



Germination Trial Results for 24 Ontario Native Sedge Species

Andrea D'Silva, lead author
Alex Maclellan, co-author
Andrew Clarke, co-author

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Swallowtail
NATIVE PLANTS

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Introduction

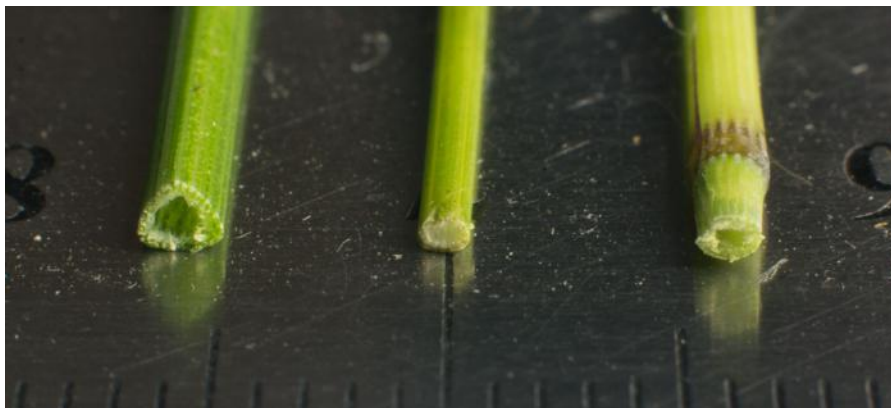
A few years back, before I became captivated by the group of plants known as sedges, I was walking through a particularly lovely section of forest in one of my local conservation areas. I came across an area covered by a sea of vibrant green grass, about fifteen centimetres high, with thin, delicate leaves sparsely grouped together. I wondered if this section of the forest used to be a meadow, and this grass was leftover from that time, struggling to grow in the shade.

Later I learned that what I had seen was not grass from an old meadow, but an upland forest sedge growing in an area rich with spring ephemeral wildflowers. The vibrant green grass was Pennsylvania sedge (*Carex pensylvanica*), the first of many different species of sedges that I would eventually come to know. Once I learned to recognize it, I found it growing on my own property.

As the owner of a native seed company, when I come across a new species my first instinct is to collect a few seeds and try to germinate them. Those first few seeds marked the beginning of a series of sedge germination trials that kept expanding to include many species and treatments. The trials are still ongoing, with new species, treatments and questions to explore, but we have results that we wanted to share so that others could also enjoy growing sedges from seed.

What are sedges?

If you find a grass-like plant (also known as a graminoid), how do you know if it is a sedge? A useful saying for telling the three main groups of graminoids apart is “Sedges have edges, rushes are round, grasses are jointed all the way to the ground”. Most sedge stems are triangular in cross section. When you roll the stem between your fingers you can usually feel the edges of the triangle. Rush and grass stems are both round in cross section and will roll smoothly between your fingers. Grass stems will have joints, or nodes where the leaves join the stem. The three main families of graminoids belong to the order Poales. Sedges are part of the Cyperaceae family, rushes belong to the Juncaceae family, and grasses are in the Poaceae family.



Cross sections, from left to right: sedge (triangular), rush (round), grass (round, with joint or node)

Within the sedge family, we have focused our germination trials on *Carex* species, the largest genus of sedges. There are around 2000 species of *Carex* worldwide, with over 250 species in Ontario. Although there has been more interest in sedges in recent years, they have often been overlooked because they are not flashy and identification can be difficult. Sedges are everywhere, but we don't see them because they are unfamiliar.

The presence of a triangular stem is one distinguishing feature of *Carex* species. Another characteristic is the perigynium, a saclike structure that surrounds the seeds (achenes). Details of the seed heads and perigynia are usually needed for identification. Sedges tend to flower in early spring and set seed in late spring to early summer.



Carex intumescens. Left: seeds enclosed in the perigynia, right: seeds with the perigynia removed

Ecological value of sedges

Sedges are a diverse group of grass-like plants. They grow in a wide variety of environmental conditions: from sand barrens to upland forests to fens and marshes. There are even sedge meadows, a type of habitat where sedges are the dominant type of vegetation. Sedges are an ecologically important group of plants, providing soil stabilization through their dense root structure as well as supporting a wide variety of wildlife by providing food and shelter. They are an integral component of biodiversity in our local ecosystems.

Sedges are some of the first species to flower and set seed in the spring. Many species have evergreen foliage, allowing them to start photosynthesizing as soon as the snow melts. They often have a clumping growth pattern, forming a dense tangle of leaves that provides cover for small mammals and nesting material for birds. While they are wind pollinated and therefore do not have nectar for pollinators, they still provide foliage in early spring before many species have begun to grow, and are host plants for caterpillars.

Some sedge species have a mutually beneficial relationship with ants similar to some flowering spring ephemerals such as bloodroot (*Sanguinaria canadensis*) and trillium (*Trillium* spp.). These species produce elaiosomes, nutrient rich structures attached to their seeds. Ants take the seeds with the elaiosomes underground, consume the elaiosome and then discard the seed within the nest. The seeds are now planted in the ground, ready to germinate.

Sedges are an excellent food source for seed-eating birds and small mammals. In wetlands, both the seeds and foliage of *Carex* spp. are an important food source for waterfowl. Even large herbivores such as bison and livestock use sedges as forage.



Carex pedunculata seeds with elaiosomes

In a garden setting, *Carex* species can be used as ornamental plants to create movement and structure. In matrix gardening they create a lush backdrop for focal species and can be used as a living mulch to help with weed suppression. Their fibrous root systems help to prevent erosion and filter water. Some sedge species have unique, delicate seedheads that can be quite striking as accent plants.

Why we conducted the *Carex* germination trials

When we began collecting sedge seeds and tried to grow them into plants, our first step was to research their germination requirements. We were surprised to discover that the same recommendation was given for almost all sedge species: 60 days of cold, moist stratification. With so many different species growing in different habitats, it seemed unlikely that all *Carex* species would have the same germination requirements. Indeed, when we started to run our trials we found some species germinated readily under many conditions, and others did not germinate at all.

We also wanted to know if there were different options for germination. For some species cold stratification was an absolute requirement, they would not germinate without it. But for other species, such as *Carex arctata*, there were several possibilities. You could begin 90 days of stratification on January 1st and have ~80% germination by May 1st. Or, you could surface sow them on March 20th (without any cold stratification), and you would have ~70% germination by May 1st.

One of the goals of Swallowtail Native Plants is to increase the commercial availability of *Carex* species for both restoration projects and the home gardener. To achieve this, we need accurate germination information in order to establish our *Carex* seed production beds. This information will also help others experience success when growing sedges from seed. Ultimately, we hope to see more sedges growing in backyards and natural areas across Southern Ontario.

Methods

Seed collection and preparation

We sustainably and ethically collected *Carex* seeds in small amounts from local populations in the regional municipality of Durham, Ontario. We dried the seeds in organza bags at room temperature for approximately one week before starting the germination trials.

In early trials we found that if we left the perigynia on the seeds, the leafy perigynia tissue would start to break down and become moldy. The presence or absence of the perigynia did not seem to impact germination. For this set of trials we removed the perigynia to reduce the amount of mold.

Germination containers

We placed the seeds on moist filter paper in small, clear, sealed plastic containers. Moisture was maintained throughout the trial by using a layer of clay LECA pellets at the bottom of the containers. We autoclaved the containers using a pressure cooker to reduce mold contamination.

Fifty seeds were placed in each container and were monitored weekly. We removed seeds that germinated from the test and recorded the results.



Carex peckii seeds in a germination trial container

Germination conditions tested

Cold, moist stratification

Seeds of many native species need to experience several months of winter conditions before they will germinate. This germination pretreatment is called “cold, moist stratification”. In order to determine whether or not a species needed cold, moist stratification we placed one set of containers in a fridge for 60 days and another control set remained at room temperature. Later in the trial, we added an extra trial with 90 days of stratification, when we found some species were not germinating after 60 days of stratification.

Light

We also wanted to test if light was a germination requirement. All of the trials had two sets of containers, one set was kept in the dark and the other was placed under lights. These results would show whether the seeds could be buried under the soil or if they needed to be sown on the surface.

Temperature

After the seeds had undergone their cold stratification pretreatment (or if they had no pretreatment) they were kept at a temperature of around 22 degrees Celsius. Temperature is known to be an important variable in sedge germination; we hope to conduct future germination trials exploring the effect of alternating temperatures on seed dormancy.

Aerated water and still water

During our research on *Carex* germination we came across a technique from the Aberdeen Plant Materials Center involving aerated water. As part of his research, Derek Tilley germinated seeds of Nebraska sedge (*Carex nebrascensis*) by placing them in water in a container with an aquarium bubbler.

It wasn't too difficult to set up trials to test germination in aerated water using an aquarium bubbler so we added this technique to our trials. While we were trialing the aerated water we thought we would see what happened when seeds were placed in still water that had not been aerated.



Left: aerated water setup with an aquarium bubbler.
Right: still water setup.

All of the water trials were placed under lights and the water was changed weekly. Placing *Carex* seeds in water turned out to be an easy method to germinate some sedge species, even without the aquarium bubbler.

Results

Cold, moist stratification

Several *Carex* species required cold, moist stratification and would not germinate at all without this pretreatment. The following species need a minimum of 90 days stratification: *Carex albursina*, *Carex aurea*, *Carex granularis*, *Carex plantaginea* and *Carex platyphylla*.

Many *Carex* species germinated without cold, moist stratification if they were exposed to light, however, stratification often improved the percentage and/or rate of germination.

Light

Exposing *Carex* seeds to light almost always significantly improved the percentage and rate of germination, regardless of whether the seeds had been stratified or not.

Aerated and still water

A surprising number of *Carex* species germinated well when they were placed in a container of still water and put under lights without any stratification pretreatment. We have not finished running all of the aerated water trials but early results indicate that aerating the water increased germination by approximately 5% in several species. Species that germinated well in water include:

Carex arctata
Carex bebbii
Carex brevior

Carex deweyana
Carex muchlenbergii
Carex peckii

Carex pedunculata
Carex sparganioides
Carex sprengei

Notes on the species pages

Images

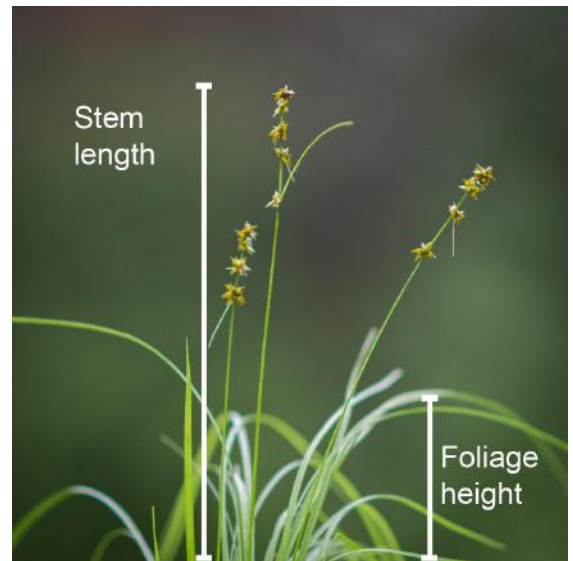
We have included images of the flower structure (inflorescence), the form of the foliage, and the seeds, usually with the perigynium. We have indicated if the perigynium has been removed.

Plant size

Plant size is indicated in the table at the top of each individual species page. The first measurement refers to the height of the foliage. The second measurement refers to the length of the flowering stem.

Results table

At the bottom of each species page we have included a table that indicates the best ways to germinate that particular species. The time indicated refers to the length of time it will take the seeds to germinate after sowing. It does not include the 60 or 90 days of stratification time.



Future trials

After running this set of germination trials, we have come up with more questions that we would like to explore in future trials.

For those species that we have not been able to germinate at all, there are several treatments we need to try. First, they may need an even longer period of cold, moist stratification, 120 days or more. It would also be useful to try a period of warm, moist stratification followed by a period of cold, moist stratification, similar to the requirements for some spring ephemeral wildflowers. We would also like to run trials on alternating temperatures, and by association, winter sowing. Winter sowing is usually a very effective means of germinating native species.

While seeds from many species can be dried and frozen in long-term storage (orthodox seeds), seeds from some species cannot be dried (recalcitrant seeds). We would like to confirm which species remain viable after drying and storing in the freezer, and how storing dried *Carex* seeds for a year affects their level of dormancy.



Carex aurea, Golden sedge

Carex albursina

White Bear Sedge

Habitat	Soil moisture	Light requirements	Size	Section
Woodlands	Average-moist	Part shade-shade	10 cm, 50 cm	<i>Laxiflorae</i>



Carex albursina is a mid-sized woodland sedge. Its broad leaves reach 3-4 cm in width and 10-20+ cm in length, and have a papery leaf sheath at the base. The small flower spikes are covered by a leaf-like bract that extends beyond the flowers. The name White Bear Sedge comes from White Bear Lake in Minnesota. Reports vary on whether the plant was first documented there, or simply abundant.

Preliminary Results

We had a limited amount of seed for our trials with *Carex albursina*. No germination occurred for the following conditions that we tested: light and dark without any stratification, light and dark with 60 days of stratification. We have germinated *Carex albursina* using the winter sowing method, (the seeds were sown at the beginning of December), but our results are anecdotal. Further testing is required with a stratification period of 90 days or longer.

Carex arctata

Drooping Woodland Sedge

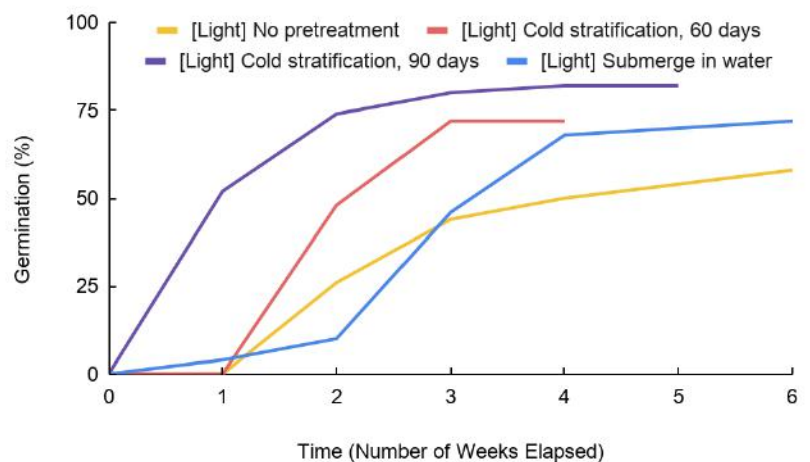
Habitat	Soil moisture	Light requirements	Size	Section
Woodlands, wetlands	Dry-average	Part Shade-shade	20 cm, 90 cm	Hymenochlaenae



Carex arctata is an elegant plant for a woodland garden. When flowering it has tall, delicate stems with spikes that cascade down. The leaves are a deep green, wrapped at the base with red leaf sheaths. It grows well under coniferous trees, especially in spruce and pine plantations.

Results

Carex arctata germinated well in a variety of conditions. Germination rates of ~75% were achieved by surface sowing the seeds after 60 to 90 days of cold, moist stratification. Surface sowing the seeds without stratification resulted in ~60% germination. Submerging the seeds in water under light resulted in ~75% germination without any stratification.



~80% Germination	3 weeks	Cold stratification, 90 days	Surface sow
~75% Germination	4 weeks	Submerge in water	Under light
~60% Germination	6 weeks	No pretreatment	Surface sow

Carex aurea

Golden Sedge

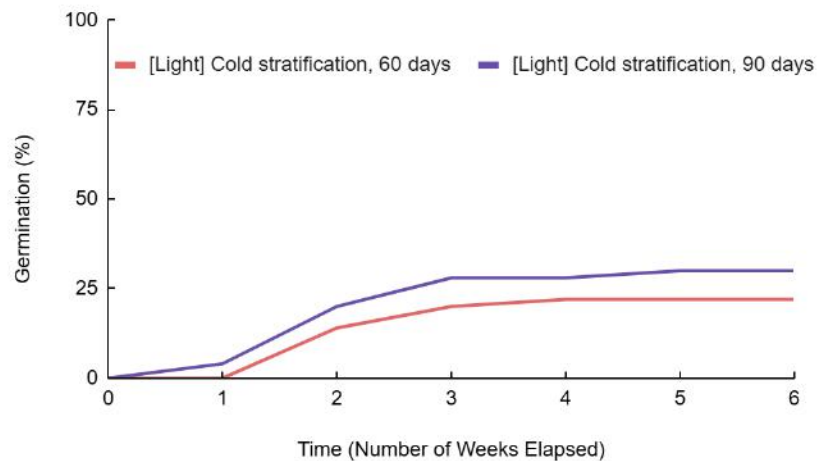
Habitat	Soil moisture	Light requirements	Size	Section
Meadows, wetlands	Dry-wet	Sun-part shade	12 cm, 10 cm	<i>Bicolores</i>



Carex aurea is a small sedge, approximately ankle-height. It grows well with full or partial sun and prefers moist or wet sandy soil. It can be found in environments that meet these conditions, such as meadows, swamps, shorelines, and ditches. The name golden sedge comes from their perigynia, which become a vibrant yellow-orange when mature. These usually appear in July, after flowering in May and June.

Results

For best results, cold stratify seeds for 90 days and then germinate under light (~30% germination). A 60 day cold stratification period was also moderately successful (~20% germination). *Carex aurea* requires cold stratification to germinate.



~30% Germination	3 weeks	Cold stratification, 90 days	Surface sow
~20% Germination	3 weeks	Cold stratification, 60 days	Surface sow

Carex bebbii

Bebb's Sedge

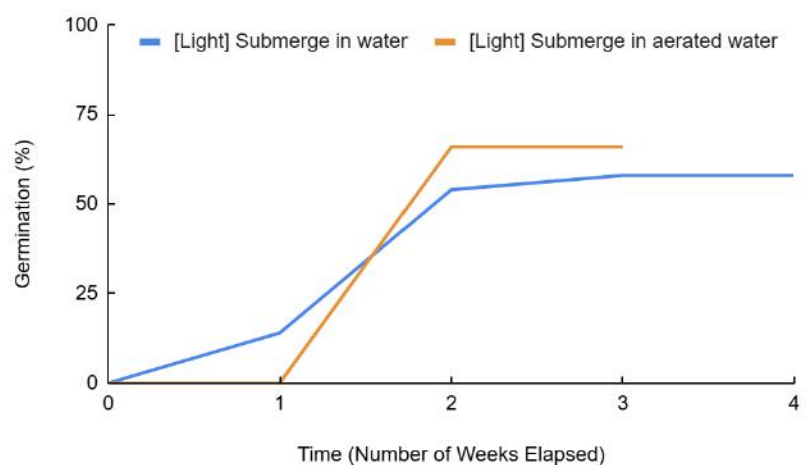
Habitat	Soil moisture	Light requirements	Size	Section
Wetlands, meadows	Average-wet	Sun-part shade	30 cm, 90 cm	Ovales



Carex bebbii is a mid-sized sedge species found in wetlands and moist meadows. It grows tall, slender stems, reaching almost one metre in length. The stems are tipped with tight clusters of upward-pointing spikes. The leaves and leaf sheaths are a vibrant green, with leaves rarely extending past the flower stems. *C. bebbii* can grow from seed to maturity and produce seed in a single year, unlike most other sedge species, which can not produce seeds until at least the second year of their life cycle.

Results

Carex bebbii germinates best when submerged in aerated water (~65% germination) or still water (~60% germination). Both trials were done under light. No germination resulted from any of the other treatments. Winter sowing was successful, (the seeds were sown at the beginning of December), but our results are anecdotal.



~65% Germination	2 weeks	Submerge in aerated water	Under light
~60% Germination	2 weeks	Submerge in water	Under light

Carex brevior

Short-Beaked Sedge

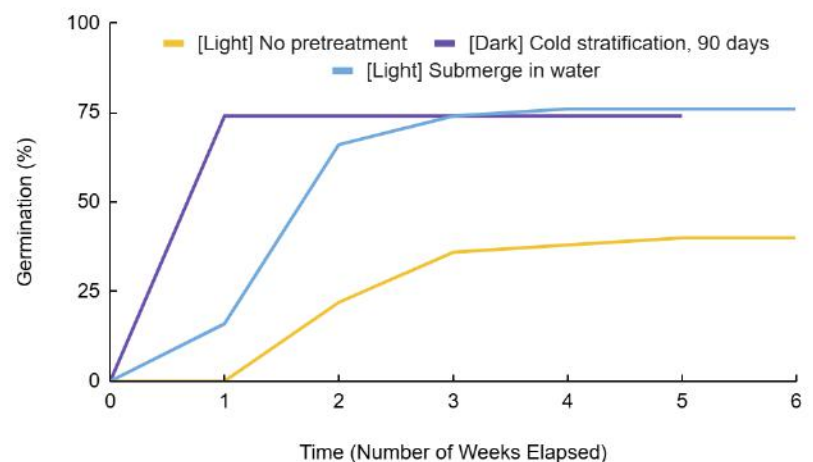
Habitat	Soil moisture	Light requirements	Size	Section
Grasslands, dunes	Average-dry	Sun	30 cm, 100 cm	Ovales



Carex brevior is a mid-sized sedge with bright green leaves and fibrous, brown leaf sheaths. Stems extend past the foliage, reaching approximately waist height, with clusters of 4 to 7 spikes at the end. *C. brevior* grows best in full sun and dry soil, and can often be found in grasslands or sandy areas.

Results

Carex brevior germinated well when submerged in still water (~75% germination). Slightly less (~65% germination) was obtained from any combination of 60 and 90 day stratification periods followed by either light or dark sowing. Moderate germination (~40%) was obtained by surface sowing the seeds without stratification.



~75% Germination	3 weeks	Submerge in water	Under light
~75% Germination	1 week	Cold stratification, 90 days	Cover with soil
~40% Germination	3 weeks	No pretreatment	Surface sow

Carex deweyana

Dewey's Sedge

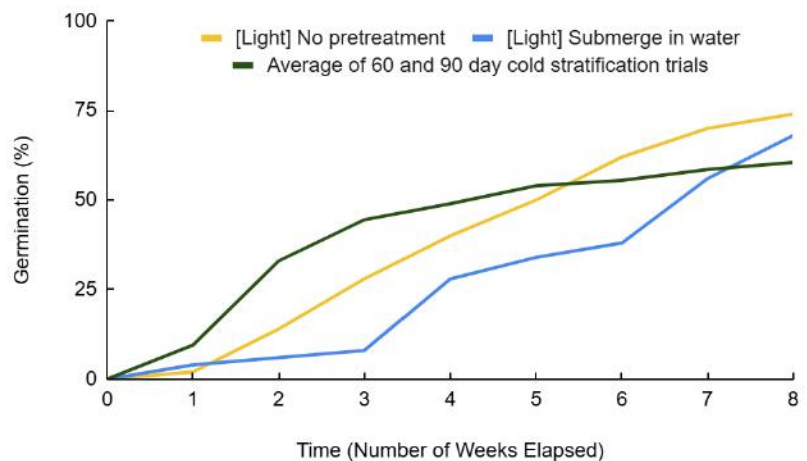
Habitat	Soil moisture	Light requirements	Size	Section
Woodlands	Dry-moist	Part shade, shade	10 cm, 75 cm	Deweyanae



Carex deweyana is a mid-sized sedge found in woodlands and bordering wetlands. It features thin, deep green leaves that delicately bend low to the ground. The base of the plant is often sheathed in fibrous brown leaves from the previous season. The flower stalks reach just under a metre in length, and grow outwards in an arc, rather than upwards. *C. deweyana* grows in moist or dry soils in full or partial shade.

Results

Carex deweyana germinated well when surface sown without stratification (~85%), although germination was slow, with a few seeds germinating each week. Submerging the seeds in still water under light resulted in good germination (~70%). Cold stratification periods of 60 or 90 days followed by sowing under light or in the dark resulted in moderate germination (averaging ~65%)



~85% Germination	8 weeks	No pretreatment	Surface sow
~70% Germination	7 weeks	Submerge in water	Under light

Carex flava

Yellow Sedge

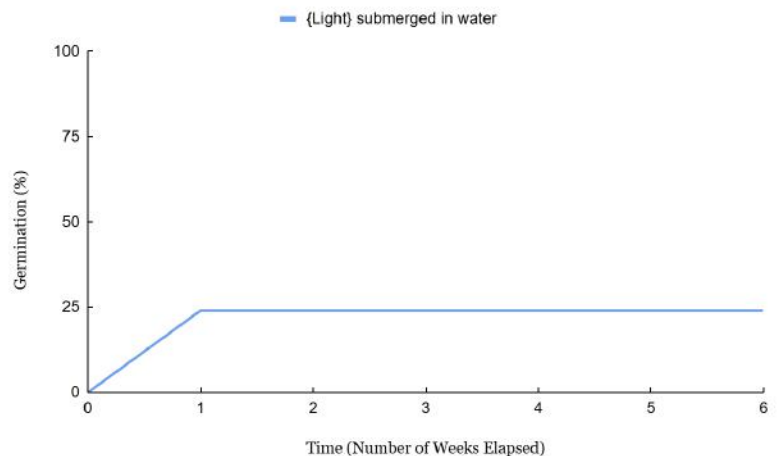
Habitat	Soil moisture	Light requirements	Size	Section
Forests: near water	Moist-wet	Sun-part shade	30 cm, 60 cm	Ceratocystis



Carex flava grows in full sun in wet meadows and shorelines, or in part shade at the edge of wet forest habitats. It has vibrant, lime green leaves that grow in tufts. It has two to five spherical spikes of seeds that are clustered at the top of the stem, they become a yellow-orange colour when mature.

Preliminary Results

Carex flava did not germinate in light or dark without any stratification. We have not completed the cold moist stratification trials yet. We have germinated *Carex flava* using the winter sowing method, (the seeds were sown at the beginning of December), but our results are anecdotal. This indicates that *Carex flava* is likely to germinate with stratification. We had some germination when we placed the seeds in still water (~25%). Further testing is required.



~25% Germination	1 week	Submerge in water	Under light
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Carex gracillima

Graceful Sedge

Habitat	Soil moisture	Light requirements	Size	Section
Woodlands, Forests	Average-wet	Part shade-shade	20 cm, 90 cm	<i>Hymenochaenae</i>



Carex gracillima is very similar in appearance to *Carex arctata*. The terminal spike has a cluster of perigynia at the tip which is absent in *Carex arctata*. It prefers medium to moist soil with part to full shade. It has three to four delicate, drooping seed spikes at the end of tall stems. The leaves have dark red sheaths at the base of the plant.

Preliminary Results

Carex gracillima did not germinate in light or dark without any stratification. This was a little surprising since this species is very similar in appearance to *Carex arctata*, which did germinate in light without stratification. We have not completed the cold, moist stratification or the water trials yet for this species.

Carex granularis

Limestone Meadow Sedge

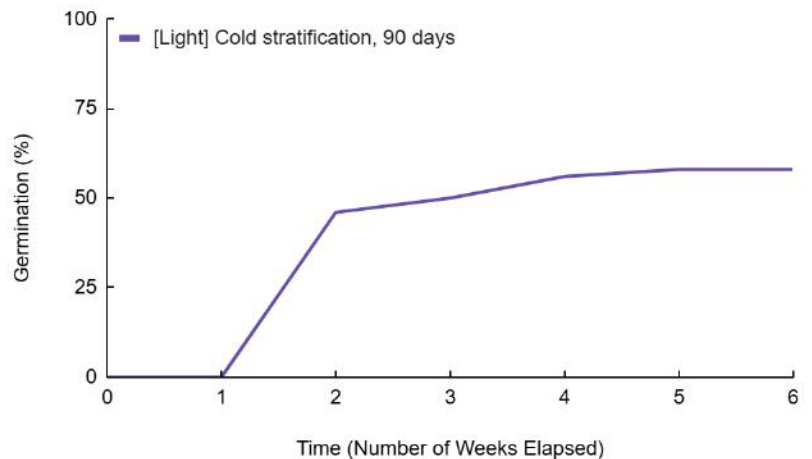
Habitat	Soil moisture	Light requirements	Size	Section
Meadows, wetland edges	Average-moist	Sun-part shade	20 cm, 30 cm	Granulares



Carex granularis is a small sedge with tightly clustered basal leaves. Its leaves can sometimes reach lengths of up to 60 cm and grow slightly taller than the flowering stalks. It grows best in moist soil and with full sun or partial shade, often at the edges of marshes or swamps. The name “Limestone Meadow Sedge” reflects how this species is tolerant of slightly alkaline soils, which often contain limestone.

Results

Carex granularis germinated best after a 90 day period of cold stratification. After the 90 day cold stratification treatment the seeds germinated at ~60% when they were surface sown and exposed to light, and ~20% when the seeds were kept in the dark. All other trials resulted in very low germination rates (under ~5%).



~60% Germination	5 weeks	Cold stratification, 90 days	Surface sow
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Carex hystericina

Porcupine Sedge

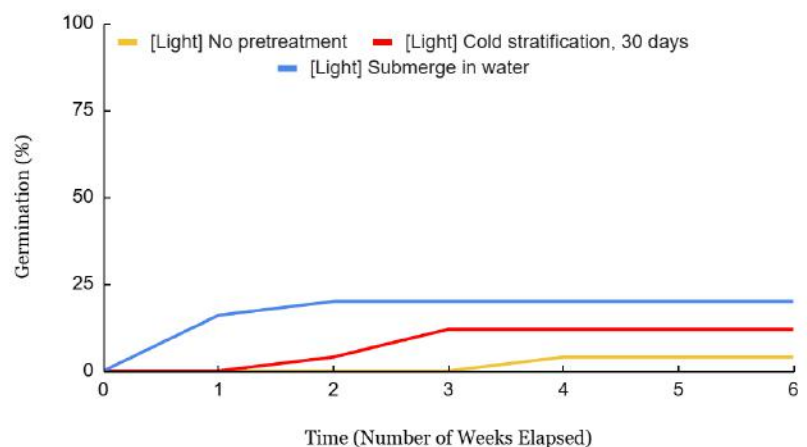
Habitat	Soil moisture	Light requirements	Size	Section
Wetlands	Wet	Sun-part shade	50 cm, 60 cm	Vesicariae



Carex hystericina is a medium sized sedge that grows at the edges of wetlands. The perigynia have long beaks, and are clustered tightly together in one to four slightly drooping cylindrical spikes. The quill-like spikes give rise to its common name, Porcupine sedge. Its leaves are bright green with reddish leaf sheaths at the base of the plant.

Preliminary Results

Carex hystericina showed a small amount of germination without pretreatment and with 30 days of cold, moist stratification. We have not completed the 60 and 90 day stratification trials for this species yet. There was also some germination (~20%) when the seeds were submerged in water.



Carex interior

Inland Sedge

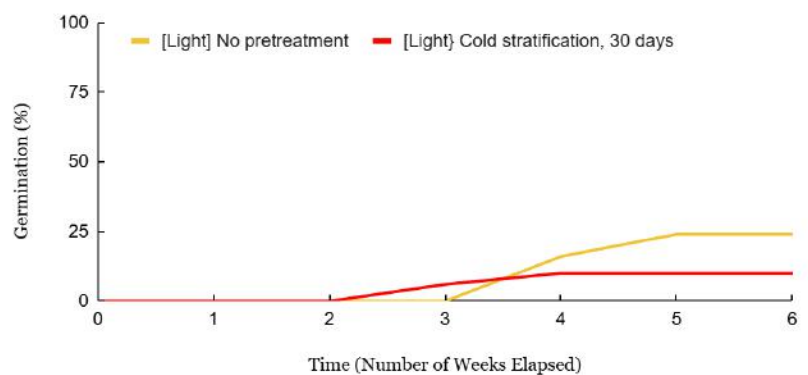
Habitat	Soil moisture	Light requirements	Size	Section
Wetlands	Wet	Part shade-shade	20 cm, 90 cm	<i>Stellulatae</i>



Carex interior grows in moist to wet soils. It has a sparse number of female flowers at the tip of the stem, with male flowers beneath, and then two to three lateral spikes along the stem. The small spikes are star-like with three to fifteen perigynia per spike. *C. interior* has very thin leaves, giving it a delicate overall appearance.

Preliminary Results

Carex interior showed a small amount of germination when exposed to light without pretreatment (~25%) and a little less germination with 30 days of cold, moist stratification (~10%). We have not completed the 60 and 90 day stratification trials for this species yet.



Carex leptoneura

Finely-Nerved Sedge

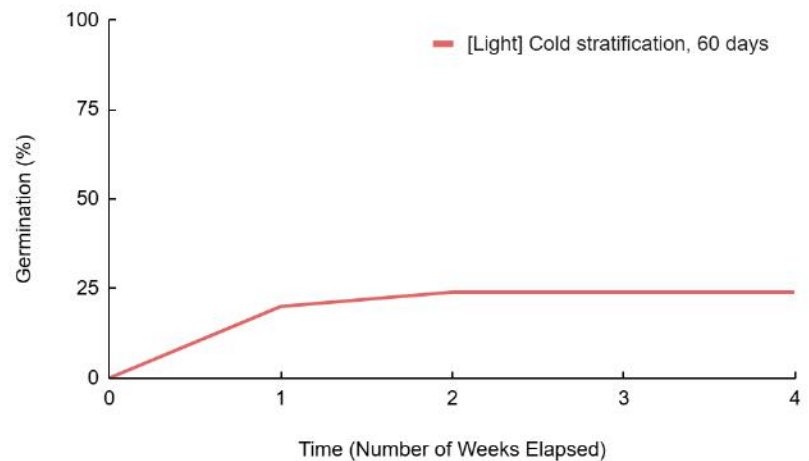
Habitat	Soil moisture	Light requirements	Size	Section
Woodlands	Moist-wet	Sun-part shade	20 cm, 40 cm	<i>Laxiflorae</i>



Carex leptoneura is a small woodland sedge. This plant prefers average or moist soil, and can also tolerate some sun. It features two fine nerves along the sides of its perigynia, the leafy sac that surrounds the seed, as well as many fine nerves that are harder to spot. While it is not a showy species, it can be used in a shady garden setting as a living mulch, providing a backdrop for focal plants.

Preliminary Results

Carex leptoneura only germinated when sown under light following a period of 60 days of cold stratification, where we observed ~25% germination. We did not have enough seed to run a 90 day stratification trial. Further research is needed.



~25% Germination	2 weeks	Cold stratification, 60 days	Surface sow
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Carex muehlenbergii

Muehlenberg's Sedge

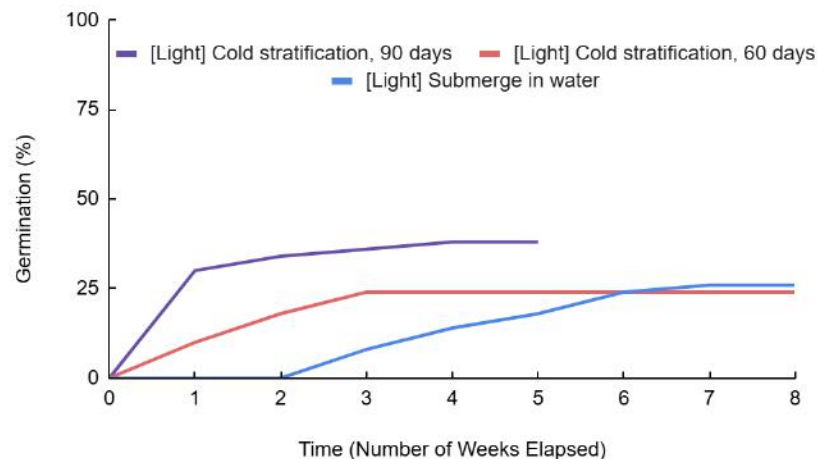
Habitat	Soil moisture	Light requirements	Size	Section
Prairies, sand barrens	Dry	Sun	20 cm, 75 cm	Phaestoglochin



Carex muehlenbergii is a mid-sized sedge with thin leaves, shorter than the flowering stems. The flower spikes are bright green and arranged in a tight cluster at the tip of the stem. *C. muehlenbergii* prefers sunny environments with dry or sandy soil and can be found in prairies, sand barrens, and forest outskirts as well as man-made clearings such as those around railroads.

Results

Carex muehlenbergii germinated best when surface sown after a 90 day period of cold stratification (~40% germination). Lower germination was achieved by surface sowing the seeds following a 60 day period of cold stratification or submerging the seeds in water (both ~25%). Less germination occurred when sowing the seeds in the dark. No germination resulted from any other trials.



~40% Germination	1 week	Cold stratification, 90 days	Surface sow
~25% Germination	6 weeks	Submerge in water	Under light

Carex peckii

Peck's Sedge

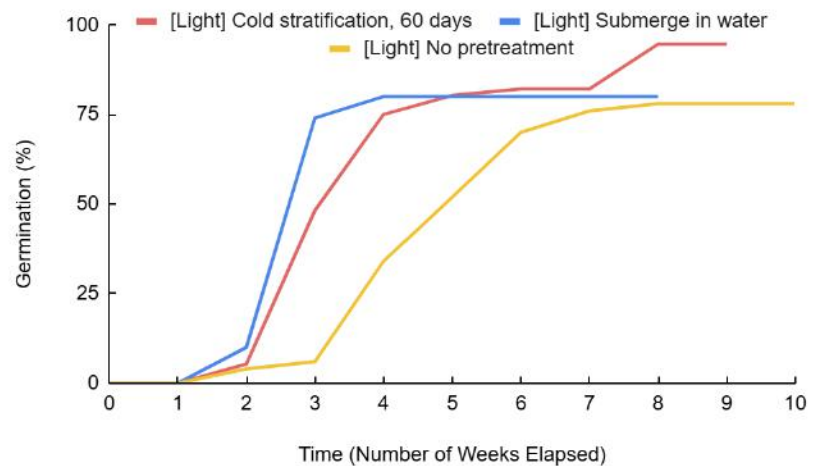
Habitat	Soil moisture	Light requirements	Size	Section
Woodlands	Dry-Average	Part shade-shade	10 cm, 40 cm	Acrocystis



Carex peckii is a small sedge, with foliage growing around ankle-high. It has thin, bright green leaves and reddish leaf sheaths. *C. peckii* has long flowering stems and dense, green-brown seed clusters. It can be found in dry, and moderately moist forests, and can uncommonly be found in swamps and bogs. This plant can reproduce by rhizome propagation and will spread to form colonies of plants.

Results

Carex peckii germinated well under all treatments with light. The best germination was achieved by surface sowing after 60 days of cold stratification (~95% germination). Good germination was also achieved by surface sowing without stratification, submerging the seeds in water, and surface sowing after 90 days of cold stratification (~80% germination). All trials done in the dark resulted in low germination (under ~10%).



~95% Germination	8 weeks	Cold stratification, 60 days	Surface sow
~80% Germination	4 weeks	Submerge in water	Under light
~80% Germination	7 weeks	No pretreatment	Surface sow

Carex pedunculata

Long-Stalked Sedge

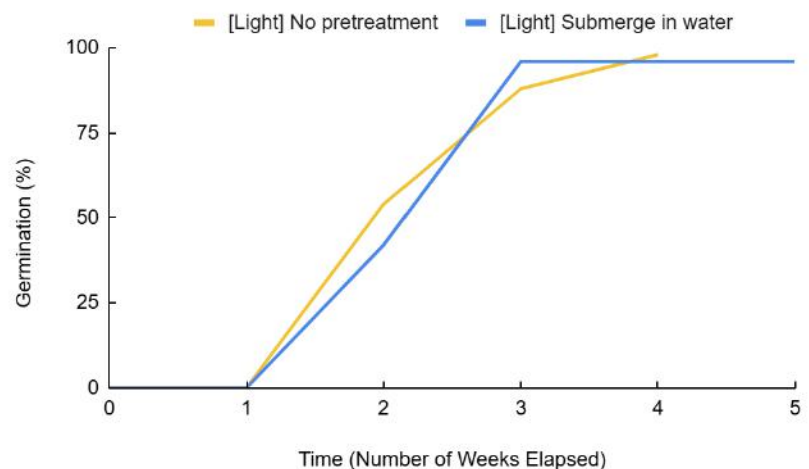
Habitat	Soil moisture	Light requirements	Size	Section
Woodlands	Dry-moist	Part shade-shade	15 cm, 30 cm	Clandestinae



Carex pedunculata is a small woodland sedge. It forms a dense group of basal leaves, making it a good option to fill out a garden matrix. It flowers in April, earlier than many sedges. The seeds of *C. pedunculata* are covered with a dark red-brown scale, similar in colour to the base of the plant. The seeds have large, nutrient dense elaiosomes, intended to be carried away by ants for seed dispersal. The ants take the fruit back to their nest to eat the elaiosome, and discard the seed, allowing it to germinate undisturbed underground.

Results

Carex pedunculata germinated best submerged in water under light and surface sown without stratification (~95% germination). Trials with stratification are underway at the time of writing, with no results yet.



~95% Germination	3 weeks	No Pretreatment	Surface sow
~95% Germination	3 weeks	Submerge in water	Under light

Carex plantaginea

Plantain-Leaved Sedge

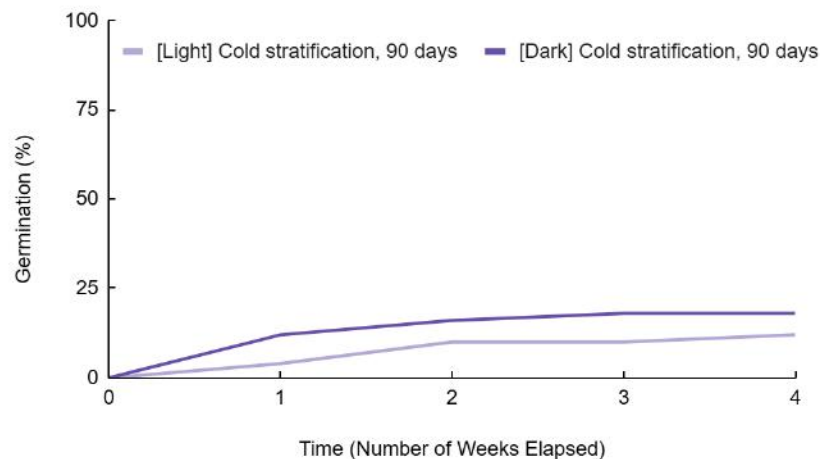
Habitat	Soil moisture	Light requirements	Size	Section
Woodlands	Moist	Part shade-shade	15 cm, 50 cm	Careyanae



Carex plantaginea is a small, dense sedge, with broad basal leaves, 3-4 cm wide. The leaves are distinct, resembling plantain (*Plantago* sp.) due to prominent lateral veins and wrinkled texture. The leaves are bright green and leaf sheaths are reddish-purple. *C. plantaginea* requires at least some shade, and can be found in moist forests with rich soil. It is a larval host plant for multiple species of butterflies from the subfamily Satyrinae.

Results

Carex plantaginea germinated best after at least 90 days of cold stratification. Sowing the stratified seeds in the dark resulted in slightly higher germination than surface sowing (~20% compared to ~10%).



~20% Germination	2 weeks	Cold stratification, 90 days	Cover with soil
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Carex platyphylla

Broad-Leaved Sedge

Habitat	Soil moisture	Light requirements	Size	Section
Woodlands	Dry-moist	Part shade-shade	8 cm, 25 cm	<i>Careyanae</i>



Carex platyphylla is a small sedge that grows in rich, moist soils in woodland habitats. This plant features distinctive broad leaves, which grow ~3 cm wide and reach lengths between 8-15 cm. The common name silver sedge refers to the colour of its pale grey or blue-green leaves.

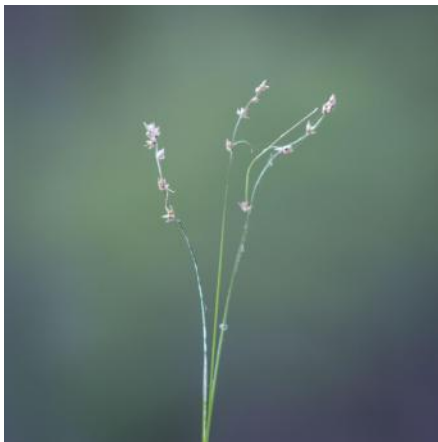
Results

We had a limited amount of seed for our trials with *Carex platyphylla*. No germination occurred for the following conditions that we tested: light and dark without any stratification, light and dark with 60 days of stratification. Further testing is required with a stratification period of 90 days or longer and using the winter sowing method.

Carex radiata

Eastern Star Sedge

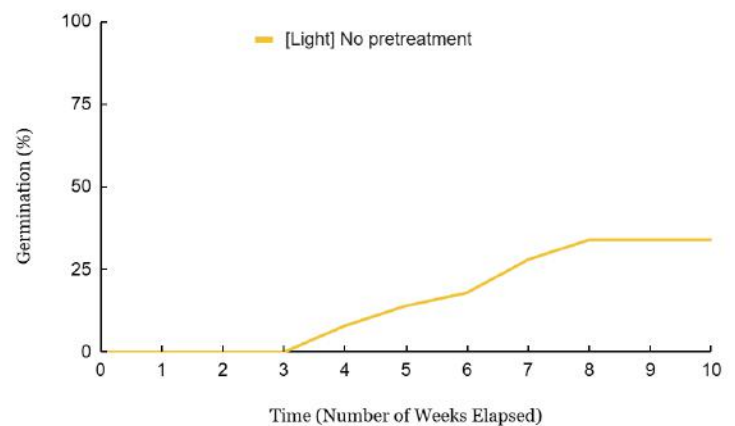
Habitat	Soil moisture	Light requirements	Size	Section
Mesic Woodlands	Average-moist	Part shade-shade	15 cm, 60 cm	Phaestoglochin



Carex radiata is a delicate sedge with thin leaves; it grows in woodland habitats, with moist to average soils. It has three to eight spikes on each stem, with a few perigynia in each spike. It is similar in appearance to *Carex rosea*, but slightly smaller, with thinner leaves and smaller perigynia.

Preliminary Results

Carex radiata had some germination when exposed to light without any pretreatment (~40%). We have not completed the 60 and 90 day cold, moist stratification trials yet, they may show increased germination percentages.



~35% Germination	8 weeks	No pretreatment	Surface sown
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Carex rosea

Rosy Sedge

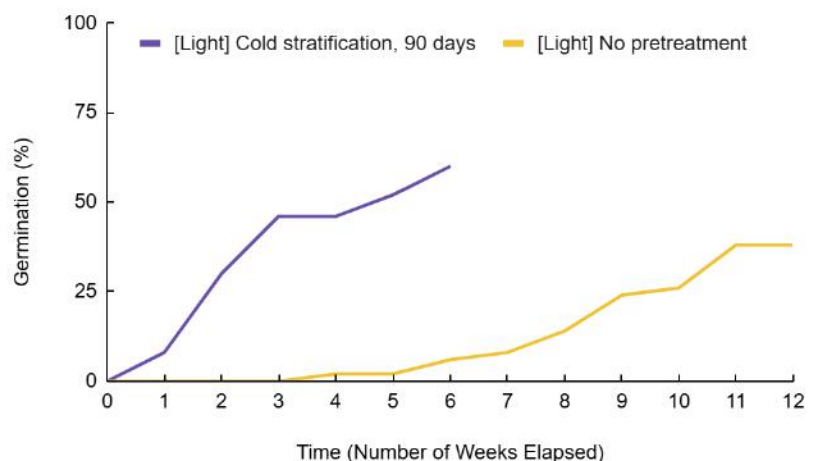
Habitat	Soil moisture	Light requirements	Size	Section
Woodland	Dry-moist	Part shade-shade	30 cm, 75 cm	Phaestoglochin



Carex rosea grows as dense clumps of lush green leaves. It features star-like flower clusters along stems that can reach around knee-height. The leaves are typically shorter than the flowering stems, and are 2-3 mm wide. *C. rosea* is found in deciduous and mixed forests. It is tolerant of both full shade and some sun, as well as dry to moist soil, making it a versatile addition to any forest garden.

Results

Carex rosea germinated best when surface sown after 90 days of cold stratification (~60%). While there was some germination without pretreatment it was very slow (~40%). Low germination occurred by submerging the seeds in water (~15%). Sowing the seeds in the dark resulted in no germination.



~60% Germination	6 weeks	Cold stratification, 90 days	Surface sow
~40% Germination	11 weeks	No pretreatment	Surface sow

Carex siccata

Dry-Spike Sedge

Habitat	Soil moisture	Light requirements	Size	Section
Grasslands, dunes	Dry	Sun	25 cm, 60 cm	Ammoglochin



Carex siccata grows in dry soil conditions in open habitats such as sand barrens. It is not clump forming, the plants grow in loose colonies with a sparse number of leaves. Its stems overtop the leaves, with three to twelve overlapping spikes at the tip. Seeds are brown when mature.

Preliminary Results

Carex siccata seeds did not germinate in our initial trials of no pretreatment and submerging the seeds in water. We have not yet completed the cold, moist stratification trials.

Carex sparganioides

Bur-Reed Sedge

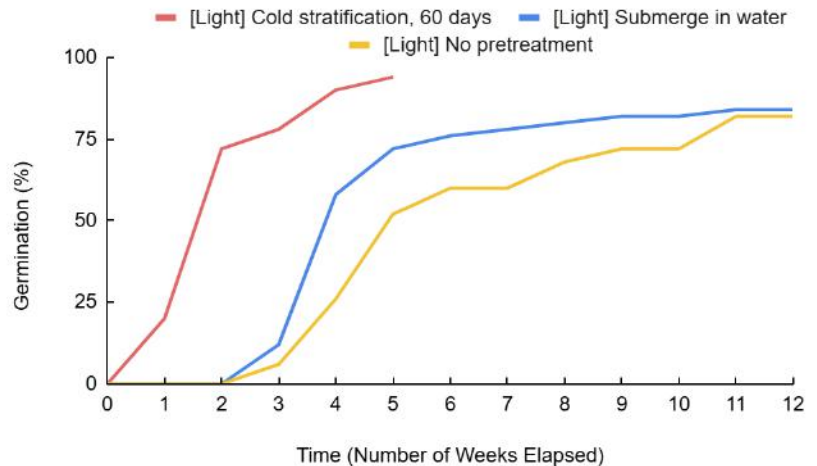
Habitat	Soil moisture	Light requirements	Size	Section
Woodlands	Dry-moist	Part shade-shade	30 cm, 100 cm	<i>Phaestoglochin</i>



Carex sparganioides is a mid-sized sedge with pale green leaves and white striped leaf sheaths. The flowers grow shorter, and more closely clumped higher up the stem, with the spacing increasing with clusters further down the stem. *C. sparganioides* cannot tolerate full sun, and grows in and around forests with rich soil.

Results

Carex sparganioides germinated well under most conditions. Best germination (~95%) was observed after being surface sown following 60 or 90 days of cold stratification. Sowing the seeds in the dark resulted in lower germination (~80%). Water trials and surface sowing without stratification also resulted in ~80% germination. Other methods resulted in low germination.



~95% Germination	5 weeks	Cold stratification, 60 days	Surface sow
~85% Germination	5 weeks	Submerge in water	Under light
~80% Germination	11 weeks	No pretreatment	Surface sow

Carex sprengeii

Sprengel's Sedge

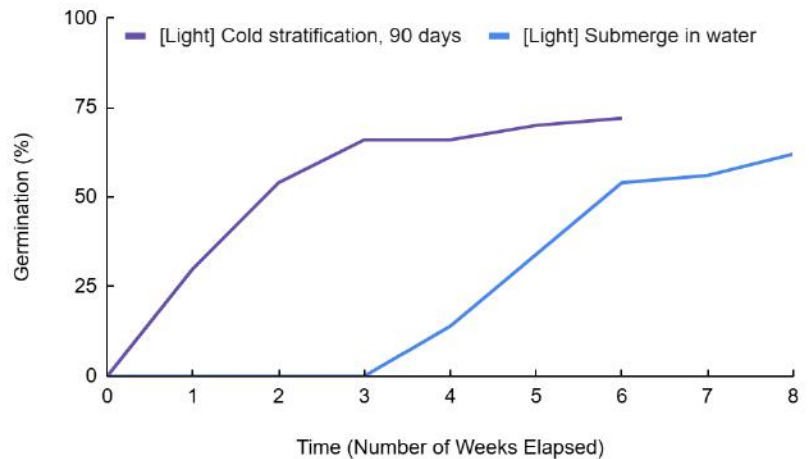
Habitat	Soil moisture	Light requirements	Size	Section
Woodland	Average - moist	Sun - part shade	30 cm, 90 cm	Hymenochlaenae



Carex sprengeii is a medium sized upland forest sedge with attractive foliage and distinctive, drooping seed heads. The bright green foliage forms clumps approximately 30 cm in diameter. As the plant matures the centre of the plant may die off forming a 'fairy ring'. The plant can be divided at this stage for more robust growth. The seeds have long "beaks", giving the seed heads a spikey appearance.

Results

Carex sprengeii germinated well (~70% germination) when surface sown after 90 days of cold stratification. Submerging the seeds in water without stratification also resulted in good germination (~60%). Other trials resulted in less than ~30% germination..

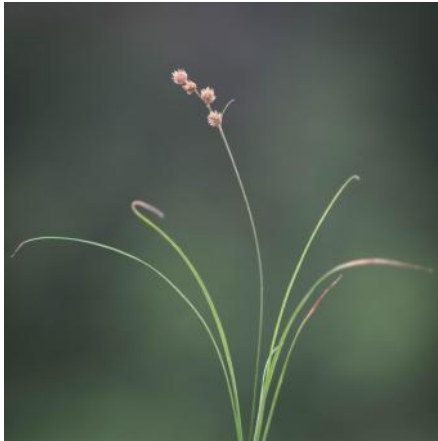


~70% Germination	3 weeks	Cold stratification, 90 days	Surface sow
~65% Germination	6 weeks	Submerge in water	Under light

Carex tenera

Tender Sedge

Habitat	Soil moisture	Light requirements	Size	Section
Most	Dry-wet	Sun-shade	50 cm, 100 cm	Cyperoideae



Carex tenera is a medium to tall sedge that grows in a wide variety of conditions, from wet to dry soil and in sunny to shady locations. It has three to eight somewhat spherical spikes spaced out at the end of the stem. The stem with the seed heads overtops the leaves.

Preliminary Results

Carex tenera seeds did not germinate in our initial trials of no pretreatment and submerging the seeds in water. Early results from the 30 day stratification with light showed ~20% germination. We have not yet completed the cold, moist stratification trials.

Carex vulpinoidea

Fox Sedge

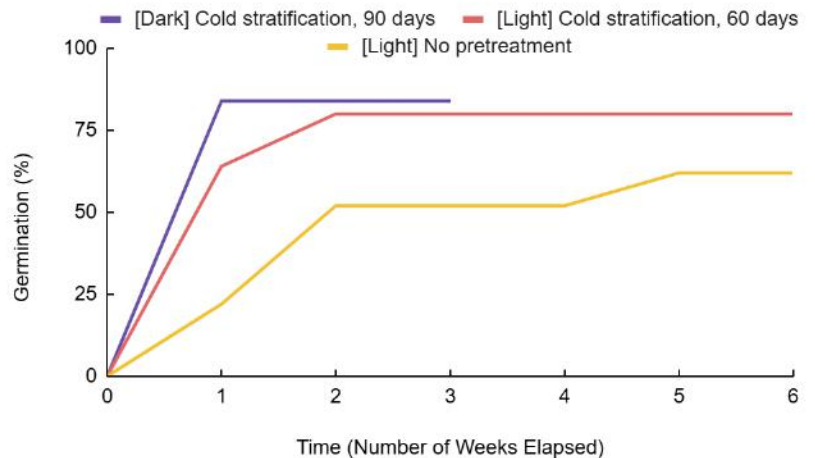
Habitat	Soil moisture	Light requirements	Size	Section
Wetlands	Moist-Wet	Sun	50 cm, 100 cm	Multiflorae



Carex vulpinoidea is a robust sedge, with the foliage reaching around knee-height. Its leaves are a vibrant lime green and form dense basal clumps with a short, fibrous brown sheath. *C. vulpinoidea* features long stems with clusters of golden-green flower spikes. Later in the season, the fruit develops a tawny orange colouration, giving the common name Fox Sedge. It is found in and around wetlands due to its preference for wetter soil and full sun. *C. vulpinoidea* is a striking plant that is well suited for a clay garden or locations with poor drainage.

Results

Carex vulpinoidea germinated well after a 90 day period of cold stratification (~85%) with or without exposure to light. Stratification removes the light requirement for germination. Without stratification good germination is achieved only when the seeds are surface sown and exposed to light (~65%). Other trials resulted in low germination (under ~35%).



~85% Germination	1 week	Cold stratification, 90 days	Cover with soil
~70% Germination	2 weeks	Cold stratification, 60 days	Surface sow
~65% Germination	5 weeks	No Pretreatment	Surface sow

Glossary

Achene	A dry, single-seed fruit.
Bract	A leaf-like structure that sits below a flower spike.
Elaiosome	A fleshy structure attached to a seed, high in fats and proteins.
Graminoid	Having morphology typical of grasses, featuring narrow leaves and small, wind-pollinated flowers.
Inflorescence	A cluster of flowers at the top of a stem.
LECA pellets	Lightweight Expanded Clay Aggregate, a growing medium used for its high drainage ability.
Matrix gardening	A garden design style where a dominant low-growing plant is used to carpet the area, while taller plants, often perennial flowers, grow through.
Perigynium	A modified leaf structure that encloses the seed.
Rhizome	A stem that grows underground, helping the plant to spread horizontally by producing roots and new vertical stems.
Stratification	A pre-treatment required by some seeds to germinate. Stratification simulates natural seasonal conditions, including a simulated winter of low temperatures and high moisture, to break seed dormancy.
Winter sowing	A cold stratification treatment where seeds are planted in transparent, ventilated containers with drainage and placed outside for the winter.

References

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Summary table of results

Sedge Species	No Pretreatment		Cold Stratification						Water	
	Light	Dark	Light			Dark			Light	
			30 Days	60 Days	90 Days	30 Days	60 Days	90 Days	Still Water	Aerated water
<i>C. albursina</i>	0%	0%		0%			0%			
<i>C. arctata</i>	60%	12%		72%	82%		36%	42%	82%	42%
<i>C. aurea</i>	0%	0%		22%	30%		0%	8%	0%	0%
<i>C. bebbii</i>	0%	0%		0%	0%		0%	0%	58%	66%
<i>C. brevior</i>	44%	14%		64%	62%		54%	74%	76%	58%
<i>C. deweyana</i>	84%	32%		80%	66%		56%	56%	70%	6%
<i>C. flava</i>	0%	0%							24%	
<i>C. gracillima</i>	0%	0%	0%			0%				
<i>C. granularis</i>	0%	0%		6%	58%		0%	18%	0%	0%
<i>C. hystericina</i>	0%	0%	16%			0%			20%	
<i>C. interior</i>	24%	0%	12%			0%			0%	
<i>C. leptonervia</i>	0%	0%		26%			2%			
<i>C. muehlenbergii</i>	6%	0%		24%	38%		8%	28%	30%	
<i>C. peckii</i>	80%	6%		95%	78%		10%	4%	80%	86%
<i>C. pedunculata</i>	98%	82%		98%			30%		96%	
<i>C. plantaginea</i>	0%	0%		0%	12%		0%	18%		
<i>C. platyphylla</i>	0%	0%		0%			0%			
<i>C. radiata</i>	40%	0%							0%	
<i>C. rosea</i>	38%	0%		40%	60%		0%	10%	16%	8%
<i>C. siccata</i>	0%	0%							0%	
<i>C. sparganioides</i>	82%	0%		94%	94%		70%	90%	84%	
<i>C. sprengelii</i>	32%	2%		14%	72%		0%	26%	66%	
<i>C. tenera</i>	0%	0%	20%			0%			0%	
<i>C. vulpinoidea</i>	64%	0%		80%	80%		64%	84%	36%	6%

Author Bios



Andrea D'Silva is the founder and owner of Swallowtail Native Plants, an online specialty seed company based in Uxbridge, Ontario. She manages 17 acres of land for a diverse range of native wildflowers and grasses. She holds a B.Sc. in Biology from McMaster University, a B.Ed. from Brock University, and a Professional Specialization Certificate in Ecological Restoration from the University of Victoria. She is an active participant in biodiversity initiatives, including the Southern Ontario Seed Strategy (SOSS). Andrea focuses on teaching individuals and communities how to grow native plants from seed. She advocates heavily for keystone species like asters and goldenrods and, of course, sedges.



Alex Maclellan is an undergraduate student at the University of Waterloo pursuing an Honours Bachelor of Science in Environmental Sciences (Ecology). He is passionate about nature, especially insects, and can often be found on hiking trails searching for new species to add to iNaturalist.



Andrew Clarke is an undergraduate student pursuing an Honours Bachelor of Science in Conservation Biology with a Minor in Chemistry at Trent University. His interests include natural history, ecology and ecological restoration. He enjoys spending time outdoors; often hiking, swimming or skiing throughout the year.