



2016-2017



800-873-3321 • ERNSTSEED.COM

MEADVILLE, PENNSYLVANIA



## IT IS THE MISSION OF ERNST CONSERVATION SEEDS TO MAKE AVAILABLE TO EASTERN NORTH AMERICA THE KEY NATIVE AND NATURALIZED SPECIES OF PLANTS FOR RESTORATION, RECLAMATION, CONSERVATION, WILDLIFE AND POLLINATOR HABITAT ENHANCEMENT, RENEWABLE BIOMASS ENERGY AND THE BEAUTIFICATION OF OUR NATION.

*We will identify, collect and propagate new species and ecotypes that meet our clients' needs, from eastern Canada to the southeastern United States. Our native seeds are produced from species that are considered the most significant foundation of an effective native restoration or reclamation project. To ensure that our customers receive a quality product, all of our seeds are harvested, conditioned and tested under the highest quality standards.*

*In addition to 8,000 acres of native seed production at Ernst, we also supply seed from some of North America's top producers and collectors.*

*Ernst Conservation Seeds and its suppliers collect, grow and process all of our products in an ecologically sustainable and renewable manner.*

## ORDERING INFORMATION

Our hours are Monday through Friday, 8 a.m. to 5 p.m. ET

### TO PLACE AN ORDER:

TOLL FREE: **800-873-3321**  
PHONE: **814-336-2404**  
FAX: **814-336-5191**  
E-MAIL: **sales@ernstseed.com**  
STREET/MAILING ADDRESS: **8884 Mercer Pike**  
**Meadville, PA 16335**

### TERMS AND CONDITIONS

\$25.00 order minimum before freight and tax.

\$5.00 line item minimum value of extended price.

Mixes must be ordered in whole pound increments.

5% custom mix charge.

**PAYMENT:** Visa, MasterCard, Discover and American Express are accepted forms of payment. Checks and money orders are also acceptable with placement of order. Sorry, Ernst cannot process COD orders.

**FREIGHT:** Orders are shipped via UPS or commercial freight (as applicable) and require a street address. Freight is prepaid and added to your invoice unless prior arrangements are made with an Ernst sales associate.

**OTHER FEES:** Other fees may include, but are not limited to, small order fees, pallet packaging, custom orders and bioengineering surcharges. We may require payment in advance for certain custom or special orders.

**WARRANTY:** All species and mixes are true to labeled weight, botanical name and genotype, and meet the label's seed test specifications within recognized tolerances. Warranty is limited to the purchase price of the product. Purchasers must make written claims for errors within 10 days of receipt of shipment.

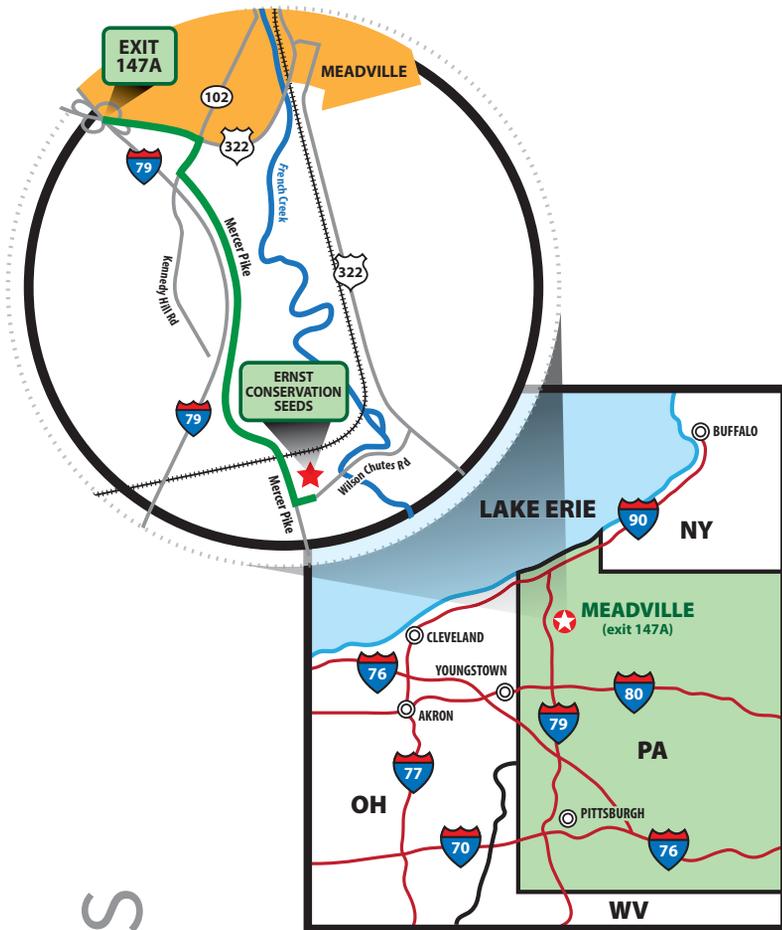
Due to planting and growing conditions out of our control, we cannot guarantee the establishment of plants using our seed.

**CANCELLATIONS & RETURNS:** We cannot guarantee that cancellation requests can be processed within 48 hours prior to the shipping date. Cancellation requests are subject to Ernst approval. Bioengineering order cancellations will be assessed a 25% cancellation fee.

All bioengineering materials are guaranteed to be what is specified on the tag or shipping documents and healthy upon receipt. Since we cannot guarantee care of such items after they leave our dock, all bioengineering material claims must be made within 48 hours of receipt.

Returns of individual items and Ernst stock mixes must be approved by Ernst, are subject to a 10% re-stocking fee and must be returned within 30 days in the original packaging. Custom orders cannot be returned once the individual items are mixed. Bioengineering orders are non-returnable.

Prices are subject to change without notice. Please call for pricing and availability.



## DIRECTIONS

### TO ERNST CONSERVATION SEEDS

(Note: Some internet and GPS directions are not accurate)

Located in northwest Pennsylvania, 80 miles north of Pittsburgh and 40 miles south of Lake Erie off I-79:

Take I-79 to Meadville Exit 147A (US 322 East to Meadville). Travel on US 322 East to 2nd traffic light. Turn right onto Mercer Pike and travel approximately 1,000 feet before turning left to continue on Mercer Pike (follow the sign to “Ernst Bike Trail”). Drive 2 miles on Mercer Pike. After crossing the railroad tracks, turn left into Ernst’s lane.

### ERNST CONSERVATION SEEDS SPECIALIZES IN NATIVE SEED AND PLANT MATERIAL

#### SPECIALTY SEED MIXES

- Upland & Meadow Sites
- Wildlife Habitat & Food Plot Sites
- Pollinator Sites
- Riparian Sites
- Disturbed Sites & Steep Slopes
- Utility Rights-of-Way & Oil and Gas Drilling Sites
- Wet Meadow & Wetland Sites
- Woodland & Shaded Sites
- Stormwater Management
- Southeastern U.S. Sites

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## “I DIDN’T INITIALLY THINK SEEDS WOULD BE MY THING,”

said Calvin Ernst frankly during an interview for a story about the 50th anniversary of Ernst Seeds back in 2014.

It’s good to know Calvin was willing to allow his career path to develop organically, so to speak.

While studying agricultural biosciences at Penn State University in 1963, Calvin literally lived and worked in the college greenhouses. One of his studies involved the propagation of *Coronilla varia* (Crownvetch), a low-growing, soil-fixing legume that demonstrated great potential for use in controlling soil erosion and holding steep slopes in place. These characteristics made the plant very attractive to the Pennsylvania Department of Transportation, which was busy constructing interstate highways like I-79 and I-80.

There was just one problem: PennDOT couldn’t find anyone interested in growing crownvetch on a sustainable scale.

Enter Calvin.

After convincing their father to set aside a mere five acres of the family farm for crownvetch, Calvin and his brother Luther soon had a cash crop. PennDOT bought all the seed they could produce – and wanted more. The following year, sixty acres were committed to crownvetch production and an enterprise – Ernst Crownvetch Farms – was born.

Crownvetch helped the company build a strong reputation in the marketplace throughout the 1970s as Calvin continued cultivating relationships with state transportation departments, erosion control contractors and govern-



image credit: MBA Business Magazine/R. Frank Photography

ment agencies.

Recognizing a decline in the crownvetch market and the ecological merits of a shift to native seeds, Ernst introduced his company’s first native plant seed in the late 1980s, and found a market for it in strip mine reclamation projects. The plant was *Panicum clandestinum* (Deertongue), and it had proven successful on sites like these where low soil pH was a challenge.

Within a few short years, he shifted the vast majority of his product offering to native plant seeds. The company began specializing in custom mixes for wetland mitigation, restoration and wildlife habitat.

The Company planted its first foundation *Panicum virgatum* (Switchgrass) seed (‘Shelter’ variety) in 1988. Calvin was interested in switchgrass because it added wildlife value to strip mine and reclamation seed mixes. This high-yielding warm season grass grows well on marginal lands, sequesters carbon and fixes nitrogen levels with marked efficiency.

As his company’s core mission and business model began to evolve, Calvin knew it was time for its identity to evolve as well. He renamed the company Ernst Conservation Seeds in 1994.

Calvin had been considering the potential for developing grass biomass for energy production. He put his plans to the test in 2005 by leasing 5,000 acres of marginal farmland in Crawford County and planting switchgrass for seed and biomass production.

Research soon began on the densification of grass biomass for use in direct combustion applications. Portable pellet mills and briquetters were tried with varying success. In a characteristically gutsy move, Calvin decided that his company would need to be the innovator once again — leading the charge instead of sitting on the sidelines. Ernst would build its own state-of-the-art facility to process warm season grasses. Michael Ernst and a select group of dedicated employees designed and constructed a pellet plant. Construction of the plant was completed in 2008 and it is currently producing densified pellets for multiple uses as a separate entity called Ernst Biomass, LLC. The facility has opened numerous new markets for grass biomass and pellets, including use as an agricultural bedding solution and as a highly effective industrial absorbent.

Today, with over 8,000 acres in production, Ernst Seeds offers more than 400 diverse crops for conservation, restoration, beautification, energy, pharmaceuticals and consumption. Though the majority of acreage is located in northwestern Pennsylvania, Ernst has additional farm land in Florida, and have cooperative growing relationships in Maryland, North Carolina and Oregon.

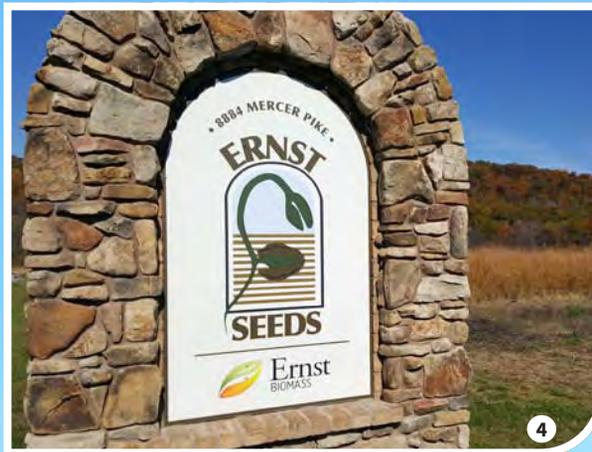
THE ERNST “FAMILY” NOW INCLUDES NEARLY 90 FULL-TIME EMPLOYEES, INCLUDING FIELD PRODUCTION CREWS, SALES AND MARKETING STAFF, RESEARCHERS, SEED CONDITIONING SPECIALISTS, FINANCE, PURCHASING, INVENTORY MANAGEMENT AND HUMAN RESOURCES PROFESSIONALS.



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**CAPTIONS**

- 1: Calvin Ernst in his natural environment – a field of *Penstemon digitalis* (Tall White Beardtongue)
- 2: To the best of our knowledge, this was the first sign for Ernst Crownvetch Farms.
- 3: At the site of our current location, this sign appeared when we changed our name to Ernst Conservation Seeds nearly twenty years ago.
- 4: Our current entrance sign was designed as part of our 50th anniversary celebration in 2014. Constructed from field stones collected on our farm, it represents the strength of our brand and our connection to the earth.
- 5: This stunning image of our headquarters, captured by one of our neighbors after a summer rain shower, illustrates the good fortune we've had to grow our business and serve our customers for over fifty years.



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# ERNST STAFF



**1. CALVIN ERNST**  
*Founder & President*  
**MARCIA ERNST**  
**2. ANDY ERNST**  
*Vice President*

**3. MICHAEL ERNST**  
*Vice President*  
**4. ROBIN ERNST**  
*President-Meadville Land Service Inc.*  
**5. DAN ARNETT**  
*Biomass Manager*

**6. STEPHANIE BRECKENRIDGE**  
*Sales & Inventory Manager*  
**7. PAULA DITHRICH**  
*Senior Accounting Manager*  
**8. RANDY FERGUSON**  
*Director of Marketing & Communications*

**9. MARK FIELY**  
*Horticulturist*  
**10. KATHY HAVEN**  
*Executive Assistant*  
**11. GREG KEDZIERSKI**  
*Bioengineering Manager*

# ERNST DEPARTMENTS



- 1. ACCOUNTING AND FINANCE
- 2. PLANTING AND HARVESTING
- 3. SHOP
- 4. SALES AND ORDER PROCESSING
- 5. BIOENGINEERING
- 6. SEED CONDITIONING

- 7. BIOMASS
- 8. SUMMER CREW
- 9. MARKETING AND COMMUNICATIONS
- 10. GREENHOUSE
- 11. WAREHOUSE AND SHIPPING

# INTRODUCTION

In eastern North America, there is a wide variety of native vegetation to replicate. Most planting objectives fall into the following categories:

- Soil erosion control & soil stabilization on slopes and along waterways
- Beautification & enhancement of landscapes
- Biodiversity & wildlife habitat enhancement and restoration
- Bioremediation to correct environmental disturbances
- Historical, cultural & ecological restoration
- Habitat for honeybees and native pollinators (butterflies, bumblebees, etc.)
- Native species for renewable biomass production



The use of native plants saves time and money while improving ecological function. Their reduced water, chemical, fertilizer and maintenance needs make them a sustainable and environmentally sound choice for virtually all scenarios. Select a combination of species that creates the desired outcome for your project. Your goals should be compatible with site conditions that cannot be altered. Native plant communities can be selected to meet nearly all site conditions.

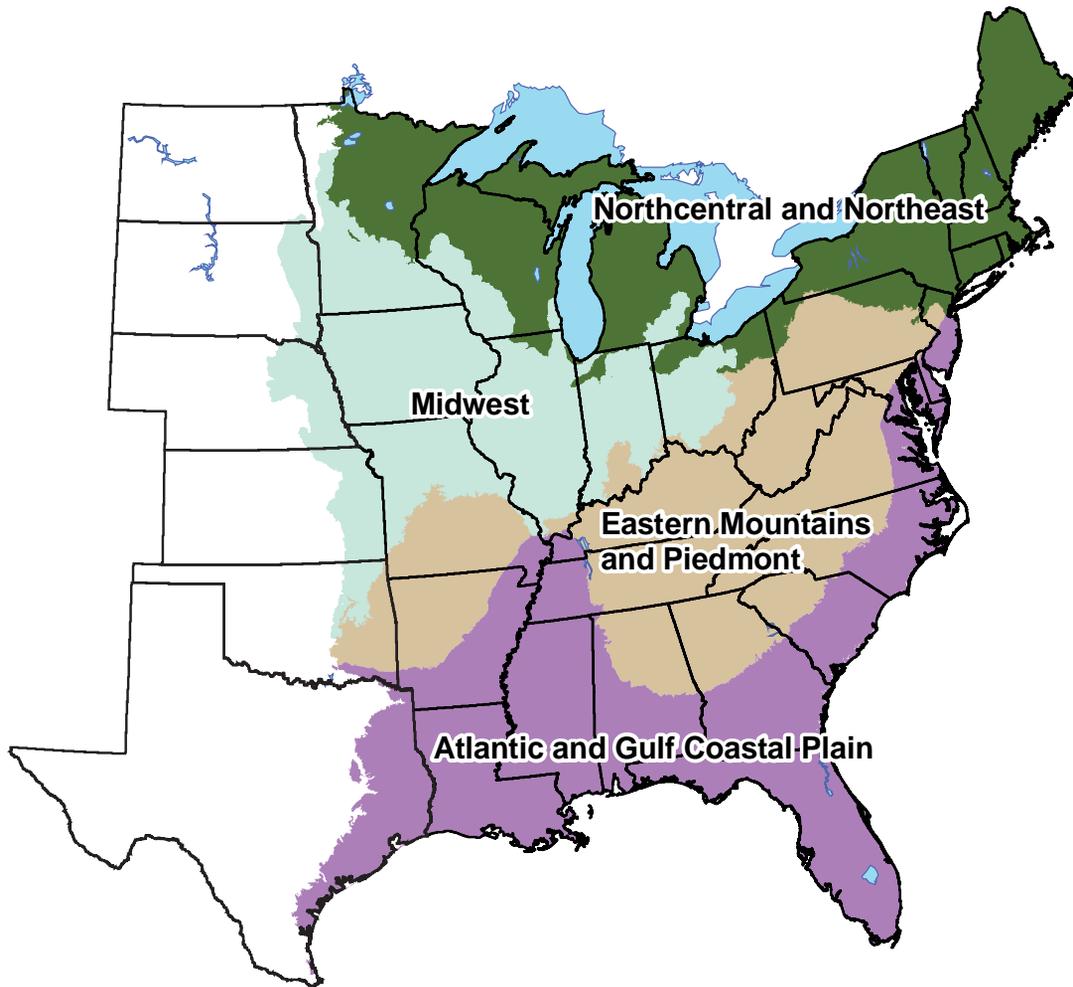
Review the appropriate section(s) below for information regarding seed mix selection and seeding methods for your project. Matching the functional goals of your site and site conditions to the appropriate seed mix will lead to greater project success. The stock seed mixes noted in each section represent a mere sampling of our complete list of mixes. A comprehensive list can be found on our website or by contacting a member of our sales team. Mixes can also be customized to your specific needs and those of your site and ecological region.

## CAPTIONS

- 1: *Monarda fistulosa* (Wild Bergamot)  
 2: *Eupatorium fistulosum* (Joe Pye Weed)  
 3: Milkweed seeds bursting from the pod  
 4: *Ratibida pinnata* (Grey Headed Coneflower)

- Upland & Meadow Sites, p. 17
- Wildlife Habitat & Food Plot Sites, p. 20
- Pollinator Sites, p. 22
- Riparian Sites, p. 25
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# KEY TO WETLAND INDICATOR



**WHAT IS A HYDROPHYTE?**

Any plant that grows only in or on water is considered a hydrophyte.

**DO YOU HAVE PICTURES OF YOUR MIXES?**

We continually strive to obtain pictures of our mixes from customers and site visits. While we do not yet have an expansive selection, our library is growing. We have both individual species and group species pictures available that represent what a site will resemble when established. The appearance of a mix will vary from site to site and from season to season.

The United States Army Corps of Engineers (USACE) is responsible for maintaining the National Wetland Plant List (NWPL) and associated Wetland Regions & Rating Information. This tool is used to determine the degree to which a particular plant species will be found in a wetland environment.

We use this tool to help you determine the proper plant species for your needs based on your wetland region and the composition of the site to be seeded.

After identifying which wetland region your site is in, you can easily identify the wetland indicator for individual species by using the key provided at the bottom of each right-facing page in the catalog. Though the USACE map includes the entire contiguous United States, Alaska, Hawaii and Cuba, the map used herein only includes the four regions generally east of the Mississippi River, as these represent the major market area of our seeds.

**INDICATOR STATUS RATINGS**

| Indicator Status    | Abrv. | Ecological Description - Lichvar and Minkin (2008)           | % Occurrence in Wetlands |
|---------------------|-------|--|--------------------------|
| Obligate            | OBL   | Almost always is a hydrophyte, rarely in uplands.            | 99                       |
| Facultative Wetland | FACW  | Usually is a hydrophyte but occasionally found in uplands.   | 67-99                    |
| Facultative         | FAC   | Commonly occurs as either a hydrophyte or nonhydrophyte.     | 34-66                    |
| Facultative Upland  | FACU  | Occasionally is a hydrophyte, but usually occurs in uplands. | 1-33                     |
| Upland              | UPL   | Rarely is a hydrophyte, almost always in uplands.            | 1                        |

**INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST**
- MIDWEST**
- EASTERN MOUNTAINS & PIEDMONT**
- ATLANTIC & GULF COASTAL PLAIN**

- OBL** Obligate wetland species
- UPL** Upland species
- FACW** Facultative wetland species
- NO** No occurrence
- FAC** Facultative species
- NI** No indicator
- FACU** Facultative upland species

## DEFINING NATIVE AND NATURALIZED SPECIES

### NATIVE

**Native** - A species that existed locally prior to European settlement.

**Ecotype** - A native species found in a defined area, state or region.

### NATURALIZED

**Naturalized** - A species not native to a certain area that grows, reproduces and maintains itself without interference.

**Variety** - A subdivision of a native or naturalized species having a distinct, consistent, though often inconspicuous, trait.

## BULK vs. PURE LIVE SEED (PLS)

Ernst Conservation Seeds conditions and prepares seed to the highest standard and sells it in bulk or pure live seed (PLS) quantities. PLS refers to the amount of live, viable seed in a lot of bulk seed. In other words, it indicates the amount of seed in the lot that is capable of developing into seedlings. Often, a “bargain” bulk seed mix with low PLS percentage will end up costing more to appropriately seed a project than a higher priced bulk seed mix with a higher PLS percentage.

All seed suppliers are required to include certain information on the tag relative to the quality of the seed. Two of the most important items are the **purity** (or percent of pure seed) and the **percent germination**.

To calculate PLS, multiply the **purity** by the percent total **germination** (**germination** + dormant + hard seed). Then divide the product by 100.

**Example:** A seed mix label indicates 90% purity, 78% germination, 10% hard and 2% dormancy.

*Calculation: 90% **purity** × 90% **total germination** (78 + 10 + 2) / 100 = 81% PLS.*

*To determine how much seed to plant, divide 100 by the percentage PLS (81 in this case). Thus, 100/81 = 1.2. This tells us that 1.2 pounds of seed with a purity of 90% and a germination of 90% would be needed for each pound specified in the desired seed mix. A less expensive mix with lower purity and percent germination might require much more bulk seed to compensate for the lower PLS percentage.*

Seeding rates in this guide are based on bulk seed unless otherwise indicated.



## FALL VS. SPRING SEEDING

Traditionally, seeding is thought of as a spring activity. Many restoration projects are completed in the summer and require fall seeding. There are some noteworthy advantages to fall seeding; however, you do have the option of seeding in the spring or in the fall. In southern states, seeding should be timed with the available moisture in the area.

### FALL OR “DORMANT” SEEDING

- Fall seeding imitates natural reseeding.
- Frost seeding is the broadcasting of seed over frozen soil following the first killing frost.
- Good seed-to-soil contact occurs through natural moisture and frost action.
- Some natural stratification occurs; i.e., natural changes occur to the seed and seed coat during the winter that enhance germination.
- Germination will most likely not occur until spring.
- Some cool season species will establish during winter; however, warm season grasses and most forbs will germinate in the spring.
- Some seed can be lost to decay and wildlife consumption during the winter.
- Establishment may be hindered by weed competition that begins during the winter.
- Mulching is an important element of dormant seeding to protect both the seed and soil and retain moisture.

### SPRING SEEDING

- Cool season species germinate soon after seeding.
- Germination of warm season species generally occurs within three weeks of the soil temperature reaching 55° F.
- Seed loss due to decay and wildlife consumption is minimized.
- Seed-to-soil contact should be accomplished by working the seed into the soil 1/4”-1/2” deep.
- Seeding can be delayed until weed control is applied in order to improve establishment.
- Irrigation during periods of dry weather is necessary for proper germination.
- Light mulching is an important element of seeding to protect both the seed and soil and retain moisture.
- Native grass biomass seedings are generally done during the spring when soil temperature is near 55° F and rising.

#### WHY DO STOCK SEED MIX FORMULATIONS CHANGE?

Stock seed mix formulas may vary within a year or between years. Each mix is created with a particular guiding philosophy. As new species become available, they will be added to enhance the performance of the mixes. Occasionally, a species may not be available due to crop failure or high sales. This will lead to a reformulation using the remaining species in the mix. To adapt to these variations in our formulations, we recommend using the phrase “Ernst Mix (X) as currently formulated” when writing specifications.

### INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

-  NORTHCENTRAL & NORTHEAST
-  MIDWEST
-  EASTERN MOUNTAINS & PIEDMONT
-  ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
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- FAC** Facultative species
- FACU** Facultative upland species

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- NI** No indicator

SEE PAGE 9 FOR EXPLANATION

## TOOLS AND SEEDING METHODS

### MINIMUM-TILL EQUIPMENT

Minimum-till equipment is used to incorporate a portion of the surface vegetation into the soil and level uneven surfaces. One of the most common tools is a disc, which cuts through vegetation, sod or hard soil and partly turns or tills it into the soil surface.

Similar equipment that turns part of the vegetative residue into the soil surface is known as Aerway® or Turbo® Till. Chisel plows drag through and turn part of the surface vegetation into the soil. Chisel plows generally leave the soil surface rough, which will require further treatment with a disc or similar tool to make it smooth enough to plant and harvest.



### ROTOTILLER

A rototiller is used to pulverize the soil with rotating blades and incorporate soil amendments and surface vegetation. Most units till up to 6" deep.



### CHISEL PLOW

A chisel plow is a minimum-till plow because it does not dislodge or turn over the entire soil profile the way a moldboard plow does. Chisel plowing is primarily used for deep tillage loosening while leaving a high percentage of debris on top. The plow typically has C-shaped shanks mounted on dual coil springs and the frame, shanks and springs are of sufficient weight, size and strength to provide an 8"-12" cutting depth. The depth of a chisel plow can be adjusted to till shallow or deep. This plow is also used for breaking up hardpan and compacted areas, which is followed by a disc harrow, tandem disc harrow or offset disc harrow of sufficient weight and size to provide a 6"-8" cutting depth.



### TRACKING

Tracking is the use of a crawler or rubber-tired tractor to make depressions and firm loose soil after construction or tilling. The depressions make local pockets in which seed and water can collect until they infiltrate the soil which aids in germination. The firm, but not compacted, seedbed will not dry out as quickly as loose soil.



## DRILL SEEDING



Drill seeding is a mechanical means of creating a furrow (opening) in the soil surface and metering the seed in at a uniform rate.

Conventional drills are capable of working in tilled and partly tilled soil. No-till drills are designed to work in soil that has not been tilled because they have heavy openers to cut through vegetation and sod, making a furrow for seed placement. However, they can work in tilled soil with the proper adjustment. The unit contains discs equipped with springs that aid in loosening the soil. All drills should be equipped with a closing or packing wheel that follows the seed placement. A special seed box is required for handling small or fluffy seed like that of many wildflowers and native grasses. Drills that can meter fluffy seed, such as that of little bluestem, big bluestem and indiagrass, need special agitation and metering equipment to handle these seeds. Switchgrass can be planted using any drill with a small seed box that can meter low rates of small seed. A drill used to plant warm season grasses must be capable of placing seed 1/4"-1/2" deep into a firm seedbed.



Calibrating a drill or broadcast seeder depends on seed bulk density and required application rates. Many native and naturalized seed mixes contain a mix of large fluffy seed and small dense seed. Some drills have special seed boxes that can meter large fluffy seed. Many native seed mixes are planted at 10-20 lb per acre (1/4-1/2 lb per 1,000 sq ft).

A simple method for calibrating a seeder is to add a bulking agent (such as kitty litter) to create an even flow of seed. Add 40-50 lb of a bulking agent to 10 lb of seed and calibrate for 50-60 lb per acre (1 lb bulking agent to 1/4 lb of seed per 1,000 sq ft). Divide the seed into proportional areas of the project. Start seeding at a lower rate than the calculated rate. If possible, plan on seeding half of the seed in one direction and make a second pass with the remaining half of the seed in a direction perpendicular to the first direction.



A drill seeder is practical for seeding several acres or more in areas where slopes aren't too steep. It generally has an 8' minimum width and contains a seed hopper capable of seeding a 6' width and row spacing of approximately 7". Some of the best drills are manufactured by Truax Company, Inc.

### INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

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- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- |   |                                   |
|---|-----------------------------------|
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| <b>FAC</b> Facultative species          | <b>NI</b> No indicator            |
| <b>FACU</b> Facultative upland species  | <b>SEE PAGE 9 FOR EXPLANATION</b> |

TOOLS AND SEEDING METHODS - *continued*

## HAND SEEDING

Seeding with machinery is not always effective or efficient for small plots or on difficult terrain. Hand seeding is easily accomplished when the seed is mixed with a bulking agent (such as kitty litter). Hand seeding means literally casting the seed onto the ground surface by hand. An experienced person can seed effectively with this method, while an inexperienced person can become effective with very little practice. The biggest challenge is coordinating the step-and-throw action to improve uniformity of seed placement. Divide the seeding area and seed mix into several small equal sections and hand cast the seed in two directions. Follow hand seeding up with hydromulch and a light raking or rolling to achieve good seed-to-soil contact. Do not roll or track the seed if the soil is wet.



## HYDROSEEDING

A hydroseeder combines water, seed, fertilizer and, sometimes, hydromulch into a mix that is then pumped through a nozzle and sprayed uniformly over the area to be seeded. Hydroseeders can distribute this mix at a distance of 150' or more which allows for the ability to seed terrain that may not be accessible by other seeding methods; namely, steep slopes, roadside cuts or sites that are too wet. The use of hydromulch assists in seed placement and helps to reduce erosion on slopes. Depending on site conditions, the use of erosion control blankets or straw mulch may be needed to cover the seed. Many native seeds should be broadcast with little mulch in the mix. A small amount of mulch can be applied with the seed as a marker, but must be limited to a minimum as native seeds will not germinate if suspended in the mulch with little or no seed-to-soil contact. A secondary application of mulch may be applied on top.



## BROADCAST SEEDING

A broadcast seeder consists of a hopper with a material regulating system in the bottom that feeds material either onto a spinner or directly onto the soil. This system is commonly used to spread seed, fertilizer, lime and other granular products. Some materials have difficulty getting through the regulating mechanism in some broadcast seeders. For these systems, the use of a flow-enhancing material (such as kitty litter) mixed with the seed will aid in uniformity and enable the system to handle the seed. Spread half of the seed in one direction (horizontally) and the remaining seed in the other direction (vertically). Follow by rolling or tracking the seed to achieve good seed-to-soil contact. Do not roll or track the seed if the soil is wet. Cover with a light layer of straw mulch.





## CULTIPACKING

A cultipacker is an excellent way of covering the seed with a minimum amount of soil to ensure proper seed-to-soil contact. It resembles a large rolling pin with evenly spaced ridges and dimples. The cultipacker's primary functions are to break up clods, remove excess air spaces from loose soil and smooth the soil surface. This method consists of heavy-duty smooth, spoke or crowfoot rollers that provide clod-breaking and smoothing capabilities. As with any tillage, it is important not to overwork the soil or work it when it is too wet.



## SPRAYER

Sprayers come in various sizes and styles, including common hand-held units like that shown here. These are often preferred for carefully targeted spraying of unwanted or invasive vegetation. Larger areas may be effectively sprayed using tractor- or ATV-drawn tank units.

Use of herbicides to control undesirable vegetation can be an important part of an integrated pest management (IPM) program when used according to the manufacturer's label. Prior to using any herbicide, read the label for safe handling and application information. Many herbicides are only available to licensed applicators. When these are needed, employ a licensed professional.



## STRAW MULCHING

A straw-mulch blower is used to distribute mulch over a seeded area. It consists of a slide (or chute) in which to feed the mulch, chopper blades for chopping and breaking up the mulch and a blower for spreading the mulch over large areas. Straw mulch can be spread by hand in smaller areas. Note: To minimize potential weed issues, it is important to use weed-free straw.

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- SEE PAGE 9 FOR EXPLANATION**

TOOLS AND SEEDING METHODS - *continued*

## DISCBINE MOWER

A discbine mower is a hay-harvesting machine with high-speed rotary discs that mow biomass for baling and assembles the material into a windrow.



## ROTARY MOWER

A rotary mower easily mows existing vegetation. Heavy-duty rotary mowers can be utilized as brush hogs to tame heavy grass and light brush, such as multiflora rose, honeysuckle and small tree seedlings. Heavy vegetation on under-utilized fields is difficult to mow with a discbine or sickle bar mower.

**NOTE:** Mowing during the growing season should not be necessary after the establishment year unless it is being used in lieu of herbicides to control weeds. In such cases, mowing height should be no lower than 8”.

To prevent succession of woody species, an important aspect of the maintenance program for an established meadow is an early spring mowing that is close to the ground (2”). Mowing should be done every one to three years in late winter or early spring, shortly before spring nesting season. This will leave cover and food for wildlife through the winter without disrupting the nesting of grassland birds.

In the second year, an adequate native meadow stand should have one to two plants per square foot, which will not (and should not) look like a lawn. Warm season grasses establish faster with good fertility and adequate, but not excessive, moisture. With ideal conditions, species may reach mature size in two years.



# UPLAND & MEADOW SITES



Upland sites are characterized as being dry most of the year. Soils at these sites are well drained and may consist of sandy clay, sandy loam, loam or shale. The topsoil layer may be thin and subject to drought. If yours is a sandy site, refer to the Southeastern U.S. Sites Establishment Guide, p. 38.

**Upland examples:** Naturally rocky soil that has been subject to erosion or steep road cuts.

**Meadow examples:** Abandoned farm fields, previous lawns, vacant land or roadsides.

## SITE PREPARATION

If your site was previously a lawn or crop field to which herbicides were applied, it is important that you allow the appropriate interval for the residues of those herbicides to break down prior to planting your meadow. Some herbicide residues can prevent seedling germination.

Competition from invasive or undesirable vegetation is the most limiting factor in upland meadow preparation. Prior to planting, all such vegetation must be fully controlled. Typical control strategies include repeated tilling, smothering with black plastic or herbicides.

When using the tillage strategy, a site is disc harrowed every two to four weeks for a one to two-month period. The underlying premise of this process is that the root system of perennial species will be worn out to the point of killing the species. In addition, tillage will stimulate germination of dormant weed seed which will be killed by subsequent tillage. Planting should not occur until perennial species are completely killed.

Black plastic may also be used to kill weeds. It may be laid across tilled or untilled soil and anchored down by burying the edges in soil or laying boards or bricks across the surface. This protocol should be utilized during a growing season where the intent is to fall plant in the same year or spring plant the following year.

The application of an approved herbicide, such as glyphosate (Roundup® or Rodeo®), is the most common and least time-intensive protocol for controlling existing vegetation. Herbicides are most effective on actively growing plant tissues; therefore, they are very effective on new growth in the

### CAPTIONS

1: A little bluestem meadow in North Carolina

2: A well-established meadow in northern Virginia

## INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**

## UPLAND & MEADOW SITES - *continued*



spring. Spraying should begin when growth is approximately 6” high. One to two weeks later, a follow-up application of spray may be made to address skips or persistent species. If substantial plant tissues remain on the surface following a full kill by herbicides, a close mowing, tillage or burning may be necessary to achieve good seed-to-soil contact.

**HABITAT:** Typically in full sun for at least half the day with good air circulation; generally occupied with UPL, FACU and FAC species.

**FERTILITY:** Natural fertility is usually adequate; fertilizer and lime are not needed (fertilizer often helps weeds and invasives). Check your soil pH and select species adapted to that pH.

**SEEDING METHOD:** Hand seed, broadcast seed, hydroseed or drill seed.

### MAINTENANCE

For seedings of annual wildflower mixes or annual & perennial wildflower mixes, problem weeds should be hand pulled.

For all other mixes:

### FIRST GROWING SEASON MAINTENANCE

Whenever canopy (overall vegetation) reaches a height of 18”-24”, use a brush hog mower or string trimmer to trim the meadow to a height of 8” (Note: A lawn mower is not recommended as the mower height will be too low and native seedlings will be killed). This will reduce competition by fast-growing weeds for sunlight, water and nutrients needed by slow-growing perennial natives. Mowing should cease by mid-September.

Problem weeds should be hand pulled or spot sprayed with approved herbicides (such as Roundup® or Rodeo®).

### CAPTIONS

3: Native meadow in northern Virginia

4: Color, texture and diversity evident in a native meadow

5: A native meadow in northern Virginia

## SECOND & SUBSEQUENT GROWING SEASON MAINTENANCE

Prior to new spring growth reaching a height of 2” (e.g., shortly after forsythia or redbud blooms), trim any material standing from the previous year close to the ground (approximately 2”). This will allow the soil to warm more quickly, which will stimulate the emergence and growth of native seedlings and reduce the likelihood of the meadow being invaded by shrubs.

Problem weeds should be hand pulled or spot sprayed with an approved herbicide.

## SPECIAL CIRCUMSTANCES - SECOND GROWING SEASON

If you notice a heavy infestation of ragweed or foxtail in the second growing season, trim the meadow to a height of 8”. Trimming should cease by mid-September.

See “*Disclaimer*,” p. 55

For “*Life of a Meadow*,” see p. 40

**The following mixes are used in full sun with well-drained soils and provide food and/or cover for wildlife. Meadow and wildflower mixes provide food for insects, including native pollinators:**

- ERNMX-102-1 - Pipeline Mix with Switchgrass
- ERNMX-105 - Northeastern U.S. Roadside Native Mix
- ERNMX-110 - Ernst Native Biomass Mix for Strip Mines & Natural Gas Production Sites
- ERNMX-111 - Ernst Native Habitat for Strip Mines Mix
- ERNMX-115 - Biodiverse Polyculture Mix for Biomass Production & Wildlife Habitat
- ERNMX-117 - Warm Season Grass Mix
- ERMNX-117 PLS - Warm Season Grass Mix
- ERNMX-123 - Native Upland Wildlife Forage & Cover Meadow Mix
- ERNMX-125 - Northeastern U.S. Roadside Native Mix without Grasses
- ERNMX-153 - Showy Northeast Native Wildflower & Grass Mix
- ERNMX-153-1 - Showy Northeast Native Wildflower Mix
- ERNMX-155 - Deer-Resistant Meadow Mix
- ERNMX-156 - Low-Growing Wildflower & Grass Mix
- ERNMX-166 - Plateau-Tolerant Wildflower & Grass Mix
- ERNMX-166-1 - Plateau-Tolerant Wildflower Mix
- ERNMX-167 - Annual Wildflower Mix
- ERNMX-168 - Northeast Annual & Perennial Wildflower Mix
- ERNMX-169 - Southeast Annual & Perennial Wildflower Mix
- ERNMX-170 - Annual & Perennial Wildlife Food Plot Mix
- ERNMX-171 - Multi-Purpose/Multi-Year Wildlife Food & Shelter Mix
- ERNMX-172 - Maryland Upland Mix
- ERNMX-173 - Eastern Native Habitat & CREP Mix
- ERNMX-174 - Virginia Gentleman’s Mix
- ERNMX-177 - Eastern Ecotype Native Grass Mix
- ERNMX-187 - Southeastern U.S. Roadside Native Mix

*Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.*

*Ernst Conservation Seeds has developed hundreds of mixes for these types of projects. For additional mixes, including state-specific mixes, please visit [www.ernstseed.com](http://www.ernstseed.com).*

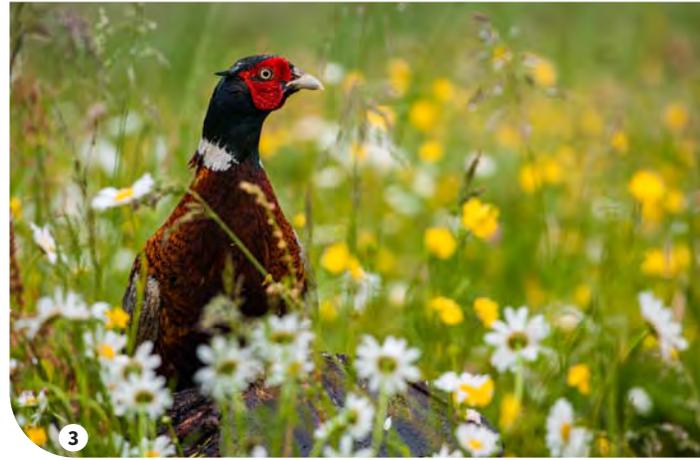
## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

-  **NORTHCENTRAL & NORTHEAST**
-  **MIDWEST**
-  **EASTERN MOUNTAINS & PIEDMONT**
-  **ATLANTIC & GULF COASTAL PLAIN**

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- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species

- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**

## WILDLIFE HABITAT &amp; FOOD PLOT SITES



Wildlife food plot sites are generally small clearings in wooded areas or farmland. Planting dates differ between annual and perennial mixes; however, most are designed for spring or fall planting.

**Examples:** Woodland openings, remote areas of large residential lots, abandoned fields or timber harvest and loading areas.

**CAPTIONS**

1: Eastern wild turkey gobbler

2: ERNMX-184 Fall Sweets Mix and ERNMX-133-1 Big Buck Mix

3: Ringneck pheasant rooster in mix of grasses and forbs

**SITE PREPARATION**

Eradicate existing invasive vegetation by having a licensed spray technician apply an approved herbicide, such as glyphosate (Rodeo®), or tilling the weeds into the soil. Hand pull or spot spray problem weeds. Perennial weeds not addressed before establishment will be difficult to remove later. Good pre-seeding weed control may require repeated tilling or spraying two applications of glyphosate at least two weeks apart. Once the weeds have been controlled, add lime or fertilizer as

recommended by soil analysis. Lime and fertilizer may be incorporated into the soil using a tiller. After amendments are incorporated, smooth out the soil to develop a good seedbed. If broadcasting the seed, run a spring-tooth harrow or ATV over the site to incorporate the seed into the soil 1/4"-1/2" deep. With adequate temperature and moisture, the seed should begin to germinate within about two weeks.

**HABITAT:** Well-drained or moderately well-drained sites in woodland openings (ideally near water sources); typically receive at least four hours of sunlight daily; UPL, FACU and FAC species may be planted, as well as plants with no indicator.

**FERTILITY:** Check your soil pH and fertility; if there is a weed problem, the addition of lime can improve the nutritional value of vegetation beneficial for wildlife.

**SEEDING METHOD:** Hand seed, broadcast seed or drill seed.

## GENERAL MAINTENANCE

A starter fertilizer (such as an 18-24-12) in the spring and fall will provide plants with essential nutrients without pushing a lot of top growth. It may be necessary to mow some mixes to a height of 4"-6" in order to help keep plants young and tender. Annual food plot mixes must be planted every year.

See "Disclaimer," p. 55

For "Life of a Meadow," see p. 40



4



5



6

The following mixes provide food for deer, turkey and other upland game birds:

- ERNMX-130 - Wildlife Food Plot Mix
- ERNMX-133 - Keystone Deer & Turkey Habitat Mix
- ERNMX-133-1 - Keystone Big Buck Mix
- ERNMX-170 - Annual & Perennial Wildlife Food Plot Mix
- ERNMX-171 - Multi-Purpose/Multi-Year Wildlife Food & Shelter Mix
- ERNMX-184 - Fall Sweets Wildlife Mix
- ERNMX-185 - Spring Greens Mix

Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.

Ernst Conservation Seeds has developed hundreds of mixes for these types of projects. For additional mixes, including state-specific mixes, please visit [www.ernstseed.com](http://www.ernstseed.com).

### CAPTIONS

- 4: Eastern wild turkey hen and poults
- 5: Whitetail buck in mixed grasses
- 6: A rutting whitetail buck

## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
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- UPL** Upland species
- NO** No occurrence
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SEE PAGE 9 FOR EXPLANATION

# POLLINATOR SITES



Pollinator meadows can be used to attract honeybees and more than 4,000 species of native pollinators in North America, including bees, butterflies, hummingbirds and even some flies.

Increased private sector and governmental attention to the plight of such pollinators as honeybees and monarch butterflies has spurred a renewed interest in developing pollinator-friendly habitat across the North American landscape. One of the highest level examples of this was the White House announcement of the National Strategy to Promote the Health of Honeybees and Other Pollinators in 2015.

**The following mixes provide food for native pollinators, as well as food and cover for songbirds and ground nesting birds, such as turkey and quail:**

ERNMX-153 - Showy Northeastern Native Wildflower & Grass Mix

ERNMX-179 - Butterfly & Hummingbird Garden Mix

XERC00102 - Xerces Mid-Atlantic Pollinator Mix

XERC00103 - Xerces Northeastern Pollinator Mix

XERC00104 - Xerces Southeast Pollinator Mix

XERC00105 - Xerces Pennsylvania Pollinator Mix

XERC00106 - Xerces Pennsylvania Pollinator Mix

*Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.*

*Ernst Conservation Seeds has developed hundreds of mixes for these types of projects. For additional mixes, including state-specific mixes, please visit [www.ernstseed.com](http://www.ernstseed.com).*

More than one-third of the world's food supply comes from plants pollinated by bees. In recent years, colony collapse disorder has caused an annual reduction of 30%-40% of honeybee populations in the United States - tripling honeybee hive rental rates. Other issues, including varroa mites, loss of habitat and off-label use of pesticides have also been attributed to declines in honeybee and native pollinator numbers.

To compensate for these declines, many fruit and vegetable growers are now planting pollinator meadows adjacent to their row crops and orchards. These buffer strips,

## CAPTIONS

1: On final approach, a honeybee works an *Tradescantia ohioensis* (Ohio Spiderwort) flower.

2: Eastern yellow swallowtail butterfly on *Liatris spicata* (Marsh Blazing Star)

3: Honeybee lighting on *Asclepias tuberosa* (Butterfly Milkweed)

THE PLIGHT OF HONEYBEES, NATIVE POLLINATORS AND THE MONARCH BUTTERFLY HAVE PLACED A RENEWED SENSE OF URGENCY ON THE DEVELOPMENT AND CONSERVATION OF HABITAT FOR THESE CRUCIAL ECOLOGICAL WORKHORSES. AS A RESULT, NUMEROUS OPPORTUNITIES EXIST FOR LANDOWNERS TO HELP ACHIEVE POLLINATOR HABITAT GOALS WHILE ENSURING THE CONTINUED PROFITABILITY OF THEIR LAND. FOLLOWING IS A RESOURCE FOR INFORMATION ON A NUMBER OF SUCH PROGRAMS.

**FEED A BEE PROGRAM (BAYER CROPSCIENCE) - [feedabee.com](http://feedabee.com)**

Feed a Bee is a major initiative to increase forage for honeybees and other pollinators, including growing 50 million flowers and providing additional forage acreage in 2015. By collaborating with organizations and individuals throughout the United States, Feed a Bee helps provide pollinators with the food they need not only to survive, but to thrive. This is particularly important as the world population is expected to grow to over 9 billion people requiring 70 percent more food by 2050. As the world's most heavily traveled livestock, bees are transported to pollinate crops where resources are challenged to sustain large bee populations.

**NATIVE POLLINATORS IN AGRICULTURE PROJECT - [agpollinators.com](http://agpollinators.com)**

In an effort to obtain an agricultural perspective on the challenges and opportunities around pollinator population declines, a pollinator protection project was initiated in 2006 by the FFA Foundation and now operates as a special project of the National Association of State Conservation Agencies. Guided by a national Steering Committee composed of agricultural and conservation leaders, the Native Pollinators in Agriculture Project examines how native pollinators can supplement the pollination services provided by managed bees, and in turn increase on-farm productivity and profitability.

**THE POLLINATOR PARTNERSHIP - [pollinator.org](http://pollinator.org)**

The Pollinator Partnership's mission is to promote the health of pollinators, critical to food and ecosystems, through conservation, education, and research. Signature initiatives include the NAPPC (North American Pollinator Protection Campaign), National Pollinator Week, Ecoregional Planting Guides, the U.S. Bee Buffer Project and the Support Highways Bettering the Economy and Environment Pollinator Protection Act (Highways BEE Act). Consider registering your meadow with Pollinator Partnership's Simply Have Areas Reserved for the Environment (S.H.A.R.E.) program. We are a part of this goal to have 1,000,000 pollinator meadows planted across the country. This free registry is an easy way to make a difference.

**USDA (NRCS AND FSA PROGRAMS) - [nrcs.usda.gov](http://nrcs.usda.gov)**

USDA provides voluntary, incentive-based conservation to landowners through local field offices in nearly every county of the nation. USDA helped landowners develop conservation plans and enrolled a record number of acres of private working lands in conservation programs, working with more than 500,000 farmers and ranchers to implement conservation practices that clean the air we breathe, conserve and clean the water we drink, prevent soil erosion and create and protect wildlife habitat. USDA support - leveraged with historic outside investments - helped support producer incomes and reward them for their good work.

**MILLION POLLINATOR GARDEN CHALLENGE - [millionpollinatorgardens.org](http://millionpollinatorgardens.org)**

The Million Pollinator Garden Challenge (MPGC) is a nationwide call to action to preserve and create gardens and landscapes that help revive the health of bees, butterflies, birds, bats and other pollinators across America. We will move millions of individuals, kids and families outdoors and make a connection between pollinators and the healthy food people eat.

**XERCES SOCIETY FOR INVERTEBRATE CONSERVATION - [xerces.org](http://xerces.org)**

The Xerces Society is a nonprofit organization that protects wildlife through the conservation of invertebrates and their habitat. Established in 1971, the Society is at the forefront of invertebrate protection worldwide, harnessing the knowledge of scientists and the enthusiasm of citizens to implement conservation programs.

as they are often referred, help increase both honeybee and native bee populations and diversity by providing food and nectar when the cash crop is not in bloom. Likewise, farmers, homeowners, corporations, public and private institutions and agencies are beginning to incorporate pollinator meadows, strips and gardens into their properties. The cumulative effect of this culture change has the potential to stem the decline of pollinators and restore them to healthy numbers.

**INDICATOR REGIONS** *(Canadian indicators would be similar to the adjacent states)*

-  NORTHCENTRAL & NORTHEAST
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-  ATLANTIC & GULF COASTAL PLAIN

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- FAC** Facultative species
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## POLLINATOR SITES - *continued*



Pollinator sites are typically composed of a variety of wildflowers, native grasses and legumes (e.g., clovers). Sites should be planted with species that will produce blooms throughout the growing season. Upland and meadow sites are generally in full sun for at least half the day and have good air circulation. But species choices should also take into account a site's unique environmental conditions, such as tolerance for moist soils or shade, if necessary. The best habitats for native pollinators are provided by plants native to the ecosystem in which the site is located. We have pre-formulated mixes to satisfy the unique needs of your site. In addition, we can also create custom mixes.

Pollinator habitat plantings provide benefits beyond attracting and supporting native pollinators. They provide foraging grounds for feral and domestic honeybees. Some of the plant species in these mixes may attract parasitoid and predator insect species that help to control orchard pests. Pollinator habitat plantings also aid in restoring ecological function to the landscape by providing food (insects and seeds) for songbirds and ground nesting birds, such as turkey and quail.

Ernst Conservation Seeds is the largest producer and distributor of native wildflower seeds in eastern North America. We produce seeds from Canada to Florida and work with additional suppliers to increase the breadth of service area we can supply.

### CAPTIONS

4: Bumblebee working a tall white *Penstemon digitalis* (Tall White Beardtongue) flower.

5: Monarch butterfly on *Aster novae-angliae* (New England Aster).

6: Bumblebees love *Baptisia australis* (Blue False Indigo).

7: A bumblebee covered in the pollen of *Pycnanthemum incanum* (Hoary Mountainmint).

8: A highway median strip in Virginia bursts with color and provides habitat for pollinators.

9 Pollinator-friendly landscaping adorns Bayer CropScience's North American Bee Care Center in Raleigh, North Carolina.

10: A monarch caterpillar fattens up on the leaves of *Asclepias incarnata* (Swamp Milkweed).





Riparian sites are usually adjacent to rivers and waterways with soils often containing clay, high amounts of organic matter and/or saturated sand.

**Examples:** River and streambanks or damp floodplains of rivers and streams.

**SITE PREPARATION**

Eradicate existing invasive vegetation by having a licensed spray technician apply an approved herbicide, such as glyphosate (Rodeo®), triclopyr (Garlon® 3A) or a similar aquatic herbicide formulation, to control undesirable vegetation, such as multiflora rose, honeysuckle and woody species. CAUTION: Some persistent species, such as purple loosestrife, phragmites or reed canarygrass may need multiple applications of glyphosate or triclopyr. Perennial weeds not addressed before establishment will be difficult to remove later. Before seeding, excess dead vegetation should be turned under or burned if conditions permit. Newly constructed riparian sites should be seeded as soon after construction as possible.

**HABITAT:** Varies from partial shade to full sun; subject to flooding; generally occupied with FACU, FAC and FACW species.

**FERTILITY:** Due to the potential for water contamination, lime and fertilizer are not recommended; however, we do recommend the addition of organic matter (straw, compost, mulch, leaf litter, etc.) when topsoil has been depleted or removed. Check your soil pH and select species adapted to that pH.

**SEEDING METHOD:** Hand seed, broadcast seed or hydroseed.

**FIRST GROWING SEASON MAINTENANCE**

Whenever canopy (overall vegetation) reaches a height of 18”-24”, use a brush hog mower or string trimmer to trim the meadow to a height of 8”. (Note: A lawn mower is not recommended as the mower height will be too low and native seedlings will be killed). This will reduce competition by fast-growing weeds for sunlight, water and nutrients needed by slow-growing perennial natives. If bioengineering materials are used on the site, mowing should be above the new growth of these materials. Mowing should cease by mid-September.

Problem weeds should be hand pulled or spot sprayed with an approved herbicide formulation (such as Rodeo® or Garlon®3A).

**CAPTIONS**

- 1: Riparian area along a stream in North Carolina
- 2: *Panicum rigidulum* (Redtop Panicgrass) along a streambank

**INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

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- SEE PAGE 9 FOR EXPLANATION**

RIPARIAN SITES - *continued*



## SECOND & SUBSEQUENT GROWING SEASON MAINTENANCE

Prior to new spring growth reaching a height of 2” (e.g., shortly after forsythia or redbud blooms), trim any material standing from the previous year close to the ground (approximately 2”). This will allow the soil to warm more quickly, which will stimulate the emergence and growth of native seedlings and reduce the likelihood of the meadow being invaded by shrubs.

If bioengineering materials were used on the site or seed of shrubs/trees were part of the mix, the site should not be trimmed after the establishment year.

Problem weeds should be hand pulled or spot sprayed with an approved herbicide.

## SPECIAL CIRCUMSTANCES - SECOND GROWING SEASON

If you notice a heavy infestation of ragweed or foxtail in the second growing season, trim the meadow to a height of 8”. Trimming should cease by mid-September.

## GENERAL MAINTENANCE

Grassy weeds or persistent perennials can re-establish in this type of soil. Monitor and control weeds by hand pulling or spot spraying.

See “*Disclaimer*,” p. 55

For “*Life of a Meadow*,” see p. 40

### CAPTIONS

3: North Carolina stream corridor

4: A well-established streambank restoration site

The following mixes are good for vegetating riparian corridors or floodplains. The species in these mixes provide food and/or cover for insects, birds and other animals:

ERNMX-154 - Floodplain Mix  
ERNMX-178 - Riparian Buffer Mix

*Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.*

*Ernst Conservation Seeds has developed hundreds of mixes for these types of projects. For additional mixes, including state-specific mixes, please visit [www.ernstseed.com](http://www.ernstseed.com).*

# DISTURBED SITES & STEEP SLOPES

Disturbed sites & steep slopes have various soil types and conditions.

**Examples:** Landfills, surface mines, road cuts or construction sites.

## SITE PREPARATION

Eradicate existing invasive vegetation by having a licensed spray technician apply an approved herbicide. Perennial weeds not addressed before establishment will be difficult to remove later. Whenever possible, regrade the site to reduce slope and build diversions which will reduce erosion and minimize seed loss.

For areas with slope greater than 3:1, final tracking should be perpendicular to the slope as the tracks will help reduce erosion, retain seed and seed moisture.

**HABITAT:** Various soils resulting from construction leaving exposed clay, sand and rock outcropping without topsoil; generally occupied with UPL, FACU and FAC species.

**FERTILITY:** Generally low in fertility; therefore, adding topsoil or organic matter (compost) can be very beneficial. Check your soil pH and select species adapted to that pH. Add lime and fertilizer as recommended by soil analysis. Incorporate amendments into the soil in a manner, such as tracking, that will leave the soil rough and minimize soil erosion and rapid runoff. Fertilizing is not recommended if there is a weed problem.

**SEEDING METHOD:** Broadcast seed (by hand or machine), drill seed or hydroseed. For areas with slope less than 3:1, cover the seed 1/8"-1/4" deep by dragging with a spring-tooth harrow or firmly press the seed into the soil using a cultipacker, lawn roller or ATV.

Mulching with straw, hydromulch or straw/coconut fiber mats is recommended on these sites to protect the seed from drying out or washing away.

## FIRST GROWING SEASON MAINTENANCE

When feasible, post-planting maintenance (if the ground is not too rough or steep) will provide improved results. Whenever canopy (overall vegetation) reaches a height of 18"-24", use a brush hog mower or string trimmer to trim the meadow to a height of 8" (Note: A lawn mower is not recommended as the mower height will be too low and native seedlings will be killed). This will reduce competition by fast-growing weeds for sunlight, water and nutrients needed by slow-growing perennial natives. If bioengineering materials are used on the site, mowing should be above the new growth of these materials. Mowing should cease by mid-September.



### CAPTIONS

1: Seedlings poke through the straw mat of a recently seeded disturbed site.

2: A steep slope mix consisting primarily of native grasses

## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
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- NO** No occurrence
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SEE PAGE 9 FOR EXPLANATION

## DISTURBED SITES & STEEP SLOPES - *continued*



Problem weeds should be hand pulled or spot sprayed with an approved herbicide (such as Roundup®).

### SECOND & SUBSEQUENT GROWING SEASON MAINTENANCE

For sites that are not too rough or steep, prior to new spring growth reaching a height of 2" (i.e., shortly after forsythia or redbud blooms), trim any material standing from the previous year close to the ground (approximately 2"). This will allow the soil to warm more quickly, which will stimulate the emergence and growth of native seedlings and reduce the likelihood of the meadow being invaded by shrubs.



If bioengineering materials were used on the site or seed of shrubs/trees were part of the mix, the site should not be trimmed after the establishment year.

Problem weeds should be hand pulled or spot sprayed.

### SPECIAL CIRCUMSTANCES - SECOND GROWING SEASON

If you notice a heavy infestation of ragweed or foxtail in the second growing season, trim the meadow to a height of 8". Trimming should cease by mid-September. However, vegetation allowed to grow without mowing provides more protection for wildlife and aids in erosion control.

See "Disclaimer," p. 55

For "Life of a Meadow," see p. 40



The following mixes are good for controlling erosion and provide food and/or cover for wildlife.

- ERNMX-101 - Non-Native Ernst Best Strip Mine & Gas Production Mix
- ERNMX-102-1 - Pipeline Mix with Switchgrass
- ERNMX-103 - Non-Native Good Value Mine Mix
- ERNMX-104 - Quick Erosion Control Cover Mix
- ERNMX-109 - Crownvetch Seeding Mix (Naturalized)
- ERNMX-110 - Ernst Native Biomass Mix for Strip Mines & Natural Gas Production Sites
- ERNMX-111 - Ernst Native Habitat Mix for Strip Mines
- ERNMX-181 - Native Steep Slope Mix with Annual Ryegrass
- ERNMX-181-1 - Native Steep Slope Mix with Grain Oats
- ERNMX-181-2 - Native Steep Slope Mix with Grain Rye
- ERNMX-194 - Flight 93 Memorial Steep Slope Mix

*Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.*

*Ernst Conservation Seeds has developed hundreds of mixes for these types of projects. For additional mixes, including state-specific mixes, please visit [www.ernstseed.com](http://www.ernstseed.com).*

#### CAPTIONS

3: Germination of a steep slope seed mix during the first growing season

4: A diverse native steep slope mix shows qualities of form and function.

5: A close-up view shows the diversity of species found in many mixes.

# UTILITY RIGHTS-OF-WAY & OIL AND GAS DRILLING SITES



Many progressive utility companies and oil and gas operators recognize a unique opportunity to go a step beyond basic reclamation standards and adopt a deeper commitment to informed, proactive and responsible reclamation practices. This new way of thinking promotes the use of native species indigenous to the area being restored. It's an opportunity to affirm the industry's commitment to environmental stewardship.

In the years after disturbance, affected areas can become biodiverse ecosystems with improved ecological function, greater wildlife populations, less erosion and improved water and soil quality.

A multiple-mile stretch of pipeline in the Marcellus and Utica shale plays, for instance, might pass through wetlands, over steep mountain slopes, across rivers and through agricultural areas and state game lands. These areas should be reclaimed with vegetation that best matches the intended use of the land, the biodiversity that existed before disturbance and with practices that best address issues, such as erosion control, habitat fragmentation and other environmental concerns.

We can design a biodiverse native seed mix to restore your environmental impact and help ensure regulatory compliance. We routinely work with environmental departments, consulting engineers and contractors seeding a project.



## SITE PREPARATION

Overall site conditions and restored areas may consist of rock fill, little to no topsoil or heavily compacted areas. These sites generally tend to be low in fertility and can be beneficially affected by adding a layer of topsoil or organic matter (compost). Check the soil pH and add the correct amount of lime as recommended by soil analysis. Once the site is regraded, eradicate any invasive vegetation that may have re-established on the site, as it is easier to control unwanted weed infestations before the seeding is complete. Perennial weeds not addressed before establishment will be difficult to remove later.

### CAPTIONS

- 1: The perimeter of a well pad now serves as habitat for pollinators, song birds and other wildlife.
- 2: A utility right-of-way exhibits characteristics of a diverse early successional habitat.
- 3: A pair of whitetail deer fawns finds shelter on the fringe of a utility site reclaimed with native grasses and forbs.

## INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**

## CAPTIONS

- 4: Pipeline right-of-way seeded with traditional grass seed mix
- 5: Pipeline right-of-way seeded with a diverse mix of native grasses, forbs and legumes
- 6: Reclaimed sites utilizing diverse native mixes better replicate the meadows historically found in their area
- 7: A closer look at the diversity of species found in this native mix



## SEEDING METHODS

Due to the wide range of areas impacted by these projects, any seeding method may be used. Once the seed has been planted, drag with a light harrow, cultipacker or track it in 1/4"-1/2" deep to ensure good seed-to-soil contact. Mulching with straw, hydromulch or straw/coconut fiber mats is recommended to protect the seed from drying out or washing away.

Follow erosion control best management practices that fit the situation. With adequate temperature and moisture, the seed should start to germinate within about three weeks.

## FIRST YEAR MAINTENANCE

Due to the varying terrains that these projects cover, assess the site and use the appropriate maintenance schedule. Mowing to a height of 4"-6" or spot spraying competitive invasive weeds should follow seeding.

See *"Disclaimer,"* p. 55

For *"Life of a Meadow,"* see p. 40

Due to the diverse range of site types that most utility transmission lines and oil & gas pipelines traverse, we recommend reviewing the seed mixes found in the accompanying pages of this catalog. Your sales representative will also be able to assist you in identifying the most appropriate seed mix for your project and site type.



# WET MEADOW & WETLAND SITES

Wet meadow & wetland sites have soils made up of clay and high organic matter, with high water tables or impervious layers that prevent drainage. They are wet most of the time.

**Wet Meadow examples:** Roadside ditches, retention basins that catch run-off water (see p. 35), pond areas or wetland edges.

**Wetland examples:** Newly created wetlands and wetland restoration sites, retention basins with wetland functions, floodplains, pond edges and open water or wet bioremediation sites.

## SITE PREPARATION

Eradicate existing invasive vegetation by having a licensed spray technician apply an approved herbicide, such as glyphosate (Rodeo®), triclopyr (Garlon® 3A) or other aquatic herbicide formulation, to control undesirable vegetation, such as multiflora rose, honeysuckle and woody species. CAUTION: Some persistent species, such as purple loosestrife, phragmites or reed canarygrass, may need multiple applications of glyphosate or triclopyr. Perennial weeds not addressed before establishment will be more difficult to remove later. The soil is often too wet to till. Newly constructed wetlands, retention basins and wet construction sites should be seeded as soon after construction as possible. Leaving the surface rough by creating mounds and kettles for an undulating microtopography can be very beneficial in obligate wetlands.

**HABITAT:** Varies from partial shade to full sun; requires wet or saturated soil, standing water or a high water table; generally occupied with OBL, FACW and FAC species.

**FERTILITY:** Due to the potential for water contamination, lime and fertilizer are not recommended; however, we do recommend the addition of organic matter (compost) when topsoil has been depleted or removed. Check your soil pH and select species adapted to that pH.

**SEEDING METHOD:** Hand seed, broadcast seed, hydroseed or drill seed when the water table is drawn down. It is not practical to seed any wetland when the water is more than 2” deep or where severe flooding is likely to occur before germination. The same caution applies to mulching. Natural seed banks (seeds in wetland soils) often establish part of the vegetative cover.

## FIRST GROWING SEASON MAINTENANCE

When feasible (the ground isn’t too slippery or mucky to safely walk), post-planting maintenance will provide the



### CAPTIONS

- 1: Wetland area with a rich diversity of native vegetation
- 2: Wet meadow punctuated with *Eupatorium perfoliatum* (Boneset), *Eupatorium fistulosum* (Joe Pye Weed) and *Vernonia gigantea* (Giant Ironweed).
- 3: Native wetland plants make this western Pennsylvania pond a diverse wildlife habitat.

## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
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- FAC** Facultative species
- FACU** Facultative upland species

- UPL** Upland species
- NO** No occurrence
- NI** No indicator

SEE PAGE 9 FOR EXPLANATION

## WET MEADOW & WETLAND SITES - *continued*



best results for wet meadows and wetlands. Whenever canopy (overall vegetation) reaches a height of 18”-24”, use a string trimmer to trim the meadow to a height of 8”. This will reduce competition by fast-growing weeds for sunlight and nutrients needed by slow-growing perennial natives. Mowing should cease by mid-September.

Problem weeds should be hand pulled or spot sprayed with an approved aquatic herbicide (such as Rodeo® or Garlon® 3A).

### SECOND & SUBSEQUENT GROWING SEASON MAINTENANCE

Problem weeds, such as phragmites, reed canarygrass and purple loosestrife, should be hand pulled or spot sprayed with an approved aquatic herbicide (such as Rodeo® or Garlon® 3A).

**See “Disclaimer,” p. 55**

**For “Life of a Meadow,” see p. 40**

**The following mixes are good for vegetating disturbed or man-made wetlands. The species in these mixes provide food and/or cover for insects, birds and mammals:**

- ERNMX-120 - OBL-FACW Perennial Food & Cover Wetland Mix
- ERNMX-122 - FACW Meadow Mix
- ERNMX-128 - Seasonally Flooded Wildlife Food Mix
- ERNMX-131 - OBL Wetland Mix
- ERNMX-137 - Specialized Wetland Mix for Shaded OBL-FACW Areas
- ERNMX-138 - Wildlife Food & Shelter Mix
- ERNMX-175 - Waterfowl Buffet Mix for Wetland Enhancement
- ERNMX-176 - Passive Acid Mine OBL Wetland Mix
- ERNMX-193 - Flight 93 Memorial Wet Meadow Mix

*Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.*

*Ernst Conservation Seeds has developed hundreds of mixes for these types of projects. For additional mixes, including state-specific mixes, please visit [www.ernstseed.com](http://www.ernstseed.com).*

#### CAPTIONS

4: North Carolina wet meadow with *Panicum anceps* (Beaked Panicgrass) and *Panicum rigidulum* (Redtop Panicgrass)

5: Wet meadow in Pennsylvania framed by deciduous trees along its edge

# WOODLAND OPENINGS, PARTIALLY SHADED SITES & SHRUBBY SITES ASSOCIATED WITH BIOENGINEERING



## SITE PREPARATION

These sites generally involve working around trees and shrubs while minimizing damage to trunks and roots. Undesirable vegetation must be controlled by tilling or direct spraying with glyphosate. Invasive weeds not addressed before establishment will be difficult to remove later. The soil needs to be loosened in order to establish seed-to-soil contact and dense leaf litter should be broken up. This can be accomplished with a rototiller. Seedlings can emerge from light leaf litter if planted at the proper depth. Light mulch or hydromulch can protect the seeds and soil until germination. Seeding and mulching around bioengineering material should occur immediately after installation. If installation cannot occur immediately after grading, temporary seeding and mulching are recommended.

**HABITAT:** Typically in moderate shade; many native species are adapted to moderate shade and the protective habitat around trees; shade tolerant native grass species, such as *Agrostis perennans* (Autumn Bentgrass), *Chasmanthium laxum* (Slender Woodoats), *Cinna arundinacea* (Wood Reedgrass), *Elymus hystrix* (Bottlebrush Grass), *Elymus riparius* (Riverbank Wildrye), *Elymus virginicus* (Virginia Wildrye) and *Panicum clandestinum* (Deertongue), provide early protection for the emerging herbaceous species.

**FERTILITY:** The addition of organic matter (compost) is most important. Check your soil pH and select species adapted to that pH.

**SEEDING METHOD:** Hand seed, broadcast seed or hydroseed. Use a garden rake, drag or roll the surface to incorporate the seed into the soil 1/4"-1/2" deep. A seed drill can be used when sufficient room exists for operation.

### CAPTIONS

1: *Cinna arundinacea* (Wood Reedgrass) provides excellent wildlife cover and forage opportunities in forested wetlands.

## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

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- SEE PAGE 9 FOR EXPLANATION**

WOODLAND OPENINGS, PARTIALLY SHADED SITES & SHRUBBY SITES ASSOCIATED WITH BIOENGINEERING - *continued*



2

## FIRST GROWING SEASON MAINTENANCE

Whenever canopy (overall vegetation) reaches a height of 18”-24”, use a brush hog mower or string trimmer to trim the meadow to a height of 8” (Note: A lawn mower is not recommended as the mower height will be too low and native seedlings will be killed). This will reduce competition by fast-growing weeds for sunlight, water and nutrients needed by slow-growing perennial natives. If bioengineering materials are used on the site, mowing should be above the new growth of these materials. Mowing should cease by mid-September.

Problem weeds should be hand pulled or spot sprayed with an approved herbicide (such as Roundup®).



3

## SECOND & SUBSEQUENT GROWING SEASON MAINTENANCE

Prior to new spring growth reaching a height of 2” (i.e., shortly after forsythia or redbud blooms), trim any material standing from the previous year close to the ground (approximately 2”). This will allow the soil to warm more quickly which will stimulate the emergence and growth of herbaceous native plants, as well as help reduce woody undergrowth invasion. In certain ecosystems, controlled burning by certified professionals can achieve the same results.

If bioengineering materials were used on the site or seed of shrubs/trees were part of the mix, the site should not be trimmed after the establishment year.

Problem weeds should be hand pulled or spot sprayed.



4

## SPECIAL CIRCUMSTANCES - SECOND GROWING SEASON

If you notice a heavy infestation of ragweed or foxtail in the second growing season, trim the meadow to a height of 8”. Trimming should cease by mid-September.

See “*Disclaimer*,” p. 55

For “*Life of a Meadow*,” see p. 40

### CAPTIONS

2: *Carex pensylvanica* (Pennsylvania Sedge) tolerates sandy soils and makes ideal ground cover in mature forests, such as this stand in New York’s Albany Pine Bush.

3: Blooming from July through October, *Aster macrophyllus* (Bigleaf Aster) adds high pollinator value to forest edges and buffer areas.

4: *Chasmanthium laxum* (Slender Woodoats) is a decorative native grass well suited for restoration projects in floodplains and shady or partially sunny sites.

The following mixes provide food and/or cover for wildlife as well as stabilization of soils in partially shaded areas:

- ERNMX-132 - Right-of-Way Woods Mix
- ERNMX-132-1 - Native Right-of-Way Woods Mix with Annual Ryegrass
- ERNMX-140 - Partially Shaded Area Roadside Mix

Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.

Ernst Conservation Seeds has developed hundreds of mixes for these types of projects. For additional mixes, including state-specific mixes, please visit [www.ernstseed.com](http://www.ernstseed.com).

# STORMWATER MANAGEMENT FACILITY SITES



Stormwater management facility sites are generally a best management practice integrated throughout land development projects, which provide for a volume of water storage, infiltration and evaporation that mimics the natural rate of runoff or groundwater recharge. The sites (i.e., size, location and depth) must be designed and constructed according to all applicable ordinances and under the direction of a qualified design professional. In addition to planting trees and shrubs, seeding with native plant species is an economical way of vegetating stormwater management sites. Erosion control fabric, mulch or hydromulch is necessary to control erosion both during and after construction.

*Examples:* Detention basins - temporarily impounds run-off water, allowing for release at controlled rates; retention basins - stormwater management facilities with permanent impoundment or pool for improving water quality; or, bioretention basins and rain gardens - dynamic, living microbiological systems that enhance retention, infiltration and evaporation of run-off water while remaining attractive to wildlife.

## PLANT SELECTION

In all stormwater management facilities, plants prevent erosion and slow water movement, hold or convert pollutants, enhance infiltration and evapotranspiration and encourage wildlife. Plant species or mixes can be selected that meet the critical objectives and extreme conditions that plants must have to survive. Native grasses produce fibrous root systems that tolerate fast-moving water. Woody and herbaceous species add aesthetics, provide wildlife food and habitat and assist with evapotranspiration while preventing erosion.

### CAPTIONS

1: Retention basin in its second growing season utilizing ERNMX-126 Retention Basin Floor Mix - Low Maintenance

2: Closer view of retention basin species in second growing season

## INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

- NORTHCENTRAL & NORTHEAST
- MIDWEST
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- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species

- UPL** Upland species
- NO** No occurrence
- NI** No indicator

SEE PAGE 9 FOR EXPLANATION

## STORMWATER MANAGEMENT SITES - *continued*



When selecting a seed mix, choose one appropriate for the site's hydrology (moisture status) to avoid stand failure: If the site is chronically moist with long periods of inundation, a retention basin FACW meadow or OBL wetland mix is appropriate; if chronically moist with occasional inundation (immediately after a rainfall) and periodic drying out, a FACW meadow or riparian floodplain mix is appropriate; or, if typically dry except for a 12-72-hour period after a rainfall, a detention basin or rain garden mix is appropriate.

### SITE PREPARATION

Invasive species, particularly those that will adapt to wet conditions, should be removed or sprayed with an approved herbicide before becoming incorporated into the site. Perennial weeds not addressed before establishment will be difficult to remove later. Normal vegetation can be worked into the topsoil, which should be stockpiled until the final grade has been established.



With the specifications and dimensions, on-site construction of the berm and outlets must be executed carefully to maintain structural integrity. The infiltration and plant growth areas should be loose and friable, high in organic matter and completed without compaction from heavy equipment. By using the "dig and drop" method<sup>1</sup>, one can use an excavator to dig and drop each area of the bottom soil in a loose manner. At this point, lime, composted leaves and/or grass clippings can be incorporated. The excavation machine does not move over the finished

surface, thus avoiding unnecessary compaction. Native vegetation can be planted or seeded over this uneven absorbent surface.

### CAPTIONS

3: A flourishing rain garden on the Crawford County Fairgrounds in Meadville, Pennsylvania

4: Native grasses and herbaceous species managing stormwater runoff from a large parking lot

5: Well established detention basin meadow

### SEEDING AND PLANTING METHODS

Seeding and planting should begin immediately upon completion of the structure while the soil is still friable and before invasive weeds emerge. Plan seeding and planting before the basin is flooded or allow the basin to drain to a few inches before seeding. Broadcast seed evenly over each unit by hand seeding or hydroseeding. Seeding rates are generally low (1/2 lb per 1,000 sq ft). A bulking agent (such as kitty litter) may be used to create a mix of 10 lb per 1,000 sq ft (i.e., 9-1/2 lb of bulking agent mixed with 1/2 lb of seed), which can be broadcast seeded evenly over the area. Oats or rye can provide temporary vegetation to protect the soil until permanent vegetation can be established. The use of such native species as *Elymus virginicus* (Virginia Wildrye) can create an intermediate cover that succeeds in long-term native vegetation. Straw mulch or straw coconut mats

are frequently used to control erosion and protect emerging seedlings from extreme temperatures and drying out. Mulch should be sparse in order to allow sunlight to reach the ground. If the site is a retention basin, refer to the Wet Meadow & Wetland Sites Establishment Guide, p. 31.

Transplanted seedlings and shrubs may need temporary water until they become well rooted. Irrigating seeded areas is beneficial until seedlings become established.

## FIRST GROWING SEASON MAINTENANCE

Whenever canopy (overall vegetation) reaches a height of 18"-24", use a brush hog mower or string trimmer to trim the meadow to a height of 8" (Note: A lawn mower is not recommended as the mower height will be too low and native seedlings will be killed). This will reduce competition by fast-growing weeds for sunlight, water and nutrients needed by slow-growing perennial natives. If bioengineering or containerized woody materials are used on the site, mowing should be above the new growth of these materials. Mowing should cease by mid-September.

Problem weeds should be hand pulled or spot sprayed with an approved herbicide (such as Rodeo®).

## SECOND & SUBSEQUENT GROWING SEASON MAINTENANCE

Prior to new spring growth reaching a height of 2" (e.g., shortly after forsythia or redbud blooms), trim any material standing from the previous year close to the ground (approximately 2"). This will allow the soil to warm more quickly, which will stimulate the emergence and growth of native seedlings. It will also reduce the likelihood of the meadow being invaded by shrubs.

If bioengineering or containerized woody materials were used on the site or seed of shrubs/trees were part of the mix, the site should not be trimmed after the establishment year.

Problem weeds should be hand pulled or spot-sprayed.

## SPECIAL CIRCUMSTANCES - SECOND GROWING SEASON

If you notice a heavy infestation of ragweed or foxtail in the second growing season, trim the meadow to a height of 8". If bioengineering or containerized woody materials were used, trimming should be above or around new growth of the plants. Trimming should cease after mid-September.

## GENERAL MAINTENANCE

In addition to structural maintenance, siltation needs to be removed as needed. Close mowing or extensive chemical use is not conducive to water quality improvement and wildlife habitat.

See "Disclaimer," p. 55

For "Life of a Meadow," see p. 40

### The following mixes are used to address stormwater:

- ERNMX-126 - Retention Basin Floor Mix - Low Maintenance
- ERNMX-127 - Retention Basin Wildlife Mix
- ERNMX-154 - Floodplain Mix
- ERNMX-180 - Rain Garden Mix
- ERNMX-180-1 - Rain Garden Grass Mix
- ERNMX-180-2 - Southeast Rain Garden Mix
- ERNMX-183 - Native Detention Area Mix

*Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.*

*Ernst Conservation Seeds has developed hundreds of mixes for these types of projects. For additional mixes, including state-specific mixes, please visit [www.ernstseed.com](http://www.ernstseed.com).*

<sup>1</sup>Basin Basics, "Dig and Drop - Not Rock & Roll", New Jersey Natural Resources Conservation Program, Ocean County Soil Conservation District ([www.ocscd.org](http://www.ocscd.org)).

## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

-  NORTHCENTRAL & NORTHEAST
-  MIDWEST
-  EASTERN MOUNTAINS & PIEDMONT
-  ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
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- SEE PAGE 9 FOR EXPLANATION**

## SOUTHEASTERN U.S. SITES



These sites include regions within the Carolinas, southern Virginia, Georgia and Florida. Sites in the Southeast typically have sandy or clay-rich soils subject to drought. These characteristics necessitate careful attention to timing and preparation.

*Examples:* Coastal Plain soils, Piedmont and sandy soils or mountain areas (refer to the Upland & Meadow Sites Establishment Guide, p. 17).

**SITE PREPARATION**

If your site was previously a lawn or crop field to which herbicides were applied, it is important that you allow the appropriate interval for the residues of those herbicides to break down prior to planting, as some herbicide residues can prevent seedling germination.

Competition from invasive or undesirable vegetation is the most limiting factor in upland meadow preparation. Prior to planting, all such vegetation must be fully controlled. Typical control strategies include repeated tilling, smothering with black plastic or multiple herbicide applications.

When using the tillage strategy, a site is disc harrowed every two to four weeks for a one to two-month period. The underlying premise of this process is that the root system of perennial species

will be worn out to the point of killing the species. In addition, tillage will stimulate germination of dormant weed seed which will be killed by subsequent tillage. Planting should not occur until perennial species are fully killed.

Black plastic may also be used to kill weeds. It may be laid across tilled or untilled soil and anchored down by burying the edges in soil or laying boards or bricks across the surface. This protocol should be utilized during a growing season where the intent is to fall plant in the same year or spring plant the following year.

**CAPTIONS**

1: *Sorghastrum nutans* (Indiangrass) is a highly versatile warm season grass, useful as a forage for livestock, attractive in landscapes and provides habitat for birds, butterflies and other wildlife.

2: Common southern species, *Muhlenbergia capillaris* (Hairawn Muhly) is a decorative grass used in meadows, along roadways and woodland margins.

The application of an approved herbicide, such as glyphosate (Roundup® or Rodeo®), is the most common and least time-intensive protocol for controlling existing vegetation. Herbicides are most effective on actively growing plant tissues; therefore, they are very effective on new growth in the spring. Spraying should begin when growth is approximately 6" high. One to two weeks later, a follow-up application of spray may be made to address skips or persistent species. If substantial plant tissues remain on the surface following a full kill by herbicides, a close mowing, tillage or burning may be necessary to achieve good seed-to-soil contact.

To achieve full control or prevent re-infestation of some weed species, the use of an appropriate selective herbicide may be necessary in conjunction with a seed mix tolerant of that herbicide.

**Sandy Soils**

Sandy soils behave differently under cultivation than those containing clays. It is essential to plant seed 1/2" deep into a firm seedbed with a seed drill if possible (Eastern Gamagrass should be planted 1" deep). Truax and other similar drills can accommodate a variety of seeds and have proven to

be effective in the Southeast. High sand content in the soil makes broadcasting seed less effective due to poor seed-to-soil contact. Seedbeds should be firmed to where one does not sink past the sole of his shoe when walking the prepared site. Soil amendments may be added as necessary to maintain proper levels of organic matter and achieve a pH of at least 6.0.

## Clay-Rich Soils

Without topsoil, soils containing high clay levels can be as hard as brick and pose a formidable challenge to successful cultivation. These soils are extremely low in organic matter which allows the small clay particles to settle and become compacted after a rain event. This soil is often iron rich, leading to a distinctive red color. To prevent the clay from hardening after a rain to the point where seedlings cannot emerge, increase organic matter to at least 1% by incorporating well-decomposed organic matter or compost. It must be worked into the top-most soil prior to planting using a tiller, harrow, disc or similar implement. Cultivating the top 6"-8" of soil will aid in root development of emergent seedlings and allow some percolation of rainwater that would otherwise run off the surface with little to no infiltration, most likely carrying the seed away with it. These initial preparations are critical to the successful establishment of native plants in this challenging soil. Since soil compaction is minimized, drilling seed 1/4"-1/2" deep is the preferred method of planting. Even with the addition of organic matter, this clay-rich soil will compact easily; therefore, operating heavy equipment over the planted site should be avoided.

**HABITAT:** Southeastern sites have a longer growing season; therefore, plants native or adapted to the region should be selected; planting from November to March is ideal when possible, as temperature is adequate and rain events are frequent; if irrigation is available, planting can continue into the later months of spring and early summer.

**FERTILITY:** With the exception of organic matter, natural fertility is generally adequate. Check your soil pH and, if necessary, add lime to achieve a pH of at least 6.0.

**SEEDING METHOD:** Drill seeding is recommended; however, broadcast seeding is an alternative preceded by rolling or tracking.

## GENERAL MAINTENANCE

Refer to Upland & Meadow Sites maintenance, p. 17.

When spot spraying, begin with lower than recommended concentrations of herbicides for weed control to avoid burning a valued crop when working in soils with low organic and high sand levels. The chemical breakdown of many herbicides is achieved via soil microbes that generally feed off organic material. With less organic material available in the soil, there will be a smaller population of microbes that may result in longer periods of exposure to the active ingredients in herbicides.

See "Disclaimer," p. 55

For "Life of a Meadow," see p. 40



The following mixes are used in full sun with well-drained soils and provide food and/or cover for wildlife. Meadow and wildflower mixes provide food for insects, including native pollinators:

- ERNMX-169 - Southeast Annual & Perennial Wildflower Mix
- ERNMX-187 - Southeastern U.S. Roadside Native Mix

Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.

Ernst Conservation Seeds has developed hundreds of mixes for these types of projects. For additional mixes, including state-specific mixes, please visit [www.ernstseed.com](http://www.ernstseed.com).

### CAPTIONS

3: A stand of *Monarda punctata* (Dotted Mint) will draw a myriad of pollinators including the endangered Karner Blue Butterfly.

4: This southern meadow features a combination of *Andropogon* (Bluestem) species.

## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
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SEE PAGE 9 FOR EXPLANATION



Ernst Conservation Seeds' crop specialists are frequently asked such questions as: What should I use for a cover crop? When will my meadow mix germinate? How can I tell if I have a successful seedling stand? How many years will it take until the species in my mix bloom? How long will my meadow last? Why did my meadow fail? In the pages that follow, we hope to answer these questions.

### **What is the appropriate cover crop for my meadow?**

We recommend the following cover crops and seeding rates:

- Grain Oats: 30 lb per acre, planted January-August
- Grain Rye: 30 lb per acre, planted August-December (planted year-round on moist sites)
- Annual Rye: 10-12 lb per acre (1/4 lb per 1,000 sq ft) (planted year-round on dry sites)
- Brown Top Millet: 10 lb per acre, planted May-September (areas south of the Mason-Dixon Line)
- Japanese Millet: 10 lb per acre, planted May-September (wet meadows)

These seeding rates are based on our experience with native meadows and our desire to establish strong, individual native plants. Planting cover crops that are too aggressive or thick diminishes the long-term viability of the perennial meadow plants. We have concluded that annual small grains, such as oats and rye, are the best cover crops or companion crops to plant with native seedlings when there is a need. Grain cover crops can reduce competition from aggressive weeds because they grow quickly and also reduce the potential for erosion by providing quick cover. We typically do not recommend annual ryegrass as it is too aggressive and can be persistent due to volunteer seedlings.

#### **CAPTIONS**

1: A meadow mix being planted with a Truax no-till drill.

## EXPECTATIONS OF YOUR NATIVE SPECIES

**Germination and Growth** (all of the following assume adequate light, appropriate moisture and good seed-to-soil contact):

In general, annual species have less dormancy than biennials and biennials have less than perennials. This dormancy is nature's hedge against unfavorable conditions during a plant's life cycle. Unfavorable conditions could be, but are not limited to, late-spring frost or drought. Dormant seeds are in reserve to germinate when nature calls them "out of reserve."

### ANNUALS -

Most species will germinate, flower and set seed by the end of the first full growing season. Germination of an individual species is likely to be high.

### BIENNIALS -

Most species will germinate, with some plants within a species population flowering and setting seed in the first full growing season. The bulk of the plants will flower and set seed in the second growing season. Germination of an individual species is likely to be lower than annuals due to the presence of seed dormancy.

### PERENNIALS -

1. Warm Season Grasses: Germination will occur in spring when moisture conditions are appropriate and soil temperatures at a 3" depth exceed 55° F (12° C). Best germination occurs when soil temperatures are much higher.

Most of these species do not require cold, wet stratification to produce an adequate stand. Two exceptions are *Tripsacum dactyloides* (Eastern Gamagrass), which needs 14-60 days of stratification, and *Chasmanthium latifolium* (River Oats), which needs 60 days of stratification for northern genotypes. **Stratification is the process of exposing seed to cool, moist conditions.**

While cold, wet stratification is not necessary in most cases to produce an adequate stand, 20%-50% of the seed may be dormant. The vast majority of seedlings that emerge will be growing by the end of the second full growing season.

Greatest growth of these species occurs when air temperatures are 75° F-95° F (24° C-35° C). The majority of growth is put into root development in the first season. Very few (<5%) plants within a species may flower and set seed in the first growing season. Maximum plant development may take two years or longer.

2. Cool Season Grasses: Some species will germinate when temperatures are a little higher than 40° F (4° C). Others will require warmer temperatures. They may germinate in fall or spring. Adequate stands of most species will not require stratification; however, 50% of the seed may remain dormant without stratification. The vast majority of seedlings that emerge will be growing by the end of the second full growing season.

Greatest growth occurs when temperatures are 65° F-85° F (18° C-29° C). With adequate moisture and nutrients, some flowering and seed set may occur in the first growing season.



**CAN SEEDS FROM ONE REGION BE GROWN IN ANOTHER?**

State-specific ecotypes will grow in other states as long as they naturally occur in that region.

### CAPTIONS

2: A fall-seeded meadow shown in April of its first growing season. Note the winter weeds that established ahead of the desired seedlings.

## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**

3. Some sedges (*Carex alata*, *albolutescens*, *annectans*, *scoparia*, *tribuloides*, *vulpinoidea*), rushes (*Juncus canadensis*, *coriaceus*, *effusus*, *tenuis*, *torreyi*) and bulrushes (*Scirpus atrovirens*, *cyperinus*, *expansus*, *polyphyllus*) have a very high seed count per pound of seed. If planted in spring, a substantial number of seedlings may be produced by these species in the first growing season. These seedlings may represent 5% or fewer of the total seeds present. Flowering and seed production will occur one to two growing seasons after an individual seedling has germinated. Maximum germination will take at least two years due to seed dormancy. Sedges and bulrushes will be recognizable by the arrangement of any three successive leaves in a pattern resembling the spokes in the Mercedes™ symbol. *Juncus spp.* will have round stems that originate at a common point near or on top of the soil.

4. Some sedges (*Carex baileyi*, *buxbaumii*, *comosa*, *conoidea*, *crinita*, *folliculata*, *frankii*, *glaucescens*, *grayi*, *gynandra*, *intumescens*, *lacustris*, *lupulina*, *lurida*, *squarrosa*, *stipata*, *stricta*, *vesicaria*) and bulrushes (*Scirpus acutus*, *americanus*, *fluviatilis*, *maritimus*, *pungens*, *robustus*, *tabernaemontani*) have a high level of seed dormancy and are unlikely to have any consequential germination without stratification.

A majority of seedlings will emerge in the first and second growing seasons after they have been stratified (artificially or naturally). Plants will flower and set seed one to three years after they germinate. *Carex spp.* in this group may be recognized as described above for other *Carex spp.* *Scirpus spp.* in this group have round or triangular stems that arise from a point that is often below the soil surface. The stems are typically larger than those of *Juncus spp.*

5. Broadleaves: For most broadleaf species, some germination will occur in the first year without stratification (artificial or natural). A high percentage of the species and seeds within the species are likely to germinate in the first growing season following the first winter in situ (on-site). The majority of the seeds that will germinate will have done so by the end of the growing season following stratification. Following germination, blooms may occur in the first growing season (*Helianthus helianthoides*, Oxeye Sunflower); second growing season (*Rudbeckia triloba*, Brown-eyed Susan; *Aster spp.*, *Monarda spp.*, *Penstemon spp.*); after three to five growing seasons (*Liatris spp.*); or, not until the seventh growing season (*Baptisia tinctoria*, Yellow False Indigo). The number of years to bloom will be influenced by soil fertility, available moisture and growing season temperatures. **The number of years to bloom may be shorter for a given species the further south you are.**

6. Seed dormancy in perennial species is affected by latitude of ecotype origin. In greenhouse studies, we have found that northern ecotypes (PA, OH, NY, NJ) typically require more weeks of cold, wet stratification than southern ecotypes (FL, GA, NC, SC) of the same species.

### Life Span of a Mix

The majority of our native seed mixes are composed of perennial species. Mixes dominated by perennial species have the potential to last for more than a decade if properly maintained. For all mixes, the site must be maintained to keep them free from invasive species or aggressive weeds. Mixes of herbaceous species that have no tree, shrub or vine components in their formula must be kept free from the encroachment of woody or vine species by controlled burning, mowing or spot spraying.

### Appearance of a Mix

The natural communities we create with native seed mixes are dynamic. Annuals, biennials and short-lived perennials may be widely present in the landscape in the first **three** growing seasons, but non-existent or present in small pockets by the fifth growing season. Over time, colonies of some long-lived perennials will grow larger in area and species composition will change in response to annual variations of drought or heavy rainfall.

### **WHY IS DIVERSITY IMPORTANT?**

A mix of species will increase the site's functionality and add to successful establishment, as well as attract a greater diversity of pollinators and birds to the landscape.



## Assessing Seedling Indicators of Successful Meadow Establishment

It is not unusual for those new to planting meadows to be nervous about a mix's performance during its establishment year. Typically, customers need confirmation that the desirable species are growing. Fortunately, our ability to assess the situation is assisted by a small set of species that generally germinate very well.

For wetland meadows, some common early emerging species include: *Eupatorium perfoliatum* (Boneset), *Carex spp.* (Sedges) and *Verbena hastata* (Blue Vervain). For upland meadows, some common early emerging species include: *Chamaecrista fasciculata* (Partridge Pea), *Elymus virginicus* (Virginia Wildrye), *Helianthus angustifolius* (Swamp/Narrowleaf Sunflower), *Monarda fistulosa* (Wild Bergamot), *Penstemon digitalis* (Tall White Beardtongue) and *Rudbeckia hirta* (Blackeyed Susan).

## OBSTACLES THAT PREVENT SUCCESSFUL MEADOW ESTABLISHMENT

Over the past 20 years, we have had the opportunity to visit sites or see photographic evidence of many sites where there was a failure to successfully establish a native meadow. We have found some fairly repetitive themes associated with these failures. Typically, the problem is related to site conditions, weeds, excessive cover crop seeding rates or use of an inappropriate cover or companion crop.

### Poor Site Conditions

- Poor pre-plant weed control: Native species need bare ground to germinate and grow. They do not establish well in a site already vegetated with weeds or lawn.
- Presence of excessive organic matter used as mulch: Mulch prevents good seed-to-soil contact. A seed may germinate, but its radicle (first root) may be unable to find moisture and the seedling dies. The micro-organisms that decompose mulch or compost consume nitrogen (a nutrient essential to plant growth), resulting in a nitrogen-deficient environment in which a seedling will grow poorly or not at all. If using compost, be certain that it has decomposed to a point where the parent material is unrecognizable.
- Soil compaction: If you cannot press the tip of a crowbar or piece of rebar 3" into the soil, you have compaction and will get a very poor or non-existent stand. For highly compacted soils, consider broadcasting 1"-2" of well-decomposed compost across the site, followed by rototilling the compost in to a depth of 6".

## WHY INOCULATE LEGUMES?

Inoculation involves adding a specific bacterium, "rhizobia," to legume seeds. Rhizobia have a beneficial relationship with legumes in that, when root nodules develop, these bacteria convert nitrogen gas from the air to solid nitrogen which is used for plant growth.

## CAPTIONS

3: A meadow in its first growing season, prior to first trimming.

4: This first-year meadow has just been trimmed for the first time in July.

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SEE PAGE 9 FOR EXPLANATION

## CAPTIONS

5: A first-year meadow after final autumn trimming

6: This meadow is in its second growing season.

- Herbicide residues (e.g., pre-emergent herbicides) from the previous year: This typically occurs on sites that were previously lawns with a lawn service contract for weed control within 12 months of planting. It can also be a problem when the site was a crop field to which atrazine or Princep® (triazine) had been applied within 12 months of planting.
- Excessively high or low soil pH: For many plant species native to eastern North America, the availability of many nutrients essential to plant growth is limited in soil with a pH less than 4.5 or greater than 7.5. Ideal pH is 5.5-7.0. When pH is outside this range, choose species tolerant of the site's pH (you can raise the pH with lime or lower it with sulfur).
- Drought within two to six weeks following a planting: Seeds cannot germinate without water and seedlings do not grow/survive without water. For drought-prone areas, we recommend planting between late October or when soil temperatures are less than 55° F (13° C) at a 3" depth, and in spring when forsythia and redbud are in full bloom.
- Erosion (on steep slopes): Caused by a failure to use erosion control blankets or to toe them in at the top of the slope. Erosion is also a problem on slopes where equipment failed to track the soil perpendicular to the slope, resulting in the seed being washed down to the bottom of the slope.
- Presence of crownvetch, sericea lespedeza, trefoil, tall fescue, bahiagrass, bermudagrass, white Dutch clover, alsike clover, bindweed, mile-a-minute or kudzu that was not controlled prior to planting or which volunteered from dormant seed when soil was prepped for planting: Plants of these species can smother desirable but slow-growing perennial natives.
- Use of borrowed topsoil infested with seeds of invasive species.
- Wildlife: Geese can eat seeds, seedlings and mature plants and deer can be devastating to some wildflowers.
- Lack of proper maintenance: Allowing annual ryegrass cover crop or weeds (e.g., foxtail or ragweed) to smother native seedlings during the first full growing season. Avoid this by trimming the meadow to a height of 8" whenever growth exceeds 18"-24".
- Failure to control invasive or problem species prior to planting or after germination.



### Application of a Cover Crop at an Excessive Rate

Generally, issues with an excessive rate of cover crop have been confined to the use of annual ryegrass. Excessive annual ryegrass applied to sites planted with native species smothers growth of the native meadow. To date, we have not had complaints when annual ryegrass was used at 10-12 lb per acre (1/4 lb per 1,000 sq ft).

## Use of an Inappropriate Cover or Companion Crop

We do not recommend the use of bahiagrass, bermudagrass or tall fescue as cover or companion crops in our native meadow mixes. As a cover crop, bahiagrass and bermudagrass will be impossible to control prior to new growth of perennial native species and will likely smother out the native species when used as a companion crop.

We do not recommend the addition of the following legumes to native meadows as they also tend to take over and smother out native species: *Lespedeza cuneata* (Sericea Lespedeza), *Coronilla varia* (Crownvetch), *Lotus corniculatus* (Bird's Foot Trefoil), *Trifolium pratense* (Red Clover) or *Trifolium repens* (Ladino Clover). If these species are already present on the site, spot spray with Roundup® (glyphosate) to control.

If you desire a legume in a meadow mix, we recommend the use of such native legumes as: *Baptisia alba* (White Wild Indigo), *Baptisia albescens* (Spiked Wild Indigo), *Baptisia australis* (Blue False Indigo), *Chamaecrista fasciculata* (Partridge Pea), *Chamaecrista nictitans* (Sensitive Pea), *Desmodium canadense* (Showy Ticktrefoil), *Desmodium paniculatum* (Panicled Ticktrefoil), *Lespedeza capitata* (Roundhead Lespedeza), *Lespedeza frutescens* (Shrubby Bushclover), *Lespedeza virginica* (Slender Bushclover), *Senna hebecarpa* (Wild Indigo) or *Senna marilandica* (Maryland Senna).

## Problem Weeds for Upland Meadows

In much of our market area, there are four weeds capable of smothering a meadow during the establishment year: crabgrass, giant foxtail, green foxtail and ragweed. If these weeds overtake your meadow, use a brush hog mower (we do not recommend the use of a lawn mower) or string trimmer to trim the meadow to a height of 8". Trimming below 4" will kill seedlings of many native species.



### CAPTIONS

7 & 8: A flourishing northern Virginia meadow in its third growing season

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SEE PAGE 9 FOR EXPLANATION



1



2

Ernst Conservation Seeds is one of the largest switchgrass seed producers in the country, with more than 30 years of experience in establishing, managing and harvesting native warm season grass seed and biomass.

Switchgrass, as well as other native warm season grasses, has attracted much attention as a potential source of alternative energy and sustainable fiber due to the following:

- Native warm season grasses are perennial.
- Native warm season grasses are able to thrive in marginal soil conditions that are too wet or dry for traditional crops.
- Native warm season grasses have minimal nutrient input requirements.
- Native warm season grasses are efficient in converting sunlight to useable biomass.
- Native warm season grasses have proven soil, water, air and wildlife benefits.

Other native grasses and legumes can be mixed with native warm season grasses to create a biomass mix that provides more diversity than a monoculture of one species; e.g., mixes of native grasses, such as *Andropogon gerardii* (Big Bluestem), *Sorghastrum nutans* (Indiangrass), *Panicum amarum* (Coastal Panicgrass), *Spartina spp.* (Cordgrass), and such legumes as *Desmodium canadense* (Showy Ticktrefoil), *Senna hebecarpa* (Wild Senna) and *Chamaecrista fasciculata* (Partridge Pea). A mix of switchgrass varieties adapted to your area can better acclimate to seasonal variation and soil conditions than a single variety.

Ernst Conservation Seeds is actively involved in numerous cooperative efforts with government agencies, universities and groups in the private sector that are interested in increasing the use of grass biomass in many applications.

Biomass production from switchgrass can vary greatly from one region to another. It is important to select switchgrass varieties that are well suited to the growing conditions of your area. Please contact us and we will be happy to make recommendations.

Biomass production can be enhanced with the use of treated seed to control seedling disease and insect damage. Ernst Conservation Seeds is permitted to treat switchgrass seed with Gaucho® XT, which reduces the need for the use of herbicides to control competitive weeds. It also decreases first-year biomass production. Many states allow atrazine, at 1 lb per acre, to control many broad-leaf and grassy weeds. Annual grasses can be controlled with the addition of Paramount® herbicide. Other herbicides are available for specific conditions.

For more information, please consult the Switchgrass FAQs on our website.

## CAPTIONS

1: *Panicum virgatum* (Switchgrass) typically produces very high yields in well-established fields.

2: Switchgrass grows through corn stubble in a no-till field.

# ADAPTING YOUR FIELD FOR BIOMASS PRODUCTION



Every field has unique characteristics that must be considered when establishing perennial native biomass species. These include soil type, hydrology, pH, fertility, erosion/run-off potential, compaction, existing vegetative cover, previous crop history and harvest methods.

The natural soil type cannot be changed; however, native warm season species can tolerate virtually any soil type. Switchgrass can survive in a wide range of soil moisture. Biomass productivity will be directly related to soil quality, as is the case with row crops or alfalfa.

Switchgrass can tolerate a soil pH of 5.0-8.0, but will produce well at 6.0. Soil pH below 6.0 should be corrected with the addition of lime according to soil test recommendations.

Soil fertility is a function of the available nutrients that can be used by the plant. Warm season grasses (switchgrass in particular) can be more productive at lower fertility levels than row crops or alfalfa. Fertility levels referred to as “moderate” are generally adequate for biomass production. Soil tests are required to determine soil fertility levels. Fertilizer is not recommended for soils with moderate fertility levels. The addition of nitrogen is recommended for the second and subsequent years based on expected yields.

Fields with a history of good weed control, such as those planted in corn or soybeans, are the easiest to convert to native warm season grasses. Fields in conventional hay or pasture are somewhat more difficult to seed. They require the application of Roundup® herbicide to kill the cool season grasses and minimum tillage to work thatch into the subsoil.

No till or minimum till are the most effective means of seeding new warm season grasses. One of the limiting factors of no till is surface crop residue that prevents proper seed-to-soil contact, shades the germinating seedlings and/or creates a nitrogen deficiency during decomposition. Each situation requires customized tillage and herbicide considerations.

**CAPTIONS**

3: Beyond their value as strong biomass producers, warm season grasses like this *Andropogon gerardii* (Big Bluestem) provide many ecological services as well.

4: Switchgrass being mowed for baling.

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5

Tilling a field going to warm season grasses corrects surface roughness and incorporates crop residue before planting. The surface of the field must be smooth enough to spray, plant, mow and bale.

Fields with perennial or invasive weeds that have not been mowed during previous growing seasons are the most difficult to prepare for native grass establishment.

Perennial vegetation of grasses and broadleaf weeds must be controlled before a field can be planted. The first step is to mow or burn existing vegetation which will produce new vegetative growth. Roundup® and a systemic broadleaf herbicide can then be sprayed, which effectively kills undesirable species. Identify maximum weeds and use label rates to control weeds with one or more applications. Once accomplished, seeding similar to that of a conventional hayfield can proceed.

All native grass establishments will benefit from an application of Roundup® and a broadleaf herbicide just before planting.

### CAPTIONS

5: An aesthetically pleasing warm season grass species, *Sorghastrum nutans* (Indiangrass) is a biomass and ecological workhorse.

## SELECTING THE RIGHT BIOMASS VARIETIES

Our supply of switchgrass seed comes from various sources. These include our licensing of the varieties produced by intensive breeding programs at numerous institutions, as well as regional populations made available from USDA plant materials centers. The regional populations have minimal genetic improvement for general physical characteristics, and have been adequate for decades of use for erosion control, wildlife plantings and in the Conservation Reserve Program (CRP). The licensed varieties have significant improvements and were bred with forage and biomass production as the focus. These varieties include 'Colony', 'Performer', 'BoMaster', 'Stuart' and 'Miami'.

### FORAGE

Switchgrass, like a number of other native warm season grasses, can produce high-quality forage. Switchgrass used in a system of rotational grazing allows for robust growth during the hot summer months. University of Tennessee findings suggest that nutrient content of this forage can be as high as 16%-17% crude protein if harvested correctly.

Ground switchgrass straw is experiencing increased use as a forage extender in livestock feeds. It works to increase bulk and dilute protein in operations with sources of high-protein feed.

### NUTRIENT RUN-OFF PREVENTION

Switchgrass has extensive roots that can grow as deep as 5'-6'. In addition to serving as a superior soil stabilizer in erosion control, this plant and its root system form a tremendous ecological filter, soaking up such nutrients as nitrogen and sequestering carbon dioxide. Use of switchgrass as a buffer between agricultural activity and watersheds is seen by many as one of the best methods for protection of these priceless resources.

### POULTRY AND DAIRY BEDDING

With the high cost and relative scarcity of such traditional bedding materials as pine sawdust and other wood-based options, switchgrass has been found to have yet another use. Numerous studies have shown that ground switchgrass is easy on the pads of chicken feet, highly absorbent and even represents a benefit over other beddings in the prevention of ammonia. From a cost perspective, producers can grow the switchgrass on their own marginal grounds and harvest and process it for their own bedding uses.



6

7

### CAPTIONS

6 & 7: Ground switchgrass is gaining popularity as an effective, readily accessible and inexpensive livestock and poultry bedding material.

### INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

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SEE PAGE 9 FOR EXPLANATION

# BIOENGINEERING MATERIALS IN CONJUNCTION WITH PROPER STREAM RESTORATION TECHNIQUES



1



2

Soil bioengineering is the term used to describe the use of plant material to arrest and prevent slope and streambank failure and erosion. The roots and stems serve as structural and mechanical elements in a slope protection system. Live cuttings and rooted plants are embedded in the ground in various arrays to serve as soil reinforcements, hydraulic drains and barriers to earth movement. Once established, this living material effectively controls a number of stabilization and erosion control problems by binding the soil with its root system and creating a natural vegetative cover. Bioengineered sites are self-repairing and have the advantage of blending with natural surroundings.

Ernst Conservation Seeds is an experienced producer of common and specialized live soil bioengineering materials. We understand the unique needs of bioengineering site construction. Our material is grown, processed and delivered to minimize on-site installation labor and maximize survival and quick establishment.

**LIVE MATERIAL NOTICE:** The bioengineering material on the following pages is dormant live material. If the material cannot be installed immediately when it arrives at the site, it must be properly stored. Place material out of direct sunlight in a cool, wet place, such as under straw or burlap. If packaged, open the pallets, boxes and plastic bags so the material can be thoroughly watered. Do not allow the material to dry out. Soaking before planting significantly increases survival and growth rate. Planting is best done during dormancy.

**NOTE:** For best survivability, the material should be planted during the dormant season, November 1st-April 30th. We do not guarantee any of our bioengineering material from May 1st-October 31st.

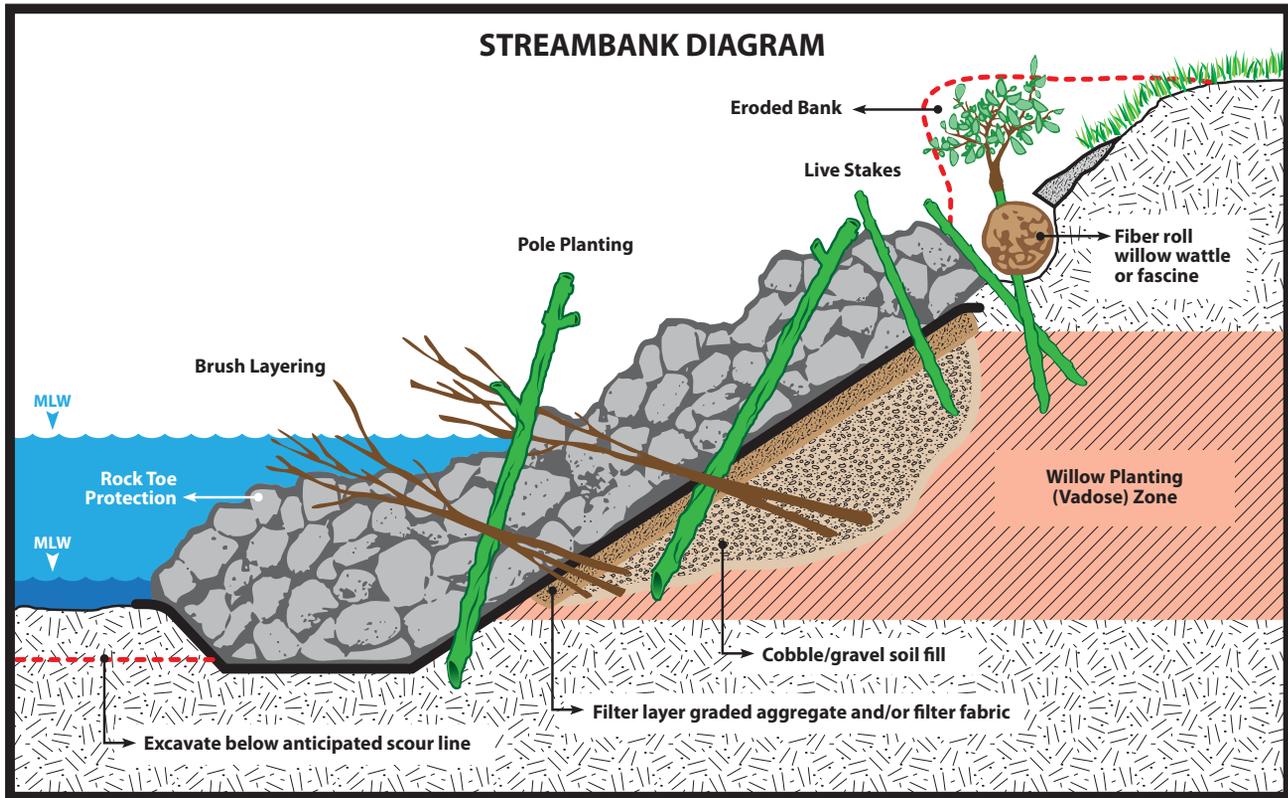
## CAPTIONS

1: First-year growth of a *Cornus amomum* (Silky Dogwood) live stake.

2: Bioengineering materials on racks ready to be shipped

Live Stake and Branch Layering Cross-Sections courtesy of United States Department of Agriculture, Natural Resources Conservation Service (NRCS), Engineering Field Handbook, December 1996, Chapter 16, "Streambank and Shoreline Protection", pp. 16-13 and 16-20.

Special thanks to John McCullah, Salix Applied Earthcare, for allowing us to use the information in his Bio-Draw software. More information is available at [www.biodraw.com](http://www.biodraw.com).



## ERNST CONSERVATION SEEDS PRODUCES BIOENGINEERING MATERIALS IN THE FOLLOWING FAST-ROOTING SPECIES:

| Botanical Name                         | Common Name            | Indicator Region                                       |
|--|------------------------|--|
| <i>Cephalanthus occidentalis</i>       | Buttonbush             | Native Shrub / 1: OBL; 2: OBL; 3: OBL; 4: OBL          |
| <i>Cornus amomum</i>                   | Silky Dogwood          | Native Shrub / 1: FACW; 2: FACW; 3: FACW; 4: FACW      |
| <i>Cornus sericea (C. stolonifera)</i> | Red Osier Dogwood      | Native Shrub / 1: FACW; 2: FACW; 3: FACW; 4: FACW      |
| <i>Salix amygdaloides</i>              | Peachleaf Willow       | Native Tree / 1: FACW; 2: FACW; 3: FACW; 4: FACW       |
| <i>Salix discolor</i>                  | Pussy Willow           | Native Shrub / 1: FACW; 2: FACW; 3: FACW; 4: FACW      |
| <i>Salix eriocephala (S. cordata)</i>  | Heartleaf Willow       | Native Shrub / 1: FACW; 2: FACW; 3: FACW; 4: FACW      |
| <i>Salix exigua ssp. interior</i>      | Sandbar Willow         | Native Shrub / 1: OBL; 2: FACW; 3: FACW; 4: FACW       |
| <i>Salix lucida</i>                    | Shining Willow         | Native Shrub / 1: FACW; 2: FACW; 3: FACW; 4: OBL       |
| <i>Salix nigra</i>                     | Black Willow           | Native Tree / 1: OBL; 2: OBL; 3: OBL; 4: OBL           |
| <i>Salix purpurea</i>                  | Streamco Willow        | Naturalized Shrub / 1: FACW; 2: FACW; 3: FACW; 4: FACW |
| <i>Salix sericea</i>                   | Silky Willow           | Native Shrub / 1: OBL; 2: OBL; 3: OBL; 4: OBL          |
| <i>Salix x cottetii</i>                | 'Bankers' Dwarf Willow | Naturalized Shrub / 1: NI; 2: NI; 3: NI; 4: NI         |
| <i>Sambucus canadensis</i>             | Elderberry             | Native Shrub / 1: NI; 2: NI; 3: NI; 4: NI              |
| <i>Viburnum dentatum</i>               | Arrowwood              | Native Shrub / 1: FAC; 2: FAC; 3: FAC; 4: FAC          |
| <i>Viburnum lentago</i>                | Nannyberry             | Native Shrub / 1: FAC; 2: FAC; 3: FAC; 4: FAC          |

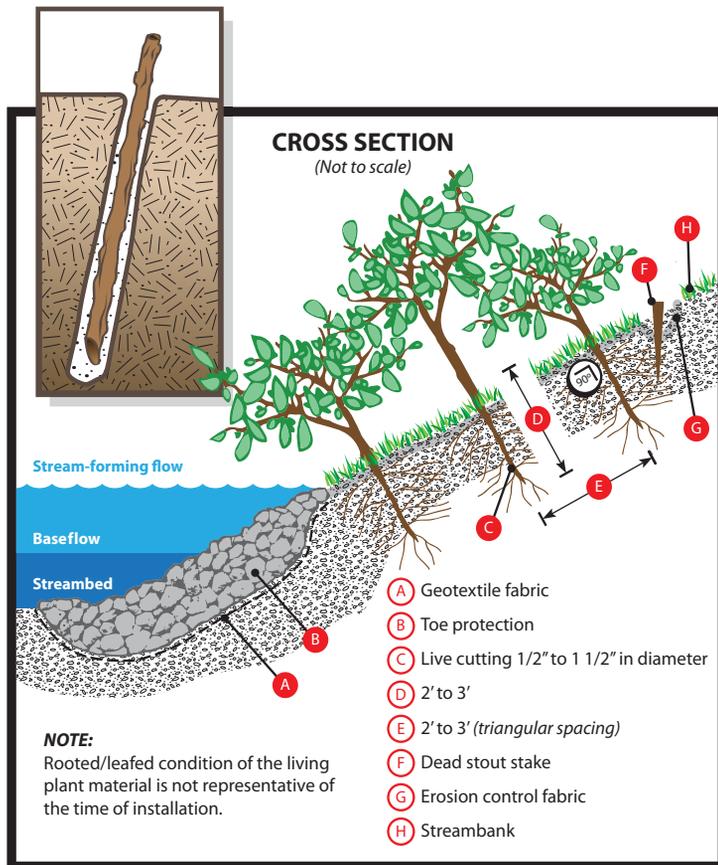
For more information on the species listed above, refer to Woodland Openings, Partially Shaded Sites & Shrubby Sites Associated with Bioengineering, p. 33.

Please call for a quote, as each bioengineering job and material selection is unique to a project.

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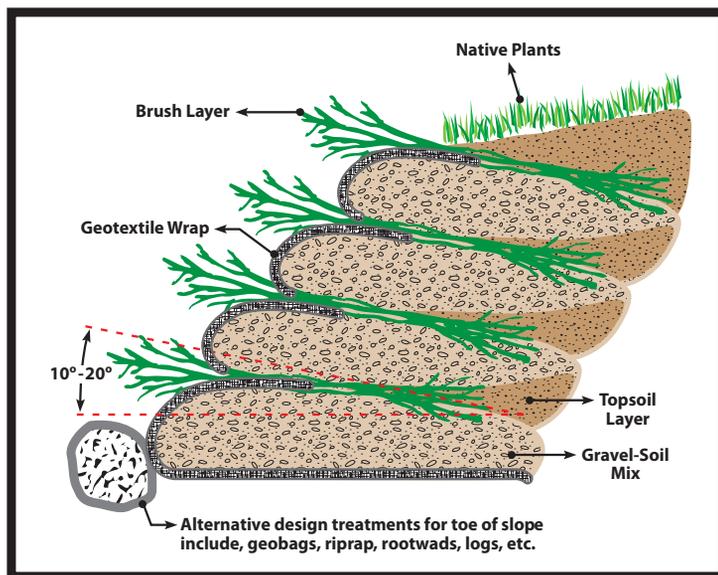


## LIVE STAKES

Stakes are dormant, live woody cuttings of a species with the branches trimmed off. Live staking performs an important function in creating a root mat that stabilizes the soil by reinforcing and binding soil particles together. Stake establishment also improves aesthetics and provides a habitat for wildlife. Live stakes can be used on their own to secure other bioengineering materials or as an anchor for erosion control and geofabric. Stakes or poles can also be inserted or driven through openings in rock structures, such as gabions, riprap and other retaining structures.

**Installation Notes:** Install stakes during their dormancy (late fall to early spring). **Do not allow them to dry out.** Soaking before planting significantly increases survival and growth rate. Drive a pilot hole in firm soil, planting at right angles (buds oriented up) **with at least two-thirds of its length underground.** Plant stakes randomly or 3'-6' apart on triangular spacing. Tamp the soil down around the cuttings and water. If a long dry spell or hot weather is expected after planting, irrigation may be warranted.

**Live Stake Sizes:** 3/8"-1-1/2" diameter; 2'-4' lengths.



## BRUSH (BRANCH) LAYERS

Brush (branch) layers are living branches placed on a terrace along contours of a streambank and interspersed between layers of soil. This technique is used to repair a slump or gully and is most effective for revegetating scour holes.

**Installation Notes:** Brush (branch) layers are placed on terraced benches **with two-thirds of the basal material tilted into the slope and covered with soil.** Branches should protrude beyond the face of the terrace. Before installing, soil terraces can be additionally protected by putting down geofabric. Starting at the bottom of the slope, secondary brush (branch) layers can be added every 3'-4' proceeding up the slope. Straw mulching the finished surface is recommended to provide moisture retention and additional erosion control. Planting should be done during the dormant season.

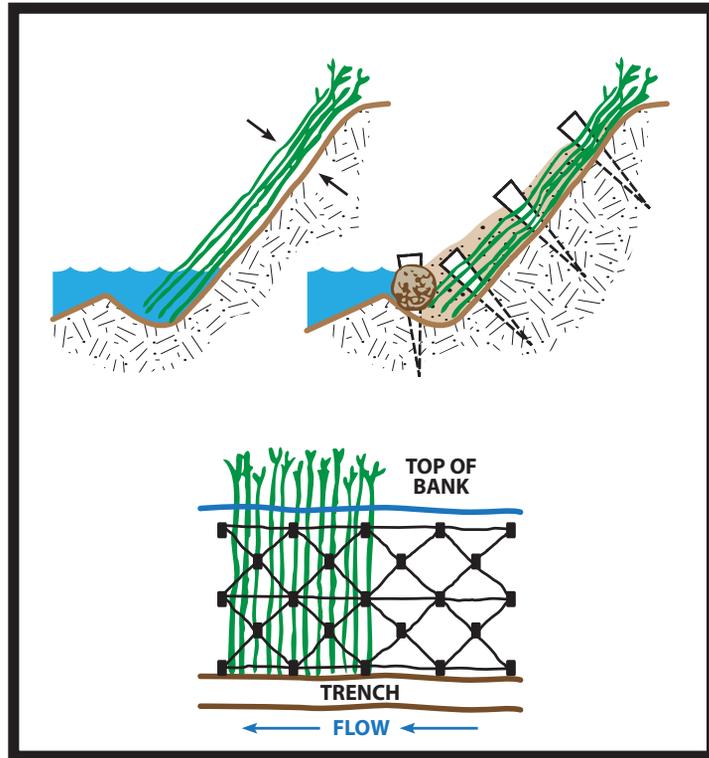
**Brush Layer Sizes:** 3 linear ft per bundle, 3-4 branches thick; available in 3'-6' bundles.

## BRUSH MATTRESSES

Brush mattresses are layers of living branches laid in a crisscross pattern, 1-2 branches thick, on a streambank to form a living ground cover. The mattress that is formed protects the bank surface until the branches can root and native vegetation becomes established. This living system normally roots in the entire bank face, encouraging natural infiltration and immediately acting as a sediment trap.

**Installation Notes:** Place material with the basal ends located toward the bottom of the slope. Using 3' square spacing, drive dead wedge stakes into the plant material. Stretch wire or biodegradable twine or rope diagonally around the dead stakes and finish driving the stakes in to tighten the wire, twine or rope and secure the mattress. Finally, **place a thin layer of soil over the entire area to encourage rooting.** Irrigation is necessary immediately after installation.

**Brush Mattress Sizes:** 3/8"-3" diameter x random length x 2-4 branches thick.



### CAPTIONS

3: Streambank restoration utilizing brush mattresses.

4: Detail of a brush mattress showing good first-year growth.

## INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species

- UPL** Upland species
- NO** No occurrence
- NI** No indicator

SEE PAGE 9 FOR EXPLANATION

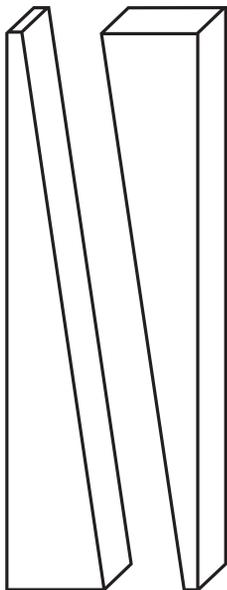


## WATTLES/FASCINES

Wattles, also known as fascines, are living branches bound together in long tubular bundles. When placed in shallow trenches across the slope of a bank, these structures provide protection from erosion and create a sediment trap. This material provides immediate bank support even prior to root growth. Once established, this live rooting material grows into a living fence-like erosion barrier. Within one growing season, roots and shoots grow along the entire length of the structure, quickly stabilizing the bank.

**Installation Notes:** This technique is simple, effective and can be installed with little site disturbance. Material is placed in 6" wide trenches on banks or slopes parallel to the stream contour and **partially covered with soil**. Wedge-like dead stakes secure them in place at 2'-3' intervals. Live stakes can also be used in conjunction with dead stakes to secure the material. Straw mulching the site after installation retains moisture and reduces surface erosion. Irrigating after installation is necessary if the soil is dry.

**Wattle/Fascine Sizes:** 6' or 8' lengths are recommended for ease of handling; available in 4"-8" diameters or 8"-12" diameters (custom lengths and diameters are available).



## DEAD WEDGE STAKES

Dead wedge stakes are pieces of hardwood cut into long wedges to secure wattles, brush mattresses and other applications of soil bioengineering and erosion control measures.

**Stake Sizes:** 1-1/4" x 3-1/4" x 2-1/2' long.

### CAPTIONS

5: Five-foot wattle ready for shipment.

## LIVE WHIPS

Whips are slender, live woody shrub material. Whips are well suited for very moist areas of stream edges and commonly used in conjunction with gabion structures, riprap and geofabric.

**Installation Notes:** Push whips into the ground as far as they will go without breaking. **At least two-thirds of the whip should be covered with soil.** Whips can be installed either by laying them on an angle or planting them erect in the soil. When using whips with hard structures, be sure they are long enough to reach into the soil and moisture behind or below the structure. (Example: If installing whips through riprap, take into account the 3' riprap depth; therefore, install a 6' whip at least 2' into the moist soil behind the stone and 1' above the riprap surface).

**Live Whip Sizes:** 3/8"-1" diameter; 4'-6' lengths.

## COMPLETING A BIOENGINEERING PROJECT

Overseeding and mulching a completed bioengineered project with the appropriate seed mixes protects the soil surface from erosion while adding biodiversity to the site. The following mixes are excellent for this purpose: ERNMX-122 FACW Wetland Meadow Mix; ERNMX-123 Native Upland Wildlife Forage & Cover Meadow Mix; and ERNMX-138 Wildlife Food & Shelter Mix.

### DISCLAIMER

The information in this review of practices is the result of more than 50 years of experience in seed production. Ernst Conservation Seeds has been supplying seeds and consulting in the reseeded of tens of thousands of acres of roadsides, surface-mined lands, conservation and restoration sites in eastern North America, as well as growing and supplying seed and consulting in the planting of hundreds of thousands of acres of CRP/CREP-related areas for erosion control and wildlife habitat.

All of these practices are opinion only and our best advice as a result of these experiences. These recommendations do not cover all of the conditions that will be encountered in the field. All of the information is for individual consideration.

Ernst Conservation Seeds is not responsible for conditions that will be encountered in individual situations. The use of brand names does not represent our endorsement of a specific product; rather, it represents our experience only and has not necessarily been replicated in peer-reviewed research. The use of chemical pest control agents is subject to manufacturers' instructions and labeling, as well as federal, state and local regulations.

### HOW SOON CAN I GET MY BIOENGINEERING ORDER?

Since we custom cut your order for you, we require at least a one week notice when bioengineering orders are placed.

### INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

-  NORTHCENTRAL & NORTHEAST
-  MIDWEST
-  EASTERN MOUNTAINS & PIEDMONT
-  ATLANTIC & GULF COASTAL PLAIN

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- FAC** Facultative species
- FACU** Facultative upland species

- UPL** Upland species
- NO** No occurrence
- NI** No indicator

SEE PAGE 9 FOR EXPLANATION



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Acorus americanus**

### **SWEETFLAG**

*Sometimes misnamed Acorus calamus, an introduced species; provides food and cover for wildlife.*

**HABITAT** Wet meadows, pastures, stream edges, ditches, swamps; pH 5.6-7.2.

**CHARACTERISTICS** A rhizomatous species; reproduces by seed or root cuttings; grows to 6' tall; 10" minimum root depth; full sun; no drought tolerance; no salt tolerance; blooms from June to July; yellowish-brown flowers.

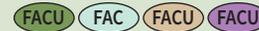
**SEEDING RATE** 1%-5% of a mix; approx. 70,000 seeds per lb.

**ECOTYPE** Midwestern U.S.



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Agrostis perennans**

### **AUTUMN BENTGRASS**

*Adapted to areas that are mesic to dry, including steep slopes and forests with dappled sun and areas with full sun; provides winter grazing for wildlife.*

**HABITAT** Dry open ground, areas in light shade; pH 5.5-7.5.

**CHARACTERISTICS** A rhizomatous species; grows to 3-1/2' tall; 8" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms in midsummer.

**SEEDING RATE** 20-30 lb per acre alone; 1%-25% of a mix; approx. 8,000,000 seeds per lb.

**ECOTYPE** PA; Albany Pine Bush-NY



**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## **Agrostis alba** **(A. gigantea)**

### **REDTOP**

*Produces quick cover on road banks and diversion ditches for erosion control; adapts well to pipeline restoration; provides food for wildlife.*

**HABITAT** Coastal marshes, roadsides, open ground; establishes well in moist soils; pH 4.5-8.0.

**CHARACTERISTICS** A rhizomatous sod-forming species; develops quickly from seed; grows to 2' tall; 20" minimum root depth; full sun; low drought tolerance; low salt tolerance; blooms from June to September; tall narrow leaves, fine stems and reddish inflorescence.

**SEEDING RATE** 5%-25% of a mix; approx. 4,850,000 seeds per lb.

**VARIETIES** Common commercial



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Agrostis scabra**

### **TICKLEGRASS** **(ROUGH BENTGRASS)**

*Emerges quickly when used for reclamation; contributes to long-term stability of seasonally wet areas.*

**HABITAT** Adapted to fine to medium-textured soils; pH 6.0-8.0.

**CHARACTERISTICS** A bunchgrass; grows to 3' tall; 12" minimum root depth; full sun; low drought tolerance; low salt tolerance; blooms from June to November.

**SEEDING RATE** 20-30 lb per acre alone; 1%-25% of a mix; approx. 5,000,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Agrostis hyemalis**

### **WINTER BENTGRASS**

*Good for partially drained soils on roadsides with moderate shade; provides winter grazing for wildlife.*

**HABITAT** Roadsides, meadows, fields; pH 5.0-7.5.

**CHARACTERISTICS** A bunch-type grass; grows to 3-1/2' tall; 8" minimum root depth; moderate shade tolerance; low drought tolerance; moderate salt tolerance; blooms from April to November.

**SEEDING RATE** 20-30 lb per acre alone; 1%-25% of a mix; approx. 8,500,000 seeds per lb.

**ECOTYPE** NC



**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## **Agrostis stolonifera**

### **CREEPING BENTGRASS**

*A sod-forming grass used on reclamation sites, lawns and golf course putting greens; also used for soil erosion control.*

**HABITAT** Wet meadows, marshes, fields, roadsides; pH 5.0-7.5 (pH 6.0-7.0 for lawns).

**CHARACTERISTICS** A dense stoloniferous species; grows from 8"-20" tall; 12" minimum root depth; full sun; low drought tolerance; moderate salt tolerance; blooms from June to September.

**SEEDING RATE** 5%-25% of a mix; approx. 6,129,000 seeds per lb.

**VARIETIES** Common commercial



## **Agrostis tenuis** **(A. capillaris)**

### **COLONIAL BENTGRASS**

*Provides erosion control; naturalized in many areas of the northeastern United States where sheep were grazed; a good source of grazing for wildlife.*

**HABITAT** Cultivated in pastures, lawns, dry open ground, along roadsides; pH 5.0-7.5 (pH 6.0-7.0 for lawns).

**CHARACTERISTICS** A rhizomatous fine-leaved grass; grows from 6"-2' tall; 12" minimum root depth; full sun; low drought tolerance; moderate salt tolerance; blooms in midsummer.

**SEEDING RATE** 5%-25% of a mix; approx. 5,890,000 seeds per lb.

**ECOTYPE** 'Highland'; Common commercial

**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## **Alopecurus arundinaceus** **(A. ventricosus)**

### **CREeping FOXTAIL**

*Ideal for pipeline restoration where wildlife is desired; provides seed, forage and cover for wildlife and domestic animals.*

**HABITAT** Wet hay meadows, waterways; pH 5.5-8.4.

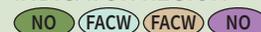
**CHARACTERISTICS** A rhizomatous species; grows to 3' tall; 12" minimum root depth; full sun; low drought tolerance; high salt tolerance; blooms from April to September; yellow seedheads mature to black seeds.

**SEEDING RATE** 5%-25% of a mix; approx. 786,000 seeds per lb.

**ECOTYPE** Common commercial

**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## **Alisma subcordatum** **(A. plantago-aquatica** **var. subcordatum)**

### **MUD PLANTAIN** **(WATER PLANTAIN)**

*Grows quickly in early spring; ideal for vernal pools; provides food for pheasants and waterfowl; low pollinator value.*

**HABITAT** Marshes, streams, muddy shores; pH 5.0-7.0.

**CHARACTERISTICS** A single-crown species; grows to 2' tall; 20" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms in midsummer; white flowers; produces seed in fall.

**SEEDING RATE** 0.5%-1% of a mix; approx. 825,000 seeds per lb.

**VARIETIES** PA; NY

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Andropogon gerardii**

### **BIG BLUESTEM**

*Used for erosion control in sand and gravel pits, mine spoils and on roadsides; contributes to diversified biomass production; a high-quality livestock forage; provides food and cover for wildlife.*

**HABITAT** Riverbanks, roadsides, meadows; pH 6.0-7.5.

**CHARACTERISTICS** A warm season bunchgrass; grows from 5'-8' tall; 20" minimum root depth; full sun; high drought tolerance; moderate salt tolerance; blooms from July to October; yellow seedheads; blue nodes; leafy foliage turns to colorful hues of brown in winter.

**SEEDING RATE** 8-10 PLS lb per acre alone; 1%-50% of a mix; approx. 144,000 seeds per lb.

**VARIETIES-STATE OF ORIGIN** 'Niagara'-NY; 'Rountree'-IA

**ECOTYPE** Albany Pine Bush-NY; Long Island-NY; 'Southlow'-MI; 'Prairie View'-IN (excellent biomass producer); 'Suther'-Piedmont NC; FL

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Allium cernuum**

### **NODDING ONION**

*An ideal native ornamental for rock gardens; readily reseeds itself; high pollinator value.*

**HABITAT** Dry rocky slopes; often limestone outcrops.

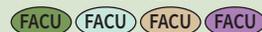
**CHARACTERISTICS** Grows to 20" tall; blooms from early June to mid-August; numerous white or pink flowers have nodding heads.

**SEEDING RATE** 0.5%-2% of a mix; approx. 123,000 seeds per lb.

**ECOTYPE** PA; OH

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Andropogon glomeratus** **var. glaucopsis** **(A. glaucopsis)**

### **PURPLE BLUESTEM**

*Emerges quickly in disturbed pine-palmetto flatwoods; chalky purple appearance.*

**HABITAT** Wet to dry flatwoods, sandhills, scrubs, ditches, coastal sand.

**CHARACTERISTICS** A small bunchgrass; grows from 2'-3' tall; blooms from February to September; plants are typically purplish-red between nodes; numerous fluffy seeds.

**SEEDING RATE** 10 PLS lb per acre alone; 1%-25% of a mix.

**VARIETIES** FL

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Andropogon glomeratus**

### **BUSHY BLUESTEM**

*The bushy heads stand out on many roadsides and open land in the southern half of the United States.*

**HABITAT** Bogs, wet pine flatwoods, wet ditches, fresh and brackish marshes, lake and pond margins, disturbed wet and upland areas; pH 5.0-6.3.

**CHARACTERISTICS** A clump-forming warm season grass; remains erect throughout the winter; grows to 6' tall; 12" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from late summer through fall; plants turn reddish following seed maturity.

**SEEDING RATE** 10 PLS lb per acre alone; 1%-25% of a mix; approx. 544,000 seeds per lb.

**ECOTYPE** FL



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Andropogon ternarius**

### **SPLITBEARD BLUESTEM**

*A pair of white seedheads makes this decorative species stand out in upland habitats of the southern half of the United States.*

**HABITAT** Pinelands, sandhills, old fields; pH 4.0-7.5.

**CHARACTERISTICS** A warm season bunchgrass; grows from 2'-5' tall; 10" minimum root depth; shade tolerant; high drought tolerance; no salt tolerance; blooms in late May to early June (unlike other bluestem species).

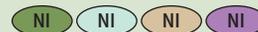
**SEEDING RATE** 10 PLS lb per acre alone; 1%-25% of a mix; approx. 216,000 seeds per lb.

**VARIETIES** VA; FL; MO



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Bouteloua curtipendula**

### **SIDEOATS GRAMA**

*A hardy warm season grass for upland meadows where sight lines are important; used for surface mine revegetation, erosion control and as a warm season companion crop; high winter forage value for wildlife and livestock.*

**HABITAT** Serpentine barrens, dry calcareous clearings, dry prairies, sandhills, other dry rocky or sandy soils; pH 5.0-7.8.

**CHARACTERISTICS** A fast-emerging rhizomatous bunchgrass; reproduces only by seed; grows to 2' tall; 12" minimum root depth; full sun; moderate drought tolerance; moderate salt tolerance; blooms from July to September; narrow leaves form a curly mass of bunchy sod.

**SEEDING RATE** 10 PLS lb per acre alone; 5%-50% of a mix; approx. 159,000 seeds per lb.

**VARIETIES** Common commercial-Midwestern U.S.

**ECOTYPE** 'Butte'-NE



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Bouteloua gracilis**

### **BLUE GRAMA**

*Used in dry highway medians, recreation area plantings and in pure stands for erosion control; provides food for wildlife.*

**HABITAT** Dry prairies, sandhills; adapts to a wide range of soil types; pH 6.5-8.3.

**CHARACTERISTICS** A fast-emerging warm season bunchgrass; grows from 6"-24" tall; 16" minimum root depth; full sun; high drought tolerance; moderate salt tolerance; blooms from May to June.

**SEEDING RATE** 1-10 PLS lb per acre alone; 5%-75% of a mix; approx. 710,000 seeds per lb.

**VARIETIES** Common commercial-Midwestern U.S.

**ECOTYPE** 'Bad River'-MN



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Andropogon virginicus**

### **BROOMSEDGE**

*The stiff straw stays erect and dominant on road cuts during winter; historically used to make brooms; provides cover for wildlife.*

**HABITAT** Old fields, hillsides, open ground with dry infertile soils; pH 4.9-7.0.

**CHARACTERISTICS** A short warm season bunchgrass; grows from 2-1/2'-5' tall; 14" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms from August to October; straw-colored through winter.

**SEEDING RATE** 10 PLS lb per acre alone; 1%-25% of a mix; approx. 800,000 seeds per lb

**ECOTYPE** Midwestern U.S.



**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## **Bromus inermis**

### **SMOOTH BROME**

*Provides food for livestock.*

**HABITAT** Grows best in well-drained fine-textured soils; pH 5.5-8.0.

**CHARACTERISTICS** A rhizomatous, sod-forming cool season grass; grows from 20"-36" tall; 12" minimum root depth; full sun; moderate drought tolerance; low salt tolerance; blooms from June to August.

**SEEDING RATE** 5%-25% of a mix; approx. 142,000 seeds per lb.

**VARIETIES** Common commercial



## *Buchloe dactyloides* (*Bulbilis d.*)

### BUFFALOGRASS

Excellent for ground cover or low-maintenance lawns with very dry soils and no irrigation; provides food for wildlife and livestock.

**HABITAT** Pastureland, dry prairies; grows best in semi-arid regions; pH 6.5-8.0.

**CHARACTERISTICS** A short, stoloniferous, sod-forming warm season grass; grows from 6"-12" tall; 12" minimum root depth; full sun; high drought tolerance; high salt tolerance; blooms in late summer.

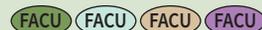
**SEEDING RATE** 80-120 lb per acre alone; approx. 335,000 seeds per lb.

**VARIETIES** 'Texoka'; 'Bowie'

**ECOTYPE** Midwestern U.S.

Native  
Herbaceous Perennial

INDICATOR REGION



## *Carex albolutescens* (*C. longii*)

### GREENWHITE SEDGE

Provides food for wildlife.

**HABITAT** Moist to wet woods and meadows; pH 4.3-7.8.

**CHARACTERISTICS** A tufted sedge; grows to 4' tall; 16" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms in spring.

**SEEDING RATE** 1%-10% of a mix.

**ECOTYPE** Coastal Plain NC

Native  
Herbaceous Perennial

INDICATOR REGION



## *Calamagrostis canadensis*

### CANADA BLUEJOINT

An excellent native for wet meadows; provides food and cover for deer, muskrats and moose.

**HABITAT** Swamps, meadows; pH 4.5-8.0.

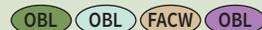
**CHARACTERISTICS** A rhizomatous grass; grows to 5' tall; 16" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from June to August; blue-green foliage.

**SEEDING RATE** 1%-5% of a mix; approx. 3,837,000 seeds per lb.

**ECOTYPE** PA

Native  
Herbaceous Perennial

INDICATOR REGION



## *Carex comosa*

### COSMOS (BRISTLY) SEDGE

Provides food and cover for wildlife.

**HABITAT** Swamps, marshes, swales; pH 4.6-7.5.

**CHARACTERISTICS** A rhizomatous bunch-type sedge; grows from 2'-4' tall; 8" minimum root depth; moderate shade tolerance; low drought tolerance; low salt tolerance; blooms from mid-May to mid-July.

**SEEDING RATE** 1%-10% of a mix; approx. 480,000 seeds per lb.

**ECOTYPE** PA

Native  
Herbaceous Perennial

INDICATOR REGION



## *Carex alata*

### BROADWING SEDGE

Adds diversity to detention basins and wetlands; provides food for wildlife.

**HABITAT** Marshes, low woods.

**CHARACTERISTICS** A bunch-type sedge; grows from 1'-3' tall; blooms from early May to late June.

**SEEDING RATE** 1%-10% of a mix.

**ECOTYPE** Southeastern VA

Native  
Herbaceous Perennial

INDICATOR REGION



## *Carex crinita*

### FRINGED (NODDING) SEDGE

Provides food and cover for songbirds, ruffed grouse chicks, ducks and moose.

**HABITAT** Moist to wet soils, thickets, marshes, ditches, streambanks; pH 4.0-7.5.

**CHARACTERISTICS** A bunch-type sedge; grows to 4' tall; 18" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from May to June.

**SEEDING RATE** 1%-10% of a mix; approx. 650,000 seeds per lb.

**ECOTYPE** PA; NC

Native  
Herbaceous Perennial

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

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- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

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  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION



## Carex folliculata

### NORTHERN LONG SEDGE

*Provides food for wildlife.*

**HABITAT** Bogs, swamps, wet woods; may tolerate low pH.

**CHARACTERISTICS** A rhizomatous sedge; grows to 3' tall; moderate shade tolerance; blooms from mid-May to mid-June.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## Carex granularis var. haleana

### LIMESTONE MEADOW SEDGE

*Provides food for wildlife.*

**HABITAT** Wet meadows, swales, moist limestone cliffs; pH 4.3-7.8.

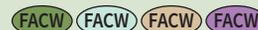
**CHARACTERISTICS** A bunch-type sedge; grows to 2-1/2' tall; 8" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms in mid-spring.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## Carex frankii

### FRANK'S SEDGE

*Establishes quickly from seed; provides food for wildlife.*

**HABITAT** Moist woods, stream-banks, low marshy ground, ditches; pH 5.9-7.2.

**CHARACTERISTICS** A rhizomatous sedge; grows to 2' tall; 9" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms in late spring.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## Carex grayi

### GRAY'S SEDGE

*A decorative species; often used for ornamental purposes in shaded areas; provides food and cover for wildlife.*

**HABITAT** Swamps, wet soils.

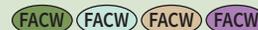
**CHARACTERISTICS** A bunch-type sedge; grows from 1'-3' tall; 8" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from mid-June to mid-September; long-lasting seedheads; dark green leaves.

**SEEDING RATE** 1%-10% of a mix; approx. 19,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## Carex glaucescens

### SOUTHERN WAXY SEDGE

*Provides food for wildlife.*

**HABITAT** Swamps, woods, wet meadows; pH 4.8-7.0.

**CHARACTERISTICS** A bunch-type sedge; grows to 3' tall; 8" minimum root depth; shade tolerant; no drought tolerance; no salt tolerance.

**SEEDING RATE** 1%-10% of a mix.

**ECOTYPE** NC

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## Carex gynandra

### NODDING SEDGE

*Provides early summer food and cover for wildlife.*

**HABITAT** Swamps, swampy woods, lake margins.

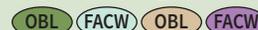
**CHARACTERISTICS** A bunch-type sedge; grows to 5' tall; blooms from May to June; large seed-bearing spikes droop from dense foliage.

**SEEDING RATE** 1%-10% of a mix.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION





## Carex intumescens

### BLADDER (STAR) SEDGE

*Provides food and cover for wildlife.*

**HABITAT** Wet woods, meadows, swamps; pH 4.8-7.0.

**CHARACTERISTICS** A bunch-type sedge; grows to 3' tall; 8" minimum root depth; shade tolerant; no drought tolerance; no salt tolerance; blooms from May to September.

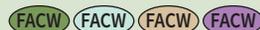
**SEEDING RATE** 1%-10% of a mix; approx. 40,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## Carex pensylvanica

### PENNSYLVANIA SEDGE

*An alternative sod that tolerates sandy soils; ideal ground cover in a mature deciduous forest.*

**HABITAT** Open woods, wooded slopes.

**CHARACTERISTICS** A stoloniferous sod-forming sedge; grows to 16" tall; tolerates a wide range of light conditions; blooms from late May to July; green in early spring.

**SEEDING RATE** Available as plants only.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## Carex lupulina

### HOP SEDGE

*Ducks enjoy the large seed grains; provides food and cover for wildlife.*

**HABITAT** Swamps, bogs, wet woods; pH 6.2-7.0.

**CHARACTERISTICS** A bunch-type sedge; grows to 4' tall; 18" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from June to October.

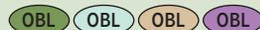
**SEEDING RATE** 1%-10% of a mix; approx. 94,700 seeds per lb.

**ECOTYPE** PA; MD; Coastal Plain NC

Native

Herbaceous Perennial

INDICATOR REGION



## Carex scoparia

### BLUNT BROOM SEDGE

*Provides food and cover for songbirds, ruffed grouse chicks, ducks and moose.*

**HABITAT** Swamps, moist to dry open ground; pH 4.6-6.9.

**CHARACTERISTICS** A bunch-type sedge; grows from 8"-36" tall; 8" minimum root depth; shade tolerant; no drought tolerance; low salt tolerance; blooms from July to August.

**SEEDING RATE** 1%-10% of a mix; approx. 1,344,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## Carex lurida

### LURID (SHALLOW) SEDGE

*Provides food and cover for songbirds, ruffed grouse chicks, ducks and moose.*

**HABITAT** Swamps, bogs, wet woods; pH 4.9-6.8.

**CHARACTERISTICS** A bunch-type sedge; grows to 3' tall; 16" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from June to July in Regions 1 and 3; May to June in Region 2.

**SEEDING RATE** 1%-20% of a mix; approx. 250,000 seeds per lb.

**ECOTYPE** PA; VA; NC

Native

Herbaceous Perennial

INDICATOR REGION



## Carex squarrosa

### SQUARROSE SEDGE

*Provides food and cover for wildlife.*

**HABITAT** Streambanks, moist woods, marshes; pH 5.6-7.3.

**CHARACTERISTICS** A bunch-type sedge; grows from 1'-3' tall; 8" minimum root depth; shade tolerant; no drought tolerance; no salt tolerance; blooms from June to July.

**SEEDING RATE** 1%-10% of a mix.

**ECOTYPE** PA; VA

Native

Herbaceous Perennial

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species

- UPL** Upland species
- NO** No occurrence
- NI** No indicator

SEE PAGE 9 FOR EXPLANATION



## Carex stipata

### AWL SEDGE

*Matures early in the season; provides food and cover for wildlife.*

**HABITAT** Wet meadows, swampy woods; pH 4.9-7.9.

**CHARACTERISTICS** A bunch-type sedge; grows from 16"-36" tall; 8" minimum root depth; shade tolerant; low drought tolerance; low salt tolerance; blooms from May to August.

**SEEDING RATE** 1%-10% of a mix; approx. 544,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## Chasmanthium latifolium

### RIVER OATS

*A decorative native grass that adds variety and texture to wildflower mixes; great for riparian sites; provides food and cover for wildlife.*

**HABITAT** Riverbanks, alluvial woods; pH 5.0-7.0.

**CHARACTERISTICS** A rhizomatous bunchgrass; grows to 4' tall; 10" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; flood tolerant; blooms from June to August.

**SEEDING RATE** 1%-40% of a mix; approx. 90,000 seeds per lb.

**ECOTYPE** PA/VA blend; WV; Coastal Plain NC; 'Suther'-Piedmont NC; SC

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## Carex stricta

### TUSSOCK SEDGE

*Provides a habitat for turtles; a source of food and cover for wildlife.*

**HABITAT** Swamps, streambanks, wet meadows; pH 3.5-7.0.

**CHARACTERISTICS** A tussock-forming sedge; grows to 3' tall; 18" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from May to June.

**SEEDING RATE** 1%-5% of a mix; approx. 1,800,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## Chasmanthium laxum

### SLENDER WOODOATS

*A decorative native grass that can be used in floodplain situations.*

**HABITAT** Moist sandy soils of the Coastal Plain; pH 4.5-7.0.

**CHARACTERISTICS** Grows to 3' tall; 10" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; moderate anaerobic tolerance; blooms in summer.

**SEEDING RATE** 1%-40% of a mix; approx. 85,000 seeds per lb.

**ECOTYPE** NC

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## Carex vulpinoidea

### FOX SEDGE

*Often the easiest sedge to establish; provides food and cover for wildlife.*

**HABITAT** Moist meadows, fields, roadside ditches; pH 6.8-8.9.

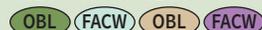
**CHARACTERISTICS** A bunch-type sedge; establishes well from seed; grows to 3' tall; 16" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from June to August.

**SEEDING RATE** 1%-40% of a mix; approx. 1,297,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## Cinna arundinacea

### WOOD REEDGRASS

*An excellent cover in forested wetlands; provides forage for wildlife.*

**HABITAT** Woods, swamps, wet meadows; pH 4.0-8.5.

**CHARACTERISTICS** A bunch-type grass; grows to 5' tall; 16" minimum root depth; very shade tolerant; low drought tolerance; no salt tolerance; blooms from August to September; decorative seedheads.

**SEEDING RATE** 1%-10% of a mix.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION





## *Cyperus esculentus*

### CHUFA (NUTSEEDGE)

The tubers are eaten by a wide variety of wildlife that can dig them from the soil.

**HABITAT** Moist ground of fields, meadows, lawns, gardens; pH 5.0-7.0.

**CHARACTERISTICS** A rhizomatous species; grows from 8"-36" tall; 10" minimum root depth; full sun; moderate drought tolerance; low salt tolerance; blooms from August to September.

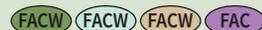
**SEEDING RATE** 5 lb per acre in a mix.

**VARIETIES** Common commercial

Native

Herbaceous Perennial

INDICATOR REGION



## *Elymus canadensis*

### CANADA WILDRYE

Establishes quickly in disturbed areas; used for soil stabilization; provides food and cover for wildlife.

**HABITAT** Alluvial thickets, open fields; establishes best in well-drained soils; pH 5.0-7.9.

**CHARACTERISTICS** A cool season bunchgrass; grows from 3'-6" tall; 16" minimum root depth; shade tolerant; moderate drought tolerance; moderate salt tolerance; blooms from June to August; seedheads are 6"-8" long with two spikelets at each node; produces small grain seeds; year-round green foliage.

**SEEDING RATE** 10 PLS lb per acre alone; 1%-25% of a mix; approx. 114,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

Native

Herbaceous Perennial

INDICATOR REGION



## *Dactylis glomerata*

### ORCHARDGRASS

A reliable grass for many grazing programs; provides excellent livestock forage.

**HABITAT** Open fields, roadsides with well-drained medium-textured soils; pH 5.5-8.2.

**CHARACTERISTICS** A long-lived cool season bunchgrass with a dense root system; grows from 2'-4' tall; 12" minimum root depth; moderate shade tolerance; moderate drought tolerance; low salt tolerance; blooms in May.

**SEEDING RATE** 5-10 lb per acre in a mix; approx. 427,000 seeds per lb.

**VARIETIES** 'Pennlate' (matures in late May to early June); 'Potomac' (matures in early May); 'Tekapo'; Common commercial

Naturalized

Herbaceous Perennial

INDICATOR REGION



## *Elymus glabriflorus*

### SOUTHEASTERN WILDRYE

A useful species for erosion control; provides good livestock forage (should not be mowed or grazed below 6").

**HABITAT** Alluvial fields, clearings, floodplain forests.

**CHARACTERISTICS** A short-lived cool season bunchgrass; grows to 4-1/2' tall; moderate shade tolerance.

**SEEDING RATE** 10-30 PLS lb per acre alone; 1%-25% of a mix.

**ECOTYPE** MD

Native

Herbaceous Perennial

INDICATOR REGION



## *Echinochloa muricata*

### BARNYARDGRASS

An excellent cover crop for moist and wet disturbed soils; *Echinochloa crusgalli* var. *frumentacea* (Japanese Millet) is a non-native substitute; provides food for songbirds and game birds.

**HABITAT** Moist ground, alluvial shores.

**CHARACTERISTICS** A bunchgrass that annually reseeds itself; grows to 5' tall; blooms from July to August; greenish-purple seedheads.

**SEEDING RATE** 10 lb per acre alone; 1%-33% of a mix.

**VARIETIES** Common commercial

Native

Herbaceous Annual

INDICATOR REGION



## *Elymus hystrix* (*Hystrich patula*)

### BOTTLEBRUSH GRASS

A decorative woodland species used for soil stabilization; provides food and cover for wildlife.

**HABITAT** Moist alluvial woods.

**CHARACTERISTICS** A cool season bunchgrass; grows from 2'-5" tall; shade tolerant; blooms from June to August; bottlebrush-like seedheads have spikes up to 4" long; produces small grain seeds; year-round foliage.

**SEEDING RATE** 10 PLS lb per acre alone; 1%-25% of a mix; approx. 75,000 seeds per lb.

**ECOTYPE** PA; Midwestern U.S.

Native

Herbaceous Perennial

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION



## *Elymus riparius*

### RIVERBANK WILDRYE

A reclamation and conservation species used for soil stabilization; often mixed with Virginia Wildrye; provides food and cover for wildlife.

**HABITAT** Alluvial flats, meadows, streambanks; pH 4.5-7.1.

**CHARACTERISTICS** A cool season bunchgrass; grows from 3'-5' tall; 10" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from July to August; year-round foliage.

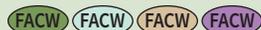
**SEEDING RATE** 10 PLS lb per acre alone; 1%-25% of a mix; approx. 125,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Eragrostis elliottii*

### FIELD LOVEGRASS

An ornamental grass used for soil stabilization; grows well in open wet areas.

**HABITAT** Savannas, waste places.

**CHARACTERISTICS** A fast-establishing clump-forming species; grows to 3' tall; blooms from September to October.

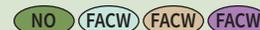
**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** FL

Native

Herbaceous Perennial

INDICATOR REGION



## *Elymus virginicus*

### VIRGINIA WILDRYE

Used for soil stabilization and revegetation of wetlands; often found with Riverbank Wildrye; provides food and cover for wildlife.

**HABITAT** Moist woods, meadows, riverbanks; pH 5.0-7.4.

**CHARACTERISTICS** A short-lived cool season bunchgrass; grows from 3'-6' tall; 12" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; blooms from June to October.

**SEEDING RATE** 10 PLS lb per acre alone; 1%-25% of a mix; approx. 73,000 seeds per lb.

**ECOTYPE** PA; New England; 'Suther'-Piedmont NC; AR; GA

Native

Herbaceous Perennial

INDICATOR REGION



## *Eragrostis hirsuta*

### BIGTOP LOVEGRASS

An attractive addition to upland meadows; early fall color.

**HABITAT** Open disturbed habitats, clearings, roadsides, fields.

**CHARACTERISTICS** A bunchgrass; grows to 4' tall; full sun; blooms from July to October; pinkish-purple panicles.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** VA

Native

Herbaceous Perennial

INDICATOR REGION



## *Eragrostis curvula*

### WEeping LOVEGRASS

An ornamental grass that grows south of the Mason-Dixon Line; used for soil stabilization on steep slopes.

**HABITAT** Light-textured, low-fertility and well-drained soils; pH 4.5-8.0.

**CHARACTERISTICS** A fast-establishing, short-lived warm season bunchgrass; grows to 3' tall; 14" minimum root depth; full sun; high drought tolerance; low salt tolerance; blooms in midsummer; large seedheads.

**SEEDING RATE** 5%-20% of a mix; approx. 1,482,000 seeds per lb.

**VARIETIES** Common commercial

Naturalized

Herbaceous Perennial

INDICATOR REGION



## *Eragrostis spectabilis*

### PURPLE LOVEGRASS

A low-growing native grass; provides a short visual layer when used with Little Bluestem or Sideoats Grama; early fall color.

**HABITAT** Sandy fields, pastures, roadsides, open woods, open areas, tolerates low-fertility soils; pH 4.0-7.5.

**CHARACTERISTICS** A short-rhizomed bunchgrass; grows from 1'-3' tall; 4" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms from August to October; produces a purplish panicle.

**SEEDING RATE** 1%-5% of a mix; approx. 1,000,000 seeds per lb.

**VARIETIES** VA; FL

Native

Herbaceous Perennial

INDICATOR REGION





## *Eragrostis trichodes*

### SAND LOVEGRASS

*Provides cover for wildlife.*

**HABITAT** Dry sand, prairies, open woods; pH 5.0-7.8.

**CHARACTERISTICS** A leafy warm season bunchgrass with a dense, deep root system; grows from 1'-3' tall; 16" minimum root depth; full sun; high drought tolerance; low salt tolerance; blooms in midsummer; loose purple or red seedheads are 6"-12" long.

**SEEDING RATE** 5%-20% of a mix; approx. 1,626,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## *Festuca arundinacea* (*Lolium arundinaceum*) (*F. elatior*)

### TALL FESCUE

*Used for mine reclamation, stabilizing grassed waterways, slopes, lawns and recreation areas.*

**HABITAT** Low-fertility, acid, clay and loamy sandy soils; pH 5.0-9.0 (pH 6.0-7.0 for lawns).

**CHARACTERISTICS** A fibrous-rooted cool season bunchgrass; grows from 3'-4' tall; 12" minimum root depth; moderate shade tolerance; moderate drought tolerance; moderate salt tolerance; blooms from May to June; flat coarse leaves.

**SEEDING RATE** Up to 35% of a mix; approx. 205,000 seeds per lb.

**VARIETIES** 'Fawn' (reclamation and forage); turf and forage types

**Naturalized**

**Herbaceous Perennial**

INDICATOR REGION



## *Erianthus contortus* (*Saccharum contortum*)

### SHORTBEARD PLUMEGRASS

*A tall native species for moist to dry soils.*

**HABITAT** Woodland borders, ditches, low woods; pH 4.0-7.5.

**CHARACTERISTICS** A warm season bunchgrass; grows to 6' tall; full sun; moderate drought tolerance; blooms from late July to late October.

**SEEDING RATE** 8-10 PLS lb per acre alone; 1%-25% of a mix.

**ECOTYPE** Southeastern VA

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## *Festuca ovina* var. *duriuscula* (*F. longifolia*)

### HARD FESCUE

*Used for reclamation and roadway revegetation where short vegetation is essential; a good wildflower companion crop.*

**HABITAT** Low-fertility well-drained soils; pH 4.5-8.5 (pH 6.0-7.0 for lawns).

**CHARACTERISTICS** A cool season bunchgrass; grows from 6"-24" tall; 10" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms from June to July; rounded smooth leaves.

**SEEDING RATE** 35% of a mix; approx. 592,000 seeds per lb.

**VARIETIES** Common commercial

**Naturalized**

**Herbaceous Perennial**

INDICATOR REGION



## *Eriophorum virginicum*

### TAWNY COTTONGRASS

**HABITAT** Swamps, bogs, swales; pH 3.8-6.5.

**CHARACTERISTICS** A decorative single-crown bog species; grows to 3' tall; 14" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from July to September; cottony white seedheads.

**SEEDING RATE** 1%-2% of a mix; approx. 180,000 seeds per lb.

**ECOTYPE** PA

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## *Festuca ovina* var. *glauca* (*F. arvernensis*) (*F. glauca*)

### BLUE FESCUE

*Used for ground cover and erosion control.*

**HABITAT** Open woods, roadsides, dry fields.

**CHARACTERISTICS** An ornamental bunchgrass; grows from 6"-24" tall; full sun; blooms from June to July; smooth bluish leaves.

**SEEDING RATE** 30 lb per acre in a wildflower mix for erosion control; up to 35% of a mix.

**VARIETIES** Common commercial

**Naturalized**

**Herbaceous Perennial**

INDICATOR REGION



## INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL Obligate wetland species
- FACW Facultative wetland species
- FAC Facultative species
- FACU Facultative upland species

- UPL Upland species
- NO No occurrence
- NI No indicator

SEE PAGE 9 FOR EXPLANATION



## **Festuca ovina**

### **SHEEP FESCUE**

*Used for reclamation, banks and pastures; adds texture to landscapes.*

**HABITAT** Open woods, dry fields, roadsides; pH 5.5-7.5.

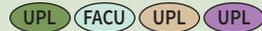
**CHARACTERISTICS** A fine-leaved cool season bunchgrass; grows from 6"-24" tall; 10" minimum root depth; moderate shade tolerance; high drought tolerance; no salt tolerance; blooms from June to July; leaves roll inward.

**SEEDING RATE** 30 lb per acre in a wildflower mix for steep slopes; up to 35% of a mix; approx. 530,000 seeds per lb.

**VARIETIES** Common commercial

**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## **Glyceria canadensis**

### **RATTLESNAKE GRASS**

*Provides food for waterfowl, muskrats and deer through winter.*

**HABITAT** Marshes, swamps, wet woods; pH 5.0-8.5.

**CHARACTERISTICS** A cool season bunchgrass; grows to 3' tall; 16" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from June to August; ornamental seedheads resemble a rattlesnake's tail.

**SEEDING RATE** 1%-10% of a mix; approx. 1,184,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Festuca rubra ssp. commutata**

### **CHEWINGS FESCUE**

*Used for erosion control on slopes, waterways and reclamation areas.*

**HABITAT** Well-drained acid soils.

**CHARACTERISTICS** A fine-leaved bunchgrass; grows from 2'-3' tall; blooms from June to July.

**SEEDING RATE** Up to 60 lb per acre in a mix; up to 35% of a mix; approx. 500,000 seeds per lb.

**VARIETIES** Common commercial

**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## **Glyceria grandis**

### **AMERICAN MANNAGRASS**

*Provides food for waterfowl, muskrats and deer through winter.*

**HABITAT** Shallow water, wet meadows.

**CHARACTERISTICS** A decorative, wetland cool season bunchgrass; grows to 6' tall; blooms from June to August; purple seedheads.

**SEEDING RATE** 1%-10% of a mix; approx. 659,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Festuca rubra**

### **CREEPING RED FESCUE**

*Used for a no-mow cover and erosion control; provides a habitat for wildlife.*

**HABITAT** Dry woods, roadsides, open ground; pH 5.0-8.0 (pH 6.0-7.0 for lawns).

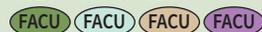
**CHARACTERISTICS** A rhizomatous sod-forming species; grows from 1'-2' tall; 12" minimum root depth; moderate shade tolerance; moderate drought tolerance; moderate salt tolerance; blooms from June to July.

**SEEDING RATE** Up to 60 lb per acre in a mix; up to 35% of a mix; approx. 245,000 seeds per lb.

**VARIETIES** 'Pennlawn'; Common commercial

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Glyceria septentrionalis**

### **FLOATING MANNAGRASS**

*This early season native grass emerges through shallow water pools and quickly develops seedheads.*

**HABITAT** Shallow water, very wet soils.

**CHARACTERISTICS** A cool season bunchgrass; grows to 4-1/2' tall; blooms from April to June.

**SEEDING RATE** 1%-2% of a mix.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION





## *Glyceria striata*

### FOWL MANNAGRASS

*Provides winter food for waterfowl, muskrats and deer.*

**HABITAT** Wet woods, swamps, bogs; pH 4.0-8.0.

**CHARACTERISTICS** A rhizomatous cool season bunchgrass; grows to 4' tall; 4" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from June to September; stays green through winter.

**SEEDING RATE** 1%-10% of a mix; approx. 1,540,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Iris virginica*

### VIRGINIA IRIS

*A native species; low pollinator value.*

**HABITAT** Swamps, marshes, meadows, ditches; pH 4.8-7.3.

**CHARACTERISTICS** A rhizomatous species; grows to 3-1/2' tall; 6" minimum root depth; shade tolerant; no drought tolerance; no salt tolerance; blooms in spring; blue flowers.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** IA

Native

Herbaceous Perennial

INDICATOR REGION



## *Hordeum jubatum*

### FOXTAIL BARLEY

*In early summer, often seen along roadsides that are subject to compaction and salt runoff.*

**HABITAT** Abandoned fields, roadsides, open ground.

**CHARACTERISTICS** A bunchgrass; grows from 6"-24" tall; salt tolerant; blooms from July to August; long awns have a silvery-metallic look.

**SEEDING RATE** 1%-50% of a mix.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Juncus canadensis*

### CANADIAN RUSH

*A decorative native grass in bogs.*

**HABITAT** Swamps, marshes, bogs, riverbanks, swales; pH 4.5-5.9.

**CHARACTERISTICS** A bunch-type species; grows to 3' tall; 12" minimum root depth; moderate shade tolerance; no drought tolerance; moderate salt tolerance; blooms from July to October.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Iris versicolor*

### BLUEFLAG

*Provides food for waterfowl, marsh birds and muskrats; low pollinator value.*

**HABITAT** Wet meadows, bogs, marshes; pH 5.0-7.0.

**CHARACTERISTICS** A decorative rhizomatous species; grows to 2' tall; moderate shade tolerance; blooms from May to June; purplish-blue flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 18,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Juncus coriaceus*

### LEATHERY RUSH

*A decorative native grass.*

**HABITAT** Swamps, pond and stream margins (typically in the Coastal Plain and Piedmont).

**CHARACTERISTICS** A bunch-type species; grows from 1'-3' tall; blooms from June to September.

**SEEDING RATE** 0.5%-3% of a mix.

**VARIETIES** Coastal Plain NC

Native

Herbaceous Perennial

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL Obligate wetland species
- FACW Facultative wetland species
- FAC Facultative species
- FACU Facultative upland species

- UPL Upland species
- NO No occurrence
- NI No indicator

SEE PAGE 9 FOR EXPLANATION



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Juncus effusus*

### SOFT RUSH

*A species with a wide geographic distribution; provides spawning grounds for bluegills in shallow water; a source of food and cover for songbirds and waterfowl.*

**HABITAT** Swamps, moist fields, floodplains, shores, ditches; pH 5.5-7.0.

**CHARACTERISTICS** A bunch-type species; grows to 4' tall; 24" minimum root depth; full sun; moderate drought tolerance; low salt tolerance; blooms from July to September in Regions 1 and 3; March to May in Region 2. This species has a long bloom window; our observations indicate peak bloom times: May to June in NC; April to June in FL.

**SEEDING RATE** 1%-5% of a mix; approx. 45,359,000 seeds per lb.

**ECOTYPE** PA; 'Suther'-Piedmont NC; Coastal Plain NC; Suwannee County, FL



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Juncus tenuis*

### PATH RUSH

*Tolerates foot traffic, but not close mowing.*

**HABITAT** Moist to dry, often heavily compacted, soils of woods, fields, open ground, paths; pH 4.5-7.0.

**CHARACTERISTICS** A bunch-type species with wire-like stems; grows from 4"-24" tall; 6" minimum root depth; moderate shade tolerance; low drought tolerance; low salt tolerance; blooms from May to June.

**SEEDING RATE** 1%-3% of a mix; approx. 29,000,000 seeds per lb.

**ECOTYPE** PA; NC



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Koeleria macrantha*

### JUNEGRASS

**HABITAT** Dry soils; pH 6.0-8.0.

**CHARACTERISTICS** A decorative cool season bunchgrass; grows to 3' tall; 20" minimum root depth; shade tolerant; high drought tolerance; no salt tolerance; blooms from June to July.

**SEEDING RATE** 1%-10% of a mix; approx. 2,315,000 seeds per lb.

**ECOTYPE** Midwestern U.S.



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Leersia oryzoides*

### RICE CUTGRASS

*Creates a natural sediment trap; not recommended for use in residential settings as the vegetation can cause cuts to the skin (which gives the species its common name); provides food for ducks and a habitat for invertebrates.*

**HABITAT** Marshes, bogs, wet meadows; pH 5.1-8.8.

**CHARACTERISTICS** A rhizomatous warm season species; grows to 3' tall; 14" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from June to October.

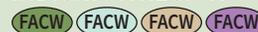
**SEEDING RATE** 1%-20% of a mix; approx. 610,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Lilium superbum*

### TURK'S CAP LILY

*Provides nectar for hummingbirds.*

**HABITAT** Moist meadows, low woods, swales in sandy peat soils.

**CHARACTERISTICS** A lily species; grows to 7' tall; blooms from July to August; yellow to reddish-orange flowers.

**SEEDING RATE** 1%-2% of a mix.

**ECOTYPE** PA



**Naturalized**  
**Herbaceous Annual**

INDICATOR REGION



## *Lolium multiflorum* (*L. perenne* var. *italicum*)

### ANNUAL RYEGRASS

*Provides quick protection against soil, wind and water erosion; used as a companion or cover crop where erosion is an immediate concern; frequently reseeds itself in disturbed areas.*

**HABITAT** Loose fertile to semi-fertile soils; pH 5.0-7.9 (pH 6.0-7.0 for lawns).

**CHARACTERISTICS** A short-lived cool season bunchgrass; grows from 1'-4' tall; 8" minimum root depth; moderate shade tolerance; low drought tolerance; high salt tolerance; blooms from May to June.

**SEEDING RATE** 5-12 lb per acre as a companion crop; up to 10% of a mix; approx. 217,000 seeds per lb.

**VARIETIES** Common commercial



## **Lolium perenne**

### **PERENNIAL RYEGRASS**

*Used for soil stabilization, reclamation, pastures, athletic fields and lawns.*

**HABITAT** Medium-fertility acid, clay and loamy soils; pH 5.2-7.5 (pH 6.0-7.0 for lawns).

**CHARACTERISTICS** A fast-growing, short-term cool season bunchgrass; grows from 1'-2' tall; 10" minimum root depth; full sun; low drought tolerance; moderate salt tolerance; blooms from June to July.

**SEEDING RATE** 20%-50% of a mix; approx. 240,000 seeds per lb.

**VARIETIES** Turf, forage and pasture types

**Naturalized**

**Herbaceous Perennial**

INDICATOR REGION



## **Panicum amarum**

### **COASTAL PANICGRASS**

*Used for stabilization of coastal dunes, wind erosion control and reclamation of gravel and mine areas; provides food and cover for wildlife.*

**HABITAT** Sandy shores, alluvium, fields, banks; pH 5.0-7.59.

**CHARACTERISTICS** A warm season bunchgrass with a deep root system; grows from 3'-6' tall; 16" minimum root depth; full sun; high drought tolerance; moderate salt tolerance; blooms in September in Regions 1 and 3; October in Region 2; bluish-green leaves.

**SEEDING RATE** 10 PLS lb per acre alone; up to 33% of a mix; approx. 325,000 seeds per lb.

**VARIETIES - STATE OF ORIGIN** 'Atlantic'-VA

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## **Muhlenbergia capillaris**

### **HAIRAWN MUHLY**

*A decorative grass used in meadows, along roadways and woodland margins in southern states.*

**HABITAT** Usually sandy or rocky soils of ridges, flatwoods, swales, saline flats, beaches, dunes; pH 5.8-6.8.

**CHARACTERISTICS** A tufted grass; grows to 3' tall; 9" minimum root depth; full sun; low drought tolerance; high salt tolerance; blooms from summer through winter; straw-colored panicles on long rolled leaves; red to white seedheads during bloom period.

**SEEDING RATE** 1%-3% of a mix; approx. 1,400,000 seeds per lb.

**ECOTYPE** FL

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## **Panicum anceps**

### **BEAKED PANICGRASS**

*This low-growing Panicum provides food and cover for wildlife; good cattle-grazing value.*

**HABITAT** Moist sandy soils of ditches, fields, savannas, low pinelands.

**CHARACTERISTICS** A rhizomatous bunchgrass; grows to 4' tall; moderate shade tolerance; blooms from July to October.

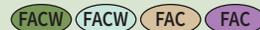
**SEEDING RATE** 1%-35% of a mix.

**ECOTYPE** Eastern Shore MD; VA; SC; GA; FL

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## **Onoclea sensibilis**

### **SENSITIVE FERN**

*Provides food for game birds and deer.*

**HABITAT** Acid soils of marshes, swamps, moist open woods, wet meadows.

**CHARACTERISTICS** A rhizomatous fern; grows to 3' tall; blooms from June to October.

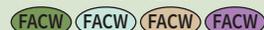
**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** PA

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## **Panicum clandestinum (Dichanthelium c.)**

### **DEERTONGUE**

*Excellent for erosion control and revegetation of acid mine spoil and pipelines through wooded areas; provides food and cover for wildlife.*

**HABITAT** Moist soils of woodland edges and clearings; pH 4.0-7.5.

**CHARACTERISTICS** A warm season bunchgrass with a fibrous root system; grows from 1'-3' tall; 16" minimum root depth; moderate shade tolerance; high drought tolerance; low salt tolerance; blooms from May to September; short broad leaves.

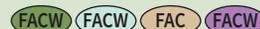
**SEEDING RATE** 10 PLS lb per acre alone; 1%-35% of a mix; approx. 280,000 seeds per lb.

**VARIETIES** 'Tioga' (PA, NY, NH)

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## **INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**



**Native**  
**Herbaceous Annual**

INDICATOR REGION



## **Panicum dichotomiflorum**

### **SMOOTH PANICGRASS**

*Used as a cover crop for wetland establishment; readily reseeds itself; the plants and seeds provide food for ducks, geese, wild turkey, deer, cottontail rabbits and muskrats.*

**HABITAT** Moist soils, open woods, meadows; pH 4.8-7.0.

**CHARACTERISTICS** A warm season bunchgrass; grows to 5' tall; 6" minimum root depth; full sun; no drought tolerance; moderate salt tolerance; blooms from April to August.

**SEEDING RATE** 1%-15% of a mix; approx. 392,000 seeds per lb.

**ECOTYPE** PA

SWITCHGRASS - *continued*



### **VARIETIES - STATE OF ORIGIN**

**'Alamo'**-TX-lowland type; standard performer in southern states for biomass production.

**'Blackwell'**-OK-upland type; performs well in low-fertility wet soils.

**'BoMaster'**-lowland type; genetically selected variety developed jointly by the NC Ag Research Service, NC State University and USDA, Ag Research Service, for biomass production.

**'Carthage'**-NC-upland type; quality forage and good biomass producer.

**'Cave-In-Rock'**-IL-upland type; good biomass producer; a favorite for reclamation and wildlife.

**'Colony'**-lowland type; genetically selected variety developed jointly by the NC Ag Research Service, NC State University and USDA, Ag Research Service, for biomass production.

**'Kanlow'**-OK-lowland type; performs well in wet marginal soils in the Northeast, Southeast and Central U.S. for biomass production.

**'Performer'**-lowland type; genetically selected variety developed jointly by the NC Ag Research Service, NC State University and USDA, Ag Research Service, for livestock forage.

**'Shawnee'**-NE-selected by the University of Nebraska-Lincoln and USDA-ARS, Lincoln, NE, for improved forage quality and yield in the Northeast and Midwest.

**'Shelter'**-NY/WV-upland type; excellent wildlife cover through winter snow areas of the Northeast.

**'Summer'**-intermediate type; early maturing northern variety.

**'Timber'**-lowland type; released by the USDA NRCS, Somerset, NJ, and Rutgers University-Agricultural Experiment Station, New Brunswick, NJ, as a Mid-Atlantic biofeedstock/biofuels crop.

### **ECOTYPE**

**'High Tide'**-Mid-Atlantic ecotype; selected for tidal shorelines and streambank stabilization.

**Long Island-NY**-upland type; short stature; use where sight line is important for urban areas or wildlife habitat.

**'Miami'**-FL-lowland type; native ecotype released by the Plant Materials Center, Brooksville, FL, for wildlife habitat, mine site reclamation and biomass in Florida and coastal states.

**Southern NJ**-upland type; intermediate stature; wildlife habitat.

**'Stuart'**-FL-native lowland ecotype; released by the Plant Materials Center, Brooksville, FL, for wildlife habitat, mine site reclamation and biomass in Florida and coastal states.



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Panicum rigidulum (P. stipitatum)**

### **REDTOP PANICGRASS**

*A common component of wetlands in the Southeast; palatable for livestock.*

**HABITAT** Wet soils of marshes, ditches, low woods; pH 5.0-7.5.

**CHARACTERISTICS** A bunchgrass; grows to 4' tall; 6" minimum root depth; full sun; low salt tolerance; high fire tolerance; blooms from August to October; attractive seedheads and red foliage in late summer and early fall.

**SEEDING RATE** 1%-50% of a mix; approx. 797,000 seeds per lb.

**ECOTYPE** PA; Coastal Plain NC



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Panicum virgatum**

### **SWITCHGRASS**

*Used for biomass in addition to soil stabilization on strip mine spoils and dikes, and in buffer strips for nutrient uptake; provides pasture and hay for cattle and sheep; a source of food and cover for wildlife.*

**HABITAT** Open woods, meadows; pH 4.5-7.5.

**CHARACTERISTICS** A rhizomatous warm season bunchgrass; grows from 4'-6' tall; 12" minimum root depth; full sun; moderate drought tolerance; moderate salt and acid tolerance; blooms from July to September in Regions 1 and 3; June to October in Region 2.

**SEEDING RATE** 8 PLS lb per acre alone; 1%-20% of a mix; approx. 259,000 seeds per lb.



## *Paspalum floridanum*

### FLORIDA PASPALUM (BEADGRASS)

The young leaves are palatable for livestock; the seeds are eaten by doves, quail and turkey.

**HABITAT** Moist sandy soils, woodland openings, grassy areas.

**CHARACTERISTICS** A rhizomatous clump-forming bunchgrass; grows from 3'-6' tall; dark green to bluish stems.

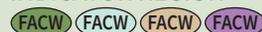
**SEEDING RATE** 8 PLS lb per acre alone; 1%-25% of a mix; approx. 91,000 seeds per lb.

**ECOTYPE** 'Harrison'-TX



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Peltandra virginica*

### ARROW ARUM

The seed must be stored wet; provides food and cover for waterfowl.

**HABITAT** Swamps, stream or lake edges, tidal marshes; pH 5.2-9.5.

**CHARACTERISTICS** A bunch-type species; grows to 3' tall; 16" minimum root depth; moderate shade tolerance; no drought tolerance; no salt tolerance; blooms from May to June; seed pods ripen in fall and contain numerous large seeds.

**SEEDING RATE** 1 lb per 1,000 sq ft; approx. 600 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Poa compressa*

### CANADA BLUEGRASS

A short compact grass.

**HABITAT** Dry woods, fields, rocky outcrops; grows in very poor soils; pH 5.0-7.0.

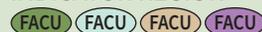
**CHARACTERISTICS** A rhizomatous, sod-forming cool season grass; grows from 7"-24" tall; 1" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; blooms from May to August.

**SEEDING RATE** 200-250 lb per acre alone (lawns); 5%-25% of a mix; approx. 2,393,000 seeds per lb.

**VARIETIES** Common commercial

**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## *Poa palustris*

### FOWL BLUEGRASS

Establishes quickly in wetlands and retention basins; provides food and cover for wildlife.

**HABITAT** Wet meadows, damp soils; pH 4.9-7.5.

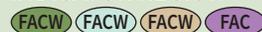
**CHARACTERISTICS** A cool season bunchgrass; grows to 4' tall; 12" minimum root depth; moderate shade tolerance; low drought tolerance; low salt tolerance; blooms from May to August; yellowish-green or purple seedheads.

**SEEDING RATE** 200-250 lb per acre alone (lawns); 10 lb per acre in wet meadow mixes; 5%-25% of a mix; approx. 1,900,000 seeds per lb.

**VARIETIES** Common commercial

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Poa pratensis*

### KENTUCKY BLUEGRASS

Used for lawns and pastures; provides food and cover for wildlife.

**HABITAT** Well-drained fertile soils; tolerates a wide range of soils; pH 5.0-8.4.

**CHARACTERISTICS** A rhizomatous, long-lived, sod-forming cool season grass; grows to 2' tall; 10" minimum root depth; full sun; low drought tolerance; low salt tolerance; blooms from May to June.

**SEEDING RATE** 200-250 lb per acre alone (lawns); 5%-25% of a mix; approx. 1,390,000 seeds per lb.

**VARIETIES** Common commercial; pasture type

**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION



**Naturalized  
Herbaceous Perennial**

INDICATOR REGION



## *Poa trivialis*

### ROUGH BLUEGRASS

*Good for use in detention basins; grows well in early spring; provides food and cover for wildlife.*

**HABITAT** Wet meadows, moist woods, roadsides; pH 4.8-7.5.

**CHARACTERISTICS** A cool season bunchgrass; grows from 1'-3' tall; 12" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from mid-June to mid-July.

**SEEDING RATE** 200-300 lb per acre alone (lawns); 10 lb per acre in wildlife habitat mixes; 10%-25% of a mix; approx. 2,090,000 seeds per lb.

**VARIETIES** Common commercial



**Native  
Herbaceous Perennial**

INDICATOR REGION



## *Pontederia cordata*

### PICKERELWEED

*The seeds should be stored wet; provides food for wildlife.*

**HABITAT** Swampy edges of lakes and streams, along tidal shores; pH 6.0-8.0.

**CHARACTERISTICS** An ornamental wetland bunchgrass; grows to 3' tall; 10" minimum root depth; full sun; no drought tolerance; low salt tolerance; blooms from July to September; blue-spiked panicles.

**SEEDING RATE** 1 lb per 1,000 sq ft; approx. 5,000 seeds per lb.

**ECOTYPE** PA



**Naturalized  
Herbaceous Perennial**

INDICATOR REGION



## *Puccinellia distans*

### ALKALIGRASS

*Useful for erosion control and along roadsides where salt runoff is prevalent.*

**HABITAT** Roadsides, disturbed sites.

**CHARACTERISTICS** A bunchgrass; grows from 6"-24" tall; full sun; salt tolerant; blooms from June to July.

**SEEDING RATE** 10%-25% of a mix; approx. 1,200,000 seeds per lb.

**VARIETIES** Common commercial



**Native  
Herbaceous Annual/  
Perennial**

INDICATOR REGION



## *Rhynchospora globularis*

### GLOBE BEAKSEEDGE

*Provides wildlife habitat.*

**HABITAT** Low pinelands, meadows, savannas, ditches.

**CHARACTERISTICS** A clump-forming species; grows to 3' tall; blooms from June to September.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** Coastal Plain NC



**Native  
Herbaceous Perennial**

INDICATOR REGION



## *Sagittaria latifolia*

### DUCK POTATO (ARROWHEAD)

*The tubers provide food for waterfowl, muskrats and beavers.*

**HABITAT** Swamps, wet shores, shallow water of ponds and streams; pH 4.7-8.6.

**CHARACTERISTICS** An ornamental wetland species; produces large underground tubers; grows to 3' tall; 18" minimum root depth; full sun; no drought tolerance; no salt tolerance; blooms from July to August; spikes of delicate white flowers.

**SEEDING RATE** 1%-10% of a mix; approx. 67,000 seeds per lb.

**ECOTYPE** PA; Midwestern U.S.



**Native  
Herbaceous Perennial**

INDICATOR REGION



## *Schizachyrium scoparium* (*Andropogon scoparius*)

### LITTLE BLUESTEM

*Good for upland meadows where sight lines are important; used for erosion control on droughty sites; provides summer forage for livestock; a source of food and cover for wildlife; grows with open exposed surfaces that host ground nesting pollinators.*

**HABITAT** Old fields, roadsides, slopes, meadows; pH 5.8-6.8.

**CHARACTERISTICS** A bunchgrass with a dense root system (reaching as deep as 8'); produces long-lived stands; grows from 2'-3' tall; 10" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms from July to October; purplish seedheads; grayish-green foliage.

**SEEDING RATE** 8 PLS lb per acre alone; 10%-67% of a mix; approx. 200,000 seeds per lb.

**VARIETIES - STATE OF GENETIC ORIGIN** 'Aldous'-KS; 'Blaze'-NE & KS; 'Camper'-NE & KS

**ECOTYPE** Fort Indiantown Gap-PA; Albany Pine Bush-NY; Long Island-NY; CT; 'Prairie View'-IN; Piedmont NC



## *Scirpus acutus* (*Schoenoplectus a.*)

### HARDSTEM BULRUSH

Provides spawning grounds for bluegills and largemouth bass in shallow water; a source of food and cover for waterfowl and muskrats.

**HABITAT** Shallow water of pond and lake margins; pH 5.2-8.5.

**CHARACTERISTICS** A rhizomatous species; grows from 3'-10' tall; 14" minimum root depth; full sun; moderate drought tolerance; low salt tolerance; blooms from August to September.

**SEEDING RATE** 1%-10% of a mix; approx. 206,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Scirpus cyperinus*

### WOOLGRASS

Stands tall in marshes; provides food and cover for waterfowl and muskrats.

**HABITAT** Moist meadows, marshes, swamps, shores, ditches; pH 4.8-7.2.

**CHARACTERISTICS** A bunch-type species; grows to 5' tall; 12" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from August to September in Regions 1 and 3; July to September in Region 2.

**SEEDING RATE** 1%-3% of a mix; approx 36,000,000 seeds per lb.

**ECOTYPE** PA; Coastal Plain NC

Native

Herbaceous Perennial

INDICATOR REGION



## *Scirpus americanus* (*S. pungens*) (*Schoenoplectus pungens*)

### THREESQUARE BULRUSH

Provides spawning grounds for bluegills and largemouth bass in shallow water; a source of food and cover for waterfowl and muskrats.

**HABITAT** Marshes, moist shores, riverbanks, mud flats; pH 3.7-7.5.

**CHARACTERISTICS** A rhizomatous species; grows to 4' tall; 14" minimum root depth; full sun; low drought tolerance; moderate salt tolerance; blooms from June to September.

**SEEDING RATE** 1%-10% of a mix; approx. 260,000 seeds per lb.

**ECOTYPE** PA

**VARIETIES** Common commercial

Native

Herbaceous Perennial

INDICATOR REGION



## *Scirpus expansus*

### WOOD BULRUSH

Provides cover for wildlife.

**HABITAT** Marshes, wet meadows.

**CHARACTERISTICS** A species that expands by long rhizomes; grows from 3'-6' tall.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Scirpus atrovirens*

### GREEN BULRUSH

Provides cover for wildlife in wet areas.

**HABITAT** Moist meadows, marshes, bogs, streambanks, pond and lake margins; tolerates clay and silt soils found in wet areas; pH 4.0-8.0.

**CHARACTERISTICS** A decorative bunch-type species; grows to 5' tall; 12" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from June to September.

**SEEDING RATE** 1%-10% of a mix; approx. 11,300,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Scirpus pendulus*

### BROWN BULRUSH

Used for wildlife habitat.

**HABITAT** Wet meadows, marshes; pH 4.9-7.0.

**CHARACTERISTICS** A bunch-forming species; grows to 4-1/2' tall; full sun; no drought tolerance; low salt tolerance; blooms in late spring.

**SEEDING RATE** 1%-2% of a mix.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species

- UPL** Upland species
- NO** No occurrence
- NI** No indicator

SEE PAGE 9 FOR EXPLANATION



## **Scirpus polyphyllus**

### **MANY LEAVED BULRUSH**

*Used for wildlife habitat.*

**HABITAT** Swamps, woods, streambanks.

**CHARACTERISTICS** A bunch-type species; the dense rhizomatous growth stabilizes soil; grows to 4' tall; moderate shade tolerance; blooms from July to August.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Scirpus robustus**

### **STURDY BULRUSH**

*The large seeds are a source of food in salt marshes; provides food and cover for wildlife.*

**HABITAT** Brackish or saline marshes; pH 6.4-8.4.

**CHARACTERISTICS** A rhizomatous species; grows to 3-1/2' tall; 16" minimum root depth; full sun; low drought tolerance; high salt tolerance; blooms from April to August.

**SEEDING RATE** 1%-10% of a mix.

**ECOTYPE** MD

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Scirpus validus (Schoenoplectus tabernaemontani)**

### **SOFTSTEM BULRUSH**

*Provides spawning grounds for fish in shallow water; a source of food for waterfowl and muskrats.*

**HABITAT** Swamps, wet ditches, mud flats, pond and lake margins; pH 5.4-7.5.

**CHARACTERISTICS** A rhizomatous species; grows to 10' tall; 16" minimum root depth; full sun; no drought tolerance; low salt tolerance; blooms from June to September; red flowers.

**SEEDING RATE** 1%-10% of a mix; approx. 496,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Sisirinchium angustifolium**

### **NARROWLEAF BLUE EYED GRASS**

*A short-lived re-seeding species; medium pollinator value.*

**HABITAT** Damp soils of fields, floodplains, meadows, open woods; pH 5.0-7.0.

**CHARACTERISTICS** A clump-forming perennial grass; grows to 1-1/2' tall; 4" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from May to July; blue flowers.

**SEEDING RATE** 1%-2% of a mix; approx. 757,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Sorghastrum elliottii**

### **SLENDER INDIANGRASS**

*Native to the southeastern Coastal Plain; produces attractive seedheads.*

**HABITAT** Cut-over roadsides, dry or low woods.

**CHARACTERISTICS** A tufted grass; grows to 6-1/2' tall; blooms from September to October.

**SEEDING RATE** 1%-50% of a mix.

**ECOTYPE** Piedmont NC

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## **Sorghastrum nutans**

### **INDIANGRASS**

*Good for erosion control, landscaping and roadside beautification; provides food and cover for wildlife.*

**HABITAT** Moist or dry fields, roadsides, serpentine barrens; grows best in deep well-drained soils; pH 5.0-7.8.

**CHARACTERISTICS** A decorative warm season bunchgrass; grows to 6' tall; 24" minimum root depth; full sun; moderate drought tolerance; moderate salt tolerance; blooms from August to October in Regions 1 and 3; September to October in Region 2; attractive bronze seedheads.

**SEEDING RATE** 8-10 PLS lb. per acre alone; 1%-50% of a mix; approx. 175,000 per lb.

**VARIETIES - STATE OF GENETIC ORIGIN** 'Holt'-NE (superior leafiness, early maturing); Nebraska 54

**ECOTYPE** PA; Long Island-NY; Suffolk County-NY; NY4-NY; NE2-New England; 'Southlow'-MI; 'Prairie View'-IN; VA; 'Suther'-Piedmont NC; Piedmont NC; GA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION





## *Sorghastrum secundum*

### LOPSIDED INDIANGRASS

*Native in the South; does not grow on poorly drained sites or on sites subject to standing water; provides good dry forage during winter.*

**HABITAT** Pine flatwoods, sandhills; adapted to well-drained soils.

**CHARACTERISTICS** A warm season bunchgrass; grows from 3'-6' tall; attractive seedheads have narrow, golden brown one-sided panicles.

**SEEDING RATE** 1%-25% of a mix.

**ECOTYPE** FL

Native

Herbaceous Perennial

INDICATOR REGION



## *Spartina pectinata*

### PRAIRIE CORDGRASS

*An aggressive grass; the root system provides erosion control on streambanks; a source of food for waterfowl and songbirds; provides a habitat for muskrats.*

**HABITAT** Sandy shores, alluvial flats; pH 6.0-8.5.

**CHARACTERISTICS** A rhizomatous, sod-forming warm season species; grows to 8' tall; 18" minimum root depth; full sun; low drought tolerance; salt tolerant; blooms from July to August.

**SEEDING RATE** 7-8 PLS lb per acre alone; 1%-25% of a mix; approx. 106,000 seeds per lb.

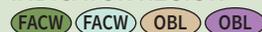
**VARIETIES** 'Red River'-ND; SD; MN (potential biomass variety)

**ECOTYPE** PA; Midwestern U.S.

Native

Herbaceous Perennial

INDICATOR REGION



## *Sparganium americanum*

### EASTERN BUR REED

*An emergent aquatic plant; provides food for waterfowl, muskrats and beavers.*

**HABITAT** Muddy shores, shallow water rivers, streams, swamps, ponds; pH 4.9-7.3.

**CHARACTERISTICS** Grows to 3-1/4' tall; 8" minimum root depth; moderate shade tolerance; no drought tolerance; no salt tolerance; blooms from May to August; greenish-brown flowers; produces ball-shaped seedheads.

**SEEDING RATE** 1%-20% of a mix; approx. 50,000 seeds per lb.

**ECOTYPE** PA; Coastal Plain NC

Native

Herbaceous Perennial

INDICATOR REGION



## *Sporobolus asper* (*Sporobolus compositus* var. *compositus*)

### ROUGH DROPSEED

*Survives in very poor soil conditions with little organic matter.*

**HABITAT** Plains, hills, dry sandy and shaley soils.

**CHARACTERISTICS** Grows from 1-1/2'-4' tall; single-flowered spikelets.

**SEEDING RATE** 5%-15% of a mix; 760,000 seeds per lb.

**ECOTYPE** IA

Native

Herbaceous Perennial

INDICATOR REGION



## *Sparganium eurycarpum*

### GIANT BUR REED

*An emergent aquatic plant; provides food and cover for waterfowl, pheasants, muskrats and beavers.*

**HABITAT** Bogs, swamps, lake margins, ditches, swampy meadows; pH 5.0-8.5.

**CHARACTERISTICS** Grows to 5' tall; 12" minimum root depth; moderate shade tolerance; no drought tolerance; no salt tolerance; blooms from July to August; greenish-brown flowers; produces ball-shaped seedheads.

**SEEDING RATE** 1%-20% of a mix; approx. 10,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Sporobolus cryptandrus*

### SAND DROPSEED

*An early emerging species; provides food and cover for wildlife.*

**HABITAT** Dry open ground, sandy shores; pH 6.6-8.0.

**CHARACTERISTICS** A warm season bunchgrass; grows to 5' tall; 18" minimum root depth; full sun; high drought tolerance; moderate salt tolerance; blooms from June to October.

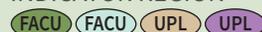
**SEEDING RATE** 2%-10% of a mix; approx. 5,600,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

Native

Herbaceous Perennial

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION



## **Sporobolus heterolepis**

### **PRAIRIE DROPSEED**

*A decorative fine-textured species; can be difficult to germinate; provides food and cover for wildlife.*

**HABITAT** Dry open ground; pH 6.0-7.2.

**CHARACTERISTICS** A short warm season bunchgrass; grows to 3' tall; 12" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from August to September.

**SEEDING RATE** 5%-10% of a mix; approx. 1,200,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## **Sporobolus junceus**

### **PINEWOODS DROPSEED**

*An attractive low-growing grass; appropriate for meadows where sight lines are important; grazed by deer and livestock in spring.*

**HABITAT** Sandhills, sandy woods, flatwoods, fields.

**CHARACTERISTICS** A clump-forming species; grows from 1'-3' tall; moderate shade tolerance; blooms from September to October.

**SEEDING RATE** 1%-50% of a mix.

**ECOTYPE** AL; FL

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## **Tradescantia ohiensis**

### **OHIO SPIDERWORT**

*Blooms open during the morning hours from spring through summer; the flowers close in response to warm temperatures; high pollinator value.*

**HABITAT** Moist alluvial fields, open ground, streambanks.

**CHARACTERISTICS** A flowering species; grows to 3' tall; blooms from late April to mid-July; blue to purple flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 128,000 seeds per lb.

**ECOTYPE** PA; Midwestern U.S.; AL

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## **Tradescantia subaspera**

### **ZIGZAG SPIDERWORT**

*The leaves are wider and it tolerates more heat than Ohio Spiderwort; the flowers close in response to warm temperatures; high pollinator value.*

**HABITAT** Rich moist woods.

**CHARACTERISTICS** A flowering species; grows from 1'-3' tall; moderate shade tolerance; blooms from late spring to early summer; attractive blue flowers.

**SEEDING RATE** 1%-3% of a mix.

**ECOTYPE** VA

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## **Tradescantia virginiana**

### **VIRGINIA SPIDERWORT**

*An attractive late-spring specimen plant that is more compact than Ohio Spiderwort; the flowers close in response to warm temperatures; high pollinator value.*

**HABITAT** Moist woods, meadows; pH 4.0-8.0.

**CHARACTERISTICS** A flowering species; grows to 3' tall; 4" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from late spring to early summer in Regions 1 and 3; April to May in Region 2; blue flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 175,000 seeds per lb.

**ECOTYPE** Southeastern PA/ Northern VA blend

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## **Tridens flavus**

### **PURPLETOP**

*Used for soil stabilization; adds late-season color to native landscapes; provides food and cover for wildlife.*

**HABITAT** Meadows, old fields, roadsides; tolerates low-quality roadside and field soils; pH 4.5-6-5.

**CHARACTERISTICS** A warm season bunchgrass; grows from 2'-5' tall; 10" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms from August to September in Regions 1 and 3; July to October in Region 2; purple spikelets.

**SEEDING RATE** 10 PLS lb per acre alone; 1%-30% of a mix; approx. 465,000 seeds per lb.

**ECOTYPE** PA; Southeastern VA; 'Suther'-Piedmont NC; AL; GA; FL; MO

**Native**

**Herbaceous Perennial**

INDICATOR REGION





**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Tripsacum dactyloides*

### EASTERN GAMAGRASS

An ornamental grass used for landscape seeding; established by planting in fall as a dormant seeding, with germination occurring in spring; requires great patience as seed has high levels of dormancy; an outstanding forage producer; provides food and cover for wildlife.

**HABITAT** Swamps, wet shores, open fields; pH 5.0-7.5.

**CHARACTERISTICS** A warm season bunchgrass; grows to 10' tall in 1'-4' diameter clumps; 20" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms in late June.

**SEEDING RATE** 16-20 PLS lb per acre alone; 5%-40% of a mix; approx. 7,000 seeds per lb.

**VARIETIES - STATE OF ORIGIN** 'Meadowcrest'-MD; 'Bumpers'-AR  
**VARIETIES** Common commercial



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Veratrum viride*

### FALSE HELLEBORE

Emerges in early spring; very attractive vegetative growth.

**HABITAT** Wet woods, swamps.

**CHARACTERISTICS** Grows to 6' tall; blooms from June to July; greenish flowers.

**SEEDING RATE** 1%-3% of a mix.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Typha angustifolia*

### NARROWLEAF CATTAIL

A source of food for snow geese, muskrats and beavers; provides cover for nesting ducks and spawning fish.

**HABITAT** Wet meadows, marshes, shores, ditches; often in calcareous or brackish habitats; pH 3.7-8.5.

**CHARACTERISTICS** A rhizomatous species; grows to 5' tall; 10" minimum root depth; full sun; low drought tolerance; moderate salt tolerance; blooms from June to July.

**SEEDING RATE** 1%-2% of a mix; approx. 14,000,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Annual**

INDICATOR REGION



## *Zizania aquatica*

### WILDRICE

Seed must be kept moist and requires clean still water to grow; provides food for wood ducks, black ducks and muskrats.

**HABITAT** Tidal and non-tidal marshes that are 1' deep or more; pH 6.4-7.4.

**CHARACTERISTICS** A bunchgrass; grows to 10' tall; 6" minimum root depth; full sun; no drought tolerance; low salt tolerance; blooms from June to September.

**SEEDING RATE** 30-40 lb per acre alone; approx. 11,000 seeds per lb; seed in late winter in standing water.

**ECOTYPE** Midwestern U.S.



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Typha latifolia*

### BROADLEAF CATTAIL

A source of food for snow geese, muskrats and beavers; provides cover for nesting ducks and spawning fish.

**HABITAT** Wet shores, swamps, marshes, ditches; pH 5.5-7.5.

**CHARACTERISTICS** A rhizomatous species; grows to 5' tall; 14" minimum root depth; moderate shade tolerance; no drought tolerance; low salt tolerance; blooms from May to June.

**SEEDING RATE** 1%-2% of a mix; approx. 14,000,000 seeds per lb.

**ECOTYPE** PA

## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species

- UPL** Upland species
- NO** No occurrence
- NI** No indicator

SEE PAGE 9 FOR EXPLANATION

# HERBACEOUS FLOWERING SPECIES



## *Agrimonia parviflora*

### SMALL FLOWERED AGRIMONY

Adds structure and texture to wetlands.

**HABITAT** Bogs, moist woods, thickets; tolerates poor soils; pH 6.0-8.0.

**CHARACTERISTICS** A flowering species; grows to 5' tall; 6" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from July to September; yellow flowers.

**SEEDING RATE** 1%-2% of a mix; approx. 288,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Apocynum cannabinum*

### INDIANHEMP

Used by Native Americans to make rope; the stem fiber is used by songbirds and orioles to build nests; butterflies are attracted to the flowers; very high pollinator value.

**HABITAT** Woods, old fields, sandy flats, limestone bluffs, open ground; pH 4.5-7.0.

**CHARACTERISTICS** A flowering species; spreads from underground roots; grows to 4' tall; 12" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from May to September; white flowers.

**SEEDING RATE** 0.1%-1% of a mix; approx. 500,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Anemone canadensis*

### CANADIAN ANEMONE

Medium pollinator value.

**HABITAT** Sandy shores, damp prairies, wet meadows.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 2' tall; blooms from May to August; white flowers.

**SEEDING RATE** 1%-3% of a mix.

**VARIETIES** PA; Midwestern U.S.

Native

Herbaceous Perennial

INDICATOR REGION



## *Aquilegia canadensis*

### EASTERN COLUMBINE

One of the first flowers to bloom in the spring; the nectar attracts hummingbirds; low pollinator value.

**HABITAT** Cliffs, rocky slopes, dry woods; usually calcareous; pH 5.0-8.0.

**CHARACTERISTICS** A flowering species; grows to 2' tall; shade tolerant; blooms from April to June; red and yellow flowers have yellow stamens.

**SEEDING RATE** 1%-2% of a mix; approx. 504,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Anemone virginiana*

### THIMBLEWEED

An excellent species for partially shaded areas; low pollinator value.

**HABITAT** Dry open woods, slopes, edges.

**CHARACTERISTICS** A flowering species; grows from 2'-3' tall; moderate shade tolerance; blooms from June to August; decorative greenish-white flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 448,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Asclepias incarnata*

### SWAMP MILKWEED

A decorative species; provides essential food for monarch butterfly caterpillars; we observe more chrysalis on this milkweed species than on any other in our production fields; very high pollinator value.

**HABITAT** Low swampy ground, wet shores, sphagnum bogs; pH 5.0-8.0.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 5' tall; 18" minimum root depth; full sun; no drought tolerance; no salt tolerance; blooms from June to August; pale-purple to greenish-white flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 70,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

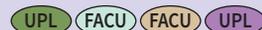
INDICATOR REGION





**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Asclepias syriaca*

### COMMON MILKWEED

*A decorative species with a fragrance resembling that of a lilac; provides essential food for monarch butterfly caterpillars; very high pollinator value.*

**HABITAT** Fields, roadsides, open ground.

**CHARACTERISTICS** A flowering species; spreads from underground roots; grows to 5' tall; blooms from June to August; pale purple flowers have large leaves.

**SEEDING RATE** 1%-3% of a mix; approx. 70,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Aster ericoides* (*Symphyotrichum e.*)

### WHITE HEATH ASTER

*A very attractive mid-summer to fall-blooming flower.*

**HABITAT** Dry open places and thickets; grows best in well-drained soils; pH 4.5-6.5.

**CHARACTERISTICS** A rhizomatous flowering species; grows from 1'-3' tall; blooms from July to October; numerous white flowers.

**SEEDING RATE** 1-5 PLS lb per acre alone; 0.5%-3% of a mix; approx. 2,256,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Asclepias tuberosa*

### BUTTERFLY MILKWEED

*A decorative species; provides essential food for monarch butterfly caterpillars; very high pollinator value.*

**HABITAT** Dry woods, abandoned fields, roadsides, shale barrens; grows best in well-drained soils; pH 4.8-6.8.

**CHARACTERISTICS** A multi-stemmed flowering species; spreads from underground tubers; grows from 1'-3' tall; 16" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms from June to August; showy yellow, red or orange flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 70,000 seeds per lb.

**ECOTYPE** PA; Midwestern U.S.

**VARIETIES** Common commercial



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Aster laevis* (*Symphyotrichum laeve*)

### SMOOTH BLUE ASTER

*Provides attractive late-summer color in meadows; sought by deer for browse; very high pollinator value.*

**HABITAT** Dry woods, rocky ledges, roadsides; pH 5.8-7.8.

**CHARACTERISTICS** A flowering species with a branched stem; grows from 1'-4' tall; 10" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from August to October; purple flowers have smooth, waxy blue-green leaves that clasp to stems.

**SEEDING RATE** 1%-3% of a mix; approx. 1,014,000 seeds per lb.

**ECOTYPE** NY; Midwestern U.S.



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Aster divaricatus* (*Eurybia divaricata*)

### WHITE WOOD ASTER

*Widely distributed in wooded areas; provides food and habitat for wildlife; very high pollinator value.*

**HABITAT** Thrives in dry woods and on steep slopes.

**CHARACTERISTICS** A rhizomatous flowering species; grows from 1'-2' tall; shade tolerant; blooms from August to September; white flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 670,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Aster lateriflorus* (*Symphyotrichum lateriflorum*)

### CALICO ASTER

*An attractive species; provides food and cover for wildlife; very high pollinator value.*

**HABITAT** Dry open places, open woods, beaches; pH 5.2-7.5.

**CHARACTERISTICS** A clump-forming species; grows to 4' tall; 10" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms in fall; white or purplish flowers.

**SEEDING RATE** 1%-3% of a mix.

**ECOTYPE** PA

## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**



## ***Aster macrophyllus*** **(*Eurybia macrophylla*)**

### **BIGLEAF ASTER**

*A source of color along wooded borders; provides a habitat for wildlife; very high pollinator value.*

**HABITAT** Woods, rocky slopes, edges; grows best in fertile soils; pH 4.9-6.9.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 4' tall; 10" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from July to October; showy violet to lavender flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 800,000 seeds per lb.

**ECOTYPE** PA

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## ***Aster novae-angliae*** **(*Symphotrichum n.*)**

### **NEW ENGLAND ASTER**

*Provides food and cover for wildlife; very high pollinator value.*

**HABITAT** Fields, roadsides, moist meadows.

**CHARACTERISTICS** A flowering species with a branched stem; grows from 2'-6' tall; full sun; blooms in late summer; purple flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 1,100,000 seeds per lb.

**ECOTYPE** PA; Midwestern U.S.

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## ***Aster novi-belgii*** **(*Symphotrichum n.*)**

### **NEW YORK ASTER**

*Used in home landscapes and native meadows; very high pollinator value.*

**HABITAT** Swamps, moist meadows; pH 5.5-7.0.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 4-1/2' tall; 10" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from late July to October; violet or blue flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 700,000 seeds per lb.

**ECOTYPE** Albany Pine Bush-NY

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## ***Aster oblongifolius*** **(*Symphotrichum oblongifolium*)**

### **AROMATIC ASTER**

*The longest blooming of our native asters (up to and sometimes beyond two months); the small oblong leaves have a rich aromatic character; very high pollinator value.*

**HABITAT** Calcareous hillsides, cliffs, bluffs.

**CHARACTERISTICS** A flowering species with a branched stem; grows from 1'-2' tall; blooms from September to November; rich violet flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 816,000 seeds per lb.

**ECOTYPE** PA



**Native**

**Herbaceous Perennial**

INDICATOR REGION



## ***Aster patens*** **(*Symphotrichum p.*)**

### **LATE PURPLE ASTER**

*An attractive species for full sun to partially shaded settings; very high pollinator value.*

**HABITAT** Dry open places and woods; pH 4.9-6.9.

**CHARACTERISTICS** A rhizomatous, multi-stemmed clump-forming species; grows from 2-1/2'-4-1/2' tall; 10" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; blooms in fall; blue flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 800,000 seeds per lb.

**ECOTYPE** Piedmont NC

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## ***Aster pilosus*** **(*Symphotrichum pilosum*)**

### **HEATH ASTER**

*Establishes quickly on disturbed sites and rights-of-way; very high pollinator value.*

**HABITAT** Dry fields, open woods, vacant lots, roadsides; pH 5.4-7.0.

**CHARACTERISTICS** A rhizomatous flowering species with a stout stem; grows from 2'-5' tall; 10" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; blooms after the fall frost; white to pale purple flowers.

**SEEDING RATE** 1%-2% of a mix; approx. 700,000 seeds per lb.

**ECOTYPE** PA

**Native**

**Herbaceous Perennial**

INDICATOR REGION





**Native**  
**Herbaceous Perennial**  
INDICATOR REGION  
FAC FAC FAC FAC

**Aster prenanthoides (Symphyotrichum p.)**

**ZIGZAG ASTER**  
*A versatile aster that tolerates urban habitats; very high pollinator value.*  
**HABITAT** Wet meadows, low woods; pH 5.5-7.2.  
**CHARACTERISTICS** A rhizomatous flowering species; grows from 2'-3' tall; 10" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms from August to October; pale violet flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 700,000 seeds per lb.  
**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**  
INDICATOR REGION  
NI NI NI NI

**Aster spectabilis (Eurybia s.)**

**SHOWY ASTER**  
*One of the prettiest asters to add to landscapes; high pollinator value.*  
**HABITAT** Dry sandy soils.  
**CHARACTERISTICS** A rhizomatous flowering species; grows from 6"-36" tall; blooms from August to October; rich violet-purple flowers.  
**SEEDING RATE** 1%-3% of a mix.  
**ECOTYPE** NJ; Coastal Plain NC



**Native**  
**Herbaceous Perennial**  
INDICATOR REGION  
NI NI NI NI

**Aster puniceus (Symphyotrichum puniceum)**

**PURPLESTEM ASTER**  
*Adds beautiful color in FACW and OBL meadows; the plants provide food for deer; very high pollinator value.*  
**HABITAT** Wet meadows, riverbanks, moist roadsides; pH 4.5-7.5.  
**CHARACTERISTICS** A rhizomatous flowering species with a stout stem; grows to 8' tall; 10" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from August to November; blue to deep violet flowers on raceme centers.

**SEEDING RATE** 1%-3% of a mix; approx. 700,000 seeds per lb.  
**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**  
INDICATOR REGION  
NI NI NI NI

**Aster umbellatus (Doellingeria umbellata)**

**FLAT TOPPED WHITE ASTER**  
*An erect decorative component of wet meadows; high pollinator value.*  
**HABITAT** Swamps, woods, moist fields.  
**CHARACTERISTICS** A rhizomatous flowering species; grows from 1'-6-1/2' tall; moderate shade tolerance; blooms from August to late summer; white flowers give way to fluffy white seedheads.  
**SEEDING RATE** 1%-3% of a mix; approx. 1,072,000 seeds per lb.  
**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**  
INDICATOR REGION  
NI NI NI NI

**Aster sagittifolius (Symphyotrichum urophyllum) (A. urophyllum)**

**ARROWLEAF (SAGITTATE) ASTER**  
*Very high pollinator value.*  
**HABITAT** Woodland edges, streambanks, open areas.  
**CHARACTERISTICS** A rhizomatous flowering species with a branched stem; grows from 1'-3' tall; blooms in fall; small white-rayed flower heads on ascending branches.

**SEEDING RATE** 1%-3% of a mix.  
**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**  
**Legume**  
INDICATOR REGION  
NI NI NI NI

**Baptisia alba (B. alba var. macrophylla) (B. leucantha)**

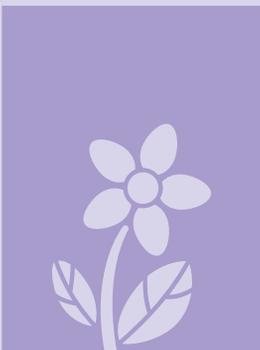
**WHITE WILD INDIGO**  
*Develops slowly, but lasts for many years in low-fertility soils; medium pollinator value.*  
**HABITAT** Coastal Plain and Piedmont.  
**CHARACTERISTICS** A rhizomatous legume; grows to 4' tall; blooms from May to July; white flowers.  
**SEEDING RATE** 0.5%-2% of a mix.  
**ECOTYPE** OH; Midwestern U.S.

**INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**

# HERBACEOUS FLOWERING SPECIES



**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## **Baptisia alba var. alba** **(B. pendula)**

### **LARGELEAF WILD INDIGO**

*An attractive early spring legume; medium pollinator value.*

**HABITAT** Flatwoods, riverbanks, open woods, clearings, hummocks.

**CHARACTERISTICS** A rhizomatous legume; grows to 5' tall; blooms from May to July; white flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** FL



**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## **Baptisia perfoliata**

### **CATBELLS**

*Perfoliate leaves hinting of eucalyptus provide interesting visual texture to a landscape; medium pollinator value.*

**HABITAT** Sandhills, open woods.

**CHARACTERISTICS** A crown-forming legume; grows to 3' tall; blooms from April to May, bright yellow flowers are produced in leaf axils.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** SC



**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## **Baptisia albescens**

### **SPIKED WILD INDIGO**

*The beautiful architecture is further enhanced by attractive blossoms; medium pollinator value.*

**HABITAT** Open woods, clearings.

**CHARACTERISTICS** Grows to 4' tall; blooms from May to July; white flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** NC; SC



**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## **Baptisia tinctoria**

### **YELLOW FALSE INDIGO** **(HORSEFLYWEED)**

*Medium pollinator value.*

**HABITAT** Coastal Plain and Piedmont; survives in shallow sloping soils; pH 5.8-7.0.

**CHARACTERISTICS** A single-crown legume; grows to 2-1/2' tall; 16" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms in midsummer; yellow flowers; gray-green foliage.

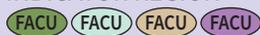
**SEEDING RATE** 0.3%-2% of a mix; approx. 300,000 seeds per lb.

**ECOTYPE** PA; Coastal Plain SC



**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## **Baptisia australis**

### **BLUE FALSE INDIGO**

*Historically used as a dye; may be planted as a specimen plant; medium pollinator value.*

**HABITAT** Open woods, riverbanks, sandy floodplains.

**CHARACTERISTICS** A long-lived legume; grows to 5' tall; blooms from May to June; attractive violet to dark blue flowers; glossy trifoliate leaves.

**SEEDING RATE** 0.5%-2% of a mix; approx. 22,000 seeds per lb.

**ECOTYPE** PA; Southern WV



**Native**  
**Herbaceous Annual**

INDICATOR REGION



## **Bidens aristosa**

### **SHOWY TICKSEED SUNFLOWER** **(BUR MARIGOLD)**

*A re-seeding annual in disturbed soils; aggressive first-year cover in wet meadows; the seeds are eaten by wildlife; medium pollinator value.*

**HABITAT** Riverbanks, open soils in wet areas; pH 5.0-7.0.

**CHARACTERISTICS** A showy single-crown flowering species; grows from 3'-4' tall; 8" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from August to October in Region 1; September to October in Region 2; large yellow flowers.

**SEEDING RATE** 1%-10% of a mix; approx. 130,000 seeds per lb.

**ECOTYPE** Coastal Plain NC



**Bidens cernua**  
**NODDING BUR MARIGOLD**  
*A re-seeding annual persistent in disturbed saturated soils; not for use in residential settings as the seeds attach themselves to clothing; provides food and cover for wildlife; medium pollinator value.*

**HABITAT** Swamps, wet shores, ditches; pH 5.1-7.0.  
**CHARACTERISTICS** A single-crown flowering species; grows to 3' tall; 8" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from July to October; attractive yellow flowers.

**SEEDING RATE** 1%-2% of a mix; approx. 130,000 seeds per lb.  
**ECOTYPE** PA

**Native**  
**Herbaceous Annual**

INDICATOR REGION



**Boltonia asteroides**  
**WHITE DOLL'S DAISY**  
*Performs well in damp areas; abundant flowers in late summer; high pollinator value.*

**HABITAT** Ditches, savannas, marshes.  
**CHARACTERISTICS** A single-crown perennial species; grows to 8' tall; blooms from August to October; white flowers.

**SEEDING RATE** 1%-2% of a mix.  
**ECOTYPE** Midwestern U.S.; FL

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



**Bidens frondosa**  
**BEGGARTICK**  
*A re-seeding annual in disturbed wetlands; not for use in residential settings as the seeds attach themselves to clothing; provides food and cover for wildlife and ducks; medium pollinator value.*

**HABITAT** Moist open ground, streambanks, roadsides; pH 5.2-7.2.  
**CHARACTERISTICS** A single-crown flowering species; grows to 4' tall; 8" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from June to October; yellow to orange flowers.

**SEEDING RATE** 1%-2% of a mix; approx. 80,000 seeds per lb.  
**ECOTYPE** PA

**Native**  
**Herbaceous Annual**

INDICATOR REGION



**Centaurea cyanus**  
**CORNFLOWER (BACHELOR'S BUTTON)**  
*Blooms in early spring if sown in fall.*

**HABITAT** Meadows, flower beds.  
**CHARACTERISTICS** Grows from 2'-3' tall; blooms from June to August; decorative bright blue flowers.

**SEEDING RATE** 1%-15% of a mix; approx. 90,000 seeds per lb.  
**VARIETIES** Common commercial

**Naturalized**  
**Herbaceous Annual**

INDICATOR REGION



**Blephilia ciliata**  
**DOWNY PAGODA PLANT**  
*Our earliest blooming mint; a beautiful addition to the landscape; high pollinator value.*

**HABITAT** Woods, meadows.  
**CHARACTERISTICS** An erect species; grows from 1'-2' tall; moderate shade tolerance; blooms from late May to early July; lavender (though occasionally white) flowers with purple speckles.

**SEEDING RATE** 0.1%-0.5% of a mix.  
**ECOTYPE** OH; Piedmont NC

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



**Chamaecrista fasciculata**  
**(Cassia f.)**  
**PARTRIDGE PEA**

*A readily re-seeding annual in disturbed upland sites; the foliage is nutritious but can be poisonous; should be considered potentially dangerous to cattle; provides food and cover for birds; high pollinator value.*

**HABITAT** Riverbanks, sandy flats, railroad cinders, roadsides; pH 5.5-7.5.

**CHARACTERISTICS** A bunch-type legume; grows to 3' tall; 14" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; blooms from July to September; yellow flowers.

**SEEDING RATE** 1%-10% of a mix; approx. 65,000 seeds per lb.  
**ECOTYPE** PA; FL

**Native**  
**Herbaceous Annual**  
**Legume**

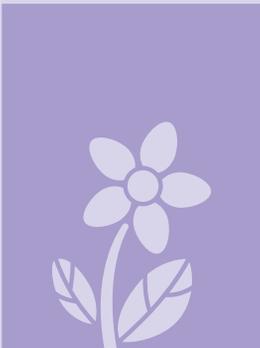
INDICATOR REGION

## INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION

# HERBACEOUS FLOWERING SPECIES



**Native**  
**Herbaceous Annual**  
**Legume**

INDICATOR REGION

## **Chamaecrista nictitans**

### **SENSITIVE PEA**

*Provides food for birds; high pollinator value.*

**HABITAT** Fields, roadsides, waste places.

**CHARACTERISTICS** A legume with a taproot; grows to 1-1/2' tall; blooms from June to October; yellow flowers.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** NC



**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION

## **Chrysanthemum leucanthemum**

### **OXEYE DAISY**

*A persistent flower on low-fertility sites.*

**HABITAT** Fields, woods, meadows, roadsides; pH 5.2-7.0.

**CHARACTERISTICS** A bunch-type flowering species; grows to 2' tall; 8" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from June to September; decorative flowers have yellow centers and white petals.

**SEEDING RATE** 1%-10% of a mix; approx. 200,000 seeds per lb.

**VARIETIES** Common commercial



**Naturalized**  
**Herbaceous Perennial/**  
**Biennial**

INDICATOR REGION

## **Cheiranthus allionii (Erysimum cheiri)**

### **WALLFLOWER**

*A decorative early blooming component in wildflower mixes.*

**HABITAT** Fields, open areas.

**CHARACTERISTICS** Grows to 3' tall; blooms in summer; yellow, orange, reddish or purplish flowers.

**SEEDING RATE** 1%-15% of a mix; approx. 335,000 seeds per lb.

**VARIETIES** Common commercial



**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION

## **Cichorium intybus**

### **BLUE CHICORY**

*Persistent on roadsides and in compacted soils; blooms last all day.*

**HABITAT** Fields, roadsides, open ground; pH 6.0-7.5.

**CHARACTERISTICS** A bunch-type flowering species; grows to 4' tall; 8" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms from July to October; attractive blue flowers.

**SEEDING RATE** 1%-10% of a mix; approx. 426,000 seeds per lb.

**VARIETIES** Common commercial



**Native**  
**Herbaceous Perennial**

INDICATOR REGION

## **Chelone glabra**

### **TURTLEHEAD**

*A showy wetland plant; browsed by wildlife; produces nectar containing catapol which helps to reduce parasite loads in bumblebees; medium pollinator value.*

**HABITAT** Streambanks, wet woods, swamps.

**CHARACTERISTICS** Grows from 2'-7' tall; blooms from July to September; pyramids of white flowers have pink tips.

**SEEDING RATE** 0.5%-1% of a mix; approx. 1,472,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION

## **Cimicifuga racemosa**

### **BLACK COHOSH (BLACK SNAKEROOT) (BLACK BUGBANE)**

*Grows well in wooded settings; repels some insects; medium pollinator value.*

**HABITAT** Rich woods.

**CHARACTERISTICS** Grows from 3'-8' tall; blooms from June to August; white flowers.

**SEEDING RATE** 1%-2% of a mix.

**ECOTYPE** PA



## *Clematis virginiana*

### VIRGIN'S BOWER

A hardy vine to include in wetland margins; attractive when in bloom and when seed is ripening; medium pollinator value.

**HABITAT** Thickets, woodland edges on low ground; pH 5.0-6.8.

**CHARACTERISTICS** A decorative single-crown species; climbs to 15'; 14" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from July to September; white or cream flowers.

**SEEDING RATE** 0.5%-2% of a mix; approx. 192,000 seeds per lb.

**ECOTYPE** PA; Midwestern U.S.

Native

Herbaceous Perennial Vine

INDICATOR REGION



## *Coreopsis lanceolata*

### LANCELEAF COREOPSIS

A popular species in wildflower meadows and along roadsides; medium pollinator value.

**HABITAT** Disturbed soils, roadsides; pH 6.0-7.0.

**CHARACTERISTICS** A single-crown flowering species; grows from 8"-36" tall; 6" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from May to July in Region 1; April to June in Region 2; yellow flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 221,000 seeds per lb.

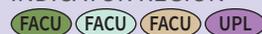
**ECOTYPE** Coastal Plain NC; SC (very short stature)

**VARIETIES** Common commercial

Native

Herbaceous Perennial

INDICATOR REGION



## *Coreopsis basalis*

### GOLDENMANE TICKSEED

Medium pollinator value.

**HABITAT** Wet flatwoods.

**CHARACTERISTICS** Grows to 2' tall; blooms in spring and summer; yellow flowers.

**SEEDING RATE** 1%-2% of a mix.

**ECOTYPE** FL

Native

Herbaceous Annual

INDICATOR REGION



## *Coreopsis leavenworthii*

### LEAVENWORTH'S TICKSEED

Used for wildlife habitat; medium pollinator value.

**HABITAT** Disturbed sites, ditches, wet flatwoods.

**CHARACTERISTICS** Grows to 3' tall; blooms throughout the year; yellow flowers.

**SEEDING RATE** 0.1%-2% of a mix.

**ECOTYPE** FL

Native

Herbaceous Annual

INDICATOR REGION



## *Coreopsis grandiflora*

### LARGEFLOWER TICKSEED

A showy species in wildflower meadows; medium pollinator value.

**HABITAT** Roadsides, upland woods.

**CHARACTERISTICS** A single-crown flowering species; grows to 2' tall; full sun; drought tolerant; blooms from late May to late July; yellow flowers.

**SEEDING RATE** 1%-3% of a mix.

**ECOTYPE** Piedmont GA

Native

Herbaceous Perennial

INDICATOR REGION



## *Coreopsis major*

### GREATER TICKSEED

An attractive species for use in landscapes where sight lines are important; medium pollinator value.

**HABITAT** Old fields, thickets, woodlands.

**CHARACTERISTICS** A rhizomatous erect-growing species; grows from 1-1/2'-3' tall; blooms from May to July; yellow flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** AL

Native

Herbaceous Perennial

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator

SEE PAGE 9 FOR EXPLANATION



## *Coreopsis tinctoria*

### PLAINS COREOPSIS

*A showy annual that can produce flowers in a short period of time on low-fertility sites; medium pollinator value.*

**HABITAT** Disturbed areas, meadows, riverbanks; occasionally escapes to yards; pH 5.2-7.8.

**CHARACTERISTICS** A single-crown flowering species; grows from 1'-4' tall; 8" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from June to August; red to yellow borders with yellow or purple centers.

**SEEDING RATE** 0.5%-2% of a mix; approx. 3,222,000 seeds per lb.

**VARIETIES** Common commercial

**Native**

**Herbaceous Annual**

INDICATOR REGION



## *Coronilla varia*

### CROWN VETCH

*Good for erosion control on steep, dry rocky slopes; seed is persistent in soil; can become aggressive in natural areas.*

**HABITAT** Rocky slopes, shallow, well-drained low-fertility soils; pH 5.0-7.5.

**CHARACTERISTICS** A rhizomatous legume; grows to 3' tall; 12" minimum root depth; moderate shade tolerance; high drought tolerance; no salt tolerance; blooms in summer; white to pink flowers.

**SEEDING RATE** 20 lb per acre alone; approx. 140,000 seeds per lb.

**VARIETIES** 'Penngift'

**Naturalized**

**Herbaceous Perennial**

**Legume**

INDICATOR REGION



## *Coreopsis tripteris*

### TALL COREOPSIS

*Very tolerant of competition; high pollinator value.*

**HABITAT** Old fields, thickets, woodland edges, roadsides.

**CHARACTERISTICS** A long-lived, single-stemmed flowering species; grows to 3' tall; full sun; blooms from July to September; yellow flowers.

**SEEDING RATE** 0.5%-2% of a mix; approx. 200,000 seeds per lb.

**ECOTYPE** PA; OH; AL

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## *Cosmos bipinnatus*

### COSMOS

*A robust flower with intense color; ideal for showy roadside plantings; attracts butterflies.*

**HABITAT** Disturbed sites, fields, roadsides.

**CHARACTERISTICS** A single-crown flowering species; grows to 6' tall; full sun; blooms from August to October; white, pink or crimson flowers have yellow centers.

**SEEDING RATE** 1%-15% of a mix; approx. 65,000 seeds per lb.

**VARIETIES** Common commercial

**Naturalized**

**Herbaceous Annual**

INDICATOR REGION



## *Coreopsis verticillata*

### WHORLED (THREADLEAF) COREOPSIS

*Develops in thick clumps; medium pollinator value.*

**HABITAT** Barns, clearings, roadbanks, dry open forests, woodlands.

**CHARACTERISTICS** A rhizomatous species; grows to 3-1/2' tall; blooms from May to July; yellow flowers.

**SEEDING RATE** 0.5% of a mix.

**ECOTYPE** VA; SC

**Native**

**Herbaceous Perennial**

INDICATOR REGION



## *Dalea candida*

### WHITE PRAIRIE CLOVER

*Can supply nitrogen to meadows.*

**HABITAT** Dry prairies, dry upland woods.

**CHARACTERISTICS** An erect smooth-stemmed legume; grows from 1'-3' tall; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms in midsummer; white flowers.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** Midwestern U.S.

**Native**

**Herbaceous Perennial**

**Legume**

INDICATOR REGION





***Dalea purpurea*  
(*Petalostemum purpureum*)**

**PURPLE PRAIRIE CLOVER**  
A nitrogen-fixing species in prairies and meadows that can be used by the grasses.

**HABITAT** Prairies, dry hills; pH 6.0-8.0.

**CHARACTERISTICS** A multi-stemmed legume; grows from 1'-3' tall; blooms from June to September; rosy-purple flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 300,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



***Desmodium canadense***  
**SHOWY TICKTREFOIL**

A nitrogen-fixing species; the seeds provide food for ground birds and small animals; attracts native pollinators.

**HABITAT** Open woods, meadows.

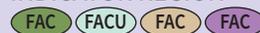
**CHARACTERISTICS** A flowering legume; grows from 2'-4' tall; moderate shade tolerance; blooms from July to August; striking pink to violet flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 80,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



***Daucus carota***

**QUEEN ANNE'S LACE**  
Persistent in meadows with poor soils; attracts butterflies.

**HABITAT** Roadsides, old fields, gardens, open ground.

**CHARACTERISTICS** A flowering species; grows to 3' tall; blooms from May to October; clusters of white flowers.

**SEEDING RATE** 1%-5% of a mix.

**VARIETIES** Common commercial

**Naturalized**  
**Herbaceous Biennial**

INDICATOR REGION



***Desmodium glabellum***  
**DILLENIUS' TICKTREFOIL**

A nitrogen-fixing species; provides food for wildlife; attracts native pollinators.

**HABITAT** Dry upland woods.

**CHARACTERISTICS** A perennial legume; grows to 5' tall; blooms from July to August; pink or purple flowers.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** 'Alcona'-MI

**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



***Desmanthus illinoensis***  
**ILLINOIS BUNDLEFLOWER**

A nitrogen-fixing species in prairies and meadows that can be used by the grasses.

**HABITAT** Roadsides, meadows, riverbanks; pH 5.0-8.0.

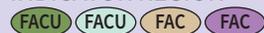
**CHARACTERISTICS** A multi-stemmed flowering legume with a deep taproot; grows from 2'-4' tall; 12" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms from June to August; white or greenish flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 120,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



***Desmodium paniculatum***  
**PANICLEDLEAF TICKTREFOIL**

A nitrogen-fixing species; the seeds provide food for wildlife; attracts native pollinators.

**HABITAT** Dry woods, fields; pH 6.0-7.0.

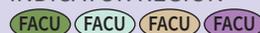
**CHARACTERISTICS** A single-crown perennial legume; grows to 4' tall; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from July to August; purple flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 200,000 seeds per lb.

**ECOTYPE** PA; 'Grant'-WI

**Native**  
**Herbaceous Perennial**  
**Legume**

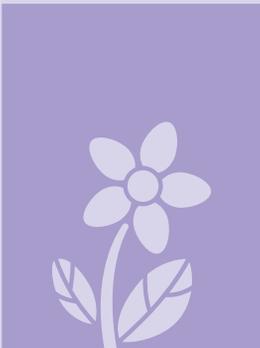
INDICATOR REGION



**INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION



## *Desmodium tortuosum*

### DIXIE TICKTREFOIL

*A tall species; may be a good substitute for Lespedeza thunbergii in southern states; seed with taller grass species, such as Switchgrass or Big Bluestem.*

**HABITAT** Fields, roadsides, waste areas; pH 5.0-7.2.

**CHARACTERISTICS** An erect-growing legume; grows from 2'-9' tall; 6" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms from July to August; blue flowers.

**SEEDING RATE** 1%-30% of a mix; approx. 200,600 seeds per lb.

**ECOTYPE** AL

Native

Herbaceous Perennial  
Legume

INDICATOR REGION



## *Elephantopus elatus*

### TALL ELEPHANTSFOOT

*An elephant foot-like broad-leaved rosette with a bolting seedhead; found along woodland trails; medium pollinator value.*

**HABITAT** Flatwoods, sandhills.

**CHARACTERISTICS** An herb that grows from a rosette; grows to 2' tall; blooms from summer to fall; light blue flowers.

**SEEDING RATE** 0.5%-1% of a mix.

**ECOTYPE** FL

Native

Herbaceous Perennial

INDICATOR REGION



## *Echinacea pallida*

### PALE PURPLE CONEFLOWER

*A source of herbal Echinacea; attractive in wildflower meadows.*

**HABITAT** Open meadows; pH 6.5-7.2.

**CHARACTERISTICS** A single-stemmed flowering species; grows from 2'-4' tall; 14" minimum root depth; full sun; moderate drought tolerance; low salt tolerance; blooms from June to July; pinkish-purple flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 106,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

Native

Herbaceous Perennial

INDICATOR REGION



## *Eryngium aquaticum* var. *aquaticum*

### MARSH RATTLESNAKEMASTER

*An attractive wetland species; high pollinator value.*

**HABITAT** Drainage ditches, tidal freshwater to brackish marshes, wet pinelands.

**CHARACTERISTICS** An erect-growing species; grows from 1'-6' tall; blooms from July to September; blue flowers.

**SEEDING RATE** 1%-4% of a mix.

**ECOTYPE** SC

Native

Herbaceous Biennial

INDICATOR REGION



## *Echinacea purpurea*

### PURPLE CONEFLOWER

*An attractive species in meadows and along roadsides; high pollinator value.*

**HABITAT** Open meadows, roadsides; grows best in moist well-drained soils; pH 6.5-7.2.

**CHARACTERISTICS** A single-stemmed flowering species; grows to 5' tall; 24" minimum root depth; full sun; low drought tolerance; low salt tolerance; blooms from June to September; purple flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 116,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

Native

Herbaceous Perennial

INDICATOR REGION



## *Eryngium aquaticum* var. *ravenelii*

### MARSH RATTLESNAKEMASTER

*An attractive wetland species; high pollinator value.*

**HABITAT** Wet savannas, pinelands; mostly or entirely over calcareous substrate.

**CHARACTERISTICS** An erect-growing species; grows from 1'-6' tall; blooms from July to September; blue flowers.

**SEEDING RATE** 1%-4% of a mix.

**ECOTYPE** FL

Native

Herbaceous Biennial

INDICATOR REGION





**Eryngium yuccifolium**  
**RATTLESNAKEMASTER**  
*Creates visual texture in native meadows; high pollinator value.*  
**HABITAT** Moist woods, meadows.  
**CHARACTERISTICS** A flowering species; grows to 3' tall; blooms from June to August; white flowers change to rust at maturity.  
**SEEDING RATE** 1%-5% of a mix; approx. 124,000 seeds per lb.  
**ECOTYPE** OH; Midwestern U.S.; SC; FL

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 FAC FAC FAC FAC



**Eupatorium maculatum**  
**(Eupatoriadelphus maculatus)**  
**SPOTTED JOE PYE WEED**  
*High pollinator value.*  
**HABITAT** Floodplains, swamps, alluvial thickets.  
**CHARACTERISTICS** A flowering species; grows to 6-1/2' tall; blooms from July to September; light purple flowers.  
**SEEDING RATE** 0.5%-2% of a mix; approx. 1,440,000 seeds per lb.  
**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 OBL OBL FACW FACW



**Eupatorium coelestinum**  
**(Conoclinium c.)**  
**MISTFLOWER**  
*The low-growing late-fall flowers are found in wetland margins; very high pollinator value.*  
**HABITAT** Old fields, meadows, streambanks; pH 5.5-7.5.  
**CHARACTERISTICS** A rhizomatous flowering species; grows from 1'-3' tall; 14" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; blooms from July to October; blue flowers.  
**SEEDING RATE** 0.5%-2% of a mix; approx. 1,500,000 seeds per lb.  
**ECOTYPE** VA; FL

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 FAC FACW FAC FAC



**Eupatorium perfoliatum**  
**BONESET**  
*A beautiful component of wetlands; very high pollinator value.*  
**HABITAT** Floodplains, swamps, bogs, streambanks, wet meadows.  
**CHARACTERISTICS** A hardy flowering species; grows to 5' tall; blooms from July to October; persistent white flowers.  
**SEEDING RATE** 0.5%-2% of a mix; approx. 2,880,000 seeds per lb.  
**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 FACW OBL FACW FACW



**Eupatorium fistulosum**  
**JOE PYE WEED**  
*This is the hollow-stemmed Joe Pye Weed; high pollinator value.*  
**HABITAT** Floodplains, meadows, moist thickets, roadsides; pH 4.5-7.0.  
**CHARACTERISTICS** A rhizomatous flowering species; grows to 7' tall; 16" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from July to September; showy pink or purple flowers.  
**SEEDING RATE** 0.5%-2% of a mix; approx. 2,000,000 seeds per lb.  
**ECOTYPE** PA; AL

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 FACW OBL FACW FACW



**Eupatorium purpureum**  
**PURPLE NODE JOE PYE WEED**  
*The stems have a sweet odor resembling vanilla when bruised; high pollinator value.*  
**HABITAT** Thickets, open woods.  
**CHARACTERISTICS** A clump-forming species; grows to 6-1/2' tall; full sun; blooms from July to September; pale pink or purplish flowers; large stems and leaves.  
**SEEDING RATE** 0.5%-2% of a mix; approx. 672,000 seeds per lb.  
**ECOTYPE** Midwestern U.S.

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 FAC FAC FAC FAC

**INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION

# HERBACEOUS FLOWERING SPECIES



## *Eupatorium rugosum* (*Ageratina altissima*)

### WHITE SNAKEROOT

*Low pollinator value.*

**HABITAT** Woods, meadows, streambanks; pH 5.5-7.5.

**CHARACTERISTICS** A flowering species; grows to 4' tall; blooms from July to October; white flowers.

**SEEDING RATE** 0.5%-2% of a mix; approx. 2,400,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Gaillardia aristata* (BLANKETFLOWER)

*An attractive flower for meadows and along roadsides.*

**HABITAT** Plains and prairies; pH 5.5-7.9.

**CHARACTERISTICS** A bunch-type flowering species; grows to 2' tall; 16" minimum root depth; full sun; moderate drought tolerance; low salt tolerance; blooms from May to September; daisy-like yellow flowers have purple bases.

**SEEDING RATE** 1%-15% of a mix; approx. 186,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Euthamia caroliniana* (*E. tenuifolia*)

### SLENDER GOLDENTOP

*Medium pollinator value.*

**HABITAT** Open sandy areas.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 3' tall; blooms from August to October; yellow flowers.

**SEEDING RATE** 0.1%-0.5% of a mix.

**ECOTYPE** NJ

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Gaillardia pulchella* ANNUAL GAILLARDIA (INDIAN BLANKET)

*A showy flower for annual wildflower beds.*

**HABITAT** Meadows, open areas; pH 7.0-8.5.

**CHARACTERISTICS** A bunch-type flowering species; grows to 2' tall; 12" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms from May to September; yellow perimeters with reddish-purple centers.

**SEEDING RATE** 1%-15% of a mix; approx. 238,000 seeds per lb.

**ECOTYPE** Southeastern U.S.

**Native**  
**Herbaceous Annual**

INDICATOR REGION



## *Euthamia graminifolia* (*Solidago g.*)

### GRASSLEAF GOLDENROD

*Provides food and cover for wildlife; medium pollinator value.*

**HABITAT** Wet meadows, riparian areas; tolerates poor soils.

**CHARACTERISTICS** A rhizomatous flowering species; grows from 2'-3' tall; blooms from August to September; yellow flowers.

**SEEDING RATE** 0.1%-0.5% of a mix; approx. 5,600,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Gentiana clausa*

### MEADOW BOTTLE GENTIAN

*A showy riparian species for retention basins; medium pollinator value.*

**HABITAT** Moist woods, streambanks, meadows; pH 5.8-7.2.

**CHARACTERISTICS** A bunch-type flowering species; grows to 2' tall; 6" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from September to October; long-lasting purple flowers.

**SEEDING RATE** 0.1%-0.5% of a mix; approx. 2,980,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION





**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Geum canadense*

### WHITE AVENS

The small seedheads add texture to landscapes after blooming; medium pollinator value.

**HABITAT** Riparian areas, roadsides; pH 4.5-7.5.

**CHARACTERISTICS** A single-stemmed flowering species; grows to 4' tall; 4" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from May to June; white flowers.

**SEEDING RATE** 0.5%-2% of a mix; approx. 400,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Helenium flexuosum*

### PURPLEHEAD SNEEZEWEED

High pollinator value.

**HABITAT** Alluvial pastures, wet meadows, ditches; pH 4.5-7.5.

**CHARACTERISTICS** A flowering species; produces one or more stems from a crown; grows from 1'-3' tall; 6" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms from May to August; yellow flowers have purple centers.

**SEEDING RATE** 1%-2% of a mix; approx. 2,000,000 seeds per lb.

**ECOTYPE** VA



**Naturalized**  
**Herbaceous Annual**

INDICATOR REGION



## *Gypsophila elegans*

### ANNUAL BABY'S BREATH

A fast-growing plant; blooms 60 days after seeding.

**HABITAT** Gardens, meadows.

**CHARACTERISTICS** A flowering species; grows from 2'-3' tall; moderate shade tolerance; fine-textured white flowers.

**SEEDING RATE** 1%-5% of a mix.

**VARIETIES** Common commercial



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Helianthus angustifolius*

### SWAMP (NARROWLEAF) SUNFLOWER

A late-season bloomer; the latest-blooming sunflower we carry; the small seeds are eaten by many birds; the nectar is food for migrating monarch butterflies; high pollinator value.

**HABITAT** Swamps, moist sites; pH 4.0-7.0.

**CHARACTERISTICS** A rhizomatous multi-stemmed species; grows from 1-1/2'-5' tall; 6" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from August to October in Region 1; July to frost in Region 2; yellow flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 504,000 seeds per lb.

**ECOTYPE** MD; Coastal Plain NC; SC; GA; AL; FL



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Helenium autumnale*

### COMMON SNEEZEWEED

An attractive late-season bloomer; high pollinator value.

**HABITAT** Swamps, moist riverbanks, alluvial thickets, wet fields; pH 4.0-7.5.

**CHARACTERISTICS** A single-stemmed flowering species; grows to 5' tall; 6" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from August to September in Region 1; September to October in Region 2; yellow flowers.

**SEEDING RATE** 1%-2% of a mix; approx. 1,464,000 seeds per lb.

**ECOTYPE** PA; Northern VA; FL



**Native**  
**Herbaceous Annual**

INDICATOR REGION



## *Helianthus annuus*

### COMMON SUNFLOWER

A re-seeding annual; provides food for songbirds.

**HABITAT** Meadows, roadsides; pH 5.5-7.8.

**CHARACTERISTICS** A single-stemmed flowering species; grows to 3' tall; 8" minimum root depth; full sun; moderate drought tolerance; low salt tolerance; blooms from July to September; yellow flowers.

**SEEDING RATE** 5%-20% of a mix; approx. 47,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**

# HERBACEOUS FLOWERING SPECIES



## *Helianthus giganteus*

### GIANT SUNFLOWER

*Provides food for birds; high pollinator value.*

**HABITAT** Swamps, moist sites.

**CHARACTERISTICS** A rhizomatous clump-forming species; grows from 3'-10' tall; blooms from August to October; 1-1/2"-2-1/2" diameter yellow flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Helianthus radula*

### RAYLESS SUNFLOWER

*This petal-free sunflower adds interesting visual texture to landscapes; high pollinator value.*

**HABITAT** Pine barrens, savannas.

**CHARACTERISTICS** A fibrous-rooted perennial; grows from 1'-2' tall; blooms from late August to October; rayless purplish-red blossoms.

**SEEDING RATE** 1%-4% of a mix.

**ECOTYPE** FL Panhandle

Native

Herbaceous Perennial

INDICATOR REGION



## *Helianthus maximiliani*

### MAXIMILIAN'S SUNFLOWER

*The tall shielding growth provides food and cover for birds.*

**HABITAT** Open meadows, railroad tracks, urban open ground; pH 6.0-8.0.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 9' tall; full sun; blooms from midsummer to fall; numerous yellow flowers on each plant.

**SEEDING RATE** 1%-2% of a mix; approx. 216,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

Native

Herbaceous Perennial

INDICATOR REGION



## *Heliopsis helianthoides*

### OXEYE SUNFLOWER

*A vigorous native with a long-bloom period; provides food and cover for birds; medium pollinator value.*

**HABITAT** Fields, woods, floodplains, streambanks.

**CHARACTERISTICS** A rhizomatous, clump-forming flowering species; grows to 4' tall; blooms from July to August; pale yellow flowers.

**SEEDING RATE** 1%-2% of a meadow mix; 1%-5% of a wildlife mix; approx. 102,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Helianthus occidentalis* var. *dowellianus*

### MCDOWELL'S SUNFLOWER

*The compact deep-green foliage is ideal for areas where medium height is important; the blooms last for a long period of time; high pollinator value.*

**HABITAT** Dry woods, dry sandy soils.

**CHARACTERISTICS** A rhizomatous, often stoloniferous, species; grows from 1-1/2'-4' tall; blooms from August to October; yellow flowers; primarily basal leaves.

**SEEDING RATE** 1%-2% of a mix; approx. 178,000 seeds per lb.

**ECOTYPE** Southern WV

Native

Herbaceous Perennial

INDICATOR REGION



## *Hesperis matronalis*

### DAMES ROCKET

*Provides early spring color to landscapes; seed is persistent in soil; can be invasive in riparian areas.*

**HABITAT** Low woods, wet meadows, roadside ditches; pH 5.0-7.0.

**CHARACTERISTICS** A bunch-type flowering species; grows to 3' tall; 12" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from May to August; pink, purple or white flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 224,000 seeds per lb.

**VARIETIES** Common commercial

Naturalized

Herbaceous Perennial

INDICATOR REGION





**Hibiscus moscheutos**  
**CRIMSONEYED ROSEMALLOW**  
*A long-lived showy perennial in wet meadows and at the water's edge; low pollinator value.*  
**HABITAT** Alluvial meadows, swamp forest edges, brackish marshes; pH 4.0-7.5.  
**CHARACTERISTICS** A multi-stemmed crown-forming species; grows to 6' tall; 10" minimum root depth; full sun; no drought tolerance; low salt tolerance; blooms from early June to September; white flowers have red bases.

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 OBL OBL OBL OBL

**SEEDING RATE** 1%-5% of a mix; approx. 200,000 seeds per lb.  
**ECOTYPE** Delmarva Peninsula-MD/DE; VA; Coastal Plain NC; 'Suther'-Piedmont NC



**Hypericum pyramidatum**  
**GREAT ST. JOHNSWORT**  
*A tall showy plant with large flowers; low pollinator value.*  
**HABITAT** Alluvial shores, rocky banks, swamps; pH 5.7-7.1.  
**CHARACTERISTICS** A single-crown flowering species; grows from 2'-6' tall; 14" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from June to August; yellow flowers.  
**SEEDING RATE** 0.1%-1% of a mix; approx. 1,800,000 seeds per lb.  
**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 FAC FAC FAC FAC



**Hypericum perforatum**  
**COMMON ST. JOHNSWORT**  
*A source of herbal St. Johnswort; seed is persistent in soil; not for use in native mixes.*  
**HABITAT** Fields, roadsides, open spaces; tolerates poor soils.  
**CHARACTERISTICS** A decorative flowering species; grows to 3' tall; blooms from June to September; yellow flowers; deep green foliage.  
**SEEDING RATE** 0.1%-1% of a mix.  
**ECOTYPE** PA

**Naturalized**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 UPL FACU FAC FACU



**Kosteletzkya virginica**  
**VIRGINIA SALT MARSH MALLOW**  
*An attractive species for coastal marshes.*  
**HABITAT** Salt or brackish marshes.  
**CHARACTERISTICS** A crown-forming species; grows from 1'-3' tall; blooms from August to September; pink flowers.  
**SEEDING RATE** 0.5%-2% of a mix; approx. 236,000 seeds per lb.  
**ECOTYPE** MD

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 OBL OBL OBL OBL



**Hypericum punctatum**  
**SPOTTED ST. JOHNSWORT**  
*A common species found in riparian areas; low pollinator value.*  
**HABITAT** Moist fields, floodplains, thickets, roadsides; pH 4.7-6.5.  
**CHARACTERISTICS** A single-crown flowering species; grows to 3' tall; 10" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms in early summer; small yellow flowers.  
**SEEDING RATE** 0.1%-1% of a mix.  
**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 FAC FAC FAC FAC



**Lathyrus sylvestris**  
**FLAT PEA**  
*Excellent for soil stabilization in infertile soils.*  
**HABITAT** Borders of fields and thickets; pH 5.0-7.8.  
**CHARACTERISTICS** A hardy rhizomatous legume; grows to 6' long; 12" minimum root depth; shade tolerant; high drought tolerance; no salt tolerance; blooms in mid-July; purple, pink or white flowers.  
**SEEDING RATE** 10%-50% of a mix; approx. 8,000 seeds per lb.  
**VARIETIES** 'Lathco' (released by the USDA Plant Materials Center)

**Naturalized**  
**Herbaceous Perennial Legume**  
 INDICATOR REGION  
 NI NI NI NI

**INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

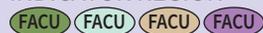
- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION



**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## *Lespedeza capitata*

### ROUNDHEAD LESPEDEZA

*Provides food for birds and small ground animals; low pollinator value.*

**HABITAT** Dry open soils; pH 5.7-8.2.

**CHARACTERISTICS** A multi-stemmed flowering legume; grows from 2'-4' tall; 18" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms from August to September; cream flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 275,000 seeds per lb.

**ECOTYPE** PA; Albany Pine Bush-NY; RI



**Naturalized**  
**Herbaceous Annual**  
**Legume**

INDICATOR REGION



## *Lespedeza stipulacea*

### KOREAN LESPEDEZA

*Introduced for erosion control and wildlife habitat; blooms 60 days after germination; seed is persistent in soil; not for use with native meadow species.*

**HABITAT** Low-fertility basic soils; pH 6.0-7.5.

**CHARACTERISTICS** A short-lived multi-stemmed legume; grows from 2'-5' tall; 8" minimum root depth; full sun; high drought tolerance; low salt tolerance; blooms in late spring; white flowers.

**SEEDING RATE** 20-30 lb per acre in a mix; approx. 238,000 seeds per lb.

**VARIETIES** Common commercial



**Naturalized**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## *Lespedeza cuneata*

### SERICEA LESPEDEZA

*Introduced for erosion control; seed is persistent in soil; not for use with native meadow species; provides food and cover for wildlife.*

**HABITAT** Fields, grassy roadsides.

**CHARACTERISTICS** A multi-stemmed legume; grows to 3' tall; blooms from August to September; white flowers.

**SEEDING RATE** 50% of a mix with 50% ryegrass; approx. 350,000 seeds per lb.

**VARIETIES** Common commercial



**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## *Lespedeza virginica*

### SLENDER LESPEDEZA

*The prettiest native Lespedeza we carry; the attractive flowers and foliage add color to native meadows; low pollinator value.*

**HABITAT** Open woods, roadsides, fields.

**CHARACTERISTICS** An erect-growing clump-forming legume; grows to 3' tall; blooms from July to September; roseate to purplish blossoms.

**SEEDING RATE** 10 PLS lb per acre alone; 1%-3% of a mix.

**ECOTYPE** VA; GA



**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## *Lespedeza frutescens* *(L. intermedia)*

### SHRUBBY BUSHCLOVER

*One of the prettiest native Lespedezas we carry; the attractive foliage adds soft color to native meadows; low pollinator value.*

**HABITAT** Rocky woods, thickets, dry open woods.

**CHARACTERISTICS** An erect-growing clump-forming legume; grows to 3' tall; blooms from July to September; pink to purplish flowers.

**SEEDING RATE** 1%-3% of a mix.

**ECOTYPE** PA; MD



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Liatris aspera*

### ROUGH BLAZING STAR

*A great species to include in floral arrangements; high pollinator value.*

**HABITAT** Dry open places.

**CHARACTERISTICS** A corm-forming flowering species; grows from 1'-4' tall; blooms from August to September; beautiful spikes of purple flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 236,000 seeds per lb.

**ECOTYPE** Midwestern U.S.



## *Liatriis elegans*

**PINKSCALE BLAZING STAR**  
*Catches your attention at woodland margins; high pollinator value.*

**HABITAT** Woods, old fields in sandy soils.

**CHARACTERISTICS** A corm-forming flowering species; grows to 4-1/2' tall; blooms from September to October; beautiful spikes of lavender, purple or pinkish flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 417,000 seeds per lb (de-bearded).

**ECOTYPE** GA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Liatriis graminifolia (L. pilosa)*

**GRASSLEAF BLAZING STAR**  
*One of our latest blooming species; showy in the Coastal Plain and Piedmont; high pollinator value.*

**HABITAT** Flatwoods, open hummocks, dry open woods; especially in sandy soils among pines; pH 5.8-6.8.

**CHARACTERISTICS** A single-stemmed, corm-forming flowering species; grows to 5' tall; full sun; moderate drought tolerance; low salt tolerance; blooms from August to October; purple flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 290,000 seeds per lb.

**ECOTYPE** NC

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Liatriis garberi*

**GARBER'S BLAZING STAR**  
*A showy part of the Florida ecosystem; high pollinator value.*

**HABITAT** Pinelands.

**CHARACTERISTICS** A corm-forming flowering species; grows to 2-1/2' tall; blooms from summer to fall; pink flowers.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** FL

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Liatriis pycnostachya*

**PRAIRIE BLAZING STAR**  
*Very popular for its "crowded" flower heads; attracts native pollinators and butterflies.*

**HABITAT** Moist or dry prairies, open woods; pH 6.0-8.5.

**CHARACTERISTICS** A multi-stemmed, corm-forming flowering species; grows from 5'-6' tall; 14" minimum root depth; full sun; moderate drought tolerance; low salt tolerance; blooms from July to October; beautiful spikes of lavender flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 120,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Liatriis gracilis*

**SLENDER GAYFEATHER**  
*A showy part of Florida's pineland ecosystem; high pollinator value.*

**HABITAT** Sandhills, flatwoods, pinelands.

**CHARACTERISTICS** A corm-forming flowering species; grows to 3' tall; blooms from September to October; pink to purple flowers.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** FL

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Liatriis spicata*

**MARSH (DENSE) BLAZING STAR (SPIKED GAYFEATHER)**  
*The flowers have a feathery appearance; high pollinator value.*

**HABITAT** Moist fields, fencerows, roadsides; pH 5.6-7.5.

**CHARACTERISTICS** A rhizomatous, corm-forming flowering species; grows from 1'-5' tall; 14" minimum root depth; moderate shade tolerance; low drought tolerance; low salt tolerance; blooms from July to September; beautiful spikes of purple flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 100,000 seeds per lb.

**ECOTYPE** PA; FL

**VARIETIES** Common commercial

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



### INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**

# HERBACEOUS FLOWERING SPECIES



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Liatris squarrosa*

### SCALY BLAZING STAR

One of the earliest *Liatris* species to bloom; attracts hummingbird moths; high pollinator value.

**HABITAT** Dry sandy prairies, thin woods.

**CHARACTERISTICS** Grows from 1'-3' tall; full sun; tuft-like purple spikes.

**SEEDING RATE** 1%-5% of a mix.

**ECOTYPE** Piedmont VA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Lobelia cardinalis*

### CARDINALFLOWER

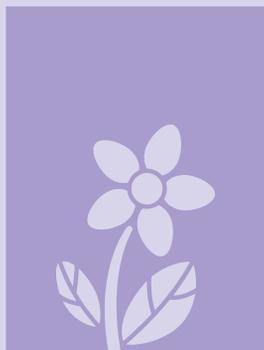
The nectar provides food for hummingbirds; high pollinator value.

**HABITAT** Wet meadows, swamps, ditches, streambanks, lakeshores; pH 5.8-7.8.

**CHARACTERISTICS** A single-stemmed flowering species; grows from 2'-6' tall; 12" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; blooms from July to October; crimson flowers.

**SEEDING RATE** 1%-2% of a mix; approx. 11,293,000 seeds per lb.

**ECOTYPE** MD; Midwestern U.S.



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Liatris squarrolosa*

### APPALACHIAN BLAZING STAR

Blooms late in the growing season; attractive to native pollinators and butterflies.

**HABITAT** Mostly xeric woodlands; pH 5.4-7.5.

**CHARACTERISTICS** A corm-forming flowering species; grows to 2-1/2' tall; 14" root depth; moderate shade tolerance; moderate drought tolerance; moderate salt tolerance; blooms in late summer; purple flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 100,000 seeds per lb.

**ECOTYPE** Piedmont NC



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Lobelia siphilitica*

### GREAT BLUE LOBELIA

Decorative indeterminate blooms; high pollinator value.

**HABITAT** Swamps, moist meadows, streambanks, ditches.

**CHARACTERISTICS** Grows from 1'-5' tall; blooms from August to September; blue flowers have white markings.

**SEEDING RATE** 0.5%-2% of a mix; approx. 7,760,000 seeds per lb.

**ECOTYPE** PA



**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## *Linum perenne*

### PERENNIAL BLUE FLAX

Short stature and intense blue flowers make this a great wildflower.

**HABITAT** Naturalized along roadsides.

**CHARACTERISTICS** Grows from 1'-2' tall; blooms from May to July; blue flowers.

**SEEDING RATE** 1%-15% of a mix.

**VARIETIES** Common commercial



**Naturalized**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## *Lotus corniculatus*

### BIRD'S FOOT TREFOIL

Excellent for erosion control on strip mines and landfills; provides excellent livestock forage.

**HABITAT** Roadsides, meadows; pH 5.0-7.7.

**CHARACTERISTICS** A single-crown flowering legume; grows from 1'-2' tall; 14" minimum root depth; full sun; moderate drought tolerance; moderate salt tolerance; blooms from May to July; yellow flowers.

**SEEDING RATE** 8-15 lb per acre in a mix; approx. 370,000 seeds per lb.

**VARIETIES** 'Norcen' (upright)-forage and erosion control; 'Empire' (low spreading)-forage and erosion control; 'Leo' (low spreading)-forage and erosion control



## *Ludwigia alternifolia*

### SEEDBOX

The four-sided seedheads add texture to winter landscapes.

**HABITAT** Swamps, fields.

**CHARACTERISTICS** Grows from 3'-4' tall; blooms from August to September; beautiful reddish fall foliage.

**SEEDING RATE** 0.5%-2% of a mix; approx. 20,800,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Lupinus polyphyllus*

### BIGLEAF LUPINE

Very attractive in early summer; not for use in habitat restoration.

**HABITAT** Fields, roadsides; adapted to fine to coarse soils.

**CHARACTERISTICS** A naturalized flowering legume; grows to 5' tall; moderate shade tolerance; blooms from June to July; blue, pink or white flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 75,000 seeds per lb.

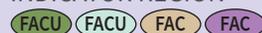
**ECOTYPE** Common commercial

Native

Herbaceous Perennial

Legume

INDICATOR REGION



## *Ludwigia linearis*

### NARROWLEAF PRIMROSE WILLOW

A fast-growing species with indeterminate blooms.

**HABITAT** Savannas, ditches, bogs.

**CHARACTERISTICS** Grows to 31" tall; blooms from early June to late September; yellow flowers.

**SEEDING RATE** 1%-2% of a mix.

**ECOTYPE** Coastal Plain SC

Native

Herbaceous Perennial

INDICATOR REGION



## *Mimulus ringens*

### SQUARE STEMMED MONKEYFLOWER

Provides cover for wildlife; the indeterminate snapdragon-like blooms attract native pollinators; medium pollinator value.

**HABITAT** Wet open ground of swamps, meadows, shores.

**CHARACTERISTICS** A rhizomatous flowering species; reseeds itself in open wet areas; grows from 2'-4' tall; blooms from June to September; pale purple to white flowers on 1" long peduncles.

**SEEDING RATE** 0.3%-1% of a mix; approx. 22,900,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Ludwigia maritima*

### SEASIDE PRIMROSE WILLOW

**HABITAT** Savannas, ditches, low pinelands, inland lowlands.

**CHARACTERISTICS** Grows to 3' tall; blooms from early June to late September; yellow flowers.

**SEEDING RATE** 1%-2% of a mix.

**ECOTYPE** Coastal Plain NC

Native

Herbaceous Perennial

INDICATOR REGION



## *Monarda fistulosa*

### WILD BERGAMOT

A showy persistent species; often used as an ornamental; high pollinator value.

**HABITAT** Fields, brushy thickets, floodplains, roadsides; pH 6.0-8.0.

**CHARACTERISTICS** A rhizomatous, single-stemmed flowering species; grows to 5' tall; 4" minimum root depth; moderate shade tolerance; no drought tolerance; no salt tolerance; blooms from June to September; lavender flowers.

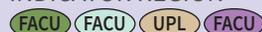
**SEEDING RATE** 0.3%-2% of a mix; approx. 1,272,000 seeds per lb.

**ECOTYPE** PA; Fort Indiantown Gap-PA; Midwestern U.S.

Native

Herbaceous Perennial

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION

# HERBACEOUS FLOWERING SPECIES



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Monarda media*

### PURPLE BERGAMOT

*Persistent in our northern regions; high pollinator value.*

**HABITAT** Low woods, streambanks, floodplains; pH 6.0-8.0.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 5' tall; blooms from July to August; reddish-purple flowers.

**SEEDING RATE** 0.3%-2% of a mix.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Oenothera speciosa*

### SHOWY EVENING PRIMROSE

*The large flowers open in the evening.*

**HABITAT** Dry fields, roadsides.

**CHARACTERISTICS** A flowering species; grows to 2' tall; blooms from June to July; pink and white flowers.

**SEEDING RATE** 0.1%-1% of a mix; approx. 3,040,000 seeds per lb.

**ECOTYPE** Midwestern U.S.



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Monarda punctata*

### SPOTTED BEEBALM

*This species has a pleasant fragrance; high pollinator value.*

**HABITAT** Dry sandy and Coastal Plain soils, dry open woods, fields.

**CHARACTERISTICS** Grows from 16"-40" tall; full sun; drought tolerant; blooms from July to September; pale yellow flowers with purple spots and white, pink or lavender bracts.

**SEEDING RATE** 0.3%-2% of a mix; approx. 1,472,000 seeds per lb.

**ECOTYPE** Albany Pine Bush-NY; Eastern Shore MD; Coastal Plain SC; FL



**Naturalized**  
**Herbaceous Biennial**

INDICATOR REGION



## *Papaver rhoeas*

### CORN POPPY

*Creates an early field of color the year after seeding.*

**HABITAT** Roadsides, meadows, gardens.

**CHARACTERISTICS** A flowering species; grows from 1'-3' tall; blooms from May to June; red flowers.

**SEEDING RATE** 1%-20% of a mix; approx. 3,400,000 seeds per lb.

**VARIETIES** Common commercial



**Native**  
**Herbaceous Biennial**

INDICATOR REGION



## *Oenothera biennis*

### EVENING PRIMROSE

*Showy the second year after seeding; new blossoms occur every evening and early morning during the season; provides good wildlife food and habitat, especially for birds; medium pollinator value.*

**HABITAT** Fertile fields, old gardens; pH 5.0-7.0.

**CHARACTERISTICS** A single-crown flowering species; grows from 3'-6' tall; 10" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms from June to August; yellow flowers.

**SEEDING RATE** 0.1%-2% of a mix; approx. 1,376,000 seeds per lb.

**ECOTYPE** PA; Midwestern U.S.



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Parthenium integrifolium*

### WILD QUININE

*The long-lasting blooms stay showy; provides texture to wild meadows; low pollinator value.*

**HABITAT** Dry slopes, roadsides.

**CHARACTERISTICS** A crown-forming flowering species with one or more stems; grows from 16"-48" tall; full sun; drought tolerant; blooms from late May to late August; grayish-white flowers.

**SEEDING RATE** 1%-3% of a mix.

**ECOTYPE** VA; NC; Midwestern U.S.

# HERBACEOUS FLOWERING SPECIES



**Penstemon australis**  
**EUSTIS LAKE BEARDTONGUE**  
*Can attract hummingbirds and pollinators; high pollinator value.*  
**HABITAT** Sandhills, pinewoods, burned-over thickets.  
**CHARACTERISTICS** Grows from 1'-2' tall; blooms from May to June; rose to lavender blossoms.  
**SEEDING RATE** 5-10 PLS lb per acre alone; 1%-5% of a mix.  
**ECOTYPE** 'Suther'-NC

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 NO NO FACU FACU



**Penstemon laevigatus**  
**APPALACHIAN BEARDTONGUE**  
*High early season pollinator value.*  
**HABITAT** Meadows, woods, roadsides.  
**CHARACTERISTICS** A showy flowering species; grows to 4' tall; blooms from May to June; violet-purple flowers.  
**SEEDING RATE** 1%-5% of a mix.  
**ECOTYPE** PA; SC

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 FACU FACU FACU FAC



**Penstemon digitalis**  
**TALL WHITE BEARDTONGUE**  
*A durable early plant found in many of our meadow mixes; high pollinator value.*  
**HABITAT** Meadows, old fields, roadsides; pH 5.5-7.0.  
**CHARACTERISTICS** A rhizomatous flowering species; grows to 4' tall; 8" minimum root depth; shade tolerant; high drought tolerance; moderate salt tolerance; blooms from May to July; white flowers.  
**SEEDING RATE** 1%-5% of a mix; approx. 400,000 seeds per lb.  
**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 FAC FAC FAC FAC



**Penstemon multiflorus**  
**MANYFLOWER BEARDTONGUE**  
*Produces nodding bell-shaped flowers found in Florida savanna ecosystems; high pollinator value.*  
**HABITAT** Sandhills, pine flatwoods, wastelands; grows best in well-drained soils.  
**CHARACTERISTICS** A re-seeding flowering species; grows from 2-1/2'-3' tall; moderate shade tolerance; blooms from April to September; pale lavender to white flowers.  
**SEEDING RATE** 1%-5% of a mix.  
**ECOTYPE** FL

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 NI NI NI NI



**Penstemon hirsutus**  
**HAIRY BEARDTONGUE**  
*High early season pollinator value.*  
**HABITAT** Dry fields, woods, roadside banks, rocky slopes.  
**CHARACTERISTICS** An attractive flowering species; grows to 2-1/2' tall; blooms from May to July; pale purple flowers.  
**SEEDING RATE** 0.5%-3% of a mix.  
**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 NI NI NI NI



**Penthorum sedoides**  
**DITCH STONECROP**  
*Offers texture to wet landscapes; seed capsules turn an attractive reddish color in fall; provides erosion control and wildlife habitat; high pollinator value.*  
**HABITAT** Low wet ground, ditches; pH 5.0-7.0.  
**CHARACTERISTICS** A stoloniferous flowering species; grows to 2' tall; 14" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from July to September; yellow flowers.  
**SEEDING RATE** 0.1%-1% of a mix; approx. 45,000,000 seeds per lb.  
**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 OBL OBL OBL OBL

## INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**

# HERBACEOUS FLOWERING SPECIES



**Native**  
**Herbaceous Annual**

INDICATOR REGION



## *Polygonum pennsylvanicum* **PENNSYLVANIA SMARTWEED**

*Acts as a cover crop in floodplains and on wetland sites; provides food and cover for wildlife; medium pollinator value.*

**HABITAT** Woodland edges, streambanks, disturbed ground; pH 4.0-8.5.

**CHARACTERISTICS** A single-crown flowering species; grows to 6' tall; 14" minimum root depth; full sun; moderate drought tolerance; low salt tolerance; blooms from May to September; attractive pink or purple flowers.

**SEEDING RATE** 1%-4% of a mix; approx. 126,000 seeds per lb.

**ECOTYPE** PA; OH



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Pycnanthemum muticum* **BIGLEAF MOUNTAINMINT**

*The white upper leaves look like snow from a distance; very high pollinator value.*

**HABITAT** Moist woods, thickets, meadows, swales.

**CHARACTERISTICS** A flowering mint species; grows to 3' tall; blooms from July to September; white flowers have white bracts.

**SEEDING RATE** 0.1%-0.5% of a mix.

**ECOTYPE** PA



**Native**  
**Herbaceous Annual/  
Perennial Vine**

INDICATOR REGION



## *Polygonum sagittatum* **ARROWLEAF TEARTHUMB**

*Not for use in residential settings as the prickly stems can cut skin; provides food for waterfowl; medium pollinator value.*

**HABITAT** Low moist ground, vernal ponds, bogs, swamps, marshes; pH 4.0-8.5.

**CHARACTERISTICS** A fast-growing, single-crown flowering species; grows to 1' tall; 6" minimum root depth; full sun; low drought tolerance; moderate salt tolerance; blooms in late spring; tiny white or pink close-clustered flowers grow at the branch tips.

**SEEDING RATE** 1%-2% of a mix; approx. 125,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Pycnanthemum tenuifolium* **NARROWLEAF MOUNTAINMINT**

*Very high late-season pollinator value.*

**HABITAT** Dry soils of prairie and upland woods, moist old fields, floodplains, sandy riverbanks.

**CHARACTERISTICS** A flowering mint species; grows to 2-1/2' tall; blooms from July to September; white flowers.

**SEEDING RATE** 0.1%-0.5% of a mix.

**ECOTYPE** PA; 'Suther' NC



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Pycnanthemum incanum* **HOARY MOUNTAINMINT**

*An attractive, sweet-scented upland species; attracts a large number of diverse pollinators; very high pollinator value.*

**HABITAT** Upland woods, old fields, thickets, barrens.

**CHARACTERISTICS** An erect-growing flowering species; grows to 3-1/4' tall; blooms in summer; white flowers with purple mottling.

**SEEDING RATE** 0.1%-0.5% of a mix.

**ECOTYPE** MD



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Pycnanthemum virginianum* **VIRGINIA MOUNTAINMINT**

*The stems and leaves are fragrant when crushed; also called mountain thyme; very high pollinator value.*

**HABITAT** Dry fields, woods.

**CHARACTERISTICS** A flowering mint species; grows from 1'-3' tall; blooms from July to September; white flowers.

**SEEDING RATE** 0.1%-0.5% of a mix; approx. 3,872,000 seeds per lb.

**ECOTYPE** PA; Midwestern U.S.

# HERBACEOUS FLOWERING SPECIES



**Ratibida pinnata**  
**GREY HEADED CONEFLOWER**  
*The showy flowers last a long time; provides food and cover for birds; medium pollinator value.*  
**HABITAT** Dry fields, limestone uplands, open roadsides; pH 5.6-6.8.  
**CHARACTERISTICS** A single-crown flowering species; grows to 4' tall; 14" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms from June to September; yellow flowers have grey centers.  
**SEEDING RATE** 1%-4% of a mix; approx. 427,500 seeds per lb.  
**ECOTYPE** OH; Midwestern U.S.; AL

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 NI NI NI NI



**Rudbeckia fulgida var. fulgida**  
**ORANGE CONEFLOWER**  
*A decorative species that provides season-long color; medium pollinator value.*  
**HABITAT** Moist fields.  
**CHARACTERISTICS** Grows from 1'-2' tall; blooms from July to October; large yellow to orange flowers have dark brown centers.  
**SEEDING RATE** 0.5%-2% of a mix; approx. 500,000 seeds per lb.  
**ECOTYPE** OH (a taller ecotype); Northern VA

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 NI NI NI NI



**Rhexia mariana**  
**MARYLAND MEADOWBEAUTY**  
*Adds texture to fall landscapes; decorative urn-shaped seed capsules; medium pollinator value.*  
**HABITAT** Marshes, meadows, ditches, savannas.  
**CHARACTERISTICS** Grows to 2-1/2' tall; blooms from May to October; white, lavender or pink flowers; attractive red fall foliage.  
**SEEDING RATE** 0.5%-1% of a mix.  
**ECOTYPE** Coastal Plain NC

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 OBL OBL OBL FACW



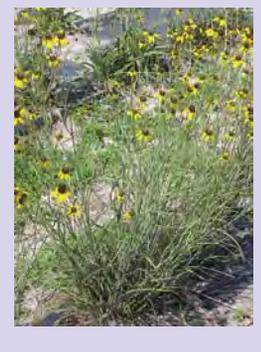
**Rudbeckia hirta**  
**BLACKKEYED SUSAN**  
*The most common native flower in our meadows; provides food and cover for birds; medium pollinator value.*  
**HABITAT** Fields, woods, meadows, roadsides, disturbed sites; pH 6.0-7.0.  
**CHARACTERISTICS** A re-seeding, single-stemmed flowering species; grows from 1'-3' tall; 10" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms from June to October in Region 1; May to July in Region 2; showy yellow flowers.  
**SEEDING RATE** 1%-5% of a mix; approx. 1,576,000 seeds per lb.  
**ECOTYPE** PA; Coastal Plain NC; VT

**Native**  
**Herbaceous Biennial**  
 INDICATOR REGION  
 FACU FACU FACU FACU



**Rhexia virginica**  
**VIRGINIA MEADOWBEAUTY**  
*Adds texture to fall landscapes; decorative urn-shaped seed capsules; medium pollinator value.*  
**HABITAT** Bogs, ditches, low areas.  
**CHARACTERISTICS** Grows to 3' tall; blooms from May to October; rose to purple flowers.  
**SEEDING RATE** 0.5%-1% of a mix.  
**ECOTYPE** Coastal Plain NC

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 OBL OBL OBL FACW



**Rudbeckia mohrii**  
**MOHR'S CONEFLOWER**  
*An attractive species for wet meadows; medium pollinator value.*  
**HABITAT** Wet pine flatwoods, cypress swamps, savannas, ditches.  
**CHARACTERISTICS** A clump-forming species; grows to 4' tall; blooms from summer to fall; yellow flowers have purplish-brown centers.  
**SEEDING RATE** 0.5%-3% of a mix.  
**ECOTYPE** FL

**Native**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 NO NO NO OBL

## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION

# HERBACEOUS FLOWERING SPECIES



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Rudbeckia nitida*

### SHINY CONEFLOWER

*The seeds are utilized by woodland animals; medium pollinator value.*

**HABITAT** Ditches, swales, wet pinelands, bayous; pH 6.0-7.5.

**CHARACTERISTICS** A multi-stemmed flowering species; grows to 5' tall; 6" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms in late spring; yellow flowers.

**SEEDING RATE** 0.5%-3% of a mix; approx. 544,000 seeds per lb.

**ECOTYPE** GA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Sanguisorba canadensis*

### CANADIAN BURNET

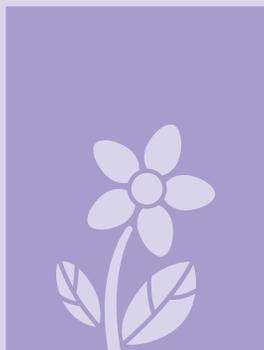
*This species has a longer blooming period than most natives.*

**HABITAT** Marshes, wet meadows, damp prairies.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 5' tall; blooms from July to September; white flowers.

**SEEDING RATE** 1%-2% of a mix.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Rudbeckia subtomentosa*

### SWEET BLACKEYED SUSAN

*Provides food and cover for birds; a source of nectar for bees.*

**HABITAT** Prairies, riverbanks.

**CHARACTERISTICS** Grows from 1'-4' tall; blooms from August to September; yellow flowers.

**SEEDING RATE** 0.5%-3% of a mix; approx. 712,000 seeds per lb.

**ECOTYPE** Midwestern U.S.



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Saururus cernuus*

### LIZARD'S TAIL

*A beautiful wetland wildflower; medium pollinator value.*

**HABITAT** Marshes, swamps.

**CHARACTERISTICS** Grows to 4' tall; blooms in summer; brush-like white spikes.

**SEEDING RATE** 0.5%-3% of a mix.

**ECOTYPE** PA; NC



**Native**  
**Herbaceous Biennial**

INDICATOR REGION



## *Rudbeckia triloba*

### BROWNEYED SUSAN

*Provides late-summer color and texture to landscapes; provides food for birds; medium pollinator value.*

**HABITAT** Moist old fields, rocky woods and edges.

**CHARACTERISTICS** Grows to 5' tall; blooms from June to October; yellow to orange flowers have dark purple or brown centers.

**SEEDING RATE** 0.5%-3% of a mix; approx. 536,000 seeds per lb.

**ECOTYPE** WV



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Scutellaria incana*

### HOARY SKULLCAP

*An attractive species for meadows; low pollinator value.*

**HABITAT** Roadsides, rocky woods.

**CHARACTERISTICS** Grows to 3' tall; blooms from June to August; blue flowers.

**SEEDING RATE** 0.1%-2% of a mix.

**ECOTYPE** PA



## *Senna hebecarpa* (*Cassia h.*)

### WILD SENNA

A robust species with sturdy growth; provides food for birds; medium pollinator value.

**HABITAT** Riverbanks, old fields.

**CHARACTERISTICS** A showy flowering legume with woody roots; grows from 3'-4' tall; blooms in August in Region 1; July to August in Region 2; yellow flowers.

**SEEDING RATE** 0.5%-3% of a mix.

**ECOTYPE** Southern WV; Northern VA

**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## *Silphium asteriscus* var. *laevicaule* (*S. dentatum*)

### STARRY ROSINWEED

The seeds provide food for birds; indeterminate flowering provides high pollinator value.

**HABITAT** Woodlands, old fields, thickets.

**CHARACTERISTICS** A clump-forming flowering species; grows to 8' tall; blooms from May to August; yellow flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** GA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Senna marilandica* (*Cassia m.*)

### MARYLAND SENNA

A robust species with sturdy growth; provides food and cover for wildlife; medium pollinator value.

**HABITAT** Dry roadsides, riverbanks; pH 4.0-7.0.

**CHARACTERISTICS** A hardy, long-lived single-stemmed legume; grows to 3' tall; 12" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms in summer; yellow flowers.

**SEEDING RATE** 0.5%-3% of a mix; approx. 20,500 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



## *Silphium integrifolium*

### PRAIRIE ROSINWEED

Adds texture to landscapes; the seeds provide food for birds; high pollinator value.

**HABITAT** Prairies, dry meadows.

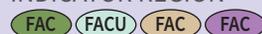
**CHARACTERISTICS** A flowering species; grows from 2'-5' tall; blooms from July to August; yellow flowers.

**SEEDING RATE** 0.5%-2% of a mix; approx. 41,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Silphium asteriscus* var. *angustatum*

### STARRY ROSINWEED

The seeds provide food for birds; indeterminate flowering provides high pollinator value.

**HABITAT** Old fields, pastures, moist woodlands.

**CHARACTERISTICS** A clump-forming flowering species; grows from 3'-8' tall; blooms from June to September; yellow flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** SC; FL

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Silphium laciniatum*

### COMPASSPLANT

The name comes from the leaf orientation; the seeds provide food for birds; high pollinator value.

**HABITAT** Prairies.

**CHARACTERISTICS** A flowering species with a taproot; grows from 3'-10' tall; blooms from July to September; yellow flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** Midwestern U.S.

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Silphium perfoliatum*

### CUP PLANT

*May be used as forage for domestic animals with multiple cuts; best established by planting in fall as a dormant seeding, with germination occurring in spring; high potential as a bioenergy crop; provides food for birds and wildlife; high pollinator value.*

**HABITAT** Floodplains, abandoned fields, moist meadows; pH 6.0-8.0.

**CHARACTERISTICS** A robust, long-lived flowering species with a thick stem; grows to 11' tall; 12" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; blooms from July to September; yellow flowers; large leaves surround the stem.

**SEEDING RATE** 0.5%-2% of a mix; approx. 100,000 seeds per lb.

**ECOTYPE** Midwestern U.S.



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Silphium terebinthaceum*

### PRAIRIE DOCK

*Adds texture to landscapes; the seeds provide food for birds; high pollinator value.*

**HABITAT** Dry meadows, woods.

**CHARACTERISTICS** A flowering species; grows from 4'-10' tall; blooms from July to August; yellow flowers on the terminal end of robust stems; leaves emerge from basal rosettes.

**SEEDING RATE** 0.5%-2% of a mix; approx. 17,000 seeds per lb.

**ECOTYPE** OH



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Solidago bicolor*

### WHITE (SILVER ROD) GOLDENROD

*Survives on low-fertility sites and road cuts; very high pollinator value.*

**HABITAT** Dry woods, wooded banks, shale barrens.

**CHARACTERISTICS** A single-stemmed flowering species; grows to 3' tall; blooms from July to October; silvery-white flowers.

**SEEDING RATE** 0.5%-1% of a mix.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Solidago caesia*

### BLUE STEM (WOODLAND) GOLDENROD

*Adds color and texture to woodland landscapes; very high pollinator value.*

**HABITAT** Rich woods; pH 5.5-7.0.

**CHARACTERISTICS** A rhizomatous flowering species; grows from 1'-3' tall; 8" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from August to October; yellow flowers have decorative blue or purple stems.

**SEEDING RATE** 0.5%-1% of a mix; approx. 700,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Silphium trifoliatum*

### WHORLED ROSINWEED

*The seeds provide food for birds; the flowers are a source of nectar for butterflies; high pollinator value.*

**HABITAT** Roadsides, dry thickets, meadows.

**CHARACTERISTICS** A clump-forming species; grows to 6-1 1/2' tall; blooms in late summer; yellow flowers.

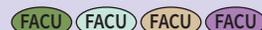
**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** PA; VA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Solidago canadensis*

### CANADA GOLDENROD

*An aggressive goldenrod that does well with Switchgrass and Big Bluestem; the dominant robust vegetation adds diversity to native landscapes; provides cover for wildlife; very high pollinator value.*

**HABITAT** Fields, roadsides; pH 4.8-7.5.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 5' tall; 12" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms from July to October; yellow flowers.

**SEEDING RATE** 0.5%-1% of a mix; approx. 4,600,000 seeds per lb.

**ECOTYPE** PA



## *Solidago fistulosa*

### PINE BARREN GOLDENROD

*This handsome goldenrod stands out because of its height and long-blooming flowers; very high pollinator value.*

**HABITAT** Upland coastal swamps, pine barrens, savannas, ditches; pH 4.5-7.0.

**CHARACTERISTICS** A rhizomatous species with erect coarse stems; grows from 3'-6' tall; 6" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from late August to frost; yellow rays.

**SEEDING RATE** 0.5%-1% of a mix; approx. 700,000 seeds per lb.

**ECOTYPE** FL

Native

Herbaceous Perennial

INDICATOR REGION



## *Solidago nemoralis*

### GRAY GOLDENROD

*Very high pollinator value.*

**HABITAT** Fields and roadsides in low-fertility soils; pH 6.5-7.5.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 3' tall; 12" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms from August to September; yellow flowers.

**SEEDING RATE** 0.5%-1% of a mix; approx. 1,008,000 seeds per lb.

**ECOTYPE** PA; VA

Native

Herbaceous Perennial

INDICATOR REGION



## *Solidago flexicaulis*

### ZIGZAG GOLDENROD

*Very high pollinator value.*

**HABITAT** Rocky wooded slopes, moist woods.

**CHARACTERISTICS** An erect-growing species with a zigzagged stem; moderate shade tolerance; blooms from August to November; yellow flowers.

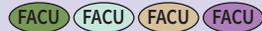
**SEEDING RATE** 0.5%-1% of a mix.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Solidago odora*

### LICORICE SCENTED GOLDENROD

*A showy addition to landscapes; leaves smell like black licorice when crushed; very high pollinator value.*

**HABITAT** Dry open woods, sandy soils.

**CHARACTERISTICS** A flowering species with a stout stem; grows from 18"-60" tall; blooms from July to September; yellow flowers.

**SEEDING RATE** 0.5%-1% of a mix.

**ECOTYPE** PA; Coastal Plain GA

Native

Herbaceous Perennial

INDICATOR REGION



## *Solidago juncea*

### EARLY GOLDENROD

*The first goldenrod of the season to bloom; a beautiful addition to meadows; very high mid-summer pollinator value.*

**HABITAT** Meadows, open disturbed sites.

**CHARACTERISTICS** A flowering species; grows to 3' tall; blooms from June to July; yellow flowers.

**SEEDING RATE** 0.5%-1% of a mix; approx. 2,538,000 seeds per lb.

**ECOTYPE** PA; VA

Native

Herbaceous Perennial

INDICATOR REGION



## *Solidago patula*

### ROUGHLEAF GOLDENROD

*Provides cover for wildlife; very high pollinator value.*

**HABITAT** Wetlands, riparian areas; pH 4.5-7.0.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 6' tall; 6" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from August to October; attractive yellow flowers.

**SEEDING RATE** 0.5%-1% of a mix; approx. 700,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION

# HERBACEOUS FLOWERING SPECIES



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Solidago riddellii* (*Oligoneuron r.*)

### RIDDELL'S GOLDENROD

*Provides cover for wildlife; very high pollinator value.*

**HABITAT** Swamps, wet meadows, moist prairies.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 3' tall; blooms from August to September; attractive yellow flowers.

**SEEDING RATE** 0.5%-1% of a mix; approx. 1,544,000 seeds per lb.

**ECOTYPE** OH



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Solidago sempervirens*

### SEASIDE GOLDENROD

*Great for coastal plantings; very high pollinator value.*

**HABITAT** Saline places along the coast; pH 5.5-7.5.

**CHARACTERISTICS** A multi-stemmed species; grows to 5' tall; 14" minimum root depth; full sun; moderate drought tolerance; high salt tolerance; blooms in late summer; yellow flowers.

**SEEDING RATE** 0.5%-1% of a mix; approx. 700,000 seeds per lb.

**ECOTYPE** DE



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Solidago rigida* (*Oligoneuron rigidum*)

### STIFF GOLDENROD

*A species with robust growth; provides food and cover for wildlife; very high pollinator value.*

**HABITAT** Moist fields and thickets in rich soils; pH 5.0-7.5.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 5' tall; 12" minimum root depth; moderate shade tolerance; high drought tolerance; no salt tolerance; blooms from late August to September; attractive yellow flowers are flat on top.

**SEEDING RATE** 0.5%-1% of a mix; approx. 1,009,000 seeds per lb.

**ECOTYPE** OH



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Solidago speciosa*

### SHOWY GOLDENROD

*Provides nectar for migrating monarch butterflies; very high pollinator value.*

**HABITAT** Moist meadows, rocky woods, thickets, rocky banks along roadsides.

**CHARACTERISTICS** A flowering species with a stout stem; grows to 4' tall; blooms from September to early October; showy yellow flowers.

**SEEDING RATE** 0.5%-1% of a mix; approx. 1,340,000 seeds per lb.

**ECOTYPE** Southern WV; Coastal Plain GA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Solidago rugosa*

### WRINKLELEAF GOLDENROD

*The dense stems provide cover for wildlife; very high pollinator value.*

**HABITAT** Fields, woods, floodplains, thickets, roadsides, open ground; pH 5.0-7.5.

**CHARACTERISTICS** A rhizomatous flowering species; grows from 1'-3-1/2' tall; 12" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from August to mid-October; yellow flowers.

**SEEDING RATE** 0.5%-1% of a mix; approx. 1,000,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Solidago stricta*

### WAND GOLDENROD

*This delicate goldenrod can be outstanding either in the wild or in a garden; very high pollinator value.*

**HABITAT** Pine barrens, savannas, sandhill ecotones, wet meadows.

**CHARACTERISTICS** A rhizomatous flowering species; grows to 6' tall; blooms from late summer to frost; yellow flowers on narrow spike-like, often one-sided, panicles; smooth stems and leaves.

**SEEDING RATE** 0.5%-1% of a mix.

**ECOTYPE** FL

# HERBACEOUS FLOWERING SPECIES



## *Thalictrum pubescens* (*T. polygamum*)

### TALL MEADOW RUE

*Provides early delicate flowers and leaves that stand above other growth in wet meadows; low pollinator value.*

**HABITAT** Wet meadows, low open woods, swamps.

**CHARACTERISTICS** A flowering species; grows to 6' tall; blooms from June to July; decorative white flowers.

**SEEDING RATE** 1%-2% of a mix; approx. 192,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Verbena urticifolia*

### WHITE VERVAIN

*Adds texture to meadows; high pollinator value.*

**HABITAT** Thickets, moist fields, meadows, open places.

**CHARACTERISTICS** A single-stemmed flowering species; grows from 1'-5' tall; blooms from June to October; white flowers.

**SEEDING RATE** 1%-2% of a mix.

**ECOTYPE** PA

Native

Herbaceous Annual/  
Perennial

INDICATOR REGION



## *Verbena hastata*

### BLUE VERVAIN

*Easily seeded in wetlands; high pollinator value.*

**HABITAT** Moist thickets, floodplains, wet ditches, roadsides.

**CHARACTERISTICS** A single-stemmed flowering species; grows from 2'-5' tall; blooms from June to October; blue to violet candelabra-like flowers.

**SEEDING RATE** 1%-4% of a mix; approx. 1,488,000 seeds per lb.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Verbesina alternifolia* (*Actinomeris a.*)

### WINGSTEM

*The aggressive growth provides cover in wet meadows; very high pollinator value.*

**HABITAT** Moist wooded slopes, shaded lowlands, roadsides.

**CHARACTERISTICS** Grows from 3'-9' tall in colonies; blooms from August to October; yellow flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** PA

Native

Herbaceous Perennial

INDICATOR REGION



## *Verbena stricta*

### HOARY VERVAIN

*Adds texture and color to open landscapes; high pollinator value.*

**HABITAT** Open fields, roadsides; tolerates poor soils.

**CHARACTERISTICS** A flowering species; grows from 10"-48" tall; blooms in late summer; deep blue to purple flowers; pale hairy leaves.

**SEEDING RATE** 1%-4% of a mix; approx. 471,000 seeds per lb.

**ECOTYPE** Midwestern U.S.

Native

Herbaceous Perennial

INDICATOR REGION



## *Vernonia acaulis*

### STEMLESS IRONWEED

*High pollinator value.*

**HABITAT** Upland or sandy woods, sandhill ecotones.

**CHARACTERISTICS** A crown-forming species; grows to 4' tall; blooms from late June to August; purple flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** SC

Native

Herbaceous Perennial

INDICATOR REGION



## INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species

- UPL** Upland species
- NO** No occurrence
- NI** No indicator

SEE PAGE 9 FOR EXPLANATION

# HERBACEOUS FLOWERING SPECIES



## *Vernonia angustifolia*

### TALL IRONWEED

*High pollinator value.*

**HABITAT** Savannas, pine barrens, sandy woods, old fields.

**CHARACTERISTICS** A non-stoloniferous multi-stemmed species; grows from 2'-4' tall; blooms from late June to early September; showy pinkish-purple flowers; narrow leaves and stems.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** SC

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Veronicastrum virginicum*

### CULVER'S ROOT

*Very high pollinator value.*

**HABITAT** Moist meadows, thickets, swamps.

**CHARACTERISTICS** A rhizomatous flowering species; grows from 2'-6' tall; blooms from June to August; showy pink or white flowers.

**SEEDING RATE** 0.1%-0.5% of a mix; approx. 7,761,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Vernonia gigantea* *(V. altissima)*

### GIANT IRONWEED

*The aggressive growth provides a nesting habitat for woodcocks; the seeds are a source of food for birds; high pollinator value.*

**HABITAT** Moist soils, wet woods.

**CHARACTERISTICS** A single-stemmed flowering species; grows from 3'-9' tall; blooms in fall; purple flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** PA; FL

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Viola cornuta*

### JOHNNY JUMPUP

*A pansy-like miniature plant added to mixes for early spring color.*

**HABITAT** Dry meadows.

**CHARACTERISTICS** A flowering species; grows to 6" tall; blooms from May to August.

**SEEDING RATE** 1%-5% of a mix; approx. 400,000 seeds per lb.

**VARIETIES** Common commercial

**Naturalized**  
**Herbaceous Annual**

INDICATOR REGION



## *Vernonia noveboracensis*

### NEW YORK IRONWEED

*The aggressive growth and seeds provide shelter and food for the birds; high pollinator value.*

**HABITAT** Streambanks, wet fields, pastures, meadows; pH 4.5-8.0.

**CHARACTERISTICS** A multi-stemmed flowering species; grows from 3'-7' tall; 6" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from July to September; purple flowers.

**SEEDING RATE** 0.5%-2% of a mix; approx. 300,000 seeds per lb.

**ECOTYPE** PA; 'Suther'-Piedmont NC

**Native**  
**Herbaceous Perennial**

INDICATOR REGION



## *Zizia aurea*

### GOLDEN ALEXANDERS

*One of our earliest blooming natives; an early source of food for pollinators; medium pollinator value.*

**HABITAT** Wooded bottomlands, streambanks, moist meadows, floodplains.

**CHARACTERISTICS** Grows to 3' tall; blooms from May to June; yellow flowers.

**SEEDING RATE** 1%-3% of a mix; approx. 172,000 seeds per lb.

**ECOTYPE** PA; Midwestern U.S.

**Native**  
**Herbaceous Perennial**

INDICATOR REGION





## ~ RECENT ADDITIONS ~



### ***Amsonia ciliata***

#### **FRINGED BLUESTAR**

*Provides food for native pollinators.*

**HABITAT** Sandhills, sandy woodlands.

**CHARACTERISTICS** A clump-forming species; grows to 2-1/2' tall; blooms in April; blue flowers.

**SEEDING RATE** 0.5%-1% of a mix.

**ECOTYPE** SC

**Native**

**Herbaceous Perennial**

INDICATOR REGION



### ***Aster lowrieanus*** **(*Symphyotrichum lowrieanum*)**

#### **LOWRIE'S BLUE WOOD ASTER**

*Provides food for pollinators.*

**HABITAT** Dry to mesic woodlands.

**CHARACTERISTICS** A flowering species with a branched stem; grows to 4' tall; partial shade tolerance; blooms from September to October; pale blue or white flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** PA

**Native**

**Herbaceous Perennial**

INDICATOR REGION



### **INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species

- UPL** Upland species
- NO** No occurrence
- NI** No indicator

SEE PAGE 9 FOR EXPLANATION



**Amorpha fruticosa**  
**RIVER LOCUST (FALSE INDIGO)**  
*Provides food and cover for wildlife and food for bees.*

**HABITAT** Alluvial soils along streams, rivers, other moist areas; pH 5.0-8.5.

**CHARACTERISTICS** A multi-stemmed shrub species; grows to 18' tall; 12" minimum root depth; full sun; no drought tolerance; moderate salt tolerance; blooms from May to June; small blue to violet flowers; seeds mature in fall and winter.

**SEEDING RATE** 0.5%-5% of a riparian mix; approx. 52,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Woody Deciduous**  
**Shrub/Legume**

INDICATOR REGION



**Aronia melanocarpa**  
**(Pyrus m.) (Sorbus m.)**  
**(Photinia m.)**

**BLACK CHOKEBERRY**  
*A source of wildlife cover and fall food; browsed by deer and rabbits.*

**HABITAT** Swamps, bogs, wet or dry woods, barrens.

**CHARACTERISTICS** A shrub species; grows to 12' tall; 24" minimum root depth; shade tolerant; moderate drought tolerance; moderate salt tolerance; blooms from March to June; white flowers; produces black fruit that lasts into winter.

**SEEDING RATE** 1%-10% of a woodland mix; approx. 256,000 seeds per lb.

**ECOTYPE** OH

**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



**Amorpha herbacea**  
**CLUSTERSPIKE FALSE INDIGO**  
*Attractive flowers and plant architecture; very high pollinator value.*

**HABITAT** Sandy fields, ridges, open woodlands; generally on the Coastal Plain.

**CHARACTERISTICS** A typically unbranched shrub species; grows to 5' tall; blooms from May to July; blue-violet to white flowers.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** NC

**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



**Carpinus caroliniana**  
**HORNBEAM (BLUE BEECH)**  
**(MUSCLEWOOD)**

*Also known as Ironwood because of its hardness; provides food (seeds, buds and catkins) for wildlife.*

**HABITAT** Rich moist woods, stream edges; pH 4.0-7.4.

**CHARACTERISTICS** A multi-stemmed tree species; grows to 40' tall; 20" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms in April.

**SEEDING RATE** 1%-10% of a woodland mix; approx. 30,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Woody Deciduous Tree**

INDICATOR REGION



**Aralia spinosa**  
**HERCULES' CLUB**  
*Provides winter food for wildlife and food for bees.*

**HABITAT** Moist woods, riverbanks, roadsides; pH 5.5-7.2.

**CHARACTERISTICS** A multi-stemmed tree species; grows to 40' tall; 30" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from June to July; white or green flowers; large seed clusters mature in late fall.

**SEEDING RATE** 1%-5% of a woodland mix; approx. 131,000 seeds per lb.

**ECOTYPE** PA

**Native**  
**Woody Deciduous Tree**

INDICATOR REGION



**Cephalanthus occidentalis**  
**BUTTONBUSH**

*Produces an abundance of seed favored by ducks; a good source of nectar for butterflies and bees.*

**HABITAT** Low wet ground, swamps, bogs, lake edges; pH 5.3-8.5.

**CHARACTERISTICS** A multi-stemmed shrub species; grows from 6'-9' tall; 14" minimum root depth; shade tolerant; moderate drought tolerance; moderate salt tolerance; blooms from May to August; attractive ball-like clusters of white flowers; produces heavy brown seeds.

**SEEDING RATE** 1%-10% of a wetland mix.

**ECOTYPE** PA; NC

**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION





**Cercis canadensis**  
**EASTERN REDBUD**  
*A great companion to Cornus florida; high pollinator value.*  
**HABITAT** Woodlands; pH 5.0-7.9.  
**CHARACTERISTICS** A widely branched shrub or tree species; grows to 31' tall; 24" minimum root depth; shade tolerant; high drought tolerance; no salt tolerance; blooms from March to May; attractive pale pink to deep rose flowers.  
**SEEDING RATE** 1%-10% of a mix; approx. 18,000 seeds per lb.  
**ECOTYPE** PA

Native  
 Woody Deciduous  
 Shrub/Tree

INDICATOR REGION  
 FACU FACU FACU UPL



Native  
 Woody Deciduous Tree  
 INDICATOR REGION  
 FACU FACU FACU FACU

**Cornus florida**  
**FLOWERING DOGWOOD**  
*An ornamental tree for woodland borders; provides abundant red fruit for birds; medium pollinator value.*  
**HABITAT** Rich moist woods, woodland edges; pH 5.0-7.0.  
**CHARACTERISTICS** A multi-stemmed tree species; grows to 40' tall; 18" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; blooms from March to April; white, yellowish or pinkish flowers.  
**SEEDING RATE** 1%-20% of a woodland mix; approx. 4,000 seeds per lb.  
**ECOTYPE** PA



**Cornus alternifolia**  
**PAGODA DOGWOOD**  
*Provides food and cover for wildlife; medium pollinator value.*  
**HABITAT** Thickets, rich woods; pH 4.8-7.3.  
**CHARACTERISTICS** A shrub species; grows to 20' tall; 20" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from May to July; white flowers; produces blue fruit.  
**SEEDING RATE** 1%-10% of a mix; approx. 8,000 seeds per lb.  
**ECOTYPE** PA

Native  
 Woody Deciduous  
 Shrub

INDICATOR REGION  
 FACU FACU FACU FACU



Native  
 Woody Deciduous  
 Shrub  
 INDICATOR REGION  
 FAC FAC FACU FACU

**Cornus racemosa**  
**GRAY DOGWOOD**  
*The thick low vegetation provides excellent habitat for a variety of wildlife; the fruit provides fall and winter food for a variety of birds; high pollinator value.*  
**HABITAT** Moist meadows, thickets; pH 5.0-7.0.  
**CHARACTERISTICS** A rhizomatous shrub species; grows to 12' tall; 16" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; blooms from May to July; attractive clusters of white, greenish-white or yellow flowers; produces blue and white fruit on red panicles.  
**SEEDING RATE** 1%-20% of a meadow mix; approx. 13,000 seeds per lb.  
**ECOTYPE** PA



**Cornus amomum**  
**SILKY DOGWOOD**  
*The thick low vegetation provides excellent habitat for a variety of wildlife; the abundant fruit is eaten by many birds; medium pollinator value.*  
**HABITAT** Moist woods, meadows, riparian areas; pH 5.0-7.0.  
**CHARACTERISTICS** A shrub species; grows to 10' tall; 16" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from May to July; attractive white, greenish-white or yellow flower clusters; produces blue and white fruit in fall.  
**SEEDING RATE** 1%-20% of a riparian mix; approx. 12,000 seeds per lb.  
**ECOTYPE** PA

Native  
 Woody Deciduous  
 Shrub

INDICATOR REGION  
 FACW FACW FACW FACW



Native  
 Woody Deciduous  
 Shrub  
 INDICATOR REGION  
 FACW FACW FACW FACW

**Cornus sericea (C. stolonifera)**  
**RED OSIER DOGWOOD**  
*The bright red stems provide attractive winter color; the thick low vegetation provides excellent habitat for a variety of wildlife; the abundant fruit is eaten by many birds; medium pollinator value.*  
**HABITAT** Moist meadows, thickets, riparian areas; pH 4.8-7.0.  
**CHARACTERISTICS** A multi-stemmed shrub species; grows to 10' tall; 16" minimum root depth; moderate shade tolerance; moderate drought tolerance; no salt tolerance; blooms from June to August; attractive clusters of white flowers; produces white fruit.  
**SEEDING RATE** 1%-20% of a riparian mix; approx. 18,000 seeds per lb.  
**ECOTYPE** PA; Midwestern U.S.

**INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Hamamelis virginiana*

### WITCHHAZEL

*Provides mid-story habitat; the nuts provide fall food for many forms of wildlife.*

**HABITAT** Rich woodland soils, woodland margins; pH 4.5-6.2.

**CHARACTERISTICS** A multi-stemmed shrub species; grows to 30' tall; 20" minimum root depth; moderate shade tolerance; low drought tolerance; moderate salt tolerance; blooms from September to November; yellow flowers; produces small brown nuts in fall.

**SEEDING RATE** 1%-10% of a mix; approx. 11,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Woody Deciduous Tree**

INDICATOR REGION



## *Nyssa sylvatica*

### BLACKGUM

*The fruit is eaten by birds in late summer; the seeds are used in winter by various wildlife; high pollinator value.*

**HABITAT** Moist woods, rocky slopes; pH 4.5-6.0.

**CHARACTERISTICS** A single-stemmed tree species; grows to 125' tall; 30" minimum root depth; shade tolerant; low drought tolerance; low salt tolerance; blooms from April to June; greenish flowers; brilliant fall foliage.

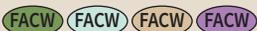
**SEEDING RATE** 1%-20% of a mix; approx. 3,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Ilex verticillata*

### WINTERBERRY

*Produces red berries that provide fall and winter food for wildlife; low pollinator value.*

**HABITAT** Bogs, moist woods, wet shores; pH 4.5-7.5.

**CHARACTERISTICS** A multi-stemmed shrub species; grows to 16' tall; 16" minimum root depth; moderate shade tolerance; low drought tolerance; moderate salt tolerance; blooms from May to August; greenish-white flowers.

**SEEDING RATE** 1%-10% of a mix; approx. 92,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Woody Deciduous Vine**

INDICATOR REGION



## *Parthenocissus*

### *quinquefolia*

#### VIRGINIA CREEPER

*Low pollinator value.*

**HABITAT** Woods, fields, edges; pH 5.0-7.5.

**CHARACTERISTICS** A high-growing vine; 16" minimum root depth; moderate shade tolerance; high drought tolerance; no salt tolerance; blooms in June; produces black fruit in fall.

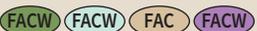
**SEEDING RATE** 1%-5% of a mix; approx. 18,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Lindera benzoin*

### SPICEBUSH

*The stems, leaves and fruit have a spicy odor when crushed; provides cover for wildlife and habitat for the swallowtail butterfly; the fruit provides fall food; low pollinator value.*

**HABITAT** Rich moist woods; pH 4.5-6.0.

**CHARACTERISTICS** A multi-stemmed shrub species; grows to 16' tall; 18" minimum root depth; moderate shade tolerance; low drought tolerance; moderate salt tolerance; blooms from March to May; attractive yellow or white flowers.

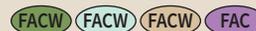
**SEEDING RATE** 1%-20% of a mix; approx. 4,500 seeds per lb.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Physocarpus opulifolius*

### NINEBARK

*A dense decorative shrub; provides excellent habitat for birds; medium pollinator value.*

**HABITAT** Wet woods, streambanks; pH 4.5-6.5.

**CHARACTERISTICS** A multi-stemmed shrub species; grows to 10' tall; 14" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms from May to July; nearly spherical clusters of white to pink flowers.

**SEEDING RATE** 1%-5% of a mix; approx. 1,045,000 seeds per lb.

**ECOTYPE** PA



## *Platanus occidentalis*

### AMERICAN SYCAMORE

A large riverbank tree; provides shade and cover for riparian shrubs and forbs.

**HABITAT** Streambanks, low woods, floodplains; pH 4.9-6.5.

**CHARACTERISTICS** A single-stemmed tree species; grows to 160' tall; 30" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms in May; red flowers; produces large brown seed clusters that last until mid-winter.

**SEEDING RATE** 1%-15% of a mix; approx. 192,000 seeds per lb.

**ECOTYPE** PA

Native

Woody Deciduous Tree

INDICATOR REGION



## *Rhus typhina* (R. hirta)

### STAGHORN SUMAC

The bark provides winter food for cottontail rabbits; the fruit is a source of emergency winter food for birds and wild turkey; medium pollinator value.

**HABITAT** Dry open fields, roadsides, woodland edges; pH 4.5-7.2.

**CHARACTERISTICS** A single-crown shrub species; grows to 40' tall; 20" minimum root depth; moderate shade tolerance; high drought tolerance; moderate salt tolerance; blooms from May to July; green flowers; produces red fruit.

**SEEDING RATE** 1%-10% of a mix; approx. 53,000 seeds per lb.

**ECOTYPE** PA

Native

Woody Deciduous Shrub

INDICATOR REGION



## *Prunus serotina*

### WILD BLACK CHERRY

One of North America's most valuable hardwoods; provides food (fruit) and nesting sites for wildlife; a source of food for caterpillars of 400 species of moths and butterflies that are eaten by birds; high pollinator value.

**HABITAT** Woods, fencerows; pH 5.0-7.5.

**CHARACTERISTICS** A multi-stemmed tree species; grows to 80' tall; 36" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms in May; white flowers; produces purplish-black fruit in fall.

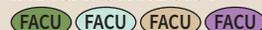
**SEEDING RATE** 1%-20% of a mix; approx. 4,800 seeds per lb.

**ECOTYPE** PA

Native

Woody Deciduous Tree

INDICATOR REGION



## *Robinia fertilis*

### BRISTLY LOCUST

A decorative shrub for screening and covering unsightly areas; high pollinator value.

**HABITAT** Dry open woods, slopes, roadsides; tolerates poor soils; pH 5.0-7.5.

**CHARACTERISTICS** A rhizomatous shrub species; grows from 3'-10' tall; 20" minimum root depth; full sun; high drought tolerance; no salt tolerance; blooms from May to June; clusters of rosy-purple flowers; seed pods are covered with reddish-brown bristles.

**SEEDING RATE** 1%-10% of a mix; approx. 28,000 seeds per lb.

**ECOTYPE** PA

Native

Woody Deciduous Shrub/Legume

INDICATOR REGION



## *Prunus virginiana*

### CHOCKECHERRY

Creates intermediate to mid-story habitat for nesting; the abundant fruit provides summer and fall food for a variety of birds; host to many native caterpillars that are also food for birds; high pollinator value.

**HABITAT** Rocky upland woods, roadsides; pH 5.2-8.4.

**CHARACTERISTICS** A multi-stemmed shrub species; grows to 20' tall; 20" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms in early spring; clusters of white flowers; produces dark red to purple fruit in summer and fall.

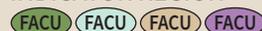
**SEEDING RATE** 1%-20% of a mix; approx. 5,000 seeds per lb.

**ECOTYPE** PA

Native

Woody Deciduous Shrub

INDICATOR REGION



## *Robinia pseudoacacia*

### BLACK LOCUST

Provides nitrogen and cover for successive vegetation; a good honey producer.

**HABITAT** Reclamation sites, floodplains, thickets, fencerows; develops quickly in poor soils; pH 4.8-7.5.

**CHARACTERISTICS** A single-stemmed tree species; spreads from root sprouts; grows from 30'-70' tall; 36" minimum root depth; full sun; high drought tolerance; low salt tolerance; blooms in May; numerous white flowers.

**SEEDING RATE** 1%-15% of a mix; approx. 24,000 seeds per lb.

**VARIETIES** Common commercial

Native

Woody Deciduous Tree

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**



## *Rosa carolina*

### PASTURE ROSE

*Provides cover for wildlife; medium pollinator value.*

**HABITAT** Dunes, pinelands, prairies, upland pastures, upland woods, woodland borders; pH 4.0-7.0.

**CHARACTERISTICS** A colonial species; grows to 3' tall; 12" minimum root depth; moderate shade tolerance; high drought tolerance; moderate salt tolerance; blooms from May to June; pink flowers.

**SEEDING RATE** 0.5%-1% of a mix.

**ECOTYPE** Piedmont NC

Native

Woody Deciduous Shrub

INDICATOR REGION



## *Salix amygdaloides*

### PEACHLEAF WILLOW

*A good bioengineering material with fibrous roots that grow into the water table to stabilize the streambank; leaf drops replenish organic life in streams; provides wildlife habitat and shade.*

**HABITAT** Riparian areas, wetlands; pH 6.0-8.0.

**CHARACTERISTICS** A multi-stemmed tree species; grows from 10'-70' tall; 30" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from May to June; live stakes have good rooting ability.

**SEEDING RATE** Space live stakes on 3'-6' centers; may be used as larger live-post plantings.

**ECOTYPE** PA

Native

Woody Deciduous Tree

INDICATOR REGION



## *Rosa palustris*

### SWAMP ROSE

*Provides food and cover for songbirds, deer, ruffed grouse, pheasants and wild turkey; medium pollinator value.*

**HABITAT** Wetlands, marshes; pH 4.0-7.0.

**CHARACTERISTICS** A rhizomatous shrub species; grows to 7' tall; 18" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from June to October; beautiful pink flowers develop rose hips that last into winter.

**SEEDING RATE** 0.5%-2% of a mix.

**ECOTYPE** PA

Native

Woody Deciduous Shrub

INDICATOR REGION



## *Salix discolor*

### PUSSY WILLOW

*A good bioengineering material; the early show of catkins is the first sign of spring; provides wildlife habitat.*

**HABITAT** Wetlands, moist or wet woods; pH 4.0-7.0.

**CHARACTERISTICS** A single-stemmed shrub species; grows from 6'-20' tall; 20" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from March to April; live stakes have good rooting ability.

**SEEDING RATE** Space live stakes on 3' centers.

**ECOTYPE** PA

Native

Woody Deciduous Shrub

INDICATOR REGION



## *Rubus allegheniensis*

### COMMON BLACKBERRY

*The berries can be consumed by humans; provides food and cover for wildlife; high pollinator value.*

**HABITAT** Dry fields, open woods; pH 4.6-7.5.

**CHARACTERISTICS** A thicket-forming shrub species; grows from 3'-6' tall; 12" minimum root depth; shade tolerant; high drought tolerance; no salt tolerance; blooms from April to June; attractive white flowers; produces black fruit.

**SEEDING RATE** 1%-10% of a mix; approx. 262,000 seeds per lb.

**ECOTYPE** PA

Native

Woody Deciduous Shrub

INDICATOR REGION



## *Salix eriocephala* (*S. cordata*)

### HEARTLEAF WILLOW

*A good bioengineering material; provides wildlife habitat.*

**HABITAT** Riparian areas, streambanks; pH 4.0-7.0.

**CHARACTERISTICS** A rhizomatous multi-stemmed shrub species; grows from 6'-13' tall; 20" minimum root depth; shade tolerant; low drought tolerance; no salt tolerance; blooms from April to June; live stakes have good rooting ability.

**SEEDING RATE** Space live stakes on 3' centers.

**ECOTYPE** PA

Native

Woody Deciduous Shrub

INDICATOR REGION





**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## **Salix exigua ssp. interior**

### **SANDBAR WILLOW**

*An excellent bioengineering material; tolerant of ice and debris loading from streamflow; provides wildlife habitat.*

**HABITAT** Sandy or gravel streambanks and waterways.

**CHARACTERISTICS** A rhizomatous shrub species; grows from 3'-15' tall; 20" minimum root depth; moderate shade tolerance; moderate drought tolerance; low salt tolerance; blooms in May; live stakes have excellent rooting ability.

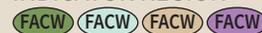
**SEEDING RATE** Space live stakes on 3' centers.

**ECOTYPE** PA



**Naturalized**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## **Salix purpurea**

### **STREAMCO WILLOW**

*An excellent early rooting bioengineering material; leaf drops replenish organic life in streams; provides wildlife habitat and shade to small streams.*

**HABITAT** Streambanks, riparian areas; pH 5.5-7.5.

**CHARACTERISTICS** A multi-stemmed shrub species; grows from 8'-20' tall; 20" minimum root depth; full sun; no drought tolerance; no salt tolerance; live stakes have excellent rooting ability and develop fibrous roots.

**SEEDING RATE** Space live stakes on 3' centers.

**VARIETIES** 'Streamco' (USDA Plant Materials Center release)



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## **Salix lucida**

### **SHINING WILLOW**

*A good bioengineering material; well suited for wetland restoration; provides streambank erosion protection and wildlife habitat.*

**HABITAT** Wetlands, streambanks; pH 5.8-7.2.

**CHARACTERISTICS** A multi-stemmed shrub species; grows from 8'-16' tall; 10" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from late May to late June; yellow flowers; live stakes have good rooting ability.

**SEEDING RATE** Space live stakes on 3' centers.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## **Salix sericea**

### **SILKY WILLOW**

*An excellent bioengineering material; provides dense wildlife habitat.*

**HABITAT** Wetlands, streambanks, riparian areas; pH 5.2-7.0.

**CHARACTERISTICS** A multi-stemmed shrub species; grows from 4'-12' tall; 18" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms in May; live stakes have excellent rooting ability.

**SEEDING RATE** Space live stakes on 3' centers.

**ECOTYPE** PA



**Native**  
**Woody Deciduous Tree**

INDICATOR REGION



## **Salix nigra**

### **BLACK WILLOW**

*The stems can be brittle, making this only a fair bioengineering material; leaf drops replenish organic life in streams; provides shade and wildlife habitat.*

**HABITAT** Wet meadows, riparian areas; pH 4.8-8.0.

**CHARACTERISTICS** A multi-stemmed tree species; grows to 65' tall; 32" minimum root depth; full sun; low drought tolerance; no salt tolerance; blooms from February to June; live stakes have excellent rooting ability and produce fibrous roots.

**SEEDING RATE** Space live stakes on 3' centers.

**ECOTYPE** PA



**Naturalized**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## **Salix x cottetii**

### **DWARF WILLOW**

*An excellent bioengineering material, ideal for utility stream crossings; tolerant of ice and debris loading from streamflow; a resilient species that will recover after vehicle disturbance; provides good wildlife habitat.*

**HABITAT** Streambanks; pH 5.5-7.5.

**CHARACTERISTICS** A multi-stemmed shrub species; grows to 6' tall; 20" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; live stakes have excellent rooting ability and develop a fibrous root system.

**PLANTING RATE** Space live stakes on 2' centers.

**VARIETIES** 'Bankers' (USDA Plant Materials Center release)

## INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Sambucus canadensis*

### ELDERBERRY

*The fruit provides an excellent summer food source for wildlife; medium pollinator value.*

**HABITAT** Wet meadows, streambanks, moist roadsides; pH 5.0-7.0.

**CHARACTERISTICS** A multi-stemmed shrub species; grows to 12' tall; 16" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms from June to July; white or yellow flowers; produces deep purple fruit.

**SEEDING RATE** 1%-5% of a mix; approx. 291,000 seeds per lb.

**PLANTING RATE** Space live stakes or rooted seedlings on 3' centers.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Spiraea betulifolia* var. *corymbosa*

### CORYMBED SPIRAEA

*A colorful woodland shrub; not browsed by deer; medium pollinator value.*

**HABITAT** Banks, rocky places.

**CHARACTERISTICS** A multi-stemmed shrub species; grows from 1'-3' tall; shade tolerant; blooms from July to August; long-lasting white flowers; produces dark corymbed seedheads.

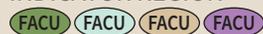
**SEEDING RATE** 0.1%-1% of a mix.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Sambucus racemosa*

### RED ELDERBERRY

*Good for soil stabilization and erosion control; the fruit may be toxic to humans when consumed without proper preparation; the colorful fruit attracts birds; a nectar source for hummingbirds; medium pollinator value.*

**HABITAT** Streambanks, ravines, swamps, moist forest clearings; pH 5.0-8.0.

**CHARACTERISTICS** A multi-stemmed shrub species; grows from 10'-20' tall; shade tolerant, but prefers full sun; blooms from April to July; creamy white flowers; produces bright red fleshy berries in summer.

**SEEDING RATE** 1%-5% of a mix; approx. 200,000-300,000 seeds per lb.

**PLANTING RATE** Space live stakes or rooted seedlings on 3' centers.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Spiraea tomentosa*

### STEEPLEBUSH

*An attractive wetland shrub; provides cover for woodcocks and rabbits; medium pollinator value.*

**HABITAT** Wet meadows, moist fields, riparian areas; pH 4.5-7.0.

**CHARACTERISTICS** A rhizomatous shrub species; grows to 3' tall; 14" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms from July to September; pinkish-purple flowers.

**SEEDING RATE** 0.1%-1% of a mix; approx. 1,100,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Spiraea alba*

### MEADOWSWEET

*A beautiful species that can become monolithic; medium pollinator value.*

**HABITAT** Bogs, swamps, moist meadows; pH 4.3-6.8.

**CHARACTERISTICS** A multi-stemmed shrub species; grows to 6-12' tall; 12" minimum root depth; moderate shade tolerance; low drought tolerance; no salt tolerance; blooms from June to September; white or pinkish flowers; produces fruit that lasts all winter.

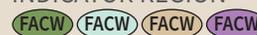
**SEEDING RATE** 0.1%-1% of a mix; approx. 1,000,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Vaccinium corymbosum*

### HIGHBUSH BLUEBERRY

*Provides food for wildlife; high pollinator value.*

**HABITAT** Bogs, open swamps; sometimes in old fields or upland woods; pH 4.7-7.5.

**CHARACTERISTICS** A multi-stemmed woody species; grows to 12' tall; 16" minimum root depth; shade tolerant; low drought tolerance; high salt tolerance; blooms from April to July; produces blue to black fruit.

**SEEDING RATE** Sold in dried berry form; 1%-5% of a mix; approx. 975,000 seeds per lb.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Viburnum dentatum*

### ARROWWOOD

*Provides late-summer and fall food, cover, browse and nesting sites for birds; medium pollinator value.*

**HABITAT** Wet woods, open wetlands.

**CHARACTERISTICS** A shrub species; grows to 16' tall; moderate salt tolerance; blooms from May to August; clusters of white or pinkish flowers; produces bluish-black fruit.

**SEEDING RATE** 1%-10% of a mix; approx. 20,000 seeds per lb.

**PLANTING RATE** Space rooted seedlings on 6' centers.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Viburnum trilobum*

### AMERICAN CRANBERRY

*The fruit provides early winter food for wildlife; medium pollinator value.*

**HABITAT** Wetlands, wet woods; pH 5.5-7.5.

**CHARACTERISTICS** A multi-stemmed shrub species; grows from 3'-10' tall; 14" minimum root depth; full sun; no drought tolerance; no salt tolerance; blooms from May to August; white flowers; produces red berries.

**SEEDING RATE** 1%-10% of a mix; approx. 13,600 seeds per lb.

**PLANTING RATE** Space rooted seedlings on 6' centers.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Viburnum lentago*

### NANNYBERRY

*The dense foliage provides cover; the fruit is a source of food for wildlife; medium pollinator value.*

**HABITAT** Woods, wetlands, roadsides; pH 5.0-7.0.

**CHARACTERISTICS** A multi-stemmed shrub species; grows to 20' tall; 14" minimum root depth; shade tolerant, low drought tolerance; no salt tolerance; blooms from April to June; white or pinkish flowers; produces dark blue fruit.

**SEEDING RATE** 1%-10% of a mix; approx. 7,800 seeds per lb.

**PLANTING RATE** Space rooted seedlings on 6' centers.

**ECOTYPE** PA



**Native**  
**Woody Deciduous**  
**Shrub**

INDICATOR REGION



## *Viburnum nudum var. cassinoides*

### WITHE ROD

*Provides food and cover for wildlife; medium pollinator value.*

**HABITAT** Swamps, wet woods; pH 4.9-7.0.

**CHARACTERISTICS** A multi-stemmed woody species; grows to 15' tall; 14" minimum root depth; shade tolerant; moderate drought tolerance; no salt tolerance; blooms from May to July; white flowers; produces blue fruit in fall.

**SEEDING RATE** 1%-10% of a mix; approx. 27,000 seeds per lb.

**ECOTYPE** PA

## INDICATOR REGIONS *(Canadian indicators would be similar to the adjacent states)*

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species

- UPL** Upland species
- NO** No occurrence
- NI** No indicator

SEE PAGE 9 FOR EXPLANATION



**Arrhenatherum elatius ssp. elatius**

**TALL OATGRASS, 'RUFFNER'**

*Referred to as evergreen grass because of its pronounced cool season growth habit; good into Canada; highly palatable for whitetail deer throughout late fall and early winter.*

**HABITAT** Roadsides, fields, waste ground; persists in shallow, moderately infertile soils; pH 5.0-7.0.

**CHARACTERISTICS** A cool season bunchgrass; grows from 3'-5' tall; 14" minimum root depth; moderate drought tolerance; moderate salt tolerance; moderate shade tolerance; blooms in early summer.

**SEEDING RATE** 7-10 lb per acre with a drill; 14-20 lb per acre if broadcast seeded; approx. 140,000-190,000 seeds per lb.

**USES** Cover Crop and Forage

**Naturalized  
Herbaceous Perennial**

INDICATOR REGION



**Naturalized  
Herbaceous Annual**

INDICATOR REGION



**Naturalized  
Herbaceous Annual/  
Biennial**

INDICATOR REGION



**Avena sativa**

**OATS**

*A cereal grain crop for animal and human consumption; a companion cover crop with a spring or fall seeding; matures quickly in hot weather and killed by freezing winter weather.*

**HABITAT** Tolerates a wide range of soil types, but prefers fertile open areas; pH 5.3-8.5.

**CHARACTERISTICS** A bunch-type small grain; grows from 1'-4' tall; 8" minimum root depth; full sun; low drought tolerance; moderate salt tolerance; blooms two months after seeding.

**SEEDING RATE** 90 lb per acre as a grain crop; 30 lb per acre as a cover crop with perennial plantings; approx. 19,000 seeds per lb.

**VARIETIES** Armor; Ogle; Common commercial

**USES** Cover Crop and Forage

**Brassica napus**

**CANOLA**

*A member of the mustard family; the seeds are approximately 37% oil; used for the production of healthy cooking and culinary oils; high-quality livestock supplement; preferred by deer in winter; also makes good biodiesel.*

**HABITAT** Agricultural soils that support winter wheat production; grows best in moderately drained medium to high-fertility soils; pH 6.0-7.0 (optimal).

**CHARACTERISTICS** Grows from 3'-6' tall; blooms in late spring; yellow flowers.

**SEEDING RATE** 4-10 lb per acre alone; 160,000 seeds per lb.

CANOLA - continued



**Naturalized  
Herbaceous Annual**

INDICATOR REGION



**Naturalized  
Herbaceous Annual/  
Biennial**

INDICATOR REGION



**VARIETIES** 'Wichita' (winter variety- can be very productive if planted in fall); 5505 CL (commercial spring variety; not winter hardy for fall planting; some spring varieties have natural tolerance to Raptor®, Beyond® Herbicides, or Odyssey® DLX in Canada)

**USES** Wildlife Food Plots, Cooking Oil and Biofuels

**NOTE** We recommend consulting with your local extension office.

**Brassica napus**

**FORAGE RAPE**

*Quality winter feed for cattle and sheep; palatable for all livestock and grazing wildlife.*

**HABITAT** Pastures; grows best in moderately drained medium to high-fertility soils.

**CHARACTERISTICS** A late-maturing, high-yielding forage rape; short stems and large paddle-like leaves.

**SEEDING RATE** 3-5 lb per acre alone.

**VARIETIES** 'Bonar'; 'Rangiora'

**USES** Wildlife Food Plots and Forage

**Brassica rapa**

**PURPLE TOP TURNIP**

*The leaves are high in protein; highly palatable and digestible for deer.*

**HABITAT** Grows best in moderately drained medium to high-fertility soils.

**CHARACTERISTICS** A brassica with a taproot.

**SEEDING RATE** 1-4 lb per acre.

**VARIETIES** Common commercial

**USES** Food Plots and Forage



**Naturalized**  
**Herbaceous Annual**  
 INDICATOR REGION  
 UPL UPL UPL UPL

**Brassica rapa**  
**Forage Turnip, 'Appin'**  
*Also called Field Mustard; establishes in 50-80 days; 80% digestible and high in protein and carbohydrates; tolerates multiple grazings; multi-crowned for improved regrowth.*  
**HABITAT** Pastures, fields, fertile open areas; grows best in moderately drained medium to high-fertility soils.  
**CHARACTERISTICS** Grows to 3' tall; 12" minimum root depth; moderate shade tolerance; low drought tolerance; moderate salt tolerance; blooms in late spring.  
**SEEDING RATE** 4-5 lb per acre alone; 192,800 seeds per lb.  
**USES** Food Plots and Forage



**Naturalized**  
**Herbaceous Annual/ Biennial**  
 INDICATOR REGION  
 FACU FACU UPL FACU

**Camelina sativa**  
**CAMELINA**  
*A member of the mustard family; used for the production of culinary oils and biodiesel; very low requirements for fertility, tillage and weed control; the oil and meal are high in Omega 3 fatty acids; approved by the USDA for human, poultry and livestock consumption.*  
**HABITAT** Prospers in various climates and soils; well suited for marginal soils.  
**CHARACTERISTICS** Grows from 1'-3' tall; blooms in summer; white, yellow or greenish-yellow racemes.  
**SEEDING RATE** 4-6 lb per acre.  
**VARIETIES** 'Blaine Creek'; 'Cheyenne'; 'Suneson'  
**USES** Culinary Oils, Biofuels and Livestock Feed



**Naturalized**  
**Herbaceous Annual/ Biennial**  
 INDICATOR REGION  
 UPL UPL UPL UPL

**Brassica rapa**  
**Hybrid Forage Turnip, 'Pasja'**  
*A cross between forage rape and forage turnip; a high-energy, early maturing hybrid forage brassica; excellent regrowth (50-70 days); excellent for grazing.*  
**HABITAT** Grows best in moderately drained medium to high-fertility soils.  
**CHARACTERISTICS** A brassica with a taproot; moderate drought tolerance.  
**SEEDING RATE** 3-5 lb per acre when direct drilled.  
**USES** Food Plots and Forage



**Naturalized**  
**Herbaceous Perennial**  
 INDICATOR REGION  
 FACU FACU FACU FACU

**Cichorium spp.**  
**CHICORY SPP.**  
*A high-yielding broad-leaved perennial; suitable for all wildlife and production livestock; excellent forage quality.*  
**HABITAT** Grows best in moderately drained medium to high-fertility soils; pH 5.6-6.5 (optimal).  
**CHARACTERISTICS** A species with a taproot; selected for intense grazing, less bolting and better disease resistance; 20% protein; drought tolerant; no flood tolerance; grows to 1' tall; sow in mid-spring.  
**SEEDING RATE** 4-5 lb per acre alone; 2 lb per acre in a mix.  
**VARIETIES** 'Oasis'  
**USES** Food Plots and Forage



**Naturalized**  
**Herbaceous Annual/ Biennial**  
 INDICATOR REGION  
 UPL UPL UPL UPL

**Brassica rapa**  
**Hybrid Forage Brassica, 'Vivant'**  
*Used by dairy cattle, beef cattle and sheep; graze within 35-50 days of planting, and at 25-30-day intervals thereafter.*  
**HABITAT** Grows best in moderately drained medium to high-fertility soils.  
**CHARACTERISTICS** A brassica with a taproot.  
**SEEDING RATE** 3-6 lb per acre.  
**USES** Food Plots and Forage



**Naturalized**  
**Herbaceous Annual**  
 INDICATOR REGION  
 FAC FACW UPL UPL

**Echinochloa crusgalli var. frumentacea**  
**JAPANESE MILLET**  
*Used for erosion control and as a fast-growing summer companion crop; seed in spring or summer; after growth, it can be flooded to a depth of 18" during waterfowl migration season; killed by heavy frost; provides food for wildlife and a favorite of waterfowl.*  
**HABITAT** Well-drained soils, but thrives in wetlands; pH 4.7-7.4.  
**CHARACTERISTICS** An annual, coarse-leaved warm season bunchgrass; grows from 1'-5' tall with a 4"-8" seedhead.  
**SEEDING RATE** 20-30 lb per acre as a grain crop; 10 lb per acre as a companion crop; approx. 110,000 seeds per lb.  
**VARIETIES** Common commercial  
**USES** Cover Crop, Wildlife Food Plots and Emergency Forage

**INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
- FACW** Facultative wetland species
- FAC** Facultative species
- FACU** Facultative upland species
- UPL** Upland species
- NO** No occurrence
- NI** No indicator
- SEE PAGE 9 FOR EXPLANATION**



**Fagopyrum esculentum**

**BUCKWHEAT**

A renovation cover crop for low-productivity land; builds organic matter that decays quickly when plowed under; planting time varies with application; killed by frost; provides food for human consumption, wildlife and honey production.

**HABITAT** Adapts to a wide range of soil types and conditions.

**CHARACTERISTICS** An erect-growing grain crop with a taproot.

**SEEDING RATE** 50-75 lb per acre alone; not recommended as a companion crop; approx. 15,000 seeds per lb.

**VARIETIES** Common commercial  
**USES** Wildlife Food Plots and Grain Crop

**Naturalized**  
**Herbaceous Annual**

INDICATOR REGION



**Lolium multiflorum (L. perenne var. italicum)**

**ANNUAL RYEGRASS**

Provides quick protection against soil, wind and water erosion; used as a companion or cover crop where erosion is an immediate concern; frequently reseeds itself in disturbed areas.

**HABITAT** Loose fertile to semi-fertile soils; pH 5.0-7.9 (pH 6.0-7.0 for lawns).

**CHARACTERISTICS** A short-lived cool season bunchgrass; grows from 1'-4' tall; 8" minimum root depth; moderate shade tolerance; low drought tolerance; high salt tolerance; blooms from May to June.

**SEEDING RATE** 5-10 lb per acre as a companion crop; approx. 217,000 seeds per lb.

**VARIETIES** Common commercial  
**USES** Cover Crop

**Naturalized**  
**Herbaceous Annual**

INDICATOR REGION



**Festuca elatior x Lolium perenne, 'Duo'**

**FESTULOLIUM, 'DUO'**

An endophyte-free high-sugar cross between meadow fescue and a tetraploid perennial ryegrass; excellent palatability.

**HABITAT** Fertile soils.

**CHARACTERISTICS** Moderate drought tolerance; cold tolerant.

**SEEDING RATE** 25-30 lb per acre alone; 15-25 lb per acre in a mix.

**USES** Forage

**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



**Medicago sativa**

**ALFALFA**

A component of right-of-way mixes; regrows quickly after mowing; good livestock and wildlife forage.

**HABITAT** Well-drained high-fertility soils; pH 6.0-8.5.

**CHARACTERISTICS** A hardy single-crown legume; grows from 15"-36" tall; 24" minimum root depth; full sun; high drought tolerance; low salt tolerance; blooms in late spring; purple flowers.

**SEEDING RATE** 15-20 lb per acre alone; 8-10 lb per acre in a mix; approx. 227,000 seeds per lb.

**VARIETIES** Vernal; Common commercial  
**USES** Cover Crop

**Naturalized**  
**Herbaceous Perennial**  
**Legume**

INDICATOR REGION



**Helianthus spp.**

**BLACK OIL SUNFLOWER**

The grain is used for oil and meal; the meal provides quality livestock feed; an extremely popular food source for birds; may be left in the field for winter bird food.

**HABITAT** pH 6.0 (minimum).

**CHARACTERISTICS** Grows from 5'-7' tall; blooms in summer; yellow flowers have pie pan-sized seedheads.

**SEEDING RATE** 20 lb per acre alone, or 1 lb per 1,000 sq ft; 10% of a food plot mix.

**USES** Food Plots

**Naturalized**  
**Herbaceous Annual**

INDICATOR REGION



**Melilotus officinalis**

**YELLOW BLOSSOM SWEETCLOVER**

Builds soil organic matter on low-fertility sites; a source of nectar and pollen for honeybees.

**HABITAT** Mine spoils, clay, gravel; pH 5.0-8.0.

**CHARACTERISTICS** A single-crown legume; grows from 2'-6' tall; 16" minimum root depth; full sun; high drought tolerance; moderate salt tolerance; blooms from June to August; yellow flowers.

**SEEDING RATE** 10-20 lb per acre alone; 5 lb per acre in a mix; approx. 259,000 seeds per lb.

**VARIETIES** Common commercial

**Naturalized**  
**Herbaceous Biennial**  
**Legume**

INDICATOR REGION





## *Panicum miliaceum*

### WHITE PROSO MILLET

The seeds are one of the most attractive foods for birds; also a grain for livestock and human consumption.

**HABITAT** Well-drained loamy soils; tolerates various soil conditions; pH 5.6 (minimum).

**CHARACTERISTICS** Grows to 3' tall; 10" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms in summer; white flowers; seedheads grow in bunches.

**SEEDING RATE** 20 lb per acre alone, or 1/2 lb per 1,000 sq ft; 35% of a mix.

**USES** Food Plots

**Naturalized**  
**Herbaceous Annual**

INDICATOR REGION



## *Sanguisorba minor*

### SMALL BURNET

A relatively long-lived evergreen forb; very attractive to deer for its herbal taste.

**HABITAT** Sunny flatlands to open slopes in well-drained soils; pH 6.0-8.0.

**CHARACTERISTICS** Grows to 15" tall; 12" minimum root depth; moderate shade tolerance; low drought tolerance; blooms in early spring; red flowers.

**SEEDING RATE** 2 lb per acre with clover; 10% of a food plot mix; approx. 48,750 seeds per lb.

**USES** Wildlife Food Plots

**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## *Phleum pratense*

### TIMOTHY

An excellent forage for horses and other livestock.

**HABITAT** Fields, open areas; moderate fertility requirements; pH 5.0-7.5.

**CHARACTERISTICS** A bunch-type grass; grows from 2'-4' tall; 10" minimum root depth; moderate shade tolerance; low drought tolerance; low salt tolerance; blooms from May to June; yellow flowers.

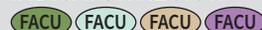
**SEEDING RATE** 25%-90% of a mix; approx. 1,163,000 seeds per lb.

**VARIETIES** 'Climax' (late maturing); Common commercial

**USES** Forage and Perennial Cover

**Naturalized**  
**Herbaceous Perennial**

INDICATOR REGION



## *Secale cereale*

### GRAIN RYE

A winter companion or cover crop for erosion control; may be planted anytime of year, but preferably in the fall or winter as rye has a strong ability to grow in cold weather; also a cover crop for temporary pasture, haylage or green chop; conserves nitrogen and builds organic matter when seeded after row crops are harvested in fall.

**HABITAT** More productive than other cereals in infertile sandy or acid soils; pH 5.2-8.0.

**CHARACTERISTICS** A bunch-type grain; grows from 2'-5' tall; 8" minimum root depth; full sun; moderate drought tolerance; high salt tolerance; blooms in early spring; yellow flowers; flat blade leaves.

**SEEDING RATE** 90 lb per acre as a grain crop; 30 lb per acre as a companion or cover crop with perennial plantings; approx. 18,000 seeds per lb.

**VARIETIES** 'Aroostook' (winter hardy for erosion control and temporary pasture); Common commercial (temporary erosion control)

**USES** Cover Crop & Livestock Grain

**Naturalized**  
**Herbaceous Annual**

INDICATOR REGION



## *Pisum arvense*

### AUSTRIAN WINTER PEA

Used for erosion control as a cover crop or temporary hay crop; good top growth with high protein content; builds nitrogen and organic matter in fields and gardens; not winter hardy north of the Mason-Dixon Line; seed in early spring or fall; excellent for wild game food plots.

**HABITAT** Prefers dry soils.

**CHARACTERISTICS** A cool season legume; tolerant of cold weather.

**SEEDING RATE** 40-60 lb per acre alone; 25%-50% of a mix.

**VARIETIES** Common commercial

**USES** Cover Crop

**Naturalized**  
**Herbaceous Annual**  
**Legume**

INDICATOR REGION



## INDICATOR REGIONS (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
- ATLANTIC & GULF COASTAL PLAIN

- OBL** Obligate wetland species
  - FACW** Facultative wetland species
  - FAC** Facultative species
  - FACU** Facultative upland species
  - UPL** Upland species
  - NO** No occurrence
  - NI** No indicator
- SEE PAGE 9 FOR EXPLANATION



**Naturalized  
Herbaceous Annual**

INDICATOR REGION



**Setaria italica**

**GERMAN (FOXTAIL) MILLET**

*Used as a cover crop and for pasture and haylage; a good supplemental hay for cattle and sheep; seed in spring or summer; provides food for wildlife.*

**HABITAT** Grows best in well-drained loamy soils with low moisture; pH 5.3-6.9.

**CHARACTERISTICS** A slender, leafy, erect-growing warm season bunchgrass with a shallow root system and short growing season; grows from 1'-4' tall; 8" minimum root depth; full sun; low drought tolerance; low salt tolerance; blooms in summer; white flowers.

**SEEDING RATE** 30 lb per acre as a grain crop; 10 lb per acre as a cover crop; approx. 217,000 seeds per lb.

**VARIETIES** Common commercial

**USES** Cover Crop



**Naturalized  
Herbaceous Annual  
Legume**

INDICATOR REGION



**Trifolium incarnatum**

**CRIMSON CLOVER**

*An upright single-crown winter legume; used in pasture, hay and silage mixes as a winter companion or cover crop and for erosion control; builds nitrogen and organic matter; the crimson flowers bring early spring color to conservation plantings; seed in fall or early spring south of I-64; plow under before next crop is planted; provides food for honeybees.*

**HABITAT** Sandy and clay-like soils; pH 5.5-7.5.

**CHARACTERISTICS** Grows from 1'-3' tall; 12" minimum root depth; full sun; low drought tolerance; no salt tolerance; crimson heads; round-tipped leaves.

**SEEDING RATE** 30 lb per acre alone; 10 lb per acre as a companion crop with wildflower mixes; approx. 150,000 seeds per lb.

**VARIETIES** Common commercial

**USES** Cover Crop



**Naturalized  
Herbaceous Perennial**

INDICATOR REGION



**Sorghum spp.**

**DWARF SORGHUM/RED MILO**

*An early maturing species; most attractive to mourning doves in fall; makes emergency food for turkey, pheasants and deer during winter.*

**HABITAT** Cultivated fields; tolerates high moisture levels.

**CHARACTERISTICS** Grows from 4'-5' tall; drought tolerant; stands erect into winter.

**SEEDING RATE** 20-30 lb per acre with a grain drill or broadcast seeded; 5%-50% of a mix.

**USES** Food Plots



**Naturalized  
Herbaceous Biennial/  
Legume**

INDICATOR REGION



**Trifolium pratense**

**RED CLOVER**

*A short-lived species used as hay, pasture and silage for domestic animals or for a cover crop that builds nitrogen and organic matter; flowers develop again after early summer cutting; may be frost seeded during early spring; provides food for bumblebees.*

**HABITAT** Medium-fertility soils; pH 6.0-7.5.

**CHARACTERISTICS** A very thick single-crown legume; grows from 2'-3' tall; 12" minimum root depth; full sun; low drought tolerance; low salt tolerance; blooms from May to June; red flowers.

**SEEDING RATE** 5-10 lb per acre alone; 15%-25% of a mix; approx. 272,000 seeds per lb.

**VARIETIES** Mammoth (fast growing and a high nitrogen producer for soil fertility improvement); Medium (fast growing with a strong root system); Kenland (fast growing with some disease resistance); Starfire (a strong, fast-spreading root system with some disease resistance); Common commercial (grows again after first cutting)

**USES** Food Plots and Forage



**Naturalized  
Herbaceous Perennial  
Legume**

INDICATOR REGION



**Trifolium hybridum**

**ALSIKE CLOVER**

*A winter-hardy legume; provides forage for domestic animals and food and cover for wildlife; a source of food for honeybees and bumblebees.*

**HABITAT** Meadows, disturbed areas; tolerates low fertility; pH 6.0-7.5.

**CHARACTERISTICS** A fast-emerging single-crown species; grows from 2'-4' tall; 12" minimum root depth; full sun; low drought tolerance; low salt tolerance; blooms from May to June; pink and white flowers; smooth stems and leaves.

**SEEDING RATE** 5-10 lb per acre alone; 25% of a mix; approx. 680,000 seeds per lb.

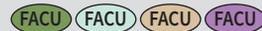
**VARIETIES** Common commercial

**USES** Cover Crop and Forage



**Naturalized  
Herbaceous Perennial  
Legume**

INDICATOR REGION



**Trifolium repens**

**WHITE CLOVER**

*A good cover for erosion control; regrows after mowing or grazing; highly palatable as food for wildlife and domestic animals; provides food for honeybees.*

**HABITAT** Moist soils, lawns, field borders; pH 6.0-7.5.

**CHARACTERISTICS** A stoloniferous legume; grows to 1' tall; 12" minimum root depth; full sun; low drought tolerance; low salt tolerance; blooms from June to September; white flowers.

**SEEDING RATE** 2-10 lb per acre alone; 10% of a mix; approx. 776,000 seeds per lb.

**VARIETIES** Dutch (small type-often used in lawns and conservation plantings); New Zealand (intermediate type-pasture and wildlife forage value, with fast regrowth after clipping); Ladino (large type-excellent pasture and wildlife forage value); Kopu II (excellent pasture and wildlife value)

**USES** Cover Crop and Forage



**Naturalized  
Herbaceous Biennial  
Legume**

INDICATOR REGION



**Vicia villosa**

**HAIRY VETCH**

*Builds nitrogen and organic matter in fields and gardens; seed in early fall after row crop is harvested; likely to freeze at -30° F.*

**HABITAT** Well-drained soils; pH 6.0-7.5.

**CHARACTERISTICS** A rhizomatous, trailing single-crown legume; grows from 3'-7' long; 6" minimum root depth; full sun; moderate drought tolerance; no salt tolerance; blooms in early spring; purple flowers.

**SEEDING RATE** 10 lb per acre in a mix with 50 lb per acre of grain rye; approx. 16,000 seeds per lb.

**VARIETIES** Common commercial

**USES** Cover Crop



**Naturalized  
Herbaceous Annual**

INDICATOR REGION



**Urochloa ramosa  
(Panicum ramosum)**

**BROWN TOP MILLET**

*Used for pasture, hay or wildlife forage; establishes quickly for erosion control; plant from May to August; matures in 60 days.*

**HABITAT** Tolerates low-fertility acidic soils; pH 5.5-6.9.

**CHARACTERISTICS** A short-lived species; grows to 3' tall; full sun; low drought tolerance; no salt tolerance; blooms in summer; produces seed in fall.

**SEEDING RATE** 30 lb per acre alone broadcast seeded; 20 lb per acre alone drilled; 10 lb per acre as a cover crop; approx. 75,000 seeds per lb.

**VARIETIES** Common commercial

**USES** Cover Crop

**INDICATOR REGIONS** (Canadian indicators would be similar to the adjacent states)

- NORTHCENTRAL & NORTHEAST
- MIDWEST
- EASTERN MOUNTAINS & PIEDMONT
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SEE PAGE 9 FOR EXPLANATION

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