

Lane Community College

The Learning Garden

Bioswale Reference Guide

This is a reference guide for The Learning Garden's Bioswale that offers students the opportunities to learn and enjoy the diversity of native grasses. Through this guide we summarize the Bioswale's functions, identify beneficial plant species, invasive plant species and a follow with a maintenance regime. We want to make our Bioswale function optimally and keep it looking pretty, so weeding is necessary throughout the year. With the actual labor involved in the Bioswale, the worker doesn't necessarily need to memorize every plant type, but rather know exactly what to weed out. The summer months are when most everything is flowering, and for the rest the year, the Bioswale is saturated or full of storm water, which gives students and staff opportunities to see the Bioswale's functions and it's beauty alike. Lane Community College and The Learning Garden is located in the Southern Willamette Valley, which has been described as a Mediterranean type climate, though somewhat cooler and wetter. With Eugene receiving about 46 inches of precipitation per year, and with the clay/loam soil composition, we have to have proper drainage, thus exemplifying the need for a Bioswale. Please feel free to talk to the Learning Garden Coordinator and volunteer to keep our Bioswale operational and looking good.

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The Bioswale has plant species that are drought tolerant during the sum-



The plant species in the Bioswale transpire and slow the storm water runoff in the Learning Garden during the rainy season.

Bioswale Functions and Terminology

A few things to understand about a bioswale are terminology and simple functions. A bioswale has shallow areas and emergent areas, where the emergent area is going to have standing water (after a precipitation event), and the shallows are generally just saturated. The plant species in these areas have been selected where, they will either propagate in a submerged area (emergent) or a dryer zone (shallow). In simple words this means, the emergents are deeper part of the bioswale and the shallows are the edges of the bioswale. Our bioswale is controlling runoff from most of the Learning Garden and remediating the stormwater with gravity and vegetation. More in-depth terminology and functions are explained on the next page.







Raised beds are what the Learning Garden grows in, and they have drainage to the Bioswale. The photo above shows one of many, orange colored conduit used for drainage.



Our Bioswale has been constructed to reduce surface runoff and convey the water to a specific area where infiltration and percolation can occur. Infiltration is governed by two forces: gravity and capillary action, where the rate of infiltration is affected by the characteristics of the soil. (I.e. ease of entry, storage capacity and transmissivity. Once water has infiltrated the soil it remains in the soil, percolates down to the ground water table or becomes subsurface runoff. The process of infiltration can only continue if there is room available for additional water at the soil surface, where the available volume is dependent upon the porosity of the soil, and the rate of previously infiltrated water. This is known as infiltration capacity (or soil saturation), where the water volume exceeds the capacity to hold additional moisture, which ultimately becomes overland flow. Overland flow is exactly what we are prohibiting in the learning garden, but the bioswale enhances the stormwater to a beneficial use. Our bioswale flows to a rain garden, which at times can be confused with the bioswale.

Bioswale Functions and Terminology

A swale always slopes to a destination point, where a rain garden does not. Although some of the percolation processes occur in the bioswale, the rain garden performs a lot of the deep drainage (or deep percolation), which occurs in the vadose zone (i.e. below the root base of the vegetation).

The plants around, and inside the bioswale are segregated into three basic vegetation zones: highest (xeric) middle (mesic) and lowest (hydric). In our bioswale, we use alternate terms for these zones, such as "the shallows" and "the emergents", where the emergent species can tolerate standing water, and the shallow species can tolerate slightly drier conditions. There are Xeric species which mainly consist of shrubs, dense sedges and potentillas, and are tolerant to even drier conditions.

The bioswale vegetation is obviously transpiring the storm water and returning it into the atmosphere as water vapor, but more significantly the bioswale is aiding in the biofiltration of pollutants. Deep root systems not only enhance infiltration, but maintain (and even augment) soil permeability, moisture distribution and sustain microbial populations (which also aid in the bio filtration process).

Bioswale Functions and Terminology

By maximizing the time water spends in the bioswale, we are reducing the various pollutants (that come from the garden beds) from reaching the creek. Without the bioswale, a big precipitation event would otherwise turn into overland flow, and jeopardize the purity of the creek.

When the bioswale and rain garden is at full capacity, the turbidity of the water will be high, but the water and suspended solids are being remediated (or filtrated) at a slow rate. As the bioswale and the rain gardens' vegetation becomes more established, the deep roots may create more channels for storm water to filter into the ground even faster. This will most likely facilitate increased deep percolation and aesthetic appeal. The misconceptions of our bioswale being a "ditch with grass in it" are words we like to avoid,

when in all actuality, the bioswale is a Best Management Practice (BMP) and we are proud to say it.



BIOSWALE SHALLOW SPECIES

<u>Carex obnupta</u> Slough
 Sedge

<u>Potentilla gracilis</u>
 Slender Cinquefoil
 Potentilla

 Juncus balticus Baltic rush

<u>Juncus effuses</u> Soft
 Rush

- <u>Carex densa</u> Dense
 Sedge
 - <u>Carex stipata</u> Awl-Fruited Sedge
- <u>Juncus acuminatus</u>
 Tapertip Rush
- <u>Glyceria occidentalis</u>
 Western Mannagrass

Listed above are the bioswale's Shallow plant species. The Binomial is listed first, followed by the common plant name. Although segregated into this zone, some of these species may be located in the emergent zone. The shallows are generally not going to be under water, but will be saturated a good percentage of the time. During a high precipitation however, this zone may be submerged.



<u>Carex obnupta</u> Slough Sedge

The Slough sedge produces upright, angled stems approaching 1.2 meters in maximum height, growing in beds or colonies from rhizome networks. These plants are not cespitose. The culms can be obtusely or acutely angled, 20-120 cm long, and glabrous. The leaves are basal sheaths, redbrown in color, with scabrous fronts and red-brown spots. The inflorescence are spikes and are in proximal bracts longer than they are wide. The fruit are loosely enclosed achenes, ellipsoid or obovoid, 2.2-3.8 × 1.4-2.2 mm, and leathery. The beak is colorless or occasionally with redbrown spots, and measure at 0.1-0.3 mm. Carex obnupta can occasionally hybridize with C. nudata. The large crop of seeds produced is important food for dozens of bird species, and coastal native people continue to use the leaves for fine traditional baskets.



staminate spikes dangle on peduncles. The fruit is coated by a hard, tough, shiny perigynium which is generally dark in color.

(see glossary for these terms)

<u>Potentilla gracilis</u> Slender Cinquefoil Potentilla

This perennial herb is variable in morphology, growing erect stems up to a meter tall from a branching caudex and rhizome unit. The leaves are basal, palmately compound, and divided into five to seven wide lanceshaped leaflets, with toothed edges. . The inflorescence is a cyme of several flowers, each with usually five yellow petals. The fruit is an achene, follicle, drupe, pome, or blackberry- to raspberry-like. A medicinal infusion made from the root and leaves are used in alternative medicine to stop bleeding, or as an astringent, antiseptic, and tonic. This is used for fevers coughs, soar throats, rashes, dysentery and debility. An infusion of the leaves makes an excellent skin cleansing lotion and is also used cosmetically as a soothing lotion for babies with delicate skin.



The potentilla are easily identifiable around the bioswale because of it's unique leaf structure and bright yellow flowers. This particular plant is marked with red flags around the bioswale and rain garden.



Juncus balticus is a perennial growing to 1 m (3ft 3in) at a fast rate and it is in flower from Jun to August. The flowers are hermaphrodite (have both male and female organs) and are pollinated by wind. At maturity, Baltic rush is 1.1 to 3.6 feet tall and grows in small clusters. The culms of Baltic rush are leafless, erect, terete, stout, 14 to 43 inches tall, and arise from creeping rhizomes. With the exception of the involucre, Baltic rush is comprised solely of rounded, clustered basal leaves approximately 0.8 to 6 inches long. Baltic rush produces 5 to 50 or more perfect flowers with the perianth segments 3 to 6 mm long. Seeds of Baltic rush are striate capsules 0.4 to 1 mm tall and 0.4 mm wide. The Baltic rush does have uses with the sugar that forms along the top of the plant. This can be gathered and eaten as candy, and the stems are used to make a fermented drink. Although there are no proven cases, this rush may be toxic to mammals.









Juncus effusus grows in large clumps about 5 feet tall and can be considered invasive. The stems are smooth cylinders with light pith filling. The inflorescences produce head-like clusters or single flowers, variously arranged. Flowers are in bracts, are subtending and are generally leaf-like. the subtending flowers occur in numbers 1-2, and are generally translucent. The inflorescence appears to emerge from one side of the stem about 20 cm from the top. In fact the stem ends there; the top part is the bract, that continues with only a slight color-band marking it from the stem. The lower leaves are reduced to a brown sheath at the bottom of the stem. In Japan this rush is grown to be woven into the covering of tatami mats. In Europe this rush was once used to make rushlights (by soaking the pith in grease), a cheap alternative to candles.







The soft rush is defined commonly as "soft" because it's flowers differ from similar plants and have rounded or "soft" edges. This plant can be found adjacent to the gazebo.



The Carex densa is native to Oregon and is commonly used in bioswales and rain gardens. The Dense Sedge is a perennial monocot with florets and fruit apparent between June and August. It grows as an evergreen, compact grass-like tuft. The leaves are narrow with a prominent folded vein along the middle and occasionally covered in brown spots. The inflorescence is a tightly clustered panicle arising terminally on 5 in long stems and is comprised of 10 spikelets and can grow to a height and width of 18-28 in (45-70 cm). The Dense sedge is commonly used in bioswales, rain gardens and as a habitat restorative grass. This is because the Dense sedge is very effective with pollution filtration, it is easily propagated, and is drought tolerant. This plant is mentioned in the ODEQ Native Plant Guide for use in riparian areas.



The Dense sedge can be found in multiple areas in the bioswale, but is abundant in the area adjacent to the gazebo.



This native perennial sedge forms an open tuft of flowering culms and arching leaves about 11/2 -3' tall. The flowering culms are more or less erect, but tend to topple over with age. The culms are light to medium green, hairless, 3-angled, and slightly winged. About 3-5 leaves are located along the lower one-third of the culm. The leaf blades are up to 8 mm. across and 2' long, light to medium green, hairless, and rather floppy. Each fertile culm terminates in an inflorescence about 1¹/₂-4" long, and have several short spikelets (especially toward the base). The spikelets are light green while immature, becoming gold-colored and finally turning brown at maturity. The root system is fibrous and short-rhizomatous. This sedge is an excellent choice for shoreline restoration, but has no known ethno botanical uses. It is however, a food source for ducks, waterfowl and upland gamebirds.



The <u>Carex stipata's</u> fruit is more or less "beaked" and has an overall congested, prickly appearance. The Awl-fruited sedge can be found in multiple locations, particularly in the latter half of the bioswale.



The Tapertip rush is a rhizomatous perennial herb forming clumps up to about 80 centimeters tall. The inflorescence is an open array of many clusters of up to 20 flowers each. The terminal panicles number from 5 to 50 heads, with 5--15 cm ascending branches where the primary bracts are erect. The flower has pointed segments a few millimeters long which may be light reddish brown to greenish in color. The terminal inflorescence with erect to spreading branches that are longer than involucral bracts, usually with 5 to many small, compact, 5-flowered to 20-flowered heads. Juncus acuminatus is scarious and the blades are green, straw-colored, or pink, nearly terete, 1--40 cm. This rush has no cultural or medicinal uses, but is a popular restorative type of rush. It is commonly used in swales rain gardens and habitat restoration.



This rush also has the common name Sharp Toothed rush, because of the sharp edged flower parts. A distinguishing characteristic compared to similar Juncus' is how it shoots off flowers in multiple directions. The Tapertip rush can be found in the bioswale adjacent to the gazebo.

<u>Glyceria occidentalis</u> Western mannagrass





Glyceria have flaccid stems (culms) that reach a height of 60 to 160 cm, and the base of the grass grows along the ground, and the plants spread from rhizomes. The leaf blades are ribbon-like, 4 to 13 mm wide, and 15 to 30 cm long. Flowerheads (panicles) are narrow and 15 to 40 cm long, with appressed branches and long cylindrical spikelets (the groupings of individual florets or flowers). Although the mannagrass is known in some regions as being an invasive weed, it is important for restoration of freshwater marshes, vernal pools, and depressions within wetland prairies. Its rapid growth, underground stems, and floating leaves aid in reducing erosion along the edges of streams and lakes where it naturally occurs. In the Pacific Northwest, this grass is recommended for use in stormwater management, including detention ponds and biofiltration swales.







Mannagrass have a short-lived flowering period, and the panicle inflorescences nod when heavy. When submerged in spring, this species produces floating stems and leaves, but flowering is reduced. The flowering period is long, from May to September.



BIOSWALE EMERGENT SPECIES

- <u>Camassia quamash</u> Camas Lily
- <u>Carex unilateralis</u> Lateral Sedge
- Deschampsia cespitosa Tufted Hairgrass
 - <u>Cyperus eragrostis</u> Flatsedge
 - <u>Scirpus acutus</u> Bulrush

Listed above are the bioswale's Emergent plant species. The Binomial is listed first, followed by the common plant name. Although segregated into this zone, some of these species may be located in the shallows. The emergents are under water most of the winter. During precipitation events these species will be submerged, and during the summer, they are tolerant to drought .



Fall **2011**

Camas Lily Camamassia quamash

Camas lily are perennial monocots with basal linear leaves measuring 8 to 32 inches (20 to 81 cm) in length, which emerge early in the spring. They grow to a height of 12 to 50 inches (30 to 130 cm), with a multi-flowered stem rising above the main plant in summer. The pale blue to deep blue flowers grow in a raceme at the end of the stem. Each of the radially symmetrical, starshaped flowers have 6 petals. The stems have a length between 30 cm and 90 cm. The leaves are basal and have a grass-like appearance. The Quamash is edible, after being harvested in the autumn, once the flowers have withered, the bulbs were pit-roasted or boiled. A pitcooked camas bulb looks and tastes something like baked sweet potatoe, but sweeter, and with more crystalline fibers due to the presence of insulin in the bulbs. When dried, the bulbs can be pounded into flour.









Camas lily gives our bioswale some colorful diversity and ethno botanical uses. It is unmistakable when flowering and somewhat difficult to spot during seed dispersal.

<u>Carex unilateralis</u>

Lateral Sedge

The Lateral sedge is densely cespitose with 35-75 cm culms. The inflorescences are ascending, dense, green to gold or brown, and has proximal bracts erect to ascending. Pistillate scales pale gold to redbrown, with pale to green midstripe, margin sometimes white, and 0.1-0.2 mm wide The apex is acuminate to awned, and the perigynia ascending with a beak usually gold or redbrown at tip. These are usually flat, winged, ciliate-serrulate or, sometimes, cylindric, abaxial suture inconspicuous or with white margin. The fruit are achenes and are stipitate, ovate to obovate, measuring 0.3–0.4 mm thick. Although there are no cultural uses, the lateral sedge is widley used for wetland and riparian restoration.









carex unnaterans has simple leaves and are arranged opposite one another The flowers are green, are arranged in spikes, and it's fruit is a nut. This sedge is also native to the Willamette Valley.





Deschampsia cespitosa is a perennial tufted plant in the grass family Poaceae. It can be found on all types of grassland, although it prefers poorly drained soil. A distinguishing feature is the upper surface of the leaf blade which feels rough and can cut in one direction, but is smooth in the opposite direction. The upper side of the leaves are deeply grooved, and are dark green. It can grow to 1.5 meters tall, and has a long, narrow, pointed ligule. The plant has ribs that are green, and the grooves between the ribs are colorless and let the light through, so you see green and white stripes. It flowers from June until August and has very long ligules - 1/2 cm to 1 1/2 cm long. Another identifiable characteristic is it's beautiful, big silvery panicles, where the culm can be up to 1.5m tall. Although there are no medicinal uses, the tufted hairgrass seeds where most likely ground into flour or used as cereal.



The Tuffted Hairgrass has extremely strong ribs on the leaves and there are green and white stripes on the blades when you hold a blade to the light. If you trail your finger down the blade, there are tiny silica hooks on the which can cut you.



flatsedge

The flatsedge is a green sedge with tall, erect stems, long, thin, pointed leaves, and flowers that are small,. They are generally wind-pollinated and its flowers are found within tough, rounded, greenish-yellow or beige spikelets. It is an annual or perennial herb, often rhizomed, and often found in wet, open places. They are generally monoecious, with fibrous, hairy roots. The leaves are parallel-veined and are often 3-ranked with a sheath that is closed. generally The inflorescence are spikelets which are variously clustered and sessile in axil of the flower bract. The perianth can be bristle-like with stamens numbering 3, and anthers attached at base,. They have a superior ovary which are 1-chambered and 1-ovuled, with styles numbering 2-3. The fruit is an achene and is generally 3sided. Although considered invasive in some areas, its seeds are a food source for water fowl and the plant also has edible tubers on the roots. Native Americans used the tubers as a food source and the leaves in basketry.



The flatsedge can be invasive if not strategically introduced. Some distinguishing characteristics are it's 3sided stem, and the inflorescence which forms in the axil of the plant. This sedge can be found at the beginning of the bioswale.



.Scirpus species are often planted to inhibit soil erosion and provide habitat for other wildlife. They are also used in some herbal remedies; the plant's rhizomes are collected in the autumn and winter and dried in the sun before use. The taxonomy of the genus is complex, and under review by botanists. It has a thick, rounded green stem growing to 1 to 3 meters (3 -10 ft) tall, with long, grasslike leaves, and radially symmetrical, clustered pale brownish flowers. The inflorescence are tiny, lack petals, each concealed by spirally arranged overlapping scales forming flower spikelets clustered at the stem tips. It has 1-8 brownish-gray spikelets per cluster, though often all solitary, about 5-15 mm long. Dyed and woven, bulrush are used to make baskets, bowls, mats, hats, clothing, duck decoys, and even boats by Native American groups. The young sprouts and shoots can be eaten raw and the rhizomes and unripe flower heads can be boiled as a vegetable. The stem pith of a bulrush is hemostatic where, a poultice of the pith is placed under a dressing in order to stop the wound bleeding. The roots have been chewed as a preventative to thirst.



Planted at shorelines, the bulrush plays an important ecological role, helping to buffer against wind and water forces, thereby allowing the establishment of other types of plants and reducing erosion.

Invasive Species

Since the invasive species in the Bioswale are so diverse, and may be confused with beneficial or intentionally planted species. identification can be difficult and tedious. With the help of future student projects, documenting the unwanted plants will ease the time period of performing **Bioswale** maintenance. Listed here, are the invasives in order of their abundance in the Bioswale and are pressed on the next few pages to show the distinguishing characteristics of their inflorescences,



<u>Holcus lanatus</u>

Velvetgrass

It has velvety grey-green leaves and produces a large amount of seed. The shoots are round colored white with pink stripes or veins and the inflorescences are robust and often tinged purple. It prefers wetter ground, often seen around drainage ditches. The ligule is 1– 4 millimeters long, blunt and hairy.

<u>Mentha pulegium</u>

Pennyroyal

It is a perennial herb with a slender branched stem, up to a foot in length, with dense clusters of small reddish -purple flowers forming almost globular whorls. It has a strong smell somewhat like that of spearmint, and has multiple pharmaceutical uses.





<u>Elymus repens</u>

Quackgrass

It has creeping rhizomes which enable it to grow rapidly, and has flat, hairy leaves with upright flower spikes. The stems grow to 40– 150 cm tall; The flowers are spikes, with three to eight florets. It flowers at the end of June through to August.



Bioswale Maintenance

Scheduled maintenance of the Bioswale may seem overwhelming when invasives get out of control. Don't let it bother you too much, just look at the characteristics of one of the pressed plants and weed those first. If you feel you can filter the others at the same time, feel free to weed around the beneficial species, and just watch where kneel, sit and step. Weeding is a task that can be done almost everyday, and with hundreds of dollars of invested in the Bioswale so far, the work is greatly appreciated.

Some good tips before you start....

- Watch where you step.
- Rushes are Round, Sedges have Edges.
- Pull weeds by the root.
- If you're not sure...don't weed it.
- If you think it's pretty...don't weed it.
- Be sure to haul off what you have weeded ...ask where to dump them.
- If you cannot perform manual labor, talk to the coordinator.
- Document what has been done (photos are good).
- Stay hydrated...and clean up any tools used.





How can you help beyond weeding ?

Identification, documentation and visual markers of the beneficial plant types, and invasives alike, can be a useful and stunning tool for the succession of the Bioswale. Every season the Bioswale shows progression, and it can only get better with help. Botanical analytical keying and signage for these species can make maintenance move much faster if there are markers near the plant types. Photography is always a great tool to document the Bioswale's growth and overgrowth, and this handbook is welcome to your additions. Many students who are Water, Sustainability or Botany majors, may find this useful for class credit, and those who just want to help your college community, we always welcome your efforts.

A NEWLY PLANTED BIOSWALE



A WEEDED BIOSWALE



AN OVERGROWN BIOSWALE



Glossary of Terms

- <u>Abaxial</u> The side away from the axis, for instance the lower surface of a leaf.
- <u>Achene A dry one-seeded indehiscent fruit, with the seed distinct from the fruit wall.</u>
- Acute Pointed, having a short sharp apex angled less than 90°
- <u>Acuminate</u> Tapering gradually to a point.
- <u>Apex</u> The apex of the leaf is the tip or end farthest from the base or point of attachment; the growing tip of a branch.
- <u>Appressed</u> Pressed closely, but not fused; e.g. leaves against a stem.
- Ascending Spreading horizontally, then becoming erect.
- <u>Awned</u> Having a fine bristle-like appendage.
- <u>Basal</u> A basal leaf is one that grows from the lowest part of the stem.
- <u>Bract</u> A leaflike or scalelike plant part, usually small, sometimes showy or brightly colored, and located just below a flower, a flower stalk, or an inflorescence.
- <u>Cespitose</u> Growing in tufts or clumps.
- <u>Compound Leaf A leaf consisting of two or more leaflets borne on the same leafstalk.</u>
- <u>Cyme</u> An inflorescence in which the first flower is the terminal bud of the main stem, and subsequent flowers develop as terminal buds of lateral stems.
- <u>Ellipsoid</u> A 3-dimensional shape; elliptic in outline and with a length/breadth ratio between 3:2 and 2:1.
- <u>Flower spikes</u> An indeterminate inflorescence bearing sessile flowers on an unbranched axis
- <u>Glabrous</u> An adjective used to describe a morphological feature as smooth, glossy, having no trichomes (bristles or hair-like structures).
- <u>Graminoid</u> Of or relating to grasses (family Gramineae or Poaceae) and grasslike plants, such as sedges (family Cyperaceae) and rushes (family Juncaceae).
- <u>Inflorescence</u> (1.) The part of a plant that consists of the flower-bearing stalks. (2.) The arrangement of the flowers on the stalks.
- <u>Involucre</u> A series of bracts beneath or around a flower or flower cluster. The cupule, the cuplike structure holding an oak acorn, is a modified, woody involucre.
- Ligule A small membranous appendage on the top of the sheath of grass leaves.
- <u>Monocot</u> The veins in monocot leaves are usually, but not always aligned parallel with one another, as in blades of grass.
- <u>Obovoid</u> Of a fruit or similar solid part egg-shaped with the narrower end at the base.
- <u>Obtuse</u> A leaf, petal, etc. rounded at the extremity.

Glossary of Terms

- <u>Ovule</u> A structure in a seed plant within which one or more megaspores are formed (after fertilization it develops into a seed).
- <u>Palmate</u> Shaped like an open palm or like a hand with the fingers extended, as a leaf or an antler.
- <u>Panicle</u> A compound raceme; an indeterminate inflorescence in which the flowers are borne on branches of the main axis, or on further branches of these.
- <u>Peduncle</u> A stalk supporting an inflorescence, which is the part of the shoot of seed plants where flowers are formed.
- <u>Pendant</u> Hanging forms of organs such as leaves, branches, limbs and the like, organs that otherwise might be rigid or erect.
- <u>Perigynium</u> Some unusual appendage about the pistil, such as the bottle-shaped body of sedges, and the bristles or scales in some other genera of the Sedge family.
- <u>Petioles</u> The slender stalk by which a leaf is attached to the stem; leafstalk.
- <u>Pistillate</u> A flower that lacks stamens is pistillate, or female, while one that lacks pistils is said to be staminate, or male.
- <u>Proximal</u> Refers to the position of a structure near a point of reference; relative to a stem, a petiole is proximal to a leaf blade.
- <u>Rhizomatous</u> The thick, horizontal underground stem of plants, such as mint whose buds develop new roots and shoots.
- <u>Radially Symmetrical</u> Flowers are actinomorphic, or regular flowers ("star shaped", "radial"), meaning they can be divided into 3 or more identical sectors which are related to each other by rotation about the center of the flower.
- <u>Sessile</u> Attached directly by its base without a stalk or peduncle.
- <u>Sheaths</u> The leaf base when it forms a vertical coating surrounding the stem.
- <u>Solitary</u> Single, of flowers that grow one plant per year, one in each axil, or widely separated on the plant; not grouped in an inflorescence.
- <u>Staminate</u> Having stamens, especially having stamens but no carpels; male.
- <u>Stipitate</u> stalked, or borne on a stipe of an ovary.
- <u>Styles</u> An elongated part of a carpel, or group of fused carpels, between the ovary and the stigma.
- <u>Superior</u> Of an ovary, borne above the level of attachment of the other floral parts, or above the base of a floral tube (that is, one that is free from the ovary and bears the perianth and stamens).
- <u>Terete</u> Cylindrical, but usually slightly tapering at both ends, circular in cross section, and smooth-surfaced.

Participants and Contact information



If you need further information, have questions, or want to make additions to this guide, feel free to contact us at the resources below.

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