Iris virginica

(*Iris virginica shrevei*)

Blue Flag Iris

Virginia Blue Flag
Wild Flag

Preferred Water Depth and Inundation Tolerance

Prefers wet meadow zone, seasonally flooded to a depth of 3 inches early in the spring. Species will not tolerate constant inundation of more than 6-8 inches.

Wildlife Value

Seeds are eaten by waterfowl and muskrat. Hummingbirds have been observed feeding on nectar. Also provides cover for amphibians, foraging habitat for snakes, and habitat for many insect species.

Application/Zone

Used in lower shoreline zones and vegetated swales.

Availability, Establishment, and Maintenance

- Seeds, transplants, and rhizomes are available from several commercial vendors.
- Seeds require cold, moist stratification for 120 days. Alternatively, they can be planted on the soil surface in the fall. Warm spring temperatures (higher than 75° F) and light will trigger germination.
- Locally, few positive results have been observed from seeding on-site. Seeds are usually eaten by birds and insects.
- In the greenhouse, 99% germination has been observed from seed in 9 days.
- Rhizomes and transplants should be planted in the spring.
- Rhizomes may be temporarily refrigerated until planting. Plant them in 2-3 inches of soil on 0.5-1.5 foot centers, allowing growing points to be visible above the soil surface.
- Young shoots should not be inundated by water.
- **CAUTION:** Severe dermatitis may result from handling rhizomes.

Blue Flag Iris

Iris virginica

Virginia Blue Flag
Wild Flag

(*Iris virginica shrevei*)

Mature Height
Up to 2.5 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Not tolerant

Siltation Tolerance
Moderate

Flowering Color and Time
Purple
May to July

Light Preference
Partial to full sun

Seeding Rate
.06 - .25 lbs/acre

Juncus effusus Common Rush

Preferred Water Depth and Inundation Tolerance

Prefers a few inches of standing water to moist soil (Max: 12"/Min: 0"). Species will tolerate some fluctuation in water levels. Tolerates drought in summer.

Wildlife Value

Seeds are eaten by songbirds and waterfowl. Plants are eaten by muskrats, deer, and small rodents. Provides cover for ducks and spawning habitat for sunfish. Also provides nesting habitat for rails and habitat for many species of insects.

Application/Zone

Used in upper and lower shoreline zones and in vegetated swales.

Availability, Establishment, and Maintenance

- Seeds, container grown transplants, rootstocks, and rhizomes are available from commercial vendors. Seed is becoming more widely available.
- Seeds are extremely small, difficult to disseminate, and may require cold to break dormancy.
- Seed may be stored in fresh water or wet sand at 35-40° F for 4 to 9 months and then spring seeded by hand broadcasting.
- Fresh seed may also be fall planted to allow overwintering to break dormancy.
- Seeds need alternating temperatures and light for best germination.
- One source recommends a seeding rate of up to 4 oz/acre in mixes.
- Rhizomes and rootstocks should be spring planted 2-3 inches deep on 0.5-1.5 foot centers because of slow rate of spread in saturated soil.

Common Rush

Juncus effusus

Mature Height
1.0-3.5 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Green or Brown
May to September

Light Preference
Partial to full sun

Seeding Rate
Not available

Juncus torreyi Torrey's Rush

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil. Species tolerates up to 2 inches of inundation for short durations.

Wildlife Value

Provides food for muskrat, marsh birds, and waterfowl. Also provides spawning ground for bluegill and other fish species.

Application/Zone

Rhizomatous root system stabilizes upper shoreline zones and vegetated swales.

Availability, Establishment, and Maintenance

- Appears to establish from seed naturally and is becoming more available from vendors.
- Fall seed or cold moist stratify.
- Because of a slow rate of spread, transplant on 0.5-1.5 foot centers once established.
- Spreads more quickly by rhizome.

Torrey's Rush

Juncus torreyi

Mature Height
Up to 3 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Green to brown
July to October

Light Preference
Partial to full sun

Seeding Rate
.006 - .125 lbs/acre

Leersia oryzoides Rice Cut Grass

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil. Young plants do not tolerate submergence for longer than 2 - 3 days (Max: 8"/Min: saturated soil). Mature plants tolerate seasonal to permanent flooding. This species also has an observed tolerance to water level fluctuations.

Wildlife Value

Seeds and roots are eaten by waterfowl, rails, herons, and muskrats. Songbirds also eat seeds. Plants provide cover for many reptiles, amphibians, insects, and fish.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and in vegetated swales. Provides good sediment stabilization.

Availability, Establishment, and Maintenance

- Seeds, rhizomes, rootstocks, and container grown plants are readily available from several commercial vendors.
- Once source reports that fall seeding is preferred. Seed dormancy can be broken by overwintering or by cold water stratification.
- Other sources report excellent greenhouse germination following cold, dry storage.
- Temperature and light do not seem to affect seed germination.
- A low rate of establishment has been observed in restorations from seed.
- Rhizomes should be planted 2-5 inches deep on 1-3 foot centers in the spring.
- Seeds, rootstocks, and rhizomes should be planted in saturated soil and not inundated during establishment. Plants should attain a height of 4-6 inches before water level is gradually increased.
- Rate of spread is moderate to sometimes aggressive once plants are established.

Rice Cut Grass *Leersia oryzoides*

Mature Height
3-5 feet, erect or sprawling

Plant Type
Perennial emergent grass

Indicator Status
Obligate

pH
6.0-7.0

Nutrient Load Tolerance
Moderate to high

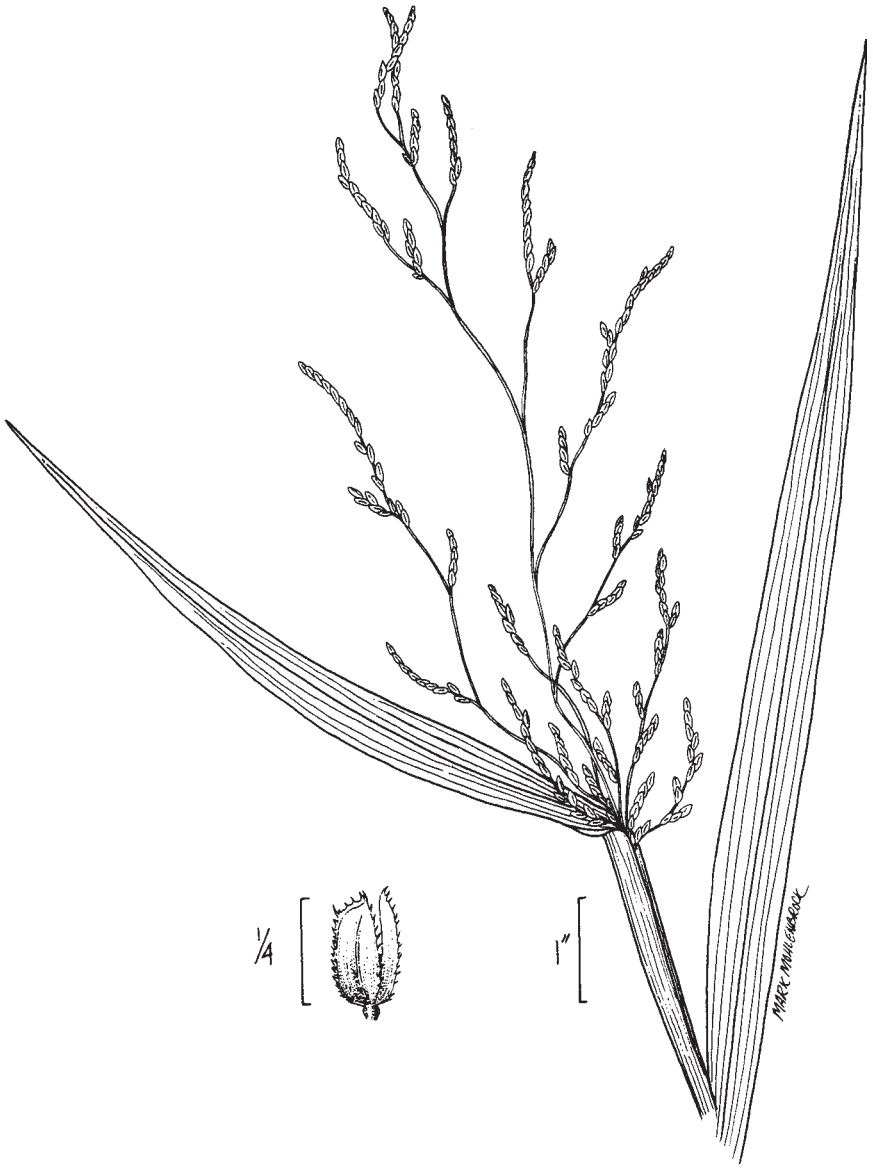
Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Greenish white
June to October

Light Preference
Partial to full sun

Seeding Rate
.1 - .25 lbs/acre



Monarda fistulosa Wild Bergamot

Preferred Water Depth and Inundation Tolerance

Mesic prairie species. Minimal inundation tolerance.

Wildlife Value

Palatable in early growth by grazing species. Attracts butterflies and honeybees.

Application/Zone

Used for upland slope buffer stabilization. Slows water run off and reduces soil erosion.

Availability, Establishment, and Maintenance

- No pretreatment is needed for seed.
- Establishes readily from seed. Seed germinates best with light at warmer temperatures and should be stored dry.
- For divisions, divide mature clumps in March before stems are sent up. Dig up the plant and divide clump into sections. Replant divisions immediately.
- Can also be established from cuttings.

Wild Bergamot *Monarda fistulosa*

Mature Height
Up to 3 feet

Plant Type
Perennial herb

Indicator Status
Facultative Upland

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Not available

Siltation Tolerance
Low to moderate

Flowering Color and Time
Pink, lavender, purple, and rarely white
August to October

Light Preference
Partial to full sun

Seeding Rate
.125- 1 lb/acre

Panicum virgatum Switch Grass

Preferred Water Depth and Inundation Tolerance

Occurs in mesic prairie and buffer slopes. Species has some tolerance of early spring inundation. Drought tolerant.

Wildlife Value

Seeds and young foliage provide food for teal, widgeon, and black duck. Seeds are a food source for many songbirds and small mammals. Provides cover for most wildlife.

Application/Zone

Used for streambank and upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Widely available as seed or plants.
- Best seed germination results with alternating temperatures. Requires light for germination.
- Seeds have an 80% germination rate at 70° F with no treatments but will germinate at cooler temperatures.
- Has slow rate of spread by rhizome. Plant on 0.5-1.5 foot centers.

Switch Grass *Panicum virgatum*

Mature Height
Up to 6.5 feet

Plant Type
Perennial grass

Indicator Status
Facultative (+)

pH
Not available

Nutrient Load Tolerance
Low to moderate

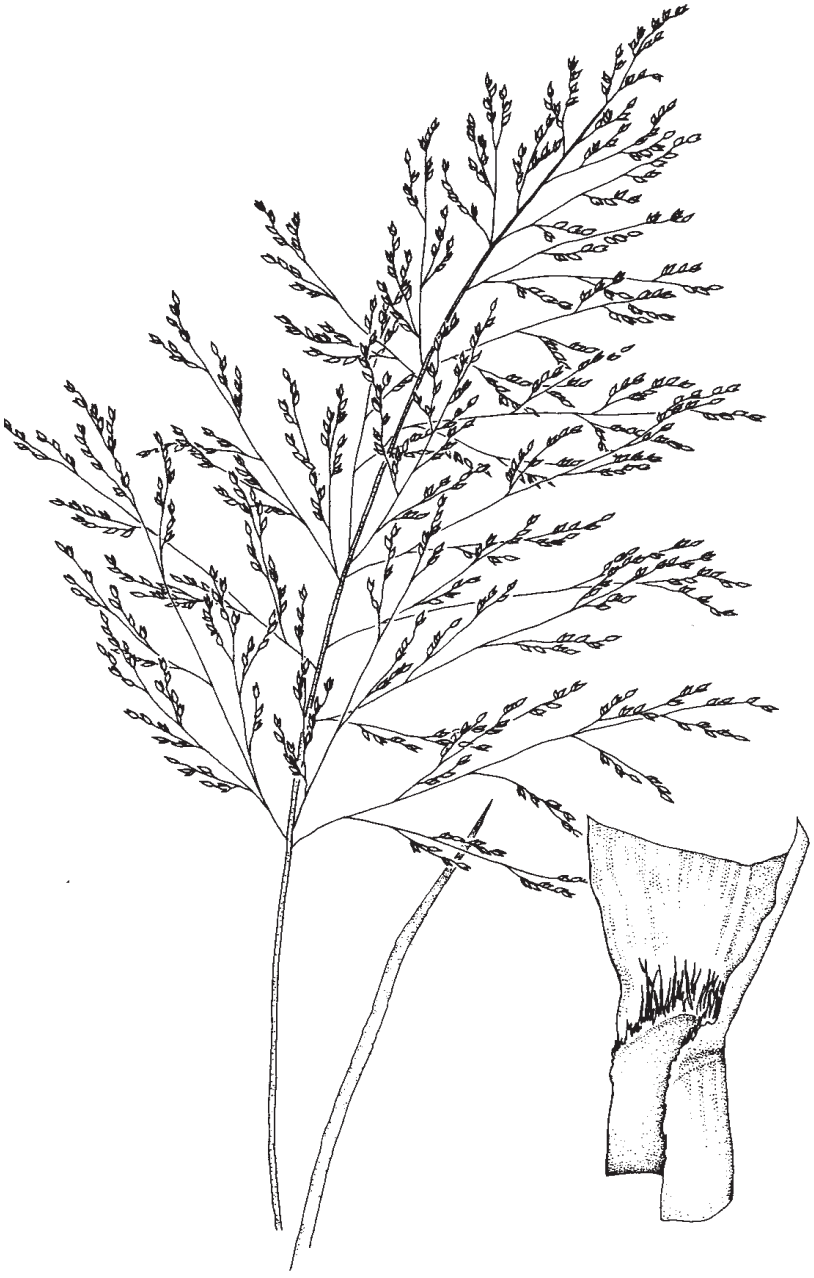
Salt Tolerance
Moderate

Siltation Tolerance
Low to moderate

Flowering Color and Time
Beige
July to October

Light Preference
Full sun

Seeding Rate
.25 - 1 lb/acre



Petalostemum purpureum Purple Prairie Clover

Preferred Water Depth and Inundation Tolerance

Mesic prairie species. Species does not tolerate inundation.

Wildlife Value

Highly palatable and nutritious for grazing.

Application/Zone

Used for upland slope buffer stabilization. Deep taproot with extensive vertical branching helps to stabilize sandy soils in prairie and dry slopes.

Availability, Establishment, and Maintenance

- Propagation is best by seed. Seed can be scarified by removing the hull, stratifying at 33-38° F for 10 days. Inoculation with Santofoin type F rhizobium produces more vigorous plants, but is not necessary. Seed can then be planted in the spring and will emerge in 6 to 10 days.
- Seed can also be planted in the fall for overwintering instead of the above treatments, but the treatments may increase the germination rate.
- Transplanting is difficult because of the deep taproot but can be done with potted plants.
- This species is not competitive in early growth and may be difficult to establish in clayey, reworked soil.

Purple Prairie Clover *Petalostemum purpureum*

Mature Height
1-3 feet

Plant Type
Perennial herb

Indicator Status
Upland

pH
5.5-6.5

Nutrient Load Tolerance
Low

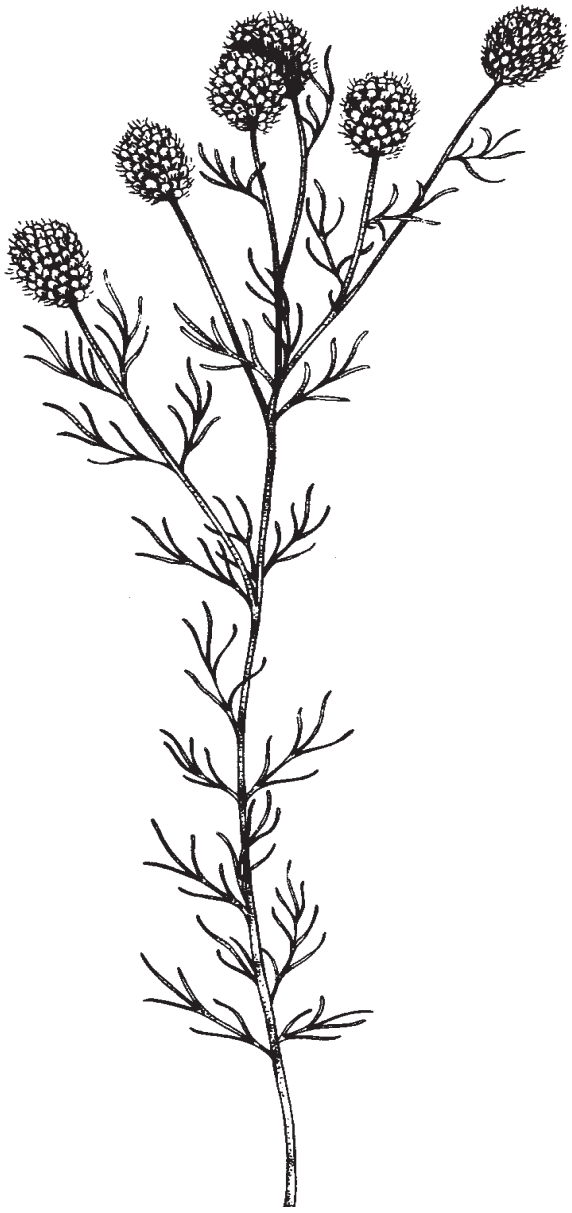
Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Purple
July to September

Light Preference
Full sun

Seeding Rate
.25 lbs/acre



Polygonum amphibium Water Smartweed

(*P. amphibium stipulaceum*) Water Knot Weed

Preferred Water Depth and Inundation Tolerance

Species has a wide tolerance for inundation (Max: 20"/Min: moist soil).

Wildlife Value

Seeds are eaten by waterfowl. Serves as a major food source for purplish copper butterfly. Also provides cover for waterfowl and fish.

Application/Zone

Used in lower shoreline zones. Wave tolerant.

Availability, Establishment, and Maintenance

- Achenes, cuttings, rootstocks, and rhizomes may be used. Plants and rootstocks have limited availability from commercial vendors. Collect achenes when they are mature (July-Sept.).
- One source recommends storing achenes in fresh, 32-34° F water for 3 to 6 months to stratify.
- Other sources indicate that seed germinates best when stored dry at 40° F followed by light at 70° F.
- Broadcast in the spring on wet site.
- To use cuttings, take 2-6 inch cuttings from top shoots and plant on site in wet area by burying lower part of cutting. Spring drawdown increases plant production.
- Achene production is high in areas shallowly flooded during the growing season.

Water Smartweed

Water Knot Weed

Polygonum amphibium

(P. amphibium stipulaceum)

Mature Height
Up to 3 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
5.4-8.8

Nutrient Load Tolerance
Moderate

Salt Tolerance
Low

Siltation Tolerance
Moderate to high

Flowering Color and Time
Red to pink
June to August

Light Preference
Partial to full sun

Seeding Rate
.5 - 1.5 lbs/acre

Pycnanthemum virginianum Common Mountain Mint

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil in sedge meadow, wet prairie, and mesic prairie zones. Species tolerates inundation only early in the season for short periods.

Wildlife Value

Attracts butterflies.

Application/Zone

Stoloniferous growth habit stabilizes soil on upper shoreline zones, upland slope buffers, and in vegetated swales.

Availability, Establishment, and Maintenance

- Can be established from seed, as this species quickly invades new restoration areas.
- Propagation can be achieved by cuttings and division in the spring. The tops of young plants can be pinched off to provide a more sturdy growth habit.
- Tolerates limited mowing.

Common Mountain Mint *Pycnanthemum virginianum*

Mature Height
20-36 inches

Plant Type
Perennial herb

Indicator Status
Facultative Wet (+)

pH
5-7

Nutrient Load Tolerance
Moderate

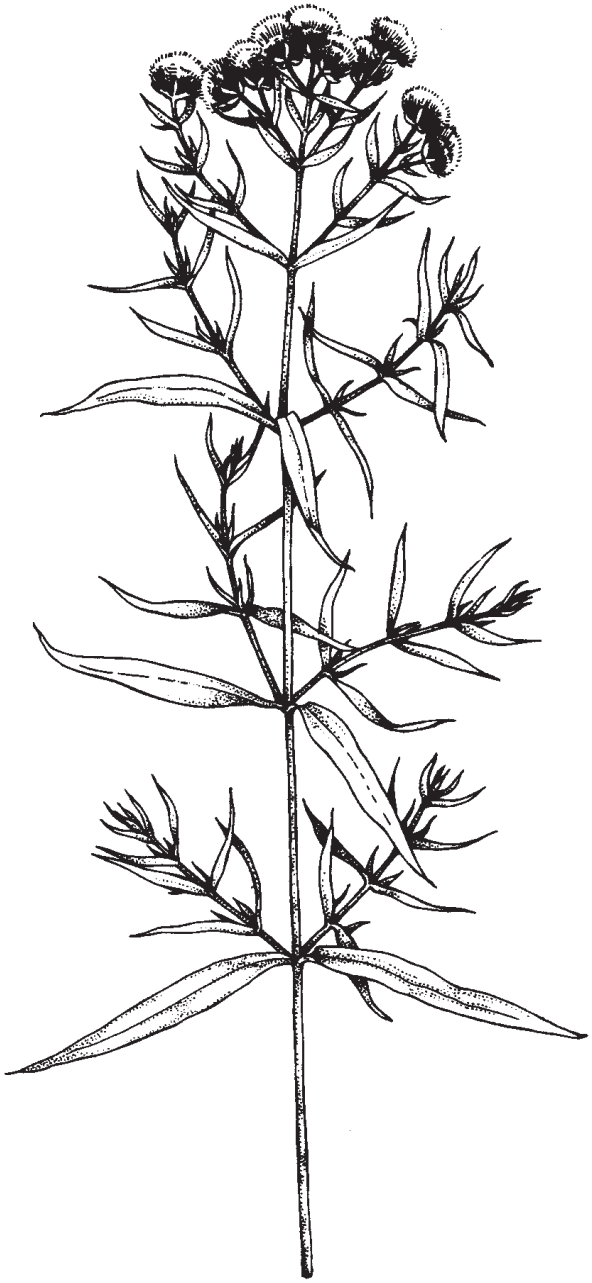
Salt Tolerance
Not available

Siltation Tolerance
Low to moderate

Flowering Color and Time
White with purple spots
July to August

Light Preference
Full sun

Seeding Rate
.02 - .06 lbs/acre



Quercus bicolor Swamp White Oak

Preferred Water Depth and Inundation Tolerance

Floodplain and terrace species. Prefers moist soil that dries out towards the end of the growing season. Species tolerates spring flooding.

Wildlife Value

Acorns from this species are an important food source for many small mammals, deer, and birds. Provides habitat for many birds, reptiles, and amphibians.

Application/Zone

Used in upper shoreline zones and for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Available as balled and burlapped or bareroot stock.
- Tap roots make most oaks difficult to transplant, but *Quercus bicolor* has a more fibrous root system, making transplanting easier.

Swamp White Oak *Quercus bicolor*

Mature Height
50 to 70 feet

Plant Type
Deciduous tree

Indicator Status
Facultative Wet (+)

pH
Not available

Nutrient Load Tolerance
Low

Salt Tolerance
Low

Siltation Tolerance
Low

Flowering Color and Time
May

Light Preference
Full sun

Seeding Rate
Not applicable

Quercus macrocarpa Bur Oak

Preferred Water Depth and Inundation Tolerance

Prefers moist soil and is drought tolerant. Species tolerates moderate dormant-season flooding.

Wildlife Value

Acorns of this species are eaten by squirrels, wood ducks, deer, rabbit, and mice. Also used as cover and for nesting sites.

Application/Zone

Planted in shelter belts for wind erosion control. Provides upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Limited availability from commercial vendors.
- Seed must be stored moist for a short time only. Seed germination is improved by stratification. Seeds germinate readily at most temperatures if protected from grubs and other depredation. Seeds may die if moisture falls below 20 - 22%.
- Seedlings develop a deep tap root and extensive lateral roots, making the species difficult to transplant, though bag or pot-grown trees can readily be transplanted.
- Best success has been observed with small bare root seedlings which require watering to reduce transplant shock.
- Fall planting works best.

Bur Oak *Quercus macrocarpa*

Mature Height
60-70 feet

Plant Type
Deciduous tree

Indicator Status
Facultative (-)

pH
Not available

Nutrient Load Tolerance
Low to high

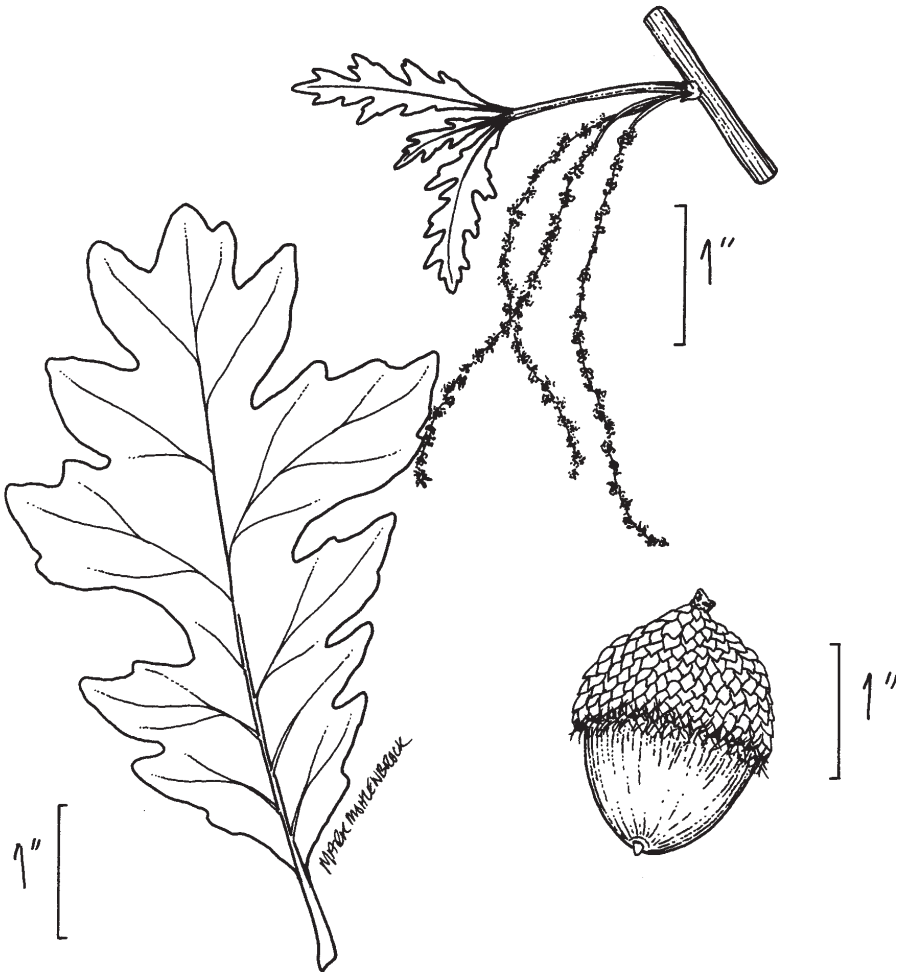
Salt Tolerance
Low

Siltation Tolerance
Low to moderate

Flowering Color and Time
April to May

Light Preference
Full sun
Not shade tolerant

Seeding Rate
Not applicable



Quercus palustris Pin Oak

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soils, but will tolerate up to 3 inches of standing water for short periods.

Wildlife Value

Acorns of this species are eaten by wildlife. Also used as cover and nesting sites.

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Readily transplantable due to shallow fibrous root system.
- Seed must be stratified at 32-41° F for 30 to 45 days. Must be kept moist or seeds will die.
- **CAUTION:** Only use in eastern sector in sandier, more acidic soils. Does not do well in calcareous till soils with higher clay content and high pH.

Pin Oak *Quercus palustris*

Mature Height
Up to 75 feet

Plant Type
Deciduous tree

Indicator Status
Facultative Wet

pH
Slightly acidic

Nutrient Load Tolerance
Low

Salt Tolerance
Low to moderate

Siltation Tolerance
Low

Flowering Color and Time
Pink
July to September

Light Preference
Full sun
Not shade tolerant

Seeding Rate
Not applicable

Ratibida pinnata Yellow Cone Flower

Preferred Water Depth and Inundation Tolerance

Mesic prairie species. Species has no inundation tolerance.

Wildlife Value

Palatable to grazing species in young growth. Attracts butterflies and other insects.

Application/Zone

Extensive fibrous root systems are used to stabilize soil on upland slope buffers.

Availability, Establishment, and Maintenance

- Establishes easily from seed. Seed can be sown in the fall or spring. Best results can be reached by stratifying seed at 33-38° F for 30 days, but this is not essential for germination.
- Older plants can be divided and planted in the spring, but an extensive root system makes this difficult.

Yellow Cone Flower *Ratibida pinnata*

Mature Height
Up to 3 feet

Plant Type
Perennial herb

Indicator Status
Upland

pH
6-7

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Yellow
July to September

Light Preference
Full sun

Seeding Rate
Not available

Rudbeckia hirta Black-Eyed Susan

Preferred Water Depth and Inundation Tolerance

Mesic to wet prairie species. Species has limited inundation tolerance.

Wildlife Value

Attracts butterflies and is used for cover.

Application/Zone

Extensive fibrous root system stabilizes soil on upland slope buffers.

Availability, Establishment, and Maintenance

- Easily established from seed. No pretreatment of seed is necessary.
- This species can be very aggressive.
- This species is early successional and will "thin out" in mature restorations.

Black-Eyed Susan *Rudbeckia hirta*

Mature Height
1 to 2 feet

Plant Type
Perennial herb

Indicator Status
Facultative Upland

pH
4.5-7.5

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Yellow with black/brown center
June to July

Light Preference
Partial to full sun

Seeding Rate
.125 - .3 lbs/acre

Sagittaria latifolia Broadleaf Arrowhead

Common Arrowleaf
Duck Potato

Preferred Water Depth and Inundation Tolerance

Prefers water depth of 6-20 inches (Max: 24"/Min: saturated mudflats). Species will tolerate some inundation for relatively short periods.

Wildlife Value

Provides waterfowl and wildlife food. Smaller tubers and seeds are eaten by rails, ducks, and swans, especially canvasback duck, Canada geese, gadwall duck, trumpeter swan, and whistling swan. Tubers and plants are eaten by muskrats, porcupines, beaver, and many others. Also provides habitat for macroinvertebrates and game fish--especially channel catfish, white bass, shiners, and shad. Also provides habitat for frogs, snakes and turtles. May serve as nesting material for black tern. Newly planted rootstock is frequently devoured by Canada geese.

Application/Zone

Used in lower shoreline zones.

Availability, Establishment, and Maintenance

- Seed, tubers, rootstock, and transplants are available from commercial vendors. Rootstock establishment is most common and the easiest method.
- Fall seeding is recommended to provide cold stratification. Broadcast the seed and cover with a thin layer of soil.
- Plant tubers 2-3 inches in the ground in the spring. Transplants and tubers are usually planted on 2-6 foot centers and must be protected from depredation. Tubers and seed should be kept in moist to saturated soil conditions. Tubers require a 6 to 8 week cold treatment to break dormancy.
- Gradually raise the water level as shoots emerge. This species has a rapid rate of spread by runners and tubers.
- Tubers survive freezing and oxygen depletion.
- This species has high seedbank longevity.

Broadleaf Arrowhead *Sagittaria latifolia*

Common Arrowleaf
Duck Potato

Mature Height
Leaves 2-8 inches
Inflorescence 4-30 inches

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
5.9-8.8

Nutrient Load Tolerance
Moderate

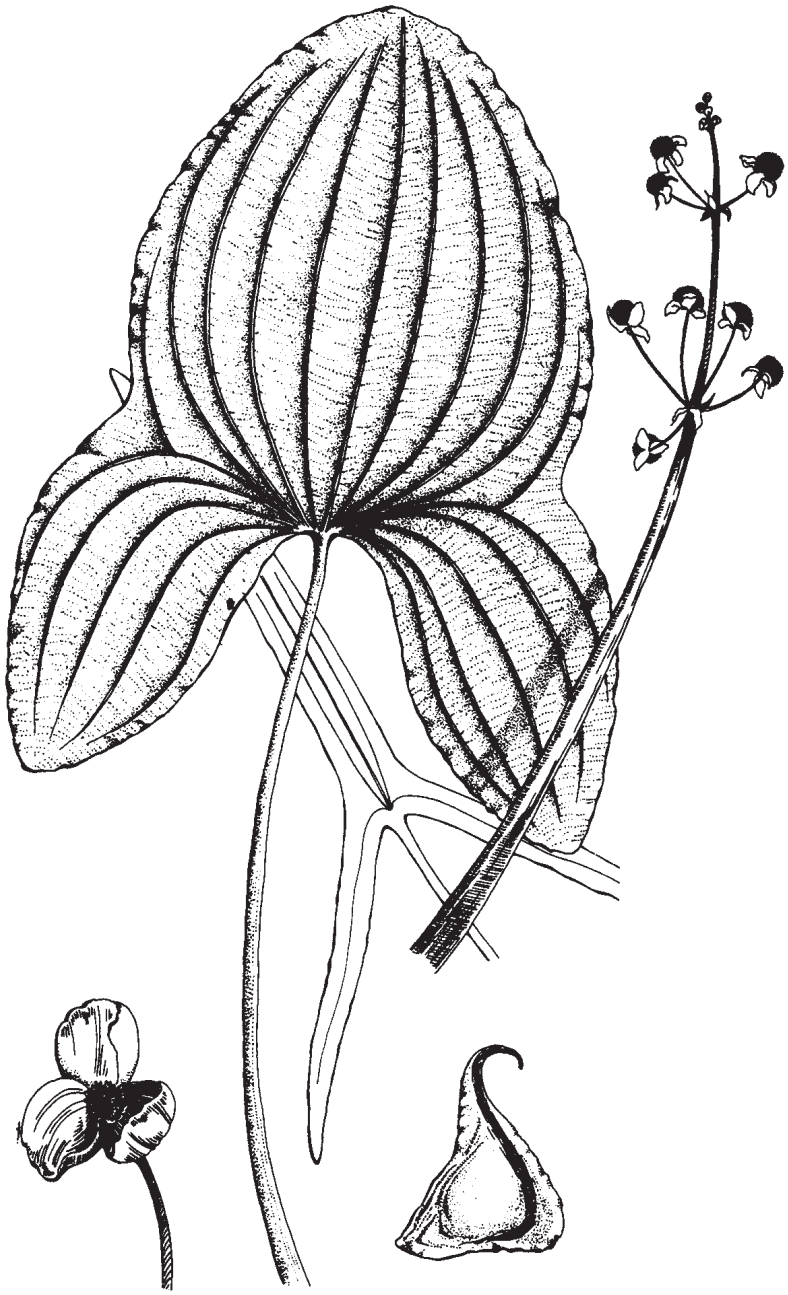
Salt Tolerance
Low

Siltation Tolerance
Low

Flowering Color and Time
White
July to September

Light Preference
Partial to full sun

Seeding Rate
.12 - .19 lbs/acre



Salix amygdaloides Peachleaf Willow

Preferred Water Depth and Inundation Tolerance

Sedge meadow species. Species tolerates 0-18 inches inundation for short periods.

Wildlife Value

Provides cover and nesting habitat for songbirds, marsh birds, amphibians, and reptiles.

Application/Zone

Used in upper shoreline zones and for streambank stabilization.

Availability, Establishment, and Maintenance

- Root by cuttings.
- Limited availability from commercial vendors.

Peachleaf Willow *Salix amygdaloides*

Mature Height
Up to 40 feet

Plant Type
Deciduous shrub

Indicator Status
Facultative Wet

pH
Not available

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Moderate

Siltation Tolerance
Low to moderate

Flowering Color and Time
Green
April to June

Light Preference
Partial to full sun

Seeding Rate
Not applicable

Salix nigra Black Willow

Preferred Water Depth and Inundation Tolerance

Natural floodplain species. Species tolerates periodic inundation with up to 2 feet of water for short durations.

Wildlife Value

Provides nesting habitat for birds. Serves as a food source for morning cloak butterfly, songbirds, waterfowl, woodpeckers, beaver, squirrel, and deer.

Application/Zone

Used in upper shoreline zones and for streambank stabilization.

Availability, Establishment, and Maintenance

- Root by cuttings. Spreads by suckers.
- Has rapid growth rate, 3 to 6 feet per year.

Black Willow

Salix nigra

Mature Height
Up to 90 feet

Plant Type
Deciduous tree

Indicator Status
Obligate

pH
6.0-8.0

Nutrient Load Tolerance
Moderate to high

Salt Tolerance
Low

Siltation Tolerance
Moderate

Flowering Color and Time
Yellow-green
April to May

Light Preference
Full sun

Seeding Rate
Not applicable

Schizachyrium scoparium Little Bluestem

(*Andropogon scoparius*)

Preferred Water Depth and Inundation Tolerance

Dry to mesic prairie species. No inundation tolerance.

Wildlife Value

Palatable and nutritious for grazing species. Provides cover for grassland birds.

Application/Zone

Branching, numerous vertical roots extending to a depth of 6 feet can stabilize upland slope buffers and generally will hold soil and prevent erosion wherever established.

Availability, Establishment, and Maintenance

- Best by seed. No pretreatment of seed is necessary. Germinates in April when planted in the fall.
- In mixed grass plantings use 75% Little Bluestem on dry, dry mesic, or mesic short grass plantings. Equal amounts of Side-oats Grama may also be used on dry mesic or dry areas.

Little Bluestem

Schizachyrium scoparium

(*Andropogon scoparius*)

Mature Height
2-3 feet

Plant Type
Perennial tufted grass

Indicator Status
Facultative Upland (-)

pH
Wide range

Nutrient Load Tolerance
Low

Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Reddish-brown
August to September

Light Preference
Full sun

Seeding Rate
1 - 6 lbs/acre

Scirpus acutus Hardstem Bulrush

Preferred Water Depth and Inundation Tolerance

Prefers saturated soils in fens and water levels to a depth of 3 feet in marsh areas. Species tolerates semi-permanently flooded conditions.

Wildlife Value

Waterfowl and shorebirds eat achenes. Muskrats and geese eat rhizomes and stems. Provides preferred nesting habitat for redhead and canvasback ducks. Also provides spawning and nursery habitat for northern pike and other fish species.

Application/Zone

Used in lower shoreline zones and in vegetated swales. Resists wave action and water level changes.

Availability, Establishment, and Maintenance

- Achenes, rootstocks, rhizomes, and transplants are available from commercial vendors.
- Achenes do not germinate readily unless they are stratified under cold, wet conditions for several months and then exposed to light and warm temperatures. Fresh collected achenes can be planted in the fall in wet mudflats after drawdown for spring germination.
- Spring planting of rootstocks and rhizomes is preferred due to greater success. Rhizomes are planted at a depth of 2-5 inches in saturated substrate and at a depth of 4-6 inches in water. Rhizomes should be placed 3 feet apart in a clustered arrangement.
- Hardstem Bulrush is a rather slow spreading plant when propagating from rhizomes. It may take up to 3 years to develop into a thick stand.

Hardstem Bulrush *Scirpus acutus*

Mature Height
3.5-9.3 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
6.7-9.1

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Moderate to high

Siltation Tolerance
Low to moderate

Flowering Color and Time
Reddish brown
May to September

Light Preference
Full sun

Seeding Rate
.06 - .25 lbs/acre

Scirpus americanus Chairmaker's Rush

(*S. pungens*)

Preferred Water Depth and Inundation Tolerance

Prefers saturated soil to inundation 16.5 inches deep. Species tolerates seasonally flooded conditions. Also has more than 50% mortality in water depths of more than 20 inches.

Wildlife Value

Serves as an important source of wildlife food. Achenes are eaten by waterfowl such as, pintail, lesser scaup, gadwall, canvasback, ringneck duck, rails, and shorebirds. Muskrats eat stems and rhizomes. Stems provide habitat for ducks and small mammals.

Application/Zone

Used in lower shoreline zones, for streambank stabilization, and in vegetated swales. Resists wave action and water level changes.

Availability, Establishment, and Maintenance

- Achenes, tubers, rootstock, and rhizomes are available from several commercial vendors.
- Achenes have dormancy requirements. Fall collected achenes require cold (34-36° F), wet stratification for 6-12 months and then warm temperatures (75-80° F) to germinate. Fall seeding provides better germination than spring due to the stratifying effects of overwintering. Seeds germinate better with light and alternating temperatures.
- Rhizomes have good survival when planted in spring through summer. They are planted in saturated substrate at depths of 2-5 inches and on 2-6 foot centers because of their rapidly spreading growth habit.
- Young, newly established plants should not be totally flooded with water. Manipulation of water levels with drawdowns and flooding are recommended for best establishment results.
- This species is also sensitive to oxygen depletion.

Chairmaker`s Rush

Scirpus americanus

(*S. pungens*)

Mature Height
Up to 4 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
6.7-8.9

Nutrient Load Tolerance
Low

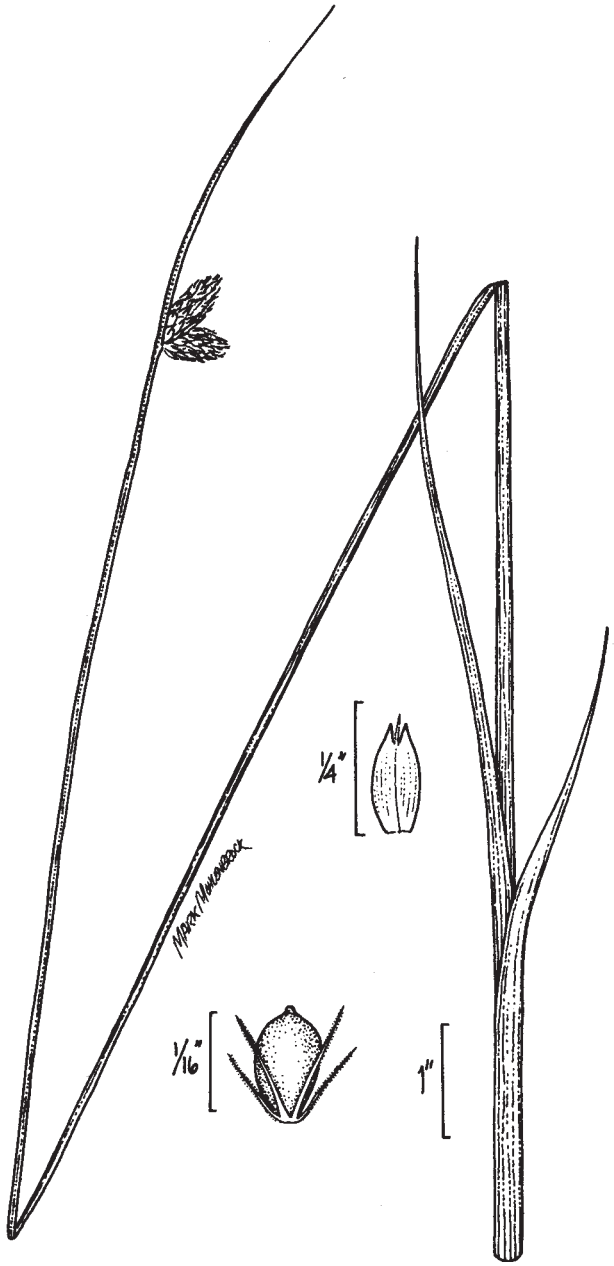
Salt Tolerance
High

Siltation Tolerance
Low to moderate

Flowering Color and Time
Brown
May to September

Light Preference
Full sun

Seeding Rate
.06 - .125 lbs/acre



Scirpus fluviatilis River Bulrush

Preferred Water Depth and Inundation Tolerance

Tolerates semipermanent to permanently flooded conditions (Max: 30"/Min: 2" to moist soil).

Wildlife Value

Achenes are eaten by ducks, geese, rails, and shorebirds. Muskrats eat aerial stems and rootstocks. Provides spawning habitat for bluegills and bass.

Application/Zone

Used in lower shoreline zones for erosion control at a depth of 1-6 inches (shallow standing water). Plants may be uprooted by wave action. Also used in vegetated swales.

Availability, Establishment, and Maintenance

- Rhizomes, rootstock, tubers, and transplants are available from several commercial vendors. Seed production is erratic, so there is sporadic availability from vendors.
- Seed also needs cold water treatment. Rhizomes, tubers, and rootstock are preferred for propagation. Rhizomes should be planted at soil depths of 2-5 inches and spaced 1-3 feet apart.
- Spring planting assures greater survival of transplants. Maintain moist substrate to a coupleinches of water during plant establishment in order to prevent flooding of young shoots.
- Avoid planting in deep shoreline water since it reduces plant spread. Mudflat conditions are preferred for planting.
- This species spreads quickly vegetatively and can form monocultures.

River Bulrush *Scirpus fluviatilis*

Mature Height
5-7 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
7.0-9.1

Nutrient Load Tolerance
Moderate to high

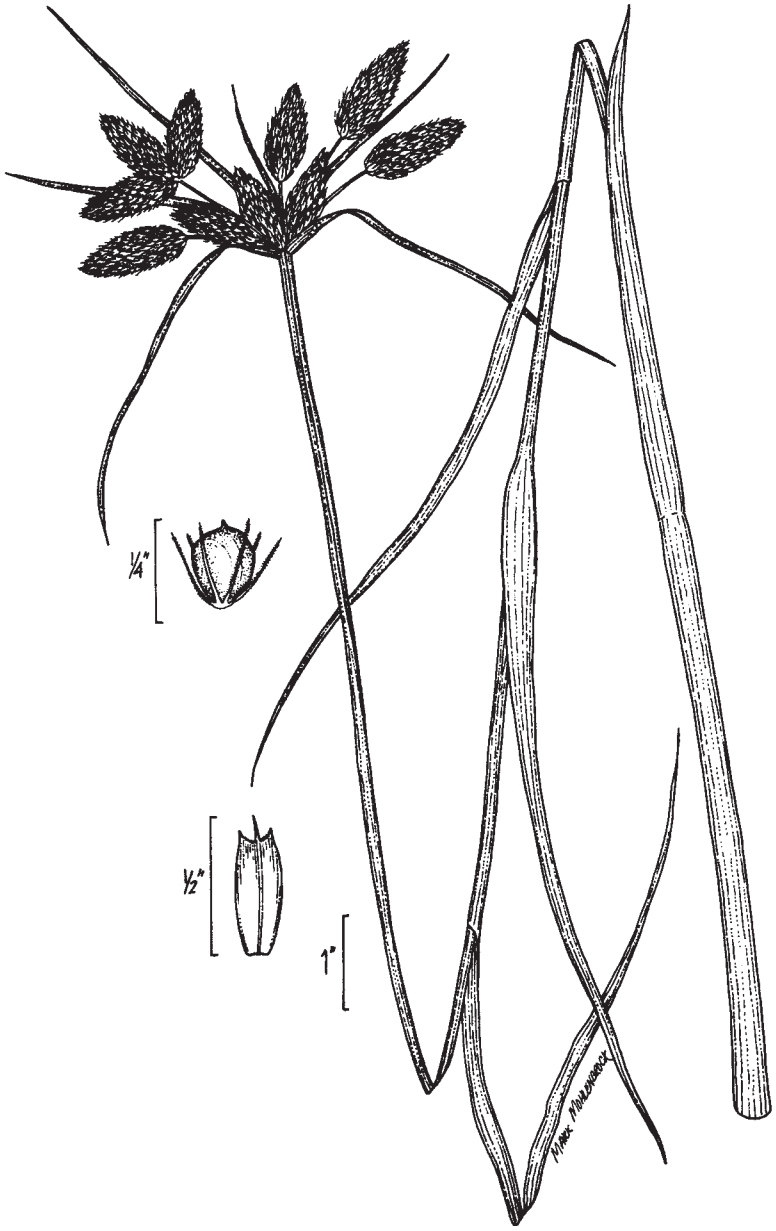
Salt Tolerance
Low to moderate

Siltation Tolerance
High

Flowering Color and Time
Brown
May to September

Light Preference
Partial to full sun

Seeding Rate
.06 - .125 lbs/acre



Scirpus tabernaemontani Soft-stem Bulrush

(*S. validus creber*) Great Bulrush

Preferred Water Depth and Inundation Tolerance

Prefers water at a depth of 12-20 inches (Max: 4'/Min: saturated soil to 6"). Species tolerates flooding of 2 feet or more, but not total inundation, for 3 weeks or longer during the growing season.

Wildlife Value

Achenes are eaten by many waterfowl, shorebirds, and rails. Plants are eaten by muskrats. Provides valuable nesting cover for waterfowl and habitat for insects and young fish.

Application/Zone

Excellent for lower shoreline zone stabilization. Also used in vegetated swales.

Availability, Establishment, and Maintenance

- Achenes, rhizomes, rootstocks, and container plants are available from several commercial vendors.
- Seeding in the fall is more successful than in the spring. Sow fresh collected achenes on wet mudflats at the end of the growing season. Seeded area must be kept wet and covered with 1-2 inches of water during the winter, followed by spring drawdown. Avoid submergence of young seedlings.
- Rootstock, rhizomes, and transplants are the preferred material for more reliable plant establishment. Best results are achieved with spring planting. Plant rootstocks and rhizomes at a depth of 5-6 inches in soil. Entire plants may be planted in 6 inches of soil and up to 1 foot of water. Space propagules on 2-6 foot centers because of their rapid rate of spread.
- Manipulation of water levels is desirable for promoting seed germination and vegetative establishment. Late spring drawdown is most favorable with gradual increase of water level.
- Because muskrats and Canada geese may depredate new plantings, control measures must be taken.
- This species is sensitive to oxygen depletion.

Soft-Stem Bulrush *Scirpus tabernaemontani*

Great Bulrush (*S. validus creber*)

Mature Height
3-9 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
6.5-8.5

Nutrient Load Tolerance
Moderate

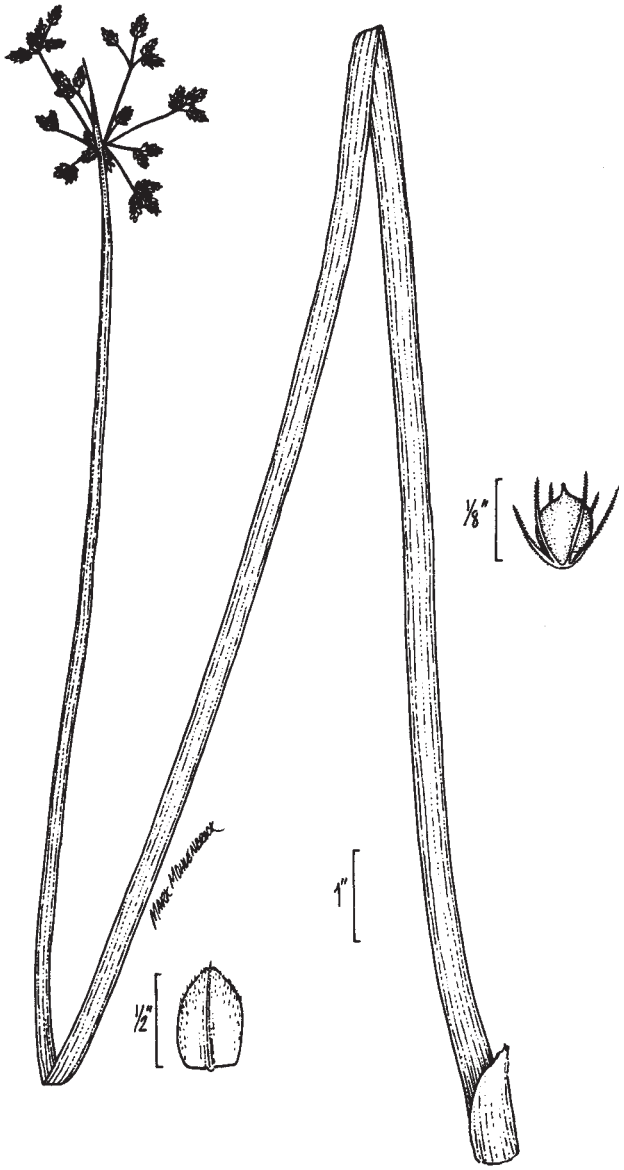
Salt Tolerance
Low to moderate

Siltation Tolerance
Moderate

Flowering Color and Time
Brown
June to August

Light Preference
Full sun

Seeding Rate
.06 - .25 lbs/acre



Silphium laciniatum Compass Plant

Preferred Water Depth and Inundation Tolerance

Usually a mesic prairie species, which does not tolerate inundation in artificial situations. This is not necessarily true in natural areas, as it is occasionally seen in sedge meadows and wet prairies.

Wildlife Value

Songbirds eat seed. Deer graze on plant. This species attracts butterflies and provides a food source for silphium weevil.

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Propagation is very successful from seed. Because of a tough seed coat, moist, cold stratification at 33-38° F for 10-60 days is beneficial. After stratification, sow seeds at a shallow depth (1/2 inch) in the spring.
- This is a very slow growing plant above ground. It may only grow one leaf in the first year and may need some protection.
- Direct seeding has been moderately successful.
- Deep taproot discourages transplanting, but can be successful if the taproot is not broken.
- Fall seeding can be very successful.

Compass Plant *Silphium laciniatum*

Mature Height
Up to 10 feet

Plant Type
Perennial herb

Indicator Status
Upland

pH
4.5-7.5

Nutrient Load Tolerance
Low

Salt Tolerance
Not available

Siltation Tolerance
Low

Flowering Color and Time
Yellow
July to September

Light Preference
Full sun

Seeding Rate
.03 - .19 lbs/acre

Silphium terebinthinaceum Prairie Dock

Preferred Water Depth and Inundation Tolerance

Wet prairie or sedge meadow species. Species tolerates 0-6 inches of inundation for short durations early in the season.

Wildlife Value

Palatable to grazing species. Attracts butterflies and other insects.

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Easily propagated from seed.
- To produce bare root transplants, sow seed 1/2 inch deep in late summer. Late planting is necessary because of rapid growth of taproot and will produce transplant stock in the fall or early the following spring.
- On permanent sites, use transplants in the fall or early spring, or sow unstratified seed in the fall or stratified seed in the spring.
- Requires light for germination.

Prairie Dock *Silphium terebinthinaceum*

Mature Height
Up to 10 feet

Plant Type
Perennial herb

Indicator Status
Facultative (-)

pH
4.5-7.5

Nutrient Load Tolerance
Low to moderate

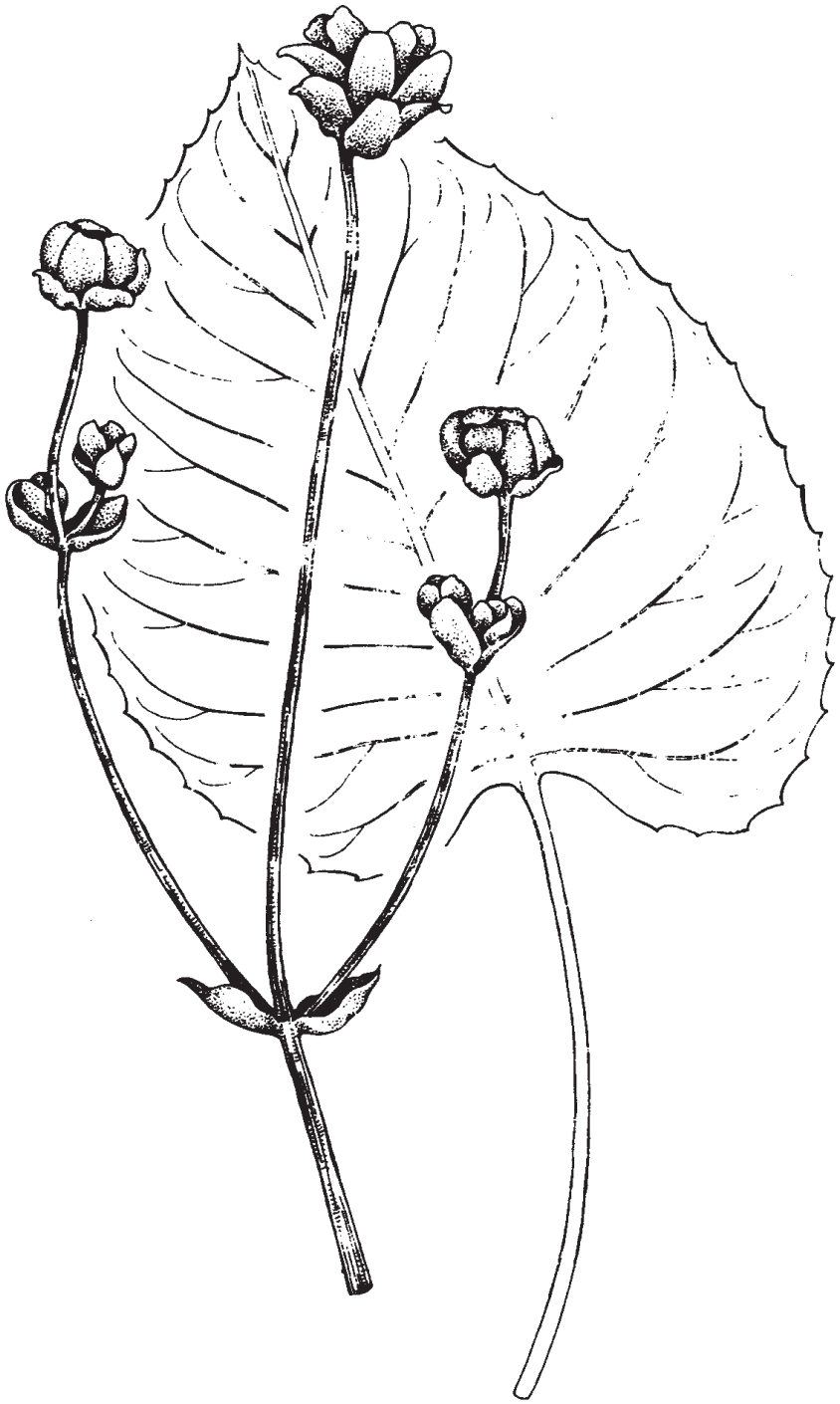
Salt Tolerance
Low

Siltation Tolerance
Low to moderate

Flowering Color and Time
Yellow
July to September

Light Preference
Full sun

Seeding Rate
.03 - .19 lbs/acre



Solidago gigantea Late Goldenrod

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soil.

Wildlife Value

Provides cover for small mammals and songbirds.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and in vegetated swales.

Availability, Establishment, and Maintenance

- Available as divisions, stem cuttings, and seed.
- Seed germinates quickly in warm humid conditions.
- Can be aggressive and form monocultures in restorations and natural areas.

Late Goldenrod *Solidago gigantea*

Mature Height
Up to 8 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet

pH
Not available

Nutrient Load Tolerance
Moderate to high

Salt Tolerance
Not available

Siltation Tolerance
Moderate

Flowering Color and Time
Yellow
July to October

Light Preference
Full sun

Seeding Rate
.125 lbs/acre

Solidago rigida Stiff Goldenrod

Preferred Water Depth and Inundation Tolerance

Prefers dry to mesic soil. Species has a minimal flooding tolerance.

Wildlife Value

Provides cover and food for songbirds. Attracts insects.

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Widely available as seed and establishes readily from seed.
- Excellent germination and coverage can be achieved by direct fall seeding on bare soil.
- Seed can be broadcast by hand or drilled.

Stiff Goldenrod *Solidago rigida*

Mature Height
Up to 6 feet

Plant Type
Perennial herb

Indicator Status
Facultative Upland (-)

pH
Not available

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Low

Siltation Tolerance
Low

Flowering Color and Time
Yellow
Mid July to October

Light Preference
Full sun

Seeding Rate
.06 - .3 lbs/acre

Sorghastrum nutans Indian Grass

Preferred Water Depth and Inundation Tolerance

Prefers mesic prairie zone. Species has no inundation tolerance.

Wildlife Value

Palatable and very nutritious to grazing species. Attracts butterflies. Provides cover for small mammals and songbirds.

Application/Zone

Dense, tangled root system binds soil well and can stabilize upland slope buffers. Slows runoff.

Availability, Establishment, and Maintenance

- Propagation by seed is best. Can be planted in the fall or late April to June.
- Debearding produces free-flowing seed that can usually be sown by drill or by hand broadcasting but debearding is not necessary.
- This species is first to establish matrix in prairie restorations, then reduces dominance and gives way to Big Bluestem after 3 - 5 years.
- Be cautious of non-local seed and hybrids.

Indian Grass *Sorghastrum nutans*

Mature Height
4-8 feet

Plant Type
Perennial grass

Indicator Status
Facultative Upland (+)

pH
Wide range

Nutrient Load Tolerance
Low

Salt Tolerance
Not available

Siltation Tolerance
Low to moderate

Flowering Color and Time
Golden brown
August to September

Light Preference
Full sun

Seeding Rate
2.5 - 6.0 lbs/acre

Sparganium eurycarpum Common Burreed

Preferred Water Depth and Inundation Tolerance

Prefers 12 inches of water in shallow marsh and water margins (Max: 24"/Min: 2").

Wildlife Value

Achenes are eaten by waterfowl, pheasant, and beaver. Muskrats eat the entire plant. Leafy growth is good cover for nesting ducks, muskrats, and marsh birds. Tubers are eaten by ducks.

Application/Zone

Used in lower shoreline zones for erosion control along lake and pond margins. The spreading root system makes an excellent buffer against wave action.

Availability, Establishment, and Maintenance

- Corms, rhizomes, rootstock, and transplants are available from several commercial vendors.
- Achenes have prolonged dormancy and low germination rates. They are also buoyant and float to the waterline. Achenes may be scarified and stored in 36-37° F water for at least one year for good germination. Overwintering in water that is allowed to freeze has also been successful.
- Corms and rhizomes are more successful than seed and can be planted in soil inundated with 2 inches of water or saturated soil in the spring. This species has a rapid rate of spread and should be planted on 2-6 foot centers.
- Potted, seed-grown plants are available and transplant well.

Common Burreed *Sparganium eurycarpum*

Mature Height
20 inches to 4 feet

Plant Type
Perennial emergent herb

Indicator Status
Obligate

pH
6.7-8.8

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Low to moderate

Siltation Tolerance
Low to moderate

Flowering Color and Time
White
June to August

Light Preference
Partial to full sun

Seeding Rate
.2 - .375 lbs/acre

Spartina pectinata Prairie Cordgrass

Preferred Water Depth and Inundation Tolerance

Prefers wet meadow conditions and saturated soil to 3 inches of inundation. Species will tolerate seasonal inundation.

Wildlife Value

Early growth provides some forage value to rodents and deer. Older growth is not readily grazed. Also provides food for waterfowl, marsh birds, and shore birds. Muskrats eat roots. Also used for wildlife cover and provides nesting habitat for marsh wren.

Application/Zone

Used in upper shoreline zones, for streambanks, upland slope buffer stabilization and in vegetated swales.

Availability, Establishment, and Maintenance

- Rhizomes and young transplants are used since seed viability can be very low.
- Preferred planting of rhizomes is 5 inches deep on 1-3 foot centers in April or May. Young transplants are most successful and widely used.
- A minimum of 1 gallon of water per linear foot per row or 1 acre inch of water should beapplied after planting. Plants require saturated, not flooded, soil to maintain stand.
- Plantings may be burned annually to stimulate seed production. Competes well with reed canary grass when established.

Prairie Cordgrass *Spartina pectinata*

Mature Height
5-7 feet

Plant Type
Perennial grass

Indicator Status
Facultative Wet (+)

pH
4.7-7.8

Nutrient Load Tolerance
Moderate to high

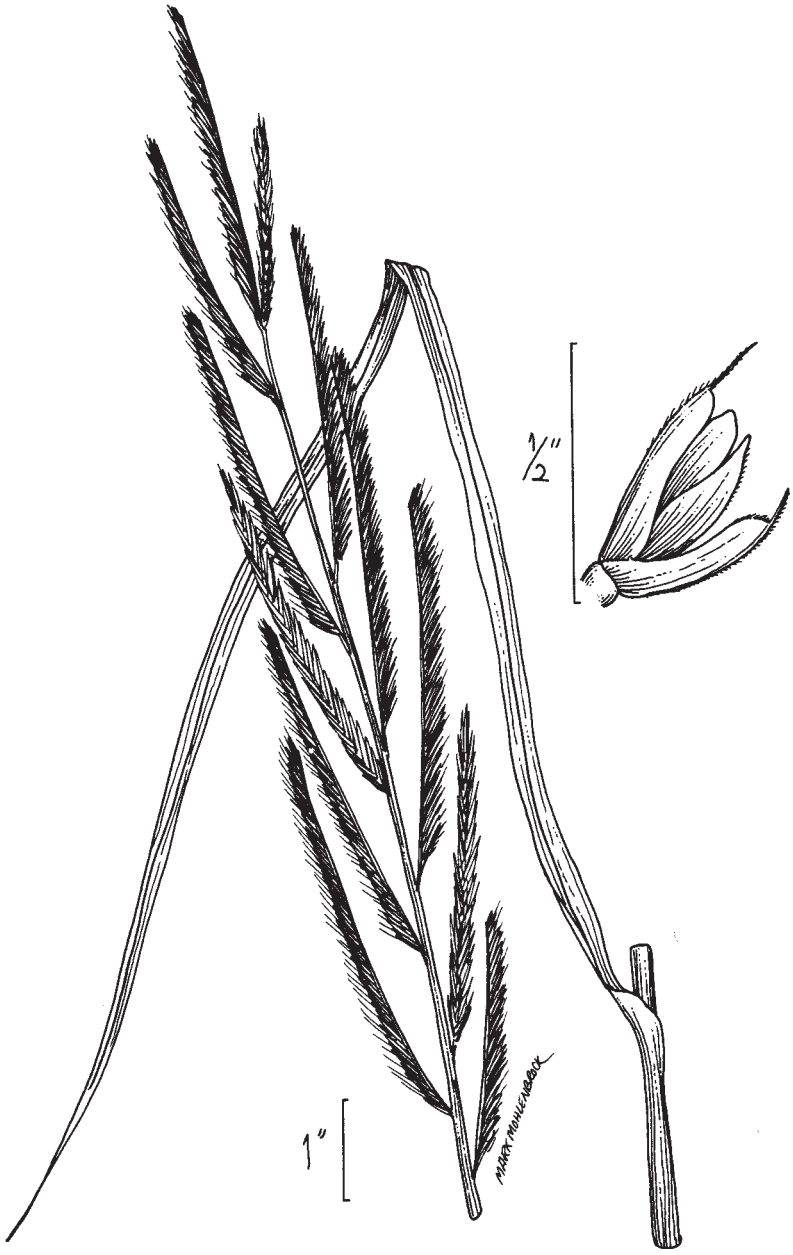
Salt Tolerance
Low to moderate

Siltation Tolerance
Moderate

Flowering Color and Time
Greenish yellow
July to August

Light Preference
Full sun

Seeding Rate
.5 - 2.0 lbs/acre



Tradescantia ohiensis Spiderwort

Preferred Water Depth and Inundation Tolerance

Dry to mesic species. Species has some tolerance of early seasonal flooding for short durations. Drought tolerant.

Wildlife Value

Not available

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Available as seed or plants.
- For best results from seed, sow fresh seed in fall, or store the seeds in cold, moist storage for 120 days before planting.
- Kelp-based fertilizers also stimulate germination.

Spiderwort *Tradescantia ohiensis*

Mature Height
1-3 feet

Plant Type
Perennial herb

Indicator Status
Facultative Upland

pH
Not available

Nutrient Load Tolerance
Moderate

Salt Tolerance
Not available

Siltation Tolerance
Moderate

Flowering Color and Time
Purple
Mid May to October

Light Preference
Partial to full sun

Seeding Rate
.06 - 1.0 lbs/acre

Verbena hastata Blue Vervain

Preferred Water Depth and Inundation Tolerance

Species tolerates moderate inundation of 0-8 inches of water as found in wet prairies, stream banks, and marshes.

Wildlife Value

Seeds are eaten by wildlife. Attracts butterflies. Small mammals eat shoots.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and in vegetated swales.

Availability, Establishment, and Maintenance

- Seed is widely available from commercial vendors.
- Propagation is easy by seed. Seed may need cold, moist stratification at 33-38° F for 30-90 days. Alternatively, some have found best germination of seed when stored dry at 40° F then shifted to 70° F with light. Sow on the surface of the soil because seeds require light to germinate.
- Division works well in the spring. Cuttings work well in the summer.
- This is a good pioneer species.

Blue Vervain *Verbena hastata*

Mature Height
Up to 5 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet (+)

pH
6-7

Nutrient Load Tolerance
Moderate to high

Salt Tolerance
Moderate to high

Siltation Tolerance
Moderate to high

Flowering Color and Time
Purple/Blue
July to September

Light Preference
Full sun

Seeding Rate
.015 - .125 lbs/acre

Vernonia fasciculata Common Iron Weed

Preferred Water Depth and Inundation Tolerance

Wet prairie, sedge meadow, and shallow marsh species. Species tolerates inundation of 2-3 inches early in the season.

Wildlife Value

Serves as a nectar source for insects.

Application/Zone

Stoloniferous habit stabilizes upper shorelines and upland slope buffers.

Availability, Establishment, and Maintenance

- The germination percentage for Common Iron Weed is very low which may be because it produces many nonviable seeds. Germination rates can be increased by sowing stored seed in a seed frame outdoors in June. If soil temperature is consistently warm, germination and seedling growth are very rapid.
- Transplant seedlings to individual containers when a rosette-like cluster of 3 to 4 four leaves develop and then move plants to the site when roots fill containers.
- For cuttings, take 4-6 inch stem cuttings in June or July. Root in a 50/50 mix of peat moss and sand. They should be well-rooted in 4 to 5 weeks and may then be transplanted into 3 to 4 inch pots. When well established, they may be transplanted on site or overwintered indoors in the pots for spring planting.
- Cuttings may not be necessary because establishment from seed has been observed in restorations.
- Seed availability may be sporadic due to an insect pest.

Common Iron Weed *Vernonia fasciculata*

Mature Height
Up to 6 feet

Plant Type
Perennial herb

Indicator Status
Facultative Wet

pH
5.6-7

Nutrient Load Tolerance
Low to moderate

Salt Tolerance
Not available

Siltation Tolerance
Moderate

Flowering Color and Time
Purple
July-August

Light Preference
Full sun

Seeding Rate
.06 - .19 lbs/acre

Viburnum dentatum lucidum Arrow Wood Viburnum

(*V. recognitum*)

Preferred Water Depth and Inundation Tolerance

Prefers dry to moist soil.

Wildlife Value

Provides cover and nesting habitat for songbirds.

Application/Zone

Used for upland slope buffer stabilization.

Availability, Establishment, and Maintenance

- Available as bare root or balled and burlapped. Spreads vegetatively.
- For seeds warm, moist stratification followed by cold, moist stratification has been reported to break dormacy.

Arrow Wood Viburnum *Viburnum dentatum lucidum*

(*V. recognitum*)

Mature Height
Up to 10 feet

Plant Type
Deciduous shrub

Indicator Status
Facultative Wet (-)

pH
Not available

Nutrient Load Tolerance
Low to moderate

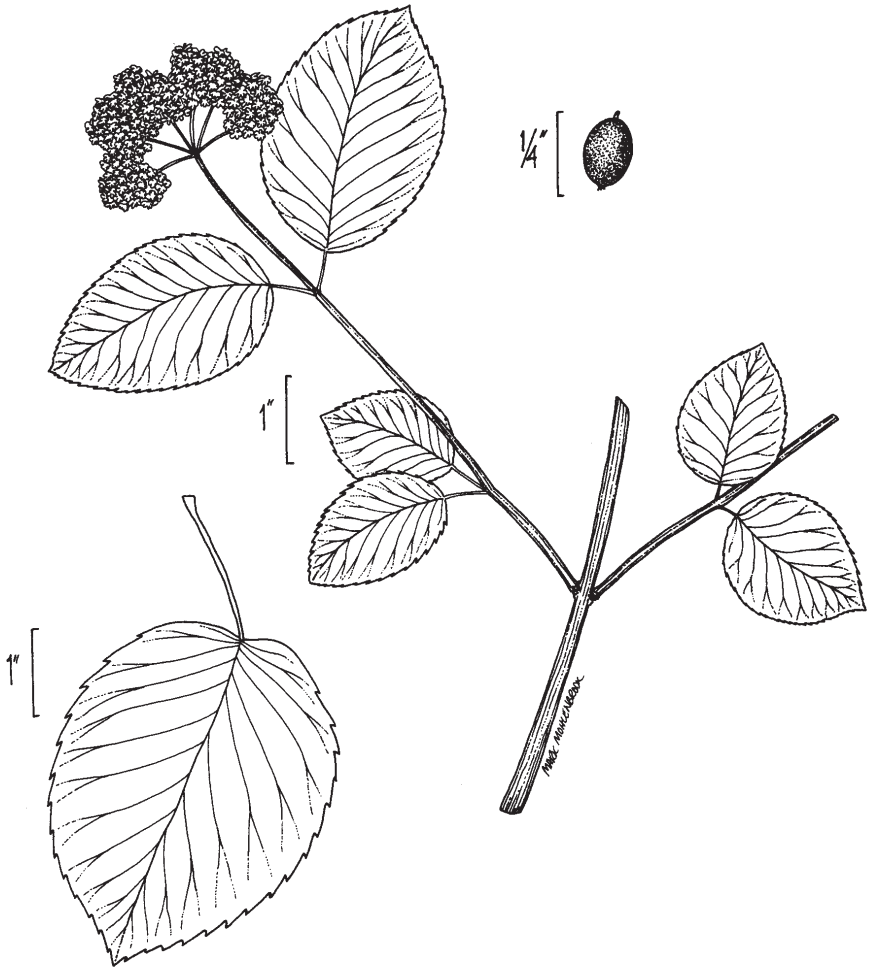
Salt Tolerance
Not available

Siltation Tolerance
Low to moderate

Flowering Color and Time
White
May to June

Light Preference
Partial to full sun

Seeding Rate
Not applicable



Viburnum lentago Nannyberry

Preferred Water Depth and Inundation Tolerance

Prefers moist to saturated soils in mesic woods. Species tolerates 1 inch of standing water.

Wildlife Value

Edible fruits attract birds. Provides food and nesting habitat for songbirds, such as, gray catbird, common flicker, American robin, eastern bluebird, cedar waxwing, and other species.

Application/Zone

Used in upper shoreline zones, for streambank stabilization, and on upland slope buffers.

Availability, Establishment, and Maintenance

- Available as bare root, container-grown, or balled and burlapped.
- Spreads vegetatively by suckers.
- Has fast growth rate, 2-2.5 feet per year.
- Some observations indicate berry pulp may need to be washed from the seed in order to achieve better germination.
- Moist, warm stratification of seeds followed by moist, cold stratification has been reported to break dormacy by some sources.

Nannyberry *Viburnum lentago*

Mature Height
15-35 feet

Plant Type
Small tree/shrub

Indicator Status
Facultative (+)

pH
6.0-7.5

Nutrient Load Tolerance
Moderate

Salt Tolerance
Low

Siltation Tolerance
Low

Flowering Color and Time
White
May to June

Light Preference
Partial sun to full sun
Shade tolerant

Seeding Rate
Not applicable