**Carex planispicata**, a Widespread and Frequent New Species of **Carex section Griseae** (Cyperaceae) from the Eastern United States of America

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ABSTRACT

*Carex planispicata* is described as new from 21 states of the eastern U.S.A., where it occurs in mesic deciduous forests. It belongs to the *C. oligocephala* complex because of its darkish perigynia and purplish red coloration extending high on its shoot bases. Features that distinguish *Carex planispicata* from its closest relatives include perigynium shape, perigynium length relative to achene body length, achene hook length, and leaf blade width.

*Carex* section *Griseae* (L. H. Bailey) Kükenethal is a group of sedges endemic to eastern North America that is most diverse in mesic deciduous forests of the southeastern United States. Numerous (usually 40 or more) longitudinal sclerenchyma traces ("nerves" of earlier authors, e.g., Fernald 1950; Gleason and Cronquist 1991) that are impressed in living and dried perigynia are aposporous dissectioning the section. Additional characters shared by members of sect. *Griseae* though not unique to them, include glabrous leaf and bract blades, long-sheathing lower bracts, usually unisexual spikes with only the terminal one staminate, and glabrous perigynia with entire apices. This section (including section *Oligocephalae* [Carex] Mack.) contains 21 species, one of which I describe here as new. This species is the sixth to be described as new in sect. *Griseae* in the last decade (Bridges and Orzell 1988; Naazi 1989, 1993, 1997).

*Carex planispicata* Naazi, sp. nov.—TYPE: U.S.A. Alabama. Lawrence County: ca. 10 mi. SW of Wren, along Borden Creek, 1.2 air mi. N of its confluence with Sipsey Fork, TSS, RSW, NE 1/4 section 32, 25 May 1993, Naazi 3108, Bryson, & Fermel (holotype: MICHI; isotypes: BRIT, FLAS, FSU, GA, GH, KNK, MO, NCU, NY, PH, TENN, UNA, US, USCH, VDB, VPI, WIN, etc.).


Herba penicillata, dense caespitosa. Rhizoma brevius, 0.2–2.2 mm longa: interculis vel ramos rhizomatum; internodis 0.2–2.2 mm longis, 1.6–2.2 mm crassis. Basibus surculis atrovirenses usque ad (3.4–) 3.5–9.6 cm. Culmi fertiles 14–58 cm alti, 0.5–0.9 mm lati in medio, plumulque laeves. Folia 1–4, lami nae 2.3–14.2 cm longae, (1.0–) 2.2–6.5 mm latae, lamina latissima (3.0–) 3.5–6.5 mm lata, virides, pagina abaxialis laevibus: vaginae glabrae. Surculi vegetativi 19–60 cm alti; pseudoduli 4.4–11.1 cm alti. Infructescenciae 10–48 cm longae; spicae remotae vel 2–3 superae imbricatae. Spicae 3–6, erectae; spica termin alis (0.6–) 1.4–2.6 (–3.0) cm longa, (0.8–) 1.3–2.5 (–3.0) mm lata, omnino mascula, in pedunculo erecto (2.4–49 mm longo portata, spicas superas laterales superans; spica infima (0.4–) 0.9–2.1 cm longa, (1.6–) 2.9–6.0 mm lata, omnino feminina, in pedunculo erecto 1.6–6.2 cm longo portata; spicae laterales (0.7–) 1.1–2.4 cm longae, (4.0–) 4.5–6.4 (–6.9) mm latae, omnino femininae, in pedunculis erectis 0.4–3.8 cm longis portatis: flores feminini spicati unilaterali (2–) 7–14 distichica imbricati. Spinaeae femininae 2.5–4.5 mm longae, (1.2–) 1.7–2.2 mm latae, aristatae; corpus 1.9–2.8 mm longum, late ovatum vel ovatum, integri marginae: arista 0.3–0.5 mm longa. Porti-
genia (3.9–) 4.2–4.9 (–5.1) mm longa, (1.4–) 1.8–1.8 mm lata, (2.4–) 2.5–3.3 mm longa quam lata, (1.9–) 2.0–2.3 mm longa quam corpora acheniorum, ascendentia, obtuse tri- quetra, nervata, glabra, oblonga, vel elliptica vel anguste oblonga vel anguste elliptica in circumscriptione, in basim truncatam gradatim contracta, in apicem subacutum rectum gra- datim contracta, crenata vel rostri minutissimae fissuris rectis integris usque ad 0.3 mm longis instructa; nervi 57–69 impressi. Achenia 2.8– 3.7 mm longa, 1.3–1.7 mm lata, obovoida, in stipites 0.4–1.0 mm longos abrupte contracta, in rostro (0.3–) 0.4–0.7 mm longa abrupte con- tracta, arcuata incusa pinnatisecta; corpora 1.9–2.4 mm longa.

Perennial herb, densely caespitose. Rhizo- zones short, 0.2–8.2 mm long between shoots or branches of the rhizomes, with internodes 0.2–2.2 mm long, 1.6–2.2 mm thick, covered with cataphylls 2–5 mm long. Shoot bases usually surrounded by cataphylls but not by bases of old leaves, strongly purple-red to (3.4–) 5.5–9.6 cm high. Reproductive shoots 14–58 cm tall, erect to spreading, not elongating in fruit, culms 0.5–0.9 mm wide at mid- height, usually smooth throughout but occasion- ally antrosely scaberosus in uppermost portions, obtusely trigonous. Cataphylls gla- brous, purple-red, multistipitate. Leaves of re- productive shoots 1–4, arising in basal 0.005– 0.009 mm culms, the longest 0.2–0.4 times as long as culms; blades 2.3–14.2 cm long. (1.0–) 2.2–6.5 mm wide, the widest (0.3–) 3.5–6.5 mm wide, green, flat to barely plicate, margins smooth near base and antrosely scaberosus near apex, adaxial surface smooth or antrosely scaberosus near apex, abaxial surface smooth; leaf sheaths 0.5–6.3 cm long, right, glabrous, green; adaxial face of sheaths with hyaline and glabrous band, hyaline band with apex slightly convex or truncate; ligules 0.6–3.3 mm long, inconspicuous with apex obtuse. Vegetative shoots 19–60 cm tall, 0.66–1.3 times as tall as culms; leaves 4–7, similar to those of culms except blades 2.6–46 cm long pseudoculmi 4.4–11.1 cm tall, 2.1–4.7 mm wide, 0.13–0.26 of vege- tative shoot height. Infructescences 10–48 cm long. 0.55–0.96 of culm height, with the spikes widely separate or the upper 2–3 spikes overlapping, the uppermost lateral spikes 1.4– 15.6 cm distant, the lowest spikes 6.4–16.2 cm distant; lowest bract with blade 4.9–28 cm long and 0.26–0.61 times as long as culm, sheath 2.5–6.4 cm long, adaxial face of sheath with glabrous and hyaline band occupying full length of sheath or nearly its full length, hyal- ine band with apex truncate or slightly convex and elongated up to 3.1 (–4.8) mm above sheath apex, sheath glabrous abaxially, ligule 0.7–3.8 (–13.4) mm long, bract blade of up- permost lateral spike 2.9–13.3 cm long and usually much exceeding terminal spike, but very rarely slightly shorter than terminal spike, sheath 2.4–7.6 mm long and glabrous, upper- most bract scale-like, sheathless, body 3.8–5.7 mm long and awn 0.1–13 mm long. Spikes 3– 6, simple, single at nodes, erect; terminal spike (0.6–) 1.4–2.6 (–3.0) cm long, (0.8–) 1.5–2.5 (–3.0) mm wide, entirely staminate, 3–54- flowed, on erect and smooth or barely sca- berosus peduncle 2.4–49 mm long, barely to much exceeding upper lateral spikes; lowest spike (0.4–) 0.9–2.1 cm long, (1.6–) 2.9–6.0 mm wide, entirely pistillate, (2–) 5–12-flow- ered, the perigynia distinctly imbricate, the internode between the lowest perigynia 1.1– 4.2 mm long, on erect, barely scaberosus or smooth peduncle 1.6–6.2 cm long, upper lat- eral spikes (0.7–) 1.1–2.4 cm long, (4.0–) 4.5– 6.4 (–6.9) mm wide, entirely pistillate and (2–) 7–14-flowered, the perigynia distinctly im- bricate, on erect and barely scaberosus or smooth peduncle 0.4–4.8 cm long. Stamina- nate scales 3.3–4.9 mm long, 1.1–1.7 mm wide, lanceolate to narrowly oblong, acute, awnless, center green and 1-nerved, margins hyaline and pale red-brown to tawny. Pistil- late scales 2.8–4.5 mm long, (1.2–) 1.7–2.2 mm wide; body 1.9–2.5 mm long, 0.39–0.60 times as long as perigynium, broadly ovoid to ovate with midrib prolonged as antrosely sca- berosus aavn. 0.3–2.5 mm long, center green and 2–4-nerved, margins entire, hyaline, whit- ish or tinged with pale red-brown. Anthers 3, 2.2–3.2 mm long. Styles jointed with achenes, portion distal to achene withering with age, portion proximal to achene persistent and be- coming achene beak; base 0.15–0.20 mm wide. Stigmas 3, 1.2–1.8 mm long, withering with age. Perigynia (3.9–) 4.2–4.9 (–5.1) mm long, (1.4–) 1.6–1.8 mm wide, (2.4–) 2.5–3.3 times as long as wide, (1.9–) 2.0–2.3 times as long as achene bodies, ascending, obtusely tri- angular in cross section, faces flat to slightly convex or adaxial face slightly concave, nerves
Carex planispicata—Nacci

deeply impressed and 57–69, glabrous, green to red-brown, oblong or elliptic to narrowly oblong or narrowly elliptic in outline, very gradually tapered from widest point to truncate base, gradually tapered to straight and subacute apex, beardless or with a minute beak; beaks 0.0–0.3 mm long, 0.0–0.06 of perigynium length, straight, smooth, entire; Achenes 2.8–3.7 mm long, 1.3–1.7 mm wide; faces tightly enveloped by perigynia, obovoid, obtusely trigonal, faces slightly concave to flat, brown, basally abruptly contracted to stipe, apically abruptly contracted to beak; stipe 0.4–1.9 mm long, vertical; body 1.9–2.4 mm long, with widest point 0.6–1.0 mm from body apex; beak (0.5–) 0.4–0.7 mm long, vertical.

Carex planispicata belongs to a lineage that also includes C. bulbostylis Mack, C. edwardsiana E. L. Bridges & Orzell, and C. oligocarpa Willd. Morphologic apomorphies that diagnose this lineage, the C. oligocarpa complex, are distinctively imbricate perigynia and purple-red coloration on the proximal 3.0–12 cm of the shoot bases (Nacci unpubl., phylogenetic analysis of Carex sect. Griseae). The rest of the members of sect. Griseae possess the pleionomorphic spirally imbricate perigynia and brown shoot bases or, if the bases are purple-red, the coloration is usually 3.6 cm high or less. When the coloration is higher, as in C. godfreyi Nacci (to 7.3 cm high) and C. oachitana Král, Manhart, & Bryson (to 10 cm high), it appears to represent a parallelism with its presence in the C. oligocarpa complex.

Carex planispicata differs from the other members of the C. oligocarpa complex in several ways (Figure 1). First, the perigynia of C. planispicata are (2.4–) 2.5–3.3 times as long as wide, while the perigynia of C. bulbostylis, C. edwardsiana, and C. oligocarpa are 1.6–2.6 times as long as wide. Second, the perigynia of C. planispicata are (1.9–) 2.0–2.5 times as long as their achene bodies. The other species have perigynia 1.5–1.9 (–2.0) times as long as their achene bodies. Third, the achenes of C. planispicata have beaks (0.5–) 0.4–0.7 mm long, while the other species have achene beaks 0.05–0.3 (–0.5) mm long. Fourth, the widest leaf of C. planispicata is (3.0–) 3.5–6.5 mm wide, whereas the other species have their widest leaves 1.8–4.0 mm wide. Additional differences between C. planispicata and particular species of the C. oligocarpa complex exist. Perigynium width, degree of inflation, and cross-sectional shape distinguish C. planispicata and C. bulbostylis. While C. planispicata has relatively narrow perigynia (1.4–1.8 mm wide) that are only slightly wider that their included achenes (perigynium width minus achene width = 0.1–0.3 mm) and obtusely triangular in cross-section, C. bulbostylis has wider perigynia (1.8–2.8 mm wide) that are inflated around their included achenes (perigynium width minus achene width = 0.2–0.8 mm) and orbicular or suborbicular in cross-section. Perigynium beak length and number of perigynia per spike separate C. planispicata from both C. edwardsiana and C. oligocarpa.

Carex planispicata has beakless or minutely beaked perigynia (beaks 0.1–0.3 mm long) and spikes containing relatively many perigynia (longest spikes usually with 7–14 perigynia). Carex edwardsiana and C. oligocarpa, on the other hand, have conspicuously beaked perigynia (beaks 0.4–1.0 mm long) and spikes with fewer perigynia (longest spikes usually with 4–8 perigynia). The key below highlights the distinctive features of C. planispicata. Given the numerous characters that diagnose C. planispicata, even depauperate specimens can be relatively easy to identify, though such specimens often have narrower leaves and fewer perigynia per spike than is usual.

Botanists have long recognized what is now called C. planispicata. Bailey (1880) was the first to describe it, as C. grisea Wahl, var. rigidula L. H. Bailey. Shortly afterward, Bailey (1894a, 1894b) synonymized this variety with C. amphibola Steud. For the next 50 years, authors accepted Bailey's synonymy (e.g., Mackenzie 1935). Fernandl (1942) resurrected the variety, but transferred it to C. amphibola. Though Bailey and Fernandl brought recognition to the taxon, their circumscriptions obscured its identity, for at least three reasons. First, C. planispicata belongs to the C. oligocarpa complex, not the lineage that includes C. grisea and C. amphibola (the C. grisea complex, which also includes C. corruccata Fernandl and C. godfreyi). Second, the rank of variety obscures the distinctive nature of C. planispicata. A suite of several characters distinguishes this taxon from its closest relatives. Thus, it is best considered a species. Third,
Fernald's specimen citations and key also obscure the identity of *Carex planispicata*. Fernald (1942) cited specimens as exemplars of *C. amphibia var. amphibia* sensu Fernald (not *C. amphibia* Steud.) and *C. amphibia var. rigida*. Both sets of citations represent mixtures of *C. planispicata* with at least two other species. Most of the specimens cited as *C. amphibia var. amphibia* are *C. planispicata* (e.g., Fernald & Long 65874), though *C. bulbostylis* (e.g., Bueh 1351) and *C. godfreyi* (e.g., Harper 56) are also present. Most of the specimens cited as *C. amphibia var. rigida* are *C. amphibia* Steud. (e.g., Wiegand 6072), though *C. corvina* (e.g., Fernald & Long 11756), *C. godfreyi* (e.g., Curtiss 6356), and *C. planispicata* (e.g., Fretz s.n. 1884) are also included. Because of his mixture of species, Fernald (1950) wrote a key that will identify some specimens of *C. planispicata* as *C. amphibia var. amphibia* sensu Fernald and others as *C. amphibia var. rigida*. As a consequence of former circumscriptions, *C. planispicata*, with *C. amphibia*, has been passing as *C. amphibia* in the literature and herbarium for the past century.

*Carex planispicata* is relatively wide-ranging, occurring in much of the eastern U.S.A. It ranges from central New Jersey southwest to southern Indiana, southeastern Missouri, and southeastern Oklahoma south to central Georgia, southern Mississippi, and southeastern Texas. Within this range, it grows in the District of Columbia and 21 states: Alabama, Arkansas, Delaware, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Mississippi, Missouri, New Jersey, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, and West Virginia. *Carex planispicata* is frequent throughout most of its range. The specimens cited below are a representative sample of 405 records (about 925 total specimens) I have seen. *Carex planispicata* inhabits mesic deciduous forests, usually on the lower portions of slopes adjacent to streams and on the upper portions of floodplains. It usually grows in acidic to nearly neutral loams, silt loams, and sandy loams. *Carex planispicata* is sympatric with *C. bulbostylis* and *C. oligocarpa* but allopatric with the more western *C. edwardsiana*. Infrequently, *C. planispicata* grows sympatrically with *C. bulbostylis*. When they do occur together, *C. planispicata* and *C. bulbostylis* usually grow intermingled. More frequently, *C. planispicata* and *C. oligocarpa* are sympatric. In such situations, *C. planispicata* usually occurs lower on slopes than *C. oligocarpa*, apparently in moister soils, though the two species can grow intermingled. Despite several observations of sympatry, I have not detected intermediates or hybrids between *C. planispicata* and *C. bulbostylis* or between *C. planispicata* and *C. oligocarpa*.

All members of the *C. oligocarpa* complex bear distichously imbri cate perigynia, causing the spikes to be more or less flat. The flat spikes are particularly noticeable in *C. planispicata* because of its relatively long perigynia that are relatively numerous in each spike. Thus, the epithet "planispicata," meaning "flat-spiked," is especially appropriate for this species.

Identification Key to *Carex planispicata* and Closely Related Species (members of *Carex* sect. Grisea with narrow to wide, purple-red shoot bases)

1a. Perigynia tightly enveloping achene or slightly indented, obtusely triangular in cross-section, 1.4-1.9 (2.3) mm wide, 1.8-2.1-3.3 times as long as wide.
1b. Perigynia (2.4-)2.5-3.3 times as long as wide, with bodies gradually tapering to spines and these basally or with bases 0.1-0.3 mm long, perigynia (1.9-)2.0-2.3 times as long as achene body; achene bases (0.2-)0.4-0.7 mm long; widest leaf (3.0-)3.5-4.5 mm wide; longest pellitale spikes with (5-)7-14 perigynia.
2a. Perigynia (1.8-)2.1-2.6 times as long as wide, with bodies usually abruptly contracted near spines to bases (0.4-)0.5-1.0 mm long.

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Figure 1. *Carex planispicata* Naczi.—A. Habit.—B. Upper portion of infructescence.—C. Pellitale spike.—D. Pellitate spike.—E. Perigynium, side view, characterized to recurved achenes.—F. Perigynium, side view.—G. Perigynium, top view.—H. Achenes, side view.—I. Achenes, top view. Bar equals 1 cm in A, 5 mm in B-C and 1 mm in D-I. Drawn from the holotype.
peignia 1.5-3.8 (-2.6) times as long as achene broad; achene beak 0.05-0.3 (-0.5) mm long; widest leaf 1.8-4.0 mm wide; long-est peltate spikes with 4-8 (-10) peignia.

3a. Lowest spike usually considerably above base of shoot, inflorescence 0.65-0.94 (-0.96) of calyx height; vegetative shoots exceeded by calyx or slightly exceeding calyx, tallest vegetative spike 0.68-1.4 times as tall as tallest calyx; hydral base of sheaths of lower bracts apically concave to truncate.

3b. Lowest spike usually at base of shoot, inflorescence 0.98-1.04 (-0.99) of calyx height; vegetative shoots usually greatly exceeding calyx, tallest vegetative spike (0.96-1.4) 4-4.4 times as tall as tallest calyx; hydral base of sheaths of lower bracts apically convex or truncate.

... C. euramericana

1b. Perigonium much inflated, orbicular or suborbicular in cross-section, (1.8-)2.0-2.5 (-2.8) mm wide, 1.6-2.0 (-2.1) times as long as wide. ... C. bulbophylla


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