



Stantec

Botanical Notes

ISSN 1541-8626

An irregularly published newsletter dedicated to dispersing taxonomic and ecological information useful for plant identification and conservation primarily in New England

Available online at <http://www.scribd.com/StantecInc>

Number 14. 12 September 2012

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A NEW NAME AND STATUS FOR *CAREX* *SCOPARIA* VAR. *TESSELLATA* (CYPERACEAE)

In 1909, M. Fernald and K. Wiegand made collections of a *Carex* in Maine belonging to the section *Cyperoideae* (formerly *Ovales*) that had not been observed before (Fernald and Wiegand 1910). They allied the plant to *Carex scoparia* Schkuhr & Willd., noting that the new taxon had crowded spikes, relatively broader perigynia, and darker carpellate scales (giving the inflorescence a checkered appearance due to the contrast of the scales against the perigynia). They referred to the new taxon as *C. scoparia* var. *tessellata* Fern. & Wieg. and noted it was known from only Washington County. Over a hundred years have passed with little research occurring on this taxon, despite its very limited global distribution.

Mastrogiuseppe et al. (2002) upheld *Carex scoparia* var. *tessellata* as a variety of *C. scoparia*, noting it occurred in New Brunswick (Canada) and Maine (United States). The New Brunswick attribution is in error (see later in this article). They also provided a key to the varieties of *Carex scoparia*, essentially presenting those diagnostic characters of Fernald (1950), but adding perigynium length. This character (perigynium length) shows complete overlap, but those of *C. scoparia* var. *scoparia* range longer than those of *C. scoparia* var. *tessellata*.

Hipp et al. (2010) found great diversity in the chromosome numbers of *Carex scoparia*, with $2n=58-$

70. *Carex scoparia* var. *tessellata* has been found to have $2n=68$. Though populations of *C. scoparia* var. *scoparia* from outside of Maine have been found to have the same chromosome number as *C. scoparia* var. *tessellata*, those from southeastern Maine (i.e., within the region of sympatry with *Carex scoparia* var. *tessellata*) have shown different numbers ($2n=64$, 66, and 67). Hipp et al. (2010) also examined genetic divergence between these two varieties and showed *Carex scoparia* var. *tessellata* to be genetically divergent from *Carex scoparia* var. *scoparia*. The estimate using the ITS region suggests these two taxa have been separate for 0.487 million years (with substantial uncertainty; the 95% confidence interval = 0.050–1.61 million years).

Over the past few growing seasons, field work (in great part by the first author of this manuscript) has revealed a number of novel differences between the two varieties of *Carex scoparia*. In particular, examination of sympatric populations has called into question the treatment of *C. scoparia* var. *tessellata* as a variety of *C. scoparia*. A discussion of the differences between these two taxa follows.

Inflorescence length

The length of the inflorescence, which in this case is an approximate measure of (1) how aggregated the individual spikes are and (2) how many spikes occur in each inflorescence, is a useful character for separating the two taxa (Figure 1), as was noted by Fernald and

Wiegand (1910). Examining well-formed inflorescences (i.e., avoiding clearly depauperate individuals), *Carex scoparia* var. *tessellata* is always somewhat to moderately congested and measurements from the base of the lowest spike to the apex of the uppermost spike range from 14–26 mm long with 4–6(–8) spikes. Those of *C. scoparia* var. *scoparia* that we have measured range from (18–)20–55 mm and have 4–10 spikes. The latter species varies in its congestion of spikes, and while many collections have somewhat elongated inflorescences, some individuals, in particular, late season collections, do have congested inflorescences. This has caused confusion in herbarium collections where specimens of *C. scoparia* var. *scoparia* with congested spikes are sometimes misidentified as *C. scoparia* var. *tessellata*. The lowest internode of the inflorescence also shows some discriminatory power: (1–)1.7–6 mm in *C. scoparia* var. *tessellata* and (1–)3.8–10.5 mm in *C. scoparia* var. *scoparia*.



Figure 1. Comparison of the inflorescences of *Carex scoparia* var. *scoparia* (left) and *C. scoparia* var. *tessellata* (right). Note color and number of spikes.

Carpellate scale color

Carex scoparia var. *tessellata* received its varietal epithet due to the darker scales (compared with those of var. *scoparia*) strongly contrasting against the green perigynium bodies. Once learned, this trait is very useful and a fairly reliable way to distinguish these two taxa during late spring through early summer. As the summer

progresses, the perigynia of *C. scoparia* var. *tessellata* also darken and the contrast between the perigynia and carpellate scales becomes less pronounced. The carpellate scales of *C. scoparia* var. *tessellata* are brown with a light green or light brown midrib (infrequently the midrib becomes darker than the rest of the scale in drying). Black is frequently reported in the literature as the scale color; this is not accurate. Those of *C. scoparia* var. *scoparia* are usually light brown to yellow-brown (Figure 2).



Figure 2. Sympatric population of *Carex scoparia* var. *scoparia* (left, light green spikes) and *C. scoparia* var. *tessellata* (right, dark green spikes) showing differences in spike color.

Leaf blade width

When sympatric populations of *Carex scoparia* var. *scoparia* and *C. scoparia* var. *tessellata* are observed, it can be seen that the leaves (and to some degree the culms) are, on average, narrower in *C. scoparia* var. *tessellata*. Though there is a fair amount of overlap, measurements of the widest leaves on plants from several sympatric populations in eastern Maine ranged mostly from 2.1 to 3.5 mm for var. *scoparia* and 1.5 to 2.9 mm for var. *tessellata*. Though range-wide measurements of *C. scoparia* var. *scoparia* would overlap those of var. *tessellata* presented here, these observations are valuable nonetheless and can be observed when the two taxa grow in close proximity.

Phenology

Observations of sympatric populations in Washington County, Maine, show that *Carex scoparia* var. *tessellata* is significantly ahead of *C. scoparia* var. *scoparia* in terms of flowering and fruiting. The former flowers approximately 10–15 days earlier than the latter (Figure 3).



Figure 3. Inflorescences of *Carex scoparia* var. *scoparia* (left, anthers exerted) and *C. scoparia* var. *tessellata* (right, anthers shed) demonstrating phenological differences (i.e., *C. scoparia* var. *tessellata* is significantly ahead of *C. scoparia* var. *scoparia*). This image captured on 16 June 2012.

Perigynia length to width ratio

As noted by Fernald and Wiegand (1910), *Carex scoparia* var. *tessellata* has relatively broader perigynia than var. *scoparia*. The measurements provided by Mastrogiuseppe et al. (2002) appear to accurately describe the difference between these two taxa. The perigynia of var. *tessellata* are 2–2.6 times as long as wide, whereas those of var. *scoparia* are (2.5–)2.8–4 times as long as wide. We find it to be rare that perigynia length-to-width ratios overlap between these two taxa. This morphological difference manifests also as a different outline of the perigynium body. Those of var. *scoparia* are lanceolate to narrow-elliptic, whereas those of var. *tessellata* are elliptic (Figure 4).



Figure 4. Perigynia of *Carex scoparia* var. *tessellata* (left) and *C. scoparia* var. *scoparia* (right). Note outline, wing margin on beak, and color of perigynia (including beaks). Scale bar = 1 mm.

Perigynium beak apex

The perigynium beak differs in both color and length of wingless portion between *Carex scoparia* var. *scoparia* and var. *tessellata*. In var. *scoparia*, the beak is light brown to brown at maturity (green prior to maturity) and has a marginal wing that extends nearly or fully to the apex of the beak—the wingless portion measures 0–0.5 mm. This is in contrast to the perigynium beaks of var. *tessellata*. In this taxon, the apex is brown to dark purple-brown and lacks a marginal wing in the apical 0.3–1.1 mm (Figure 4). The dark color and lack of a ciliate wing near the apex of the perigynium beak create a characteristic look to the perigynia of var. *tessellata*—even though the perigynia are relatively broader, their apices look very slender and dark. This difference has apparently not been noted before.

Distance from scale apex to perigynium beak apex

Measurements of the distance from the tip of the carpellate scale to the apex of the associated perigynium beak reveal differences between *Carex scoparia* var. *scoparia* and var. *tessellata*. For this character, measurements are performed on scales from the middle to apex of the spike (the lower carpellate scales are often longer and broader relative to the perigynia, so this portion of the spike is avoided for this measurement). This distance measures (0.8–)1–2(–2.3) mm in var. *scoparia* and 0.2–1.2 mm in var. *tessellata* (Figures 5 and 6). As a result, the carpellate scales more nearly cover

the associated perigynia than in var. *scoparia*. This difference has apparently not been noted before.



Figure 5. Intact spike of *Carex scoparia* var. *scoparia* showing apex of carpellate scale (lower arrow of each pair) and apex of associated perigynium beak (upper arrow of each pair).

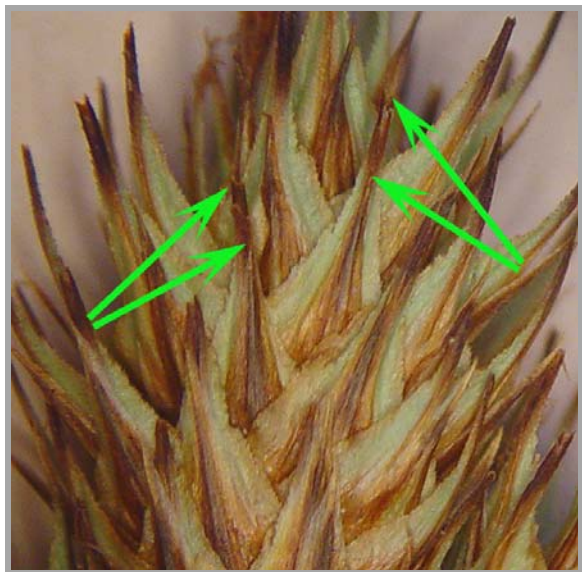


Figure 6. Intact spike of *Carex scoparia* var. *tessellata* showing apex of carpellate scale (lower arrow of each pair) and apex of associated perigynium beak (upper arrow of each pair).

Given the existence of multiple morphological characters that distinguish *Carex scoparia* var. *tessellata* from *C. scoparia* var. *scoparia*, combined with observable phenological differences and measurable genetic

divergence, *C. scoparia* var. *tessellata* is here considered to represent a distinct species of highly limited geographic distribution. Only two collections were cited by Fernald and Wiegand (1910), but no holotype was designated.

***Carex waponahkikensis* M. Lovit & A. Haines, stat. et nom. nov.**

Based on: *Carex scoparia* Schkuhr ex Willd. var. *tessellata* Fern. & Wieg.; Rhodora 12: 135. 1910.
Lectotype (here designated): United States. Maine, Washington County, Pembroke, 8 Jul 1909, Fernald 1464 (GH!).

Note: though the protologue states that the collection designated as the lectotype was collected by both Fernald and Wiegand, the actual specimen label lists only Fernald.

Etymology: The specific epithet *waponahkikensis* (pronounced wah-buh-nah-kee-GEN-sis) is derived from the Passamaquoddy word waponahkik (pronounced wah-buh-NAH-keeg), a locative noun meaning “in, at, or to the Dawn-land.” The Dawn-land is broadly defined as northeastern North America (i.e., New England and maritime Canada), which receives the morning sunlight before most of North America. This spelling comes from the Passamaquoddy spelling of Wabanaki (their spelling: Waponahki). The Passamaquoddy are a Native American people living in southeastern Maine. *Carex waponahkikensis* is currently known only from this region. We suggest “Dawn-land sedge” as its common name.

Identification key to distinguish *Carex scoparia* and *Carex waponahkikensis*:

- 1a.** Perigynia (2.5–)2.8–4 times as long as wide, lanceolate to narrow-elliptic; perigynium beak at maturity light brown to brown and wingless in the apical 0–0.5 mm, exceeding the tip of the associated subtending scale by (0.8–)1–2(–2.3) mm; inflorescence (18–)20–55 mm long ***C. scoparia***
- 1b.** Perigynia 2–2.6 times as long as wide, elliptic; perigynium beak at maturity brown to dark purple-brown and wingless in the apical 0.3–1.1 mm, exceeding the associated subtending scale by 0.2–1.2 mm; inflorescence 14–26 mm long ***C. waponahkikensis***

Distribution and Conservation

As a result of careful examination of specimens, especially in the light of the additional characters that separate these two taxa, it is now realized that *Carex waponahkikensis* is a globally restricted taxon that is found only in extreme eastern Maine along the coastal plain. Many collections, including all those from Canada

(New Brunswick and Nova Scotia) and regions of Maine outside of Hancock and Washington Counties, were misidentified. We are aware of fewer than 20 living populations (approximately 12), contributing to a tentative G-rank of G2. This species occupies open, early successional, often human-disturbed, habitats, including fields, roadsides, and ditches.

Specimens of *Carex waponahkikensis*

United States. ME. Hancock County. T10 SD, north side of Rte 182 at Jct with road to Tunk Mountain, about 11 miles west of Cherryfield, dry sandy/gravelly disturbed roadside through upland hardwoods, 10 Jul 1993, *Reznicek 9634* (MICH). T10 SD, north side of Rte #182 7 miles ENE of Jct with Hwy #200 at Franklin, moist open bottom of abandoned sand pit, 3 Jul 1994, *Reznicek 9921* (MICH). Hancock, bottom of moist sand pit, Jul 1995, *Dibble & Rotherrock* [sic] *s.n.* (UNB).

Washington County. Cherryfield, north side of Ridge Road about 4.5 miles north of Cherryfield, 44° 39' 50" N, 67° 52' 42" W, seepy slope below sunny pond bank in gravelly soil, 2 Jul 2000, *Reznicek 11177* (MICH).

Columbia Falls, moist low flat open sandy ditch, 11 Jul 1998, *Reznicek 10698* (MICH). Jonesport, meadows behind Sandy River Beach, 3.5 miles ENE of Jonesport, on the east side of Route 187, 44° 34' N, 67° 32' W, wet meadow near shore of artificial pond and nearby rough hay meadows of undulating terrain, 17 Jul 1992, *Reznicek 9154* (MICH). Jonesport, east side of Hwy #187 along entrance to Jonesport High School, dry open shallow sandy roadside ditch with sparse grasses and sedges, 7 Jul 1999, *Reznicek 10923* (MICH). Jonesport, hay meadow near salt marsh and sandy beach, near mouth of Sandy River, E of Rte #187, 8 July 1998, *Reznicek & Zika 13483* (MICH). Lubec, in a field west from the Straight Bay Road and east from Morong Cove, on land owned by the State of Maine. Maine Dept. of Inland Fisheries & Wildlife manages the field for grassland birds by annual mowing. In 2012 there were ~20 clumps of var. *tessellata* in a slight depression in the field, with *Carex scoparia*, *Carex conoidea*, *Anthoxanthum odoratum*, *Festuca rubra*, *Alopecurus pratensis*, *Phleum pratense*, *Ranunculus acris*, *Hieracium caespitosum*, *Rhinanthes minor*, *Spiraea alba*, *Vicia cracca*, *Trifolium arvense*, *Stellaria graminea*, *Fragaria virginiana*, *Potentilla simplex*, and *Rosa* sp., N 44.85295° W 067.08253, 27 Jun 2012, *Lovit 413* (MAINE). Marshfield, damp, low ground, 8 July 1902, *Fernald s.n.* (GH, MICH). Pembroke, dry low ground, 8 July 1909, *Fernald 1464* (GH, MICH, CONN, NY, BH). Robbinston, in a field that is generally mowed annually, at the corner of Sweeney Road and Brewer/Number 3 Road, with *Carex scoparia*, *Carex nigra*, *Onoclea sensibilis*, *Festuca rubra*, *Prunella vulgaris*, *Scirpus atrocinctus*, *Spiraea alba*, *Juncus filiformis*,

Symphiotrichum novi-belgii, and *Rosa* sp., N 45.07499° W 067.13728°, 12 Jul 2012, *Lovit 420* (MAINE). Trescott, in a low area of an open field south of State Highway #189 at the Whiting Town Line, multiple clumps of this variety present, near *Scirpus microcarpus*, with *Carex nigra*, *Carex canescens*, *Ranunculus acris*, *Doellingeria umbellata*, *Lysimachia terrestris*, and *Galium* sp., N 44.79006° W 067.16454°, 27 Jun 2012, *Lovit 411* (MAINE). West Pembroke, dry roadside, 8 July 1909, *Wiegand 96* (NY). Roque Bluffs, swale at Johnson Mountain, in sphagnum, 23 July 1988, *Dibble 1588* (MICH). Steuben, gravel pit at jct of Dyer Bay Road and Road to Eagle Hill, 27 Jul 1996, *Reznicek 10319* (MICH, MAINE). Steuben, east side of Unionville Road 5.3 miles north of US Rte #1, dry sandy ditch dominated by sedges and grasses, 4 Jul 1993, *Reznicek 9589* (MICH).

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Acknowledgments: Kanchi Gandhi, Andrew Hipp, Tony Reznicek, Thomas Vining, and Emily Wood are thanked for their assistance with this manuscript.

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