Haunts and Habits of Midwest Sedges

Andrew L. Hipp
The Morton Arboretum
4100 Illinois Route 53
Lisle IL 60532-1293
ahipp@mortonarb.org
redwood.mortonarb.org/lab_pages/hipp

Characteristics shared by sedges

- Leaves three-ranked (*Dulichium arundinaceum* 'Three-way sedge')
- Sheaths closed (*Scirpus* sp.)
- Flowers small, not showy, each subtended by a single scale

***A few genera in the sedge family* (Cyperaceae)**

Twig-rush (*Cladium mariscoides*)
Spike-rush (*Eleocharis rostellata*)
Cotton-grass (*Eriophorum virginicum*)
Beak-rush (*Rhynchospora alba*)
Wool-grass (*Scirpus cyperinus*)
Three-way sedge (*Dulichium arundinaceum*)

Carex is set apart from the other members of the genus by the perigynium

- Sedges in the genus *Carex* have female flowers enclosed in a sac-like structure called the perigynium (illustration from T.V. Egorova's *The Sedges* (Carex *L.*) *of Russia and Adjacent States*, 1999)

The perigynium is far more variable than the achene in Carex

- Flotation (e.g. *C. intumescens* 'Shining bur sedge')
- Ingestion by birds or mammals (e.g. *C. aurea* 'Golden-fruited sedge')
- Ant-dispersal (e.g., *C. pedunculata*)
- Insect-pollination (e.g., *Cymophyllus fraseri*, which is embedded within *Carex*)

***Two subgenera of* Carex**

- Subgenus *Vignea*: stigmas 2, spikes sessile and usually short, generally bisexual
- Subgenus *Carex*: stigmas 3 (2 in a few groups), spikes elongate or stalked, often unisexual

Species found predominantly in prairies

Mesic to wet prairies

Bicknell's sedge (*Carex bicknellii*)
Fescue sedge (*Carex brevior*)
Troublesome sedge (*Carex molesta*)
These three species are superficially similar… also compare C. molesta with C. normalis

Broad-leaved woolly sedge (*Carex pellita*, = *C. lanuginosa*)

Yellow-headed fox sedge (*Carex annectens* [= *C. brachyglossa*])
Fox sedge (*Carex vulpinoidea*)
These two species resemble each other and are closely related. However, they can be distinguished in the field fairly readily by drawing the leaves and flowering stem up between your fingers… if the flowering stem is much longer

than the leaves, you are probably handling C. annectens. Also, C. annectens perigynia become very yellow in age and have short, abrupt beaks, while those of C. vulpinoidea remain green and taper more gradually to the beak.

Broom sedge (*C. scoparia*)

Calcareous wet prairies, grading to fens

Prairie straw sedge (*C. suberecta*)

Carex scoparia and C. suberecta are similar to each other, but C. suberecta has broader perigynia with wedge-shaped bases, and the inner band of the leaf sheaths tends to be green rather than hyaline.

Prairie gray sedge (*Carex conoidea*) – perigynium veins impressed rather than raised
Common stiff sedge (*Carex tetanica*) – beak sharply bent
Early fen sedge (*Carex crawei*) – red pigment flecks on scales and perigynia; staminate spike long-stalked; long-rhizomatous
Limestone meadow sedge (*Carex granularis*) – red pigment flecks on scales and perigynia; staminate spike short-stalked; cespitose
These four species are superficially similar, but each has distinctive characteristics as indicated above

Buxbaum's sedge (*Carex buxbaumii*)
Small yellow sedge, hidden-scales sedge (*Carex cryptolepis*)
Large-fruited star sedge (*Carex echinata*)
Inland star sedge (*Carex interior*)

***Dry prairies* (calcareous)**

Mead's sedge (*Carex meadii*)
Prairie hummock sedge (*Carex richardsonii*)
Early oak sedge (*Carex umbellate*)

***Dry prairies and sand barrens* (more often sandy)**

Sand sedge (*Carex muehlenbergii*)
Running savanna sedge, hillside sedge (*Carex siccata*)

Species predominantly found in forests and woodlands

Dry to mesic forests and woodlands

Pennsylvania sedge (*Carex pensylvanica*)

Straight-styled wood sedge (*Carex radiata*)
Curly-styled wood sedge (*Carex rosea*)

These two resemble one another (and superficially C. interior and C. echinata, from which they differ by having androgynous spikes (male flowers at the apex of each little cluster of perigynia). Differentiate them by habit (C. radiata has weak stems that splay out in age, C. rosea tends to stand pretty erect throughout the season) and by stigmas (C. rosea has dark, thick, tightly curled stigmas; C. radiata has weak, filiform stigmas.

Oval-headed sedge (*Carex cephalophora*)

Mesic wet-mesic forests

Clustered bracted sedge (*Carex cephaloidea*)
Bur-reed sedge (*Carex sparganioides*)
Common wood sedge (*Carex blanda*)
White bear sedge (*Carex albursina*)

Plantain-leaved sedge (*Carex plantaginea*)
Hairy sedge (*Carex hirtifolia*)
Wood's stiff sedge, pretty sedge (*Carex woodii*)
Sprengel's sedge (*Carex sprengelii*)
Graceful sedge, purple-sheathed graceful sedge (*Carex gracillima*)
Awned graceful sedge (*Carex davisii*) – a bottomland forest species, allied to *C. gracillima*
Drooping woodland sedge (*Carex arctata*)

Greater straw sedge (*Carex normalis*)
Quill sedge (*Carex tenera* var. *tenera*) – really a wet prairie / dry upland wood species
Marsh straw sedge (*Carex tenera* var. *echinodes*)

These three resemble each other very closely. However, morphological, chromosomal, and molecular data indicate they are distinct enough to warrant all being considered separate species. In fact, C. tenera v. echinodes is probably more closely related to C. normalis than to C. tenera!

Wet to bottomland forests, soils often alluvial
Awl-fruited oval sedge (*Carex tribuloides*)
Necklace sedge (*Carex projecta*)
Muskingum sedge (*Carex muskingumensis*)

These three are in the same group as C. brevior, C. tenera and their look-alikes (Carex section Ovales). The first two are especially similar to one another but distinct from the rest of the section. Both grow vegetatively by sprouting from the nodes of fallen culms.

Shining bur sedge (*Carex intumescens*) – really a mesic forest species, but closely related to *C. lupulina* et al.
Common hop sedge (*Carex lupulina*)
Gray's sedge (*Carex grayi*)
Bent-seeded hop sedge, Tuckerman's sedge (*Carex tuckermanii*)
Awned graceful sedge (*Carex davisii*)
Assiniboine sedge (*Carex assiniboinensis*)

Marsh edges, sedge meadows, other open wetlands

Common fox sedge, owl-fruit sedge (*Carex stipata*)
Running marsh sedge (*Carex sartwellii*)
Bristly sedge (*Carex comosa*)
Bottlebrush sedge, porcupine sedge (*Carex hystericina*) – most common in wet prairies to fens
Nodding sedge (*Carex gynandra*)
Lake sedge (*Carex lacustris*)
Common yellow lake sedge (*Carex utriculata*)
Hairy-fruit lake sedge (*Carex trichocarpa*)
Long-toothed lake sedge (*Carex laeviconica*)
Hairy-leaved lake sedge (*Carex atherodes*)
Tussock sedge (*Carex stricta*)
Hayden's sedge (*Carex haydenii*)
Emory's sedge (*Carex emoryi*)

Summary of habitats of 44 relatively common *Carex* species of prairies and oak woodlands

The following summary of habitats may be taken as a preliminary planting recommendation for restorationists working in southern Wisconsin and adjacent counties. Anyone planting the following species is advised to first read the more complete habitat summaries in the original article (Hipp 1998) and adhere to any geographic restrictions that apply. *Source:* Hipp, 1998. *Transactions of the Wisconsin Academy* 86:77-99.

Wet prairie

brachyglossa – esp. in sand
atherodes – in wet swales or standing water
bebbii
bicknellii
buxbaumii
conoidea
emoryi – alluvial soils only
haydenii
hystericina
interior
laeviconica – alluvial, especially in swales
molesta
normalis
pellita
sartwellii
scoparia – especially in disturbed, sandy soils
stipata – transitions
tenera
tetanica
trichocarpa – alluvial
vesicaria – alluvial
vulpinoidea

Mesic prairie

bicknellii
brevior
molesta
pensylvanica

Dry lime prairie

eburnea
meadii
richardsonii
rugosperma
umbellata

Dry sand prairie

brevior
muhlenbergii
pensylvanica
rugosperma
siccata
tonsa

Mesic savanna

bicknellii
blanda
brevior
cephalophora
normalis
pensylvanica
radiata
rosea
tenera
vulpinoidea

Dry savanna

brevior – not commonly
eburnea – especially *Juniperus* glades
muhlenbergii -- sand
pensylvanica
rugosperma
siccata

Lowland savanna

atherodes – very open, in swales or standing water
bebbii – minimal shade
bicknellii – minimal shade
emoryi – alluvial soils only
granularis – calcareous soils
laeviconica – alluvial
lupulina – generally alluvial
normalis
projecta
stipata – transitions between woods and openings
tribuloides – alluvial
trichocarpa – alluvial
vesicaria – alluvial
vulpinoidea

Dry to mesic oak woods (sugar maple not dominant)

blanda
brevior – tending toward sandier, more open woods
cephalophora
gracillima – generally on richer soils
normalis
pensylvanica
radiata
rosea
sparganioides – primarily in sugar maple forests
sprengelii – primarily in sugar maple forests
pensylvanica

Recommended references:

1. *The Spring Flora of Wisconsin*. Norman C. Fassett (xx, University of Wisconsin Press).
   [Keys to the sedges by James H. Zimmerman, illustrations by Elizabeth H. Zimmerman.]
   This may be the best book to begin learning Wisconsin sedges (*Carex* species only): it provides a useful introduction to the features used to identify sedges; the key-writer (Jim Zimmerman) was an excellent field-naturalist, and his keys display an intimacy with the genus; the illustrator (Libby Zimmerman) worked from live material; the book is small, and the older editions have a binding that will hold up adequately under field conditions. Although several species were not included, this is a good book with which to begin learning sedges, and its size makes it a useful companion even after you have become more familiar with the flora. Do not use this book as a final authority.

2. *Flora of Michigan, Volume I (Monocots)*. Edward G. Voss (1972, Cranbrook Institute of Science).
   Voss is a great key-writer and understands sedges. His keys to the sedges and to aquatic plants in vegetative condition shine; both are found in this ridiculously inexpensive ($12.50??!) volume. Many species are illustrated with clear line drawings and the habitat information is reliable. I carry this book with me in the field all the time, leaving Fernald (*Gray's Manual*) at home or in the car.

3. *Gray's Manual of Botany, 8th Edition*. Merritt Lyndon Fernald (1950, American Book Company).
   Fernald's keys to the sedges work well and his descriptions are succinct, accurate, and at times lyrical. He italicizes key characters that distinguish similar species and provides illustrations of inflorescence and perigynia characters. This is a wonderful book for our flora… buy a used a copy and use it at every opportunity. If I could own only one book for the flora of the Midwest and Northeast, this would be it. Watch out for the nomenclature, which is more out of date than in the other volumes listed here. Double-check it against the Wisconsin Checklist of Vascular Plants (www.wisc.edu/herbarium).

4. *Sedges: Carex*. Robert H. Mohlenbrock (1999, Southern Illinois University Press).
   Mohlenbrock's book contains the best single collection of sedge illustrations for our flora. I don't think a better collection of illustrations from herbarium specimens (which is pretty appropriate for sedges, grasses and rushes) has been made since the illustrations for Kenneth K. MacKenzie's (1933) monograph of the genus for Flora of North America.

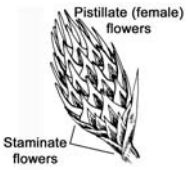
5. *Field Guide to Wisconsin Sedges: An introduction to the genus* Carex *(Cyperaceae)*
   Andrew L. Hipp, with illustrations by Rachel D. Davis, Maps and Appendices by Merel R. Black and Theodore S. Cochrange (2008, University of Wisconsin Press).
   This book provides an introduction to the genus, with color illustrations and discussion of the taxonomy, as well as keys to all species in the state's *Carex* flora.

6. For photos of many *Carex* species, see:
   - http://wisplants.uwsp.edu/VascularPlants.html
   - http://botany.wisc.edu/herbarium/carex/

Wisconsin Subgenera of *Carex*

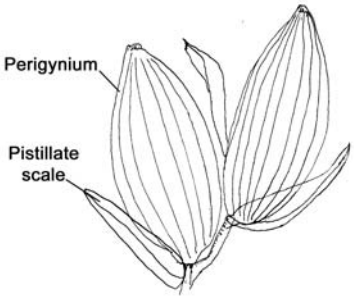
1. Individual spikes bisexual and generally sessile, stigmas two, achenes lenticular, bracts not sheathing or leaf-form. Generally no reddish hue to bases of plants, though the bases may be darkened by the old leaves that enshroud the new culms. **Subgenus *Vignea***.

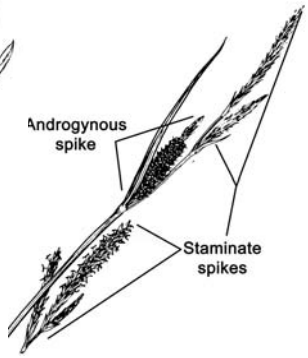
    2. Some or all spikes gynocandrous, i.e. having female florets at the end. Again, look closely for the filaments, which should be protruding from scales at the bases of spikes in the gynocandrous species. Sometimes this character shows up in the form of clavate bases, i.e. bases that are club-shaped, with basal scales wrapped tightly around the rachis and expanding near the top to accommodate the big bad perigynia. **Gynecandrous *Vignea* sections**

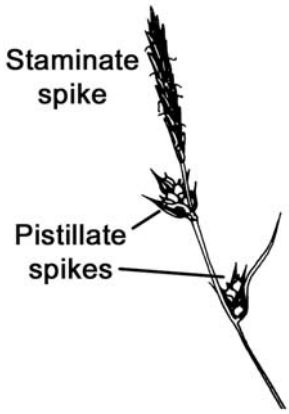


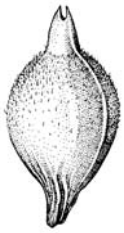
    2. Some or all spikes androgynous, i.e. having male florets at the end and perigynia at the bases. Look closely with a hand lens for this feature, as you will often find only filaments remaining of the stamens. Early in the season the perigynia have not yet expanded, so that it can be difficult to ascertain whether a scale is hiding a male flower or a female; peel the scales back if you have doubts. **Androgynous *Vignea* sections**

1. Individual spikes generally unisexual, or at least forming two different types, some unisexual and some bisexual. The textbook case, pure unisexuality of the spikes, is often not followed, but you should be able to see a distinct difference between the spikes with some strictly pistillate (female, i.e. with perigynia). Spikes are often elongate or peduncled (i.e. on stalks). Stigmas are for the most part three and achenes triangular in cross-section, but there are three groups of species in Wisconsin that violate this rule as well: the *Carex stricta* group (section *Acutae*), the *Carex aurea* group (section *Bicolores*), and the *Carex crinita* group (section *Cryptocarpae*) all have lenticular achenes with but two stigmas. Fortunately, there is still division of sexes among the spikes (with terminal spikes staminate), which are also elongate or peduncled, even in these aberrant sections. Bracts are leafy and very often form sheaths. Reddish to purplish bases are common, but not ubiquitous. **Subgenus *Carex* (*Eucarex*)**.



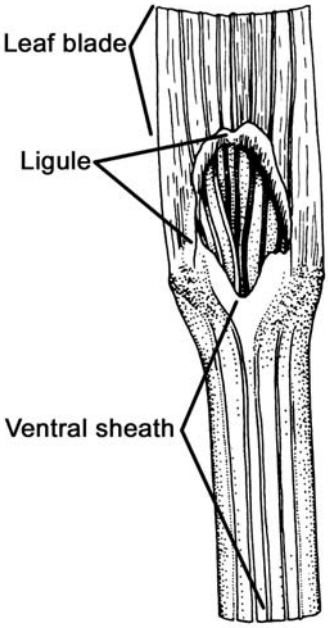




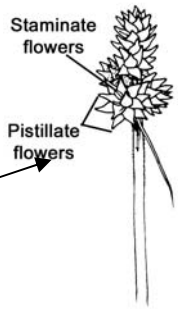


Glossary of terms used in the Sedge Family (Cyperaceae)

Many of the terms discussed below are used for grasses and/or rushes as well as for sedges. A '**' indicates such terms.



Achene. A hard, nutlike fruit… also sometimes referred to as a "nutlet." Although technically the term refers only to nutlike fruits derived from single, superior carpels, the term is used more generally for the fruits of such families as the sunflower family (with inferior ovaries).



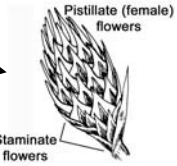
Androgynous. Having male flowers of a spike positioned above the female flowers of that same spike (cf. *gynecandrous*).

****Beak.** A slender prolongation or protuberance off of an otherwise broader organ, such as an achene or perigynium.

****Compound inflorescence.** An inflorescence in which more than one spike emerges from a single inflorescence node.

****Culm.** The flowering stem of a grass or sedge. Sterile shoots are generally not referred to as culms, though in some sedge groups, non-flowering shoots do develop elongated stems with true nodes and internodes.

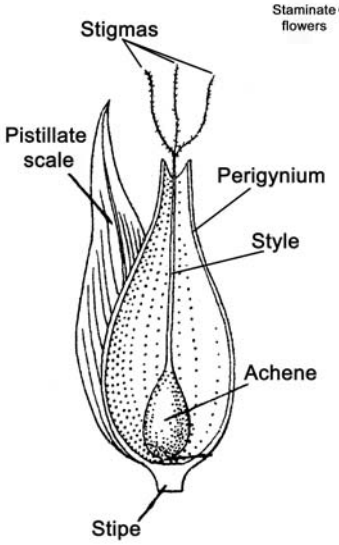
Gynecandrous. Having female flowers of a spike positioned above the male flowers of that same spike (cf. *androgynous*).



****Ligule.** Appendage at the summit of the leaf sheath, where the sheath meets the blade, and on the inner side. In grasses, usually loose, whereas sedges generally have the ligule partly fused to the inner leaf blade surface.

****Nerve.** A vein, often specifically a vein of perigynium or scale.

Perigynium. A sac that encloses the female flower… in our flora, restricted to the genus *Carex*. The perigynium hides the fruit inside (the achene), acting as the main agent of dispersal.



****Scale.** A bract that subtends (grows immediately beneath) a flower.

Pistillate scale. Subtends a female (pistillate) flower.
Staminate scale. Subtends a male (staminate) flower.

****Sheath.** That portion of a leaf that enwraps a culm (on fertile shoots) or other leaves (on sterile shoots).

Ventral sheath. The face of the sheath opposite the leaf blade.
Dorsal sheath. Face(s) of the sheath continuous with the leaf blade.

Spike. The ultimate division of the sedge inflorescence, composed of many individual flowers (in some species, one or only a few flowers per spike).