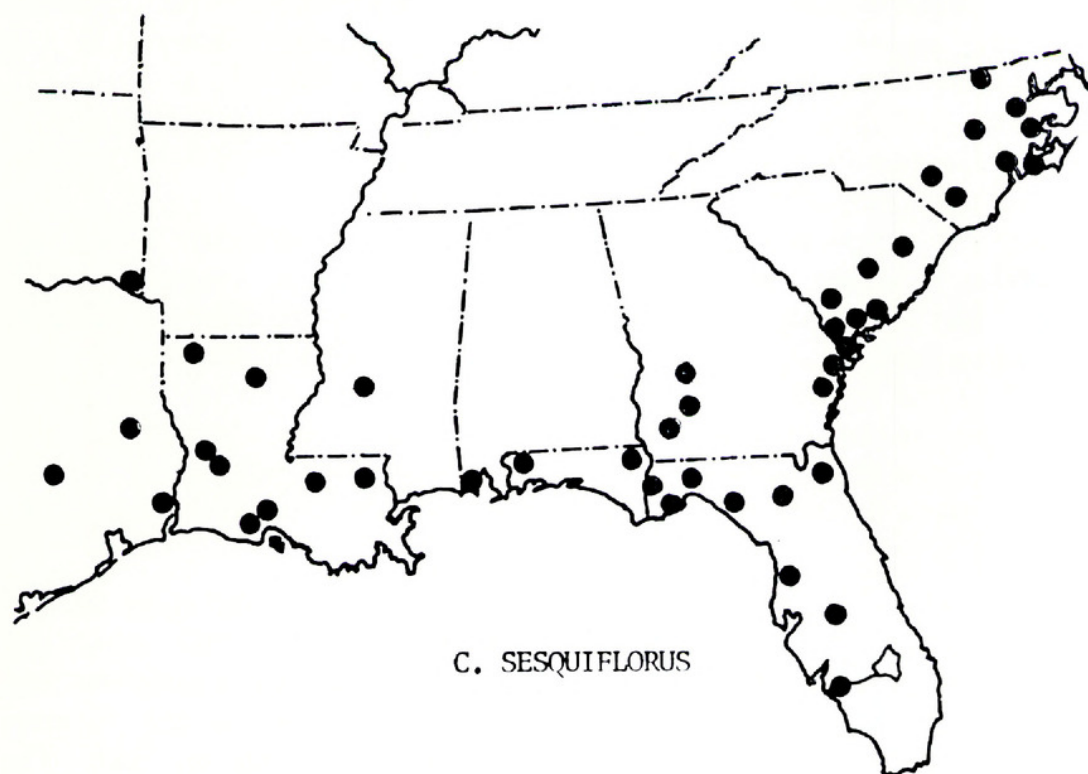
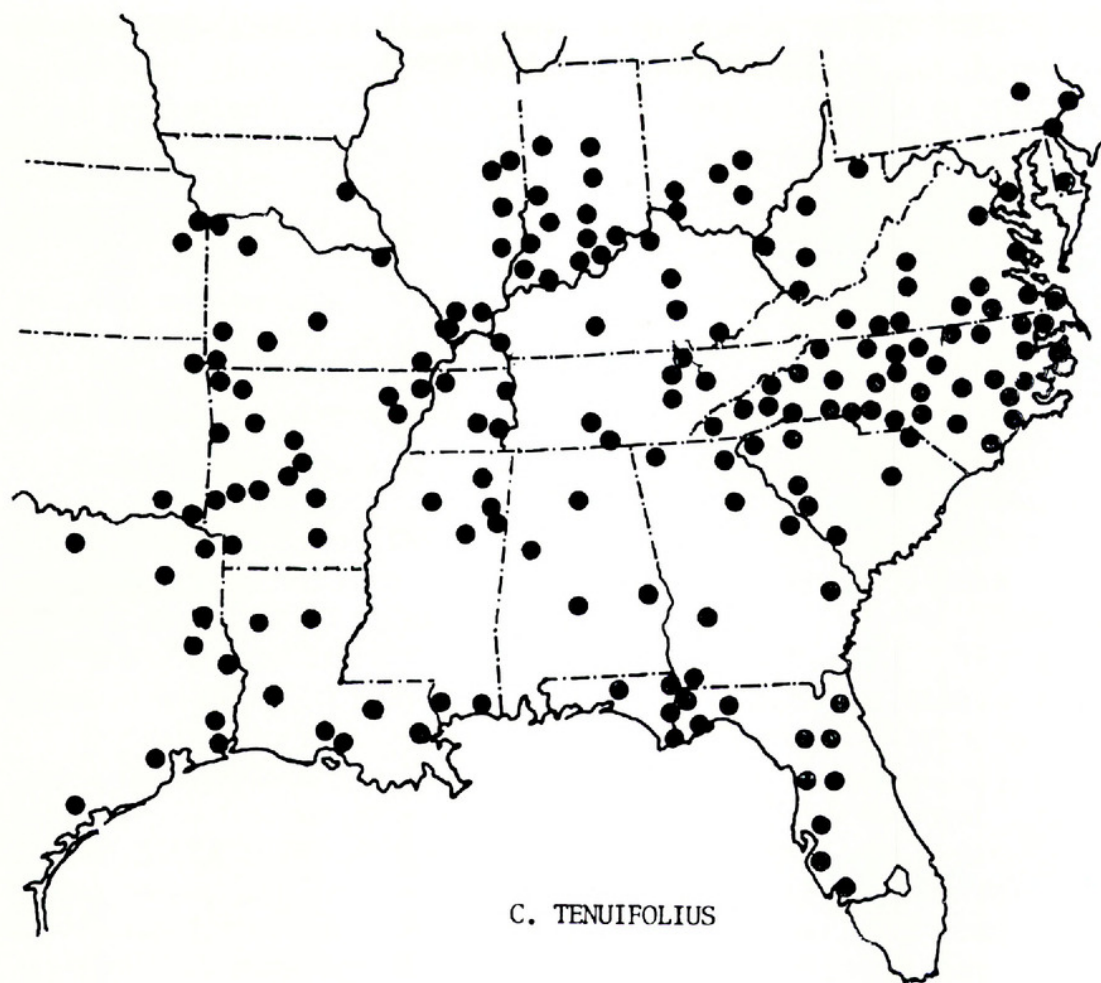
4. *CYPERUS SESQUIFLORUS* (Torr.) Mattf. et Kükenth., in Kükenth., *Cypereae* 591. 1936.

Kyllinga sesquiflora Torr.; *K. odorata* Vahl

Heads 1-3, 7-14 mm long, 5-7 mm wide, very light green to whitish; bracts subtending head(s) often strongly reflexed; spikelets 2.4-3.2 (mean 2.8) mm long, 1.1-1.5 (mean 1.3) mm wide, the tips of the scales spreading, not appressed; scale keel sometimes denticulate (in. ca. one-fourth of the specimens examined) but more often smooth; achene 1.2-1.5 (mean 1.4) mm long, 0.8-0.9 (mean 0.83) mm wide, long obovate and usually somewhat angular, rather than smoothly curved, in outline, purple black at maturity but stipe and apiculus pale yellowish white.

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drawings of spikelets and achenes were done by Mr. Billy Dan Hinton; the maps, by Mr. Tony Hebert.

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