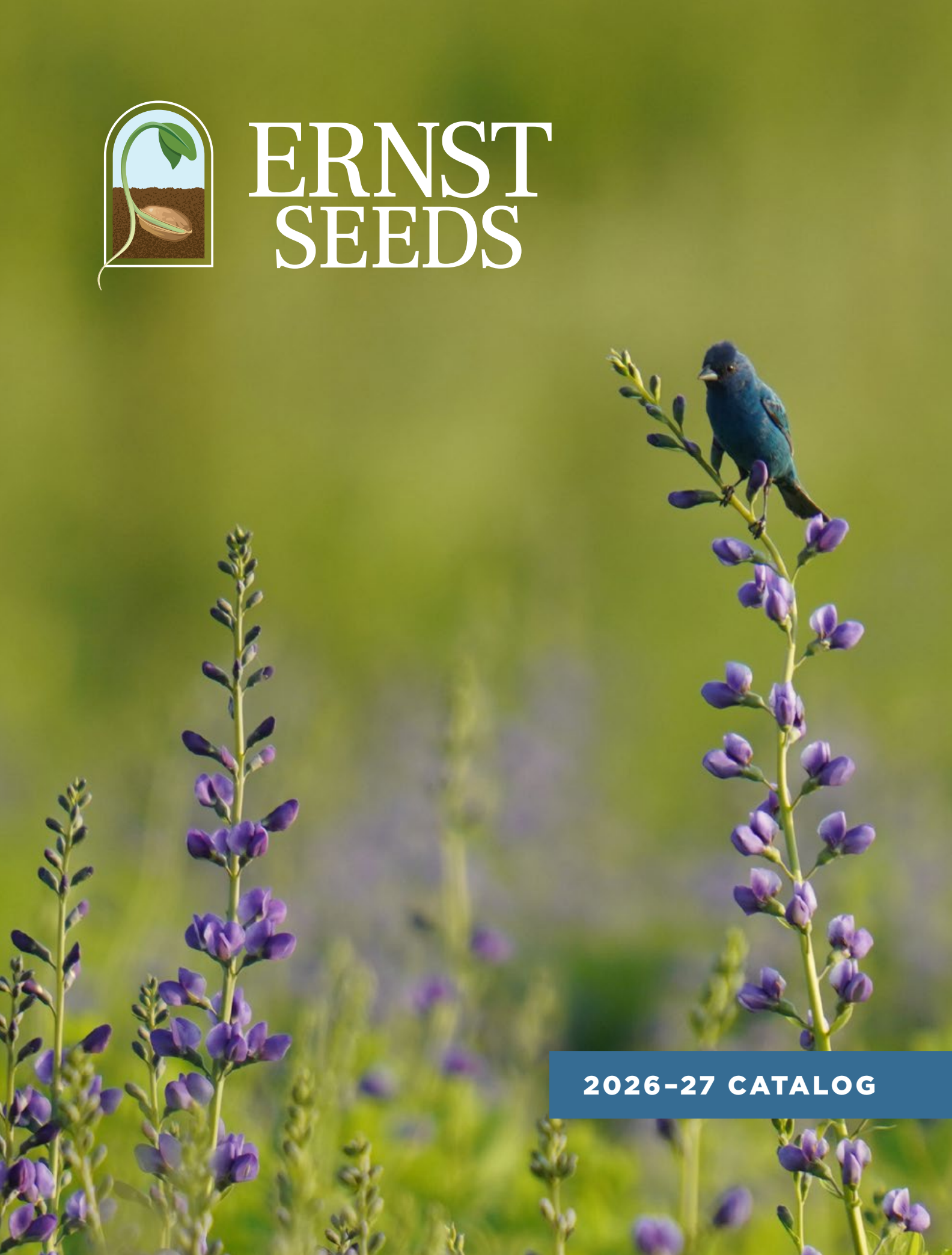
ERNST SEEDS



2026–27 CATALOG

OUR mission

The mission of Ernst Seeds is to increase habitat. In support of this mission, we will make key native and naturalized plant species available to Eastern North America for restoration, reclamation, conservation, wildlife and pollinator habitat enhancement, renewable biomass energy production, and beautification.

Ernst Seeds
8884 Mercer Pike
Meadville, PA 16335

DIRECTIONS

Our farm is located in Northwest Pennsylvania, 80 miles north of Pittsburgh and 40 miles south of Lake Erie off I-79. To get here:

- 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 the “Ernst Bike Trail”).
- Drive two miles on Mercer Pike.
- After crossing the railroad tracks, turn left into the Ernst Lane.

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

CONTENTS

planting resources

planting guides

species we offer

TAKE THE GUESSWORK OUT OF YOUR PLAN

Knowing what to plant–where, when, and why–is the root of our business. Whether you need help brainstorming options or a pro to stamp your master plan, our team of experts are standing by.

Reach out today, and let's get growing!

FOLLOW US

ORDERING INFORMATION

WAYS TO PLACE YOUR ORDER

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

TOLL-FREE
(800) 873-3321

PHONE
(814) 336-2404

E-MAIL
sales@ernstseed.com

FAX
(814) 336-5191

BUY ONLINE
ernstseed.com

ADDRESS
8884 Mercer Pike
Meadville, PA
16335

TERMS & CONDITIONS

ORDER MINIMUMS

- 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.

CANCELLATIONS & RETURNS

We cannot guarantee that cancellation requests can be processed within 48 hours of the shipping date. Cancellation requests are subject to Ernst approval.

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

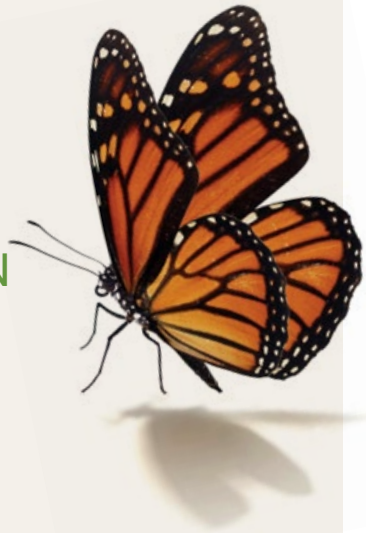
All orders are subject to acts of natural destruction crop failures; liability is limited to refund or replacement.

Returns must be approved by Ernst and are subject to a restocking fee. Individual items and Ernst stock mixes are subject to a 10% restocking fee and must be returned within 30 days in the original packaging. Custom orders cannot be returned once the individual items are mixed. Bioengineering order cancellations are subject to our approval and assessed a 25% cancellation fee. Bioengineering orders are non-returnable.

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


WELCOME TO
ERNST SEEDS
WE'RE HIRING
ERNST
SEEDS


ERNST
Greenwich Farms
RD.5 · MEADVILLE, PA.
Plants and Seed for Conservation.



Calvin & Marcia Ernst

YOUR PARTNER IN
growth

Dear Friends,

For more than 60 years, it has been an honor to know and serve you. You have trusted us to provide the seeds and bioengineering products you have used to prevent erosion of slopes and streambanks, to protect waterways from siltation and nutrient runoff, and to increase habitat for birds, insects, and large and small mammals. All this has been done while making those landscapes more beautiful.

As we continue into our seventh decade in business, we remain committed to serving you and our mission to increase habitat. We continue to acquire new species to grow and land on which to produce those species. We have built, modified, or purchased equipment to increase our production efficiency. Our production team is refining protocols to maintain or increase yields. We are re-evaluating the signals that indicate when a crop is at optimal ripeness for harvest. Our seed conditioning team continually strives to improve the quality of the seed that will be shipped to you, and our sales team is continually learning new information to provide you with better recommendations.

I've often said that this business has been a mix of persistence, patience, and good partnerships. It's your support and shared commitment to stewardship that make this work possible. For that, I'm deeply grateful. Each project you take on, whether it's a small patch of ground or a wide stretch of streambank, adds to the ongoing restoration of our native landscapes.

It is your patronage that allows us to pursue our passion for producing and selling seeds and bioengineering materials. We thank you for your trust and for letting us be a part of that work. We look forward to continuing the journey with you, one growing season at a time.

Sincerely,

Calvin L. Ernst
Founder & President

OUR ROOTS

run deep

Our story began with a curious boy and continues more than 60 years later. Our growth and success have been fueled by his passion for nature, shared by his family, our employees, and our loyal customers.

Our founder and visionary, Calvin Ernst, was born and raised a stone's throw from today's sprawling agribusiness. At age 14, he obtained a Pennsylvania nursery license and began experimenting on his parent's farm. During his senior year of high school, he grew the record corn crop in Crawford County with guidance from his 4-H leader and the local Penn State Cooperative Extension office.

1960–69

As a junior at Penn State, Calvin, his brother Luther, and a few friends researched crownvetch for the Pennsylvania Department of Transportation (PennDOT). Learning of PennDOT's need and the lack of growers, Calvin and his brother scrape together $1,000 to purchase seed and convince their father, Ted, to plant it on five acres of their family's farm.

Calvin and Marcia met and eventually married in 1963, forging their partnership as husband and wife and valued business partners.

Calvin and Luther planted an additional 60 acres of crownvetch on leased land. Their first crop was sold to Stanford Seed and, soon after, they hired their first full-time employee.

Development of the U.S. Interstate Highway System introduces I-79, I-80, I-90, and I-95 to the American landscape, accelerating the demand for erosion control and vegetation restoration.

The Company purchased a 180-acre property (the home of Ernst Seeds today) and joined forces with Multi-Systems, Inc., to purchase a 640-acre farm in Nebraska dedicated solely to growing irrigated crownvetch.

1970–79

The price of crownvetch collapses, and the partnership with Multi-Systems, Inc., is severed, leaving Ernst with a $12,000 debt.

Calvin and Marcia secure financing for 500+ acres in Crawford County and expand by growing crownvetch as well as potted crownvetch plants, allowing them to pay off their debt.

1980–89

The Company continues to expand until the 22% interest rate hike, which caused the value of crownvetch to be less than the cost of harvesting it. Calvin pivots, planting large volumes of no-till corn in the existing crownvetch fields, creating high corn yields due to the legume's excellent nitrogen-fixing properties.

Ernst hires its first full-time IT employee to manage inventory, sales, and marketing activities, a progressive characteristic of the Company's professional and business-minded approach to agriculture.

The Company plants its first foundation native seed, *Panicum virgatum* (switchgrass) and *Panicum clandestinum* (Deertongue), and harvests native seed from surrounding wetlands in Crawford County.

1990–99

Thoughts on non-natives evolve nationally, and the environmentalists blacklist some aggressive and invasive species. Calvin shifts his business strategy toward the diversity of natives, moving acreage from grain and crownvetch to native forbs and grasses.

At the invitation of Rodale Institute, Calvin and Marcia, with their conservation experience, travel to eastern Europe to study diverse agricultural practices. Later, Calvin travels with the USDA to China to promote inter-cropping perennial legumes with annual grain crops to reduce crop inputs and erosion.

The Company thrives, harvesting and growing native wetland seeds for the wetland mitigation market and continues collaborating with federal agencies, highway departments, and land developers to establish wetlands and meadows using native seeds.

Ernst hires a full-time horticulturist to identify useful native species and develop production strategies for seed production.

Calvin and Marcia's children, Andy, Michael, and Robin, become involved in the Company, expanding native seed production and sales.

2000–09

A fire destroys the Company's seed conditioning facility and several crops. Employees and neighbors rally, bringing tools to the farm to help the rebuild.

Calvin utilizes vacuum harvesting technology on wiregrass in central Florida, and the Ernst family purchases a farm in Live Oak, Florida for field production. Due to decreased demand and production difficulties, the venture was not as fruitful as hoped. Still, it yielded a knowledge of Southeast native plants for reclamation and restoration.

Ernst leases 5,000 acres of farmland in Crawford County, plants switchgrass for seed and biomass production, and builds a state-of-the-art facility to process warm season grasses. Michael and a small group of employees design and construct a pellet plant that uses only grass. Today it operates as a separate entity, Ernst Biomass, LLC.

2010–19

Andy and Michael continue in day-to-day operations at Ernst Seeds and Ernst Biomass, while Robin operates Meadville Land Service, Inc., and Monarch Vegetation Service.

2020–24

The Ernst Team consists of 80+ full-time employees, including field production crews, sales and marketing staff, researchers, seed conditioning specialists, finance, purchasing, and inventory management.

In the last 10 years, Ernst's owned acreage has doubled, and sales have increased by 50%. Healthy expansion continues with the addition of new drying and storage bins, equipment storage buildings, and a state-of-the-art spray bay. The company decommissioned two greenhouses that had served us for over half a century and replaced them with a 2-bay gutter-connect greenhouse, which added extra space.

2025

Fencing was installed in late spring in select production fields to help increase the yields of crops that are particularly prone to deer browsing. We spent the months prior to the installation clearing the ground to prepare.

Ernst purchased property for the future expansion of the seed drying and processing infrastructure. The company added 8 drying bins, bringing the total to 59. Ernst currently farms 11,000 acres and has a fleet of 30 tractors, 13 combines, and 50 trucks.

MEET THE TEAM

At Ernst Seeds, we rise early, enjoy digging into a good challenge, and welcome any opportunity to share our knowledge from the field. Our highly skilled, expertly trained, and wildly innovative team runs 80+ members deep, with many celebrating over two decades at the farm. Needless to say, we take great pride in the work we do, the seeds we offer, and the customers we serve. If you've got a question about growing, reach out to a pro today.

Have a question and not sure where to start? Call (800) 873-3321, Monday through Friday, 8 a.m.–5 p.m. EST or e-mail us at sales@ernstseed.com.

Calvin Ernst
President

Marcia Ernst
Partner

Andy Ernst
Vice President

Michael Ernst
Vice President

Robin Ernst
Partner

Dan Arnett
Biomass Manager

Steph Breckenridge
Operations & Inventory Manager

Paula Dithrich
Senior Accounting Manager

Mark Fiely
Horticulturist

Cheri Haines
Human Resources Manager

Kathy Haven
Executive Assistant

Nikki Hindle
Sales Manager

Kevin Jamison
Agronomist

Greg Kedzierski
Plant Material Specialist

Amanda Keller
Communications & Marketing Coordinator

Scott Waybright
Accounting Manager

Scan here to Shop!
Shop our native selection anytime online.

Sales & Order Processing


Warehcuse & Shipping


Planting & Harvesting


Greenhouse


Bioengineering


Seed Conditioning


Biomass


Accounting & Finance


Marketing

LET'S GET GROWING

DEFINING NATIVE VS. NATURALIZED SEEDS

NATIVE

Species that existed locally prior to European settlement.

NATURALIZED

Species not native to a certain area that grow, reproduce, and maintain themselves without interference.

ECOTYPE

Native species found in a defined area, state, or region.

VARIETY

A subdivision of native or naturalized species having one or more distinct, consistent, though often inconspicuous, traits.

WHY STOCK 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, resulting in 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.

ERNMX-140 Partially Shaded Area Roadside Mix

ERNMX-168 Northeast Annual & Perennial Wildflower Mix

UNDERSTANDING PURE LIVE SEED (PLS)

The Pure Live Seed (PLS) standard was developed to aid in determining the appropriate amount of bulk seed to be applied.

PLS refers to the percentage of live seed by weight in a seed lot having the potential to develop into a seedling. Live seed refers to the germination percent, dormant seed, and hard seed. The remainder of the lot is non-viable seed, inert matter, other crops, and/or weed seed.

INDEX

Pure Seed – Viable and non-viable seed.

Viable Seed – Seed having the potential to produce a seedling.

% Nonviable Seed – Percent of seed that will not germinate.

% Purity – Percentage of pure seed by weight.

% Germination – Percent of seed by weight having the potential to germinate relatively quickly.

% Hard Seed – Percent of viable seed having a hard seed coat that can take longer to break and germinate.

% Dormant Seed – Percent of viable seed taking longer to germinate.

% Total Germination – Percent of seed by weight composed of hard seed, dormant seed, and germination percentage having the potential to produce a seedling.

% Inert Matter – Material other than seed.

Weed Seed – Seeds or other reproductive parts of species recognized by law as weeds.

Other Crop Seed – Seeds that are not weeds or pure seed.

HOW TO CALCULATE PLS

Percent Total Germination =
(Germination + Hard Seed + Dormant Seed)

70 + 15 + 5 = 90% Total Germination
Use that figure and the purity percentage to calculate the PLS percentage.

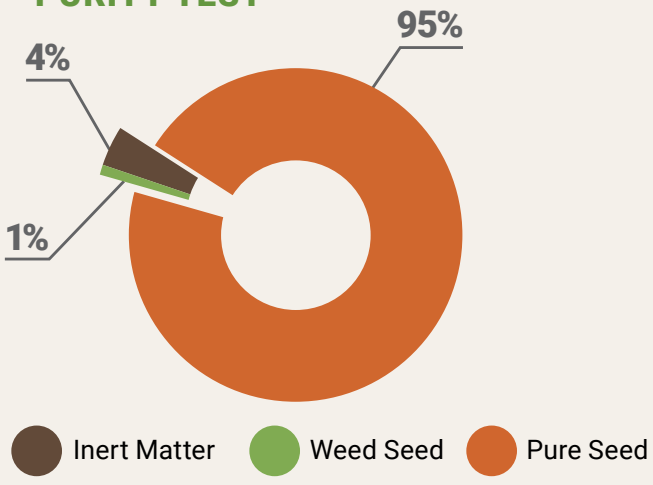
Multiply Total Germination by Purity / 100 = PLS %
(95% X 90%)/100 = 85.5% of Pure Live Seed

What Does This Mean?
85.5% of this seed lot by weight has the potential to grow. If 10 pounds of pure live seed is needed on a site, the quantity of bulk seed needed is determined by:

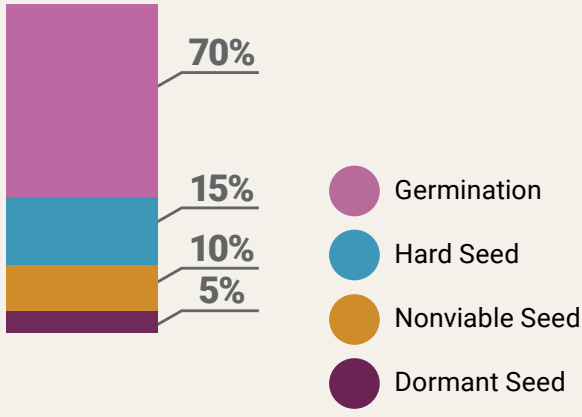
100 / PLS = Pounds of bulk seed needed to produce 1 lb of PLS

100 / 85.5 = 1.17 lbs of bulk seed X 10 lbs = 11.7 lbs of bulk seed

PURITY TEST



GERMINATION TEST



EXPECTATIONS OF NATIVE SPECIES

EXPECTATIONS OF NATIVE SPECIES

GERMINATION & GROWTH (all the following assume adequate light, adequate soil temperature, appropriate moisture, and good seed-to-soil contact):

In general, annual species have less seed dormancy than biennials and biennials have less than perennials. Seed dormancy is nature's hedge against unfavorable conditions during a plant's life cycle. Unfavorable conditions can be, but are not limited to, late spring frost or drought. Dormant seeds germinate when favorable conditions are present.

ANNUALS

Most species 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 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 that of an annual due to seed dormancy.

PERENNIALS

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

Most of these species do not require cold, wet stratification to produce an adequate stand. Five exceptions are *Tripsacum dactyloides* (Eastern Gamagrass), which requires 14-60 days of stratification, and *Chasmanthium latifolium* (River Oats), which requires 60 days of stratification for northern genotypes, *Panicum anceps* (Beaked Panicgrass), *Tridens flavus* (Purpletop), and *Sporobolus heterolepis* (Prairie Dropseed), all requiring 60-90 days of cold, wet stratification. Stratification is the process by which seed is exposed 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. Most 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). Most of the growth is in root development 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.

New growth of Eastern Gamagrass *(Tripsacum dactyloides)* in a Florida field in the spring.

Eastern Gamagrass *(Tripsacum dactyloides)*

2. Cool Season Grasses: Some species will germinate when temperatures are a little higher than 40°F (4°C) while others will require warmer temperatures. They may germinate in the fall or spring. Adequate stands of most species do not require stratification; however, 50% of the seed may remain dormant without stratification. Most 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.

3. Some sedges *(Scoparia, vulpinoidea)*, **rushes** *(Juncus effusus, tenuis)*, and **bulrushes** *(Scirpus atrovirens, cyperinus, expansus, polyphyllus)* have a very high seed count per pound of seed. When planted in the spring, a substantial number of seedlings may be produced by these species in the first growing season. These seedlings may represent 5% or less 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 are 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 bur reeds *(Sparganium americanum, eurycarpum),* **sedges** *(Carex comosa, crinita, frankii, grayi, intumescens, lupulina, lurida, squarrosa, stricta),* and **bulrushes** *(Scirpus validus)* have a high level of seed dormancy and may not have consequential germination without stratification.

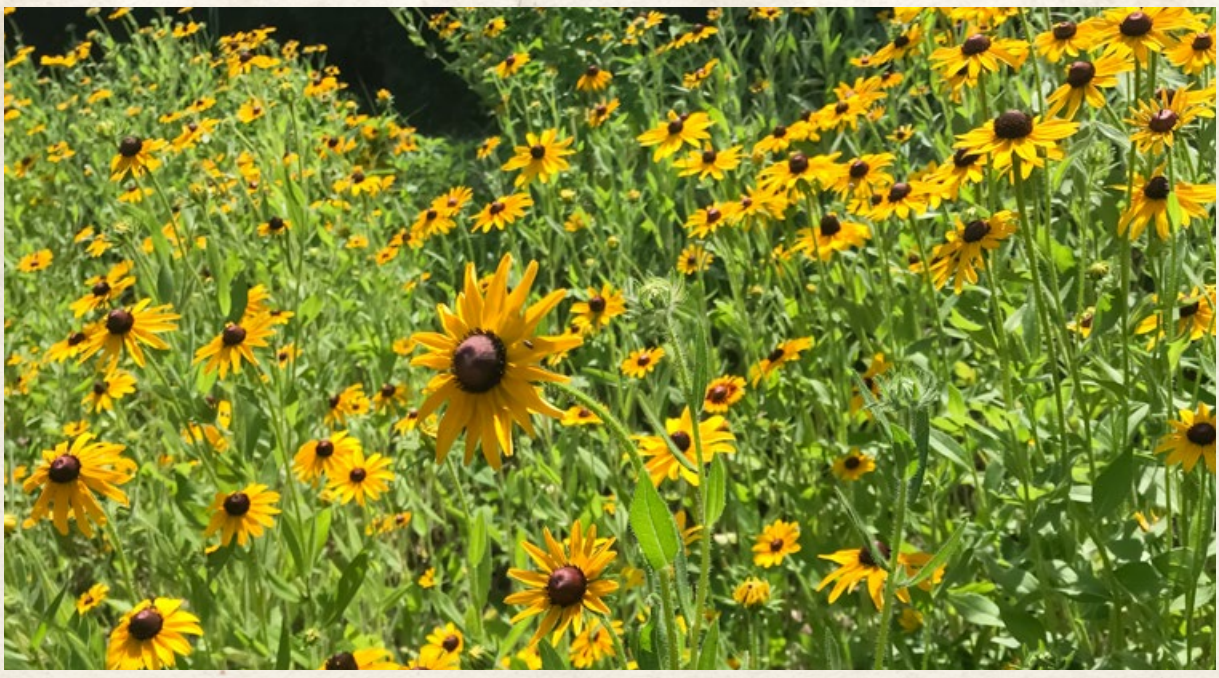
Most seedlings will emerge in the first and second growing seasons after stratification (artificially or naturally). Plants will flower and set seed one to three years after they germinate. *Carex spp.* in this group may be recognized as described above for other *Carex spp. Scirpus spp.* in this group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

5. For most broadleaf species, some germination will occur in the first year without stratification (artificial or natural). A high percentage of species and seeds within the species are likely to germinate in the first growing season following the first winter *in situ* (on-site). Most of the seeds that germinate will have done so by the end of the growing season following stratification. Following germination, blooms may occur in the first growing season: *Rudbeckia hirta* (Blackeyed Susan); second growing season: *Rudbeckia triloba* (Browneyed Susan), *Aster spp., Monarda spp., Penstemon spp., Solidago 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 blooming depends on soil fertility, available moisture, and growing season temperatures. It may be shorter for a given species the further south one is located.

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

Virginia Wildrye *(Elymus virginicus)*

Nodding Sedge *(Carex crinita)*



Blooms may occur in the first growing season with *Rudbeckia hirta* (Blackeyed Susan), while other broadleaf species may take numerous growing seasons to bloom.

require more weeks of cold, wet stratification than southern ecotypes (FL, GA, NC, SC) of the same species.

Most of our native seed mixes are composed of perennial species. Mixes dominated by perennial species have the potential to last more than a decade if properly maintained. For all mixes, a site must be kept free from invasive species or aggressive weeds. Mixes of herbaceous species with no tree, shrub, or vine components in the formula must be kept free from the encroachment of woody or vine species with controlled burning, mowing, or spot spraying. For tips on weed control see the QR code on page 25.

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 rainfall variations.

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 a situation is assisted by a small set of species that generally germinate very well.

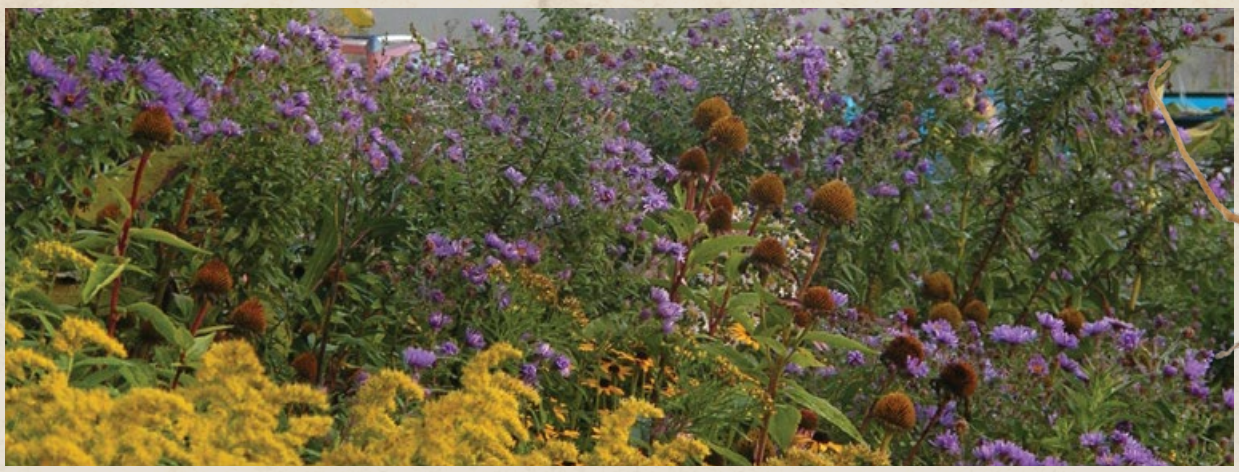
For wetland meadows, some common early emerging species include: *Asclepias incarnata* (Swamp Milkweed), *Eupatorium perfoliatum* (Boneset) and *Carex spp.* For upland meadows, some common early emerging species include: *Chamaecrista fasciculata* (Partridge Pea), *Elymus virginicus* (Virginia Wildrye), *Helianthus angustifolius* (Narrowleaf Sunflower), *Heliopsis helianthoides* (Oxeye Sunflower), *Monarda fistulosa* (Wild Bergamot), *Penstemon digitalis* (Tall White Beardtongue), and *Rudbeckia hirta* (Blackeyed Susan). Seedling images of many of these species are available on our website.

DISCLAIMER: The information in this review of practices is the result of 60+ years' experience in seed production. Ernst Seeds has been supplying seeds and consulting in the reseeding 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 these practices are opinion only and our best advice as a result of these experiences. These recommendations are for individual consideration and do not cover all the conditions that will be encountered in the field.

Ernst 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.

ESTABLISHMENT GUIDE



ERNMX-105 Mesic to Dry Native Pollinator Mix buffer planting.

ESTABLISHMENT GUIDE 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 & native pollinators (butterflies, bumblebees, etc.)
- Native species for renewable biomass production

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

Please review the appropriate section(s) below for information regarding seed mix selection and seeding methods. Matching the functional goals of the 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 more comprehensive list may be found at www.ernstseed.com or by contacting a member of our sales team. Mixes can also be customized to specific needs as well as those of a site and ecological region.

PLANTING GUIDES

FALL VS. SPRING SEEDING

Traditionally, seeding is thought of as a spring activity, but it can also occur during the fall or dormant season. Fall seeding works well for restoration projects completed in the summer.

While there are some noteworthy advantages to fall seeding, seeding in either spring, fall, or the dormant season will produce good results. In drought-prone regions, seeding should be timed to take advantage of the available moisture in the area.

FALL OR "DORMANT" SEEDING

- Fall seeding imitates natural reseeding. Dormant seeding can take place when soils are dry enough to work.
- Good seed-to-soil contact occurs through precipitation and the freeze-thaw cycle.
- Natural stratification and scarification occur; natural changes within the seed or to the seed coat during the winter enhance germination in the spring.
- Mulching is an important element of dormant seeding to protect the soil.
- Some seed may be lost to decay and wildlife consumption during the winter.
- Establishment may be hindered by growth of winter annuals in the fall.

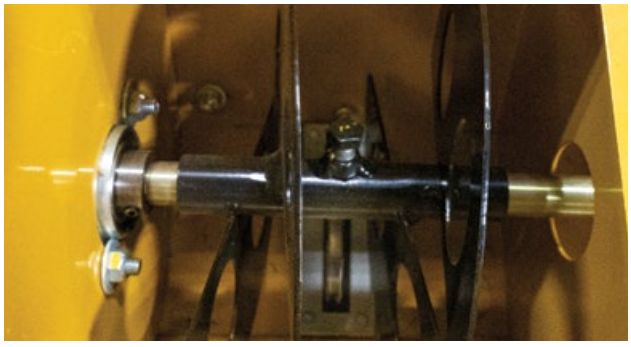
FROST SEEDING

- Frost seeding is the act of broadcasting seed onto or drilling into frozen soil.
- Good seed-to-soil contact occurs through the freeze-thaw cycle.
- Natural stratification and scarification occur; natural changes within the seed or to the seed coat during the winter enhance germination in the spring.
- Mulching may be done.
- Some seed may be lost to decay and wildlife consumption during the winter.
- Establishment may be hindered by growth of winter annuals in the fall.

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 (13°C).
- 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 may be delayed until weed control is applied to improve establishment.
- Irrigation during dry weather periods is necessary for proper germination.
- Light mulching is an important element of seeding to protect both the seed and soil and retain moisture.
- When planting native grasses for biomass, seeding generally takes place during the spring when soil temperatures at a 3" depth are near 55°F and rising.

SEEDING METHODS



DRILL SEEDING

Drill seeding is a mechanical means of creating furrows (openings) in the soil surface and metering seed in at a uniform rate. A drill seeder is practical for seeding multiple acres in larger areas.

Conventional drills can work in tilled and partly tilled soil. No-till drills are designed to work in soil that has not been tilled. They have heavy openers that cut through vegetation and sod to make a furrow for seed placement. With the proper adjustment, a no-till drill can work in tilled soil. It has discs that aid in loosening the soil. All drills should be equipped with a closing or packing wheel that follows seed placement.

The goal of drill seeding is to achieve uniform seed distribution over the site with seed placement at the correct depth (1/4"-1/2") and good seed-to-soil contact. With experience, this depth may be adjusted. Calibrating a drill or broadcast seeder depends on seed bulk density and required application rates. Manufacturers provide manuals with charts to guide seeding rate calibration. To ensure uniform application of seed, conduct a test run over a small area using the appropriate amount of seed for that area, then make any necessary adjustments. Most traditional seed drills are designed to handle seeds with high bulk densities, such as oats and wheat. Some drills may have a small seed box able to plant small seeds, such as alfalfa, clover, and switchgrass.

Many native and naturalized species are fluffy and will not readily flow through a traditional seed drill. Examples of fluffy seed include little bluestem, big bluestem, and indiangrass. With the aid of a bulking agent, some fluffy seeds may be planted through the large seed box of a traditional drill. Bulking agents include kitty litter, dry sawdust, vermiculite, or rice hulls. Test with a small amount of seed. Native seed drills, such as Truax, have specialized seed boxes that are effective for planting fluffy seed (see above left). When seed will not readily flow through a native seed drill's fluffy seed box, a bulking agent may be needed.

HAND SEEDING

Hand seeding is the casting of seed onto the soil (see above right). Hand seeding is used on small plots or difficult terrain where seeding with machinery is not an option. The goal is to achieve an even distribution of seed over the site. This can be accomplished by spreading half of the seed in one pass and the balance in a perpendicular pass. To ensure uniform application of seed, conduct a test run over a small area using the appropriate amount of seed for that area. To know how wide to make your passes, check the width of seed distribution.

If possible, a light raking to a depth of 1/4" and/or firming with a lawn or Brillion-type roller is recommended to achieve good seed-to-soil contact. Cover with straw mulch at 70 lb per 1,000 sq ft or hydromulch at 34 lb per 1,000 sq ft.

When the volume of seed to be applied is small (less than 50 lb per acre), a bulking agent may be helpful to provide the volume necessary to get uniform application. Such bulking agents include kitty litter, dry sawdust, vermiculite, or rice hulls.

BROADCAST SEEDING

A broadcast seeder consists of a hopper with an adjustable door that regulates seed flow onto a spinner. Some broadcast seeders have an agitator that aids with seed flow in the hopper. Broadcast seeders are commonly used to spread seed, fertilizer, lime, and other granular products. The goal is to achieve an even distribution of seed over the site. To ensure uniform application of seed, conduct a test run over a small area using the appropriate amount of seed for that area. To know how wide to make the passes, check the width of seed

distribution from the spreader. The settings can then be adjusted as needed. To achieve better distribution, spread half of the seed in one pass and the balance in a perpendicular pass. We recommend refilling the hopper when it is 1/3 full rather than letting it empty out. Follow up by tracking or firming the seed into the soil with a lawn or Brillion-type roller to achieve good seed-to-soil contact. Do not roll or track the seed if the soil is wet. Cover with straw mulch at 70 lb per 1,000 sq ft or hydromulch at 34 lb per 1,000 sq ft.

Many native seeds are fluffy and will not uniformly flow through a broadcast seeder. To enhance the flow, mix the seed with a bulking agent of similar density. Dry sawdust, vermiculite, or rice hulls are some options. An agitator in the hopper may be required in these circumstances. We recommend a minimum rate of 50 lb per acre of seed and bulking agent.

A bulking agent can also be helpful if you are planting small quantities of seed. It provides the volume necessary to get uniform application. For fine seeds, kitty litter is a more appropriate bulking agent.

CULTIPACKING

A cultipacker is an excellent tool for 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 primary functions of a cultipacker are to break up clods, remove excess air spaces from loose soil, and smooth the soil. The heavy-duty smooth, spoke, or crowfoot rollers 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.

HYDROSEEDING

A hydroseeder combines water, seed, fertilizer and, sometimes, hydromulch into a mix that is pumped through a nozzle and sprayed uniformly over the area to be seeded. Hydroseeders can distribute this mix at 150' or more, allowing for the ability to seed terrain that may not be accessible with other seeding methods, such as steep slopes, roadside cuts, or sites that are too wet. Using hydromulch aids in seed placement and reduces erosion on slopes. Depending on site conditions, erosion control blankets or straw mulch may be needed to cover the seed. Many native seeds should be broadcast with 500 lb per acre of mulch as a marker. Do not exceed this amount as native seeds may die if suspended in the mulch with little or no seed-to-soil contact. The balance of the hydromulch, often 1,000 lb per acre, may be applied on top in a secondary application.

STRAW MULCHING

A straw-mulch blower distributes mulch over a seeded area. It has a slide (or chute) in which to feed the mulch, chopper blades to break up the mulch, and a blower to spread the mulch over large areas. Straw mulch may be spread by hand in smaller areas. It is important to use weed-free straw from small grains, such as oats or grain rye, to minimize potential weed issues.

TOOLS FOR SITE PREPARATION

MINIMUM-TILL EQUIPMENT

Minimum-till equipment incorporates a portion of the surface vegetation into the soil and levels uneven surfaces. One of the most common tools is a disc which cuts through vegetation, sod, or hard soil and partially turns or tills it into the soil. Similar equipment that turns part of the vegetative residue into the soil is known as Aerway® or Turbo® Till.

TRACKING

Tracking is the use of a crawler or rubber-tired tractor to make depressions and firm loose soil after construction or tilling. Tracks should be oriented perpendicular to the slope of a site. The depressions from tracking help to reduce erosion and retain seed and moisture. The firm, but not compacted, seedbed will not dry out as quickly as loose soil.

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 breaking up hardpan soil or loosening compacted soil while leaving a high percentage of debris on top. A chisel plow can be adjusted to till shallow or deep and 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 a cutting depth of 8”-12”. To make the soil smooth enough for planting after the use of a chisel plow, use a disc harrow, tandem disc harrow, or offset disc harrow of sufficient weight and size to provide a cutting depth of 6”-8”.

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.

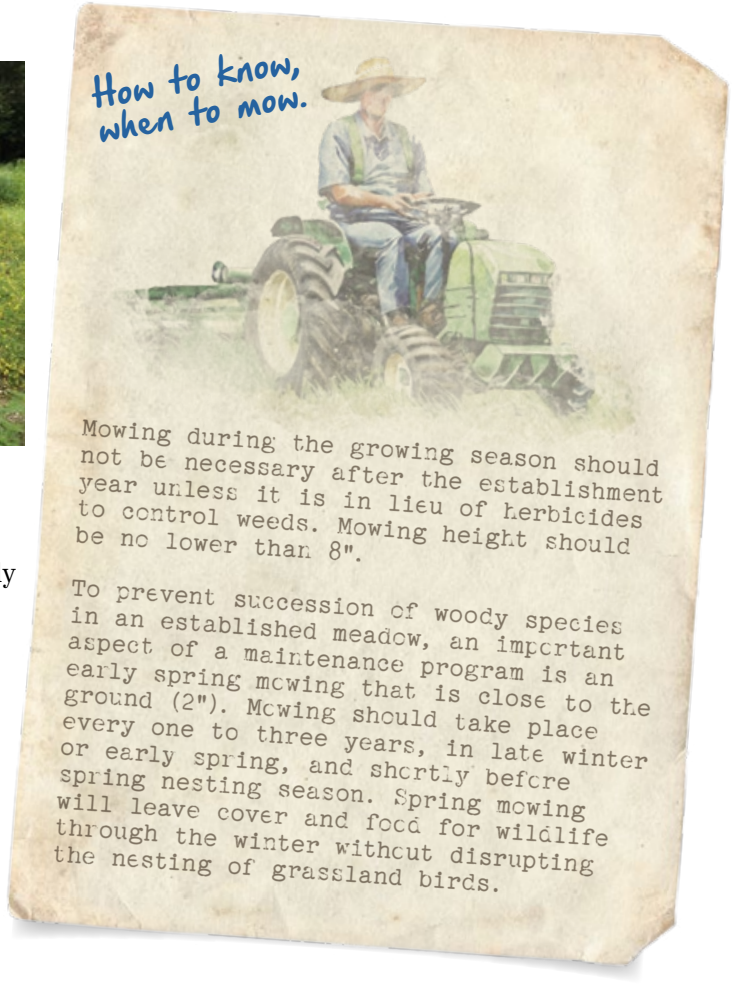
TOOLS FOR MAINTENANCE

ROTARY MOWER
Heavy vegetation on under-utilized fields is difficult to mow with a discbine or sickle bar mower. 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.

SPRAYER
Sprayers come in various sizes and styles, including common hand-held units like the one 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 applied 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.

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



UPLAND & MEADOW SITES

FAST FACTS

Upland & Meadow Sites are characterized as being dry most of the year. Soils on 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 the site is sandy, refer to the Southeastern U.S. Sites Establishment Guide, p. 54.

Upland examples: Naturally rocky soil subject to erosion or steep road cuts. Meadow examples: abandoned farm fields, lawns, vacant land, or roadsides.

SITE PREPARATION

If the site was previously a lawn or crop field to which herbicides were applied, it is important to allow the appropriate time interval for the herbicide residues to break down prior to planting. Some herbicide residues can prevent seedlings from germinating.

Competition from invasive or undesirable vegetation is the most limiting factor for a successful upland meadow establishment. Prior to planting, all such vegetation must be fully controlled. It may take a full growing season or more to control rhizomatous species, such as mugwort, Canada thistle, poison ivy, or johnsongrass. If these species are not fully controlled prior to planting, they will overrun your planting. Typical control strategies include repeated tilling, smothering with black plastic, or herbicides. While any of these methods may control existing weeds, they will not kill all weed seeds lying dormant in the soil. Seeds of such species as velvetleaf and pokeweed may germinate many decades after the species last flowered on the site.

When using the tillage strategy, a site is disc harrowed every two to four weeks for one to two months. The underlying principle 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 some dormant weed seeds that will be killed with subsequent tillage. Planting should not take place 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 strategy should be utilized in a growing season when the intent is to fall plant in the same year or spring plant the following year.

Use of an approved herbicide, such as glyphosate (Roundup® or Rodeo®), by a licensed spray technician is the most common and least time-intensive method for controlling existing vegetation. Since herbicides are most effective on actively growing plant tissues, they are very effective on new spring growth. Spraying should begin when growth reaches 6". A follow-up application one to two weeks later will address skips or persistent species. If substantial plant tissue remains on the surface following a full kill by herbicides, close mowing, tillage, or burning may be necessary to achieve good seed-to-soil contact.

ERNMX-179 Butterfly & Hummingbird Garden Mix meadow planting in Hershey, Pennsylvania.

ERNMX-153 Showy Northeast Native Wildflower & Grass Mix meadow planting.

An upland meadow using ERNMX-179 Butterfly & Hummingbird Garden Mix. Credit: Paul Stead

GROWING SEASON MAINTENANCE

MAINTENANCE

Problem weeds should be hand pulled in annual wildflower mixes or annual and perennial wildflower mixes. For all other mixes, see below.

FIRST GROWING SEASON

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

Problem weeds should be hand pulled or spot sprayed with an approved herbicide, such as Roundup®, Rodeo®, Garlon®, Garlon® 3A, Sonora™, or Milestone®. Be vigilant in controlling vines or thorny plants if they were not part of the mix. These are more easily pulled early than after two to three months of growth. Examples include bindweed, blackberry, multiflora rose, mile-a-minute, and Japanese hops. Be equally vigilant in the control of other invasive species, such as autumn olive, Canada thistle, and mugwort.

SECOND & SUBSEQUENT GROWING SEASONS

Prior to new spring growth reaching 2” (e.g., shortly after forsythia or redbud blooms), trim any remaining material from the previous year close to the ground (approximately 2”). This will allow the soil to warm more quickly, stimulating emergence and growth of native seedlings and reducing the likelihood of shrub invasion.

Problem weeds should be hand pulled or spot sprayed with an approved herbicide, such as Roundup®, Rodeo®, Garlon®, Garlon® 3A, Sonora™, or Milestone®. Be vigilant in controlling vines or thorny plants if they were not part of the mix. These are more easily pulled early than after two to three months of growth. Examples include bindweed, blackberry, multiflora rose, mile-a-minute, and Japanese hops. Be equally vigilant in the control of other invasive species, such as autumn olive, Canada thistle, and mugwort.

SPECIAL CIRCUMSTANCES

If there is a heavy infestation of ragweed or foxtail in the second growing season, trim the meadow to 8”. Trimming should cease by mid-September. To prevent weed reinfestation, use of an appropriate selective herbicide in conjunction with a seed mix tolerant of that herbicide may be necessary. For additional insight into weed control, see Weeds of Meadows. For images of native plant seedlings, see the Seedling Gallery QR code on page 71.

A meadow installation at a Princeton, New Jersey residence. Credit: OPEN Landscape Architecture

UPLAND & MEADOW SITES SEED MIXES

ERNMX-105	Mesic to Dry Native Pollinator Mix
ERNMX-110	Ernst Native Biomass Mix for Strip Mines & 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
ERNMX-123	Native Upland Wildlife Forage & Cover Meadow Mix
ERNMX-125	Mesic to Dry Native Pollinator Mix without Grasses
ERNMX-153	Showy Northeast Native Wildflower & Grass Mix
ERNMX-153-1	Showy Northeast Native Wildflower 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-179	Butterfly & Hummingbird Garden 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. See "Disclaimer," p. 15. For "Expectations of Native Species," see p. 12.

WILDLIFE HABITAT & FOOD PLOT SITES

FAST FACTS

Wildlife Habitat and Food Plot Sites are generally small clearings in wooded areas or farmland. While planting dates differ between annual and perennial mixes, 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.

SITE PREPARATION

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

Eradicate existing vegetation by having a licensed spray technician apply an approved herbicide, such as glyphosate (Roundup® or Rodeo®), or by 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.

GROWING SEASON MAINTENANCE

It may be necessary to mow some mixes to 4”-6” in order to keep plants young and tender. Annual food plot mixes must be planted yearly.

HABITAT

Well-drained or moderately well-drained sites in woodland openings (ideally near water sources); typically in full sun for at least half the day; upland species may be planted.

FERTILITY

Check soil pH and fertility; adding lime can improve the nutritional value of vegetation beneficial for wildlife. If a soil test has not been obtained, a starter fertilizer, such as 200 lb per acre of 16-16-16, should be applied. If uncertain about the soil pH, add 1,000-2,000 lb of lime per acre which will provide plants with essential nutrients without pushing up a lot of top growth. Lime and fertilizer may be incorporated into the soil using a tiller. After incorporating amendments, smooth 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.

SEEDING METHOD

Hand seed, broadcast seed, or drill seed.

ERNMX-184 Fall Sweets Wildlife Mix. Credit: Elicia Winner.

A ringneck pheasant rooster takes flight in a hunting preserve using Ernst habitat mixes.

A pair of eastern wild turkey jakes in a spring food plot.

A mature whitetail deer standing on the edge of a marsh.

WILDLIFE HABITAT & FOOD PLOT SITES SEED MIXES	
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. See "Disclaimer," p. 15. For "Expectations of Native Species," see p. 12.

POLLINATOR-FRIENDLY SITES

FAST FACTS

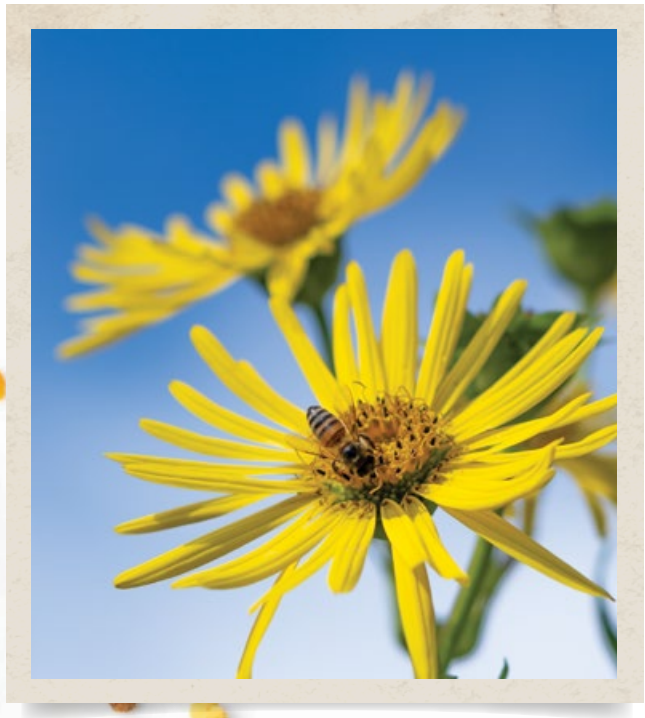
Pollinator meadows may be used to attract honeybees and more than 4,000 species of native pollinators in North America, including bees, butterflies, hummingbirds, and even some flies. Increased attention to the plight of such pollinators as honeybees and monarch butterflies by the government and private sector has spurred an interest in developing pollinator-friendly habitats across the North American landscape. One of the highest examples was the 2015 White House announcement of the National Strategy to Promote the Health of Honeybees and Other Pollinators.

ABOUT POLLINATOR-FRIENDLY SITES

Almost any site not intended to be mowed repeatedly during the growing season may be designed to be pollinator friendly. Pollinator-friendly meadows are often thought of as being planted on flat sites in full sun, but they can also be planted at woodland edges. Pollinator-friendly species aid in soil stabilization on steep slopes and riparian areas. Storm basins and wetlands are more aesthetically pleasing when enhanced with pollinator-friendly species. Rights-of-way under utility transmission lines, above pipelines, and along roadways can be developed to an ecologically beneficial state when functional diversity and pollinator-friendly species are incorporated into seed mix design. When planted within a solar array, transpiration from native plants can reduce panel temperatures thereby increasing panel efficiency.

The primary energy source for most adult bees, butterflies, and other flower-loving pollinators is nectar. Pollen is essential for providing proteins and lipids to developing bee larvae while leaf tissue from specific host plant families is required for butterfly caterpillars. Most native bees are nectar generalists in that, though pollen specialists, they can consume nectar from many plant families. They are also pollen specialists whose larvae require a specific ratio of proteins to lipids. The best sources of pollen for native bees as well as leaf tissue for native butterflies are the native plant species with which they have co-evolved.

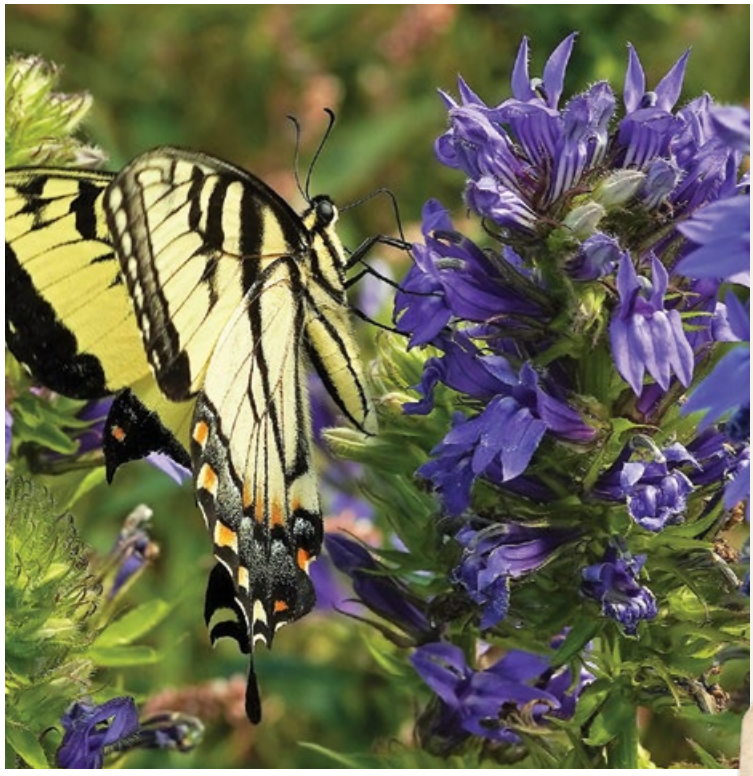
While not native to the U.S., honeybees have evolved to be able to use pollen from a wide range of species. Like native bees, honeybees feed nectar and pollen to their larvae. They also need pollen to have a particular protein-to-lipid ratio that they get by collecting pollen from a variety of plant species.



Honeybee on a Cup Plant *(Silphium perfoliatum)*.

Monarch butterflies on Marsh Blazing Star (*Liatris spicata*). Photo credit: Rob Davis.

To meet the dietary needs of a wide range of pollinators, it is important to know that some pollinator species are not active for the entire growing season. During the active period, food and nesting resources must be available. The availability of flowering shrubs or trees for pollen and/or nectar before herbaceous species bloom in the spring is beneficial to some pollinator species. Continuity of bloom from as early in the season to as late in the season as possible is important. A minimum of three species should be in bloom in the spring, summer, and fall. For the benefit of monarchs, milkweeds should be planted.



Swallowtail Butterfly on Great Blue Lobelia *(Lobelia siphilitica).*

TO SUPPORT THE GREATEST DIVERSITY OF NATIVE POLLINATORS:

- Provide continuity of bloom from as early to as late in the season as possible.
- Minimum of three species blooming in spring, summer, and fall.
- Plant milkweeds for monarchs.

POLLINATOR-FRIENDLY SITES SEED MIXES	
ERNMX-105	**Mesic to Dry Native Pollinator Mix**
ERNMX-125	**Mesic to Dry Native Pollinator 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-157	**Honeybee Forage Mix**
ERNMX-179	**Butterfly & Hummingbird Garden 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. See "Disclaimer," p. 15. For "Expectations of Native Species," see p. 12.

RIPARIAN SITES

FAST FACTS

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 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 such undesirable vegetation as multiflora rose, honeysuckle, and woody species. CAUTION: Some persistent species, such as purple loosestrife, phragmites, Japanese knotweed, or reed canarygrass, may require 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 removed, 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 populated with riparian and floodplain species.

FERTILITY

Due to the potential for water contamination, fertilizer is 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 soil pH, and adjust with lime as needed, or select species that adapt to that pH.

SEEDING METHOD

Hand seed, broadcast seed, or hydroseed.

ERNMX-178 Riparian Buffer Mix along a small stream corridor.

Before

After

Bowman's Creek re-setting and rehabilitation project in northeastern Pennsylvania. Credit: Adam Nordfors

GROWING SEASON MAINTENANCE

FIRST GROWING SEASON

Whenever canopy height (overall vegetation) reaches 18"-24", trim the meadow to 8" using a brush hog mower or string trimmer. Trimming reduces competition by fast-growing weeds for sunlight, water, and nutrients needed by slower growing perennial natives. A lawn mower is not recommended as the mower height will be too low and native seedlings will be killed.

If bioengineering materials were used on the site, mowing should be above the new growth of these materials. Trimming should cease by mid-September.

Problem weeds should be hand pulled or spot sprayed with an approved herbicide, such as Rodeo® or Garlon® 3A. Be vigilant in controlling invasive vines, such as bindweed, mile-a-minute, and Japanese hops. These are more easily pulled early than after two to three months of growth. Be equally vigilant in the control of other invasive species, such as autumn olive and Japanese knotweed.

SECOND & SUBSEQUENT GROWING SEASONS

Prior to new spring growth reaching 2" (e.g., shortly after forsythia or redbud blooms), trim any remaining material from the previous year close to the ground (approximately 2"). This will allow the soil to warm more quickly, stimulating emergence and growth of native seedlings and reducing the likelihood of shrub invasion.

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, such as Rodeo® or Garlon® 3A. Be vigilant in controlling vines or thorny plants if they were not part of the mix. These are more easily pulled early than after two to three months of growth. Examples include bindweed, multiflora rose, mile-a-minute, and Japanese hops. Be equally vigilant in the control of other invasive species, such as autumn olive and Japanese knotweed.

SPECIAL CIRCUMSTANCES - SECOND GROWING SEASON

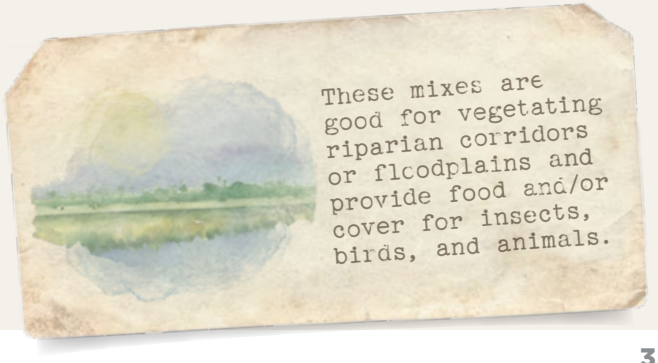
If there is a heavy infestation of ragweed or foxtail in the second growing season, trim the meadow to 8". Trimming should cease by mid-September.

GENERAL MAINTENANCE

Grassy weeds or persistent perennials can re-establish in these soils. Monitor and control weeds by hand pulling or spot spraying.

RIPARIAN SITES SEED MIXES	
ERNMX-128	Seasonally Flooded Wildlife Food Mix
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. See "Disclaimer," p. 15. For "Expectations of Native Species," see p. 12.



DISTURBED SITES & STEEP SLOPES

FAST FACTS

Disturbed Sites & Steep Slopes have various soil types and conditions typically distinguished by lower quality soils and a predisposition to runoff and erosion. Examples: Landfills, surface mines, road cuts, or construction sites.

SITE PREPARATION

Eradicate existing 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 to reduce erosion and minimize seed loss.

For areas with slope greater than 3:1, final tracking should be perpendicular to the slope. The tracks will aid in reducing erosion and retaining seed and moisture.

Mulching with straw, hydromulch, or straw/coconut fiber mats is recommended on these sites to protect the seed from drying out or washing away. For areas steeper than 3:1, the use of erosion control blankets or flexible growth medium (e.g., Flexterra®) is recommended. When using erosion control blankets, be sure they are toed in at the top of the slope.

HABITAT

Various soils with exposed clay, sand, and rock outcropping without topsoil as a result of construction; generally populated with upland species.

FERTILITY

Typically low in fertility; therefore, adding topsoil or organic matter (compost) can be very beneficial. Check 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 way that will leave the soil rough and minimize soil erosion and rapid runoff (e.g., tracking). If there is a weed problem, fertilizing is not recommended.

SEEDING METHOD

Hand seed, broadcast seed, hydroseed, or drill seed. 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 pressing the seed into the soil using a cultipacker, lawn roller, or ATV.

ERNMX-181 Native Steep Slope mix with Annual Ryegrass in Morgantown, West Virginia.

A one-year-old Big Bluestem *(Andropogon gerardii)* meadow at Fishkills Landfill on Staten Island, New York.

This wetland was constructed on a former mine site.

GROWING SEASON MAINTENANCE

FIRST GROWING SEASON

Post-planting maintenance will provide improved results if the ground is not too rough or steep. Whenever canopy height (overall vegetation) reaches 18”-24”, use a brush hog mower or string trimmer to trim the meadow to 8”. Trimming reduces competition by fast-growing weeds for sunlight, water, and nutrients needed by slower growing perennial natives. A lawn mower is not recommended as the mower height will be too low and native seedlings will be killed.

If bioengineering materials were used on the site, mowing should be above the new growth of these materials. Trimming should cease by mid-September.

Problem weeds should be hand pulled or spot sprayed with an approved herbicide, such as Roundup®, Rodeo®, Garlon®, Garlon® 3A, Sonora™, or Milestone®. Be vigilant in controlling vines or thorny plants if they were not part of the mix. These are more easily pulled early than after two to three months of growth. Examples include bindweed, blackberry, multiflora rose, mile-a-minute, and Japanese hops. Be equally vigilant in the control of other invasive species, such as autumn olive, Canada thistle, and mugwort.

SECOND & SUBSEQUENT GROWING SEASONS

Prior to new spring growth reaching 2” (e.g., shortly after forsythia or redbud blooms), trim any material standing from the previous year close to the ground (approximately 2”) on sites that are not too rough or steep. This will allow the soil to warm more quickly, stimulating emergence and growth of native plants and reducing the likelihood of shrub invasion.

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, such as Roundup®, Rodeo®, Garlon®, Garlon® 3A, Sonora™, or Milestone®. Be vigilant in controlling vines or thorny plants if they were not part of the mix. These are more easily pulled early than after two to three months of growth. Examples include bindweed, blackberry, multiflora rose, mile-a-minute, and Japanese hops. Be equally vigilant in the control of other invasive species, such as autumn olive, Canada thistle, and mugwort.

SPECIAL CIRCUMSTANCES - SECOND GROWING SEASON

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

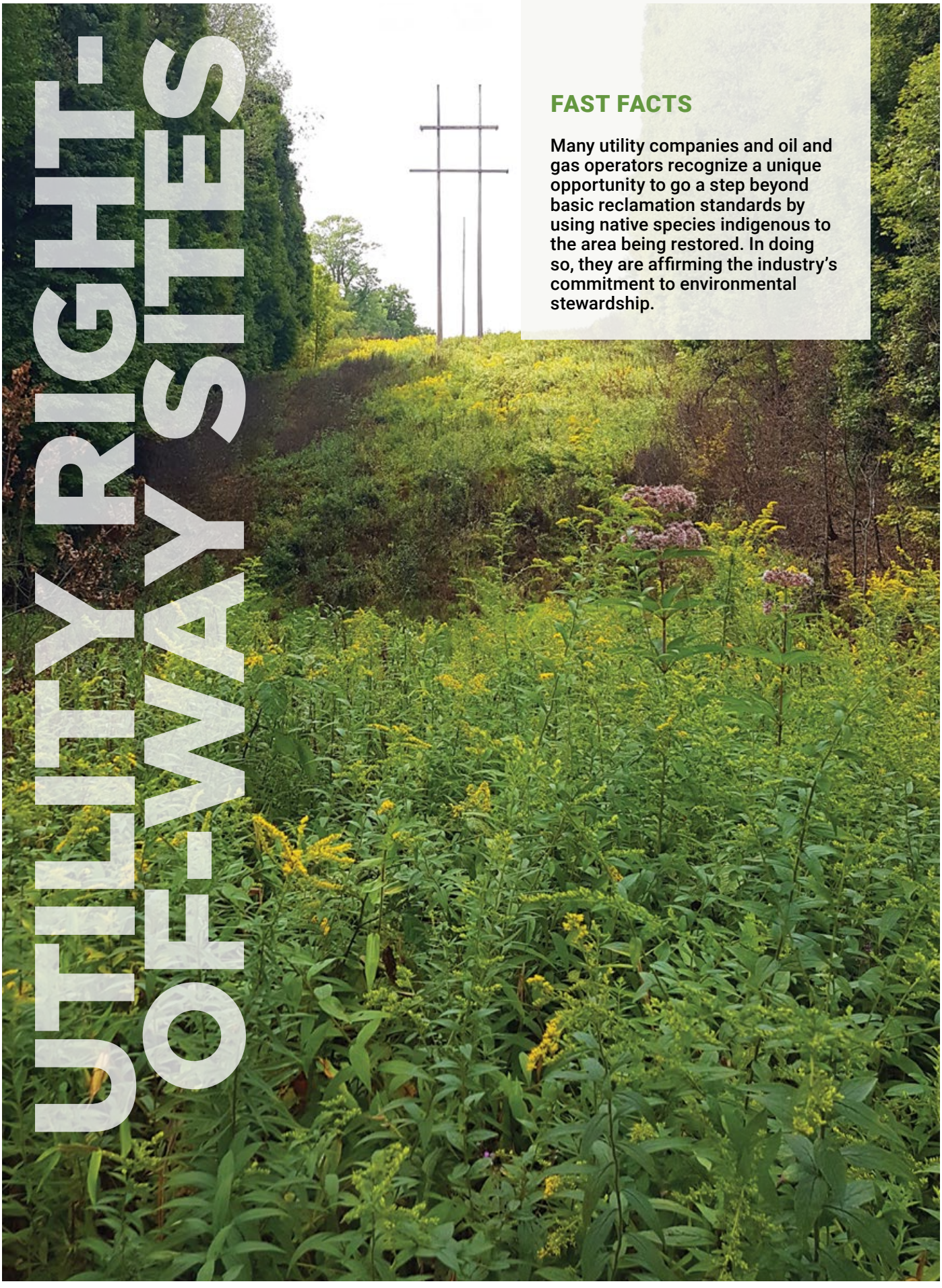
A steep slope and retaining wall utilizing ERNMX-181 Native Steep Slope Mix with Annual Ryegrass at the Millcreek Square in Lancaster, Pennsylvania.

Seedlings from a steep slope mix poking through an erosion control blanket.

DISTURBED SITES & STEEP SLOPES SEED MIXES	
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**

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. See "Disclaimer," p. 15. For "Expectations of Native Species," see p. 12.

UTILITY RIGHT-OF-WAY SITES



FAST FACTS

Many utility companies and oil and gas operators recognize a unique opportunity to go a step beyond basic reclamation standards by using native species indigenous to the area being restored. In doing so, they are affirming 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.

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

We can design a biodiverse native seed mix to mitigate the environmental impact and aid in ensuring regulatory compliance. We routinely work with landscape architects, environmental departments, consulting engineers, and contractors seeding a project.

For Upland Meadow Sites Establishment Guide, see p. 23;
Disturbed Sites & Steep Slopes Establishment Guide, see p. 36;
Wetland Sites Establishment Guide, see p. 42;
Riparian Sites Establishment Guide, see p. 33.

This former well pad is bringing ecological value back to the landscape.

A pipeline seeded with a mix of native grasses, forbs, and legumes.

WET MEADOW & WETLAND SITES

FAST FACTS

Wet Meadow & Wetland Sites have soils made up of clay and high organic matter with high water tables or impervious layers that prevent drainage. These sites are wet most of the time. Wet Meadow Examples: Roadside ditches, retention basins that catch run-off water, pond areas, or wetland edges. Wetland Examples: Newly created wetlands and wetland restoration sites, retention basins with wetland functions, floodplains, pond edges, open water, or wet bioremediation sites.

SITE PREPARATION

Eradicate existing 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 such undesirable vegetation. CAUTION: Some persistent species, such as purple loosestrife, phragmites, Japanese knotweed, or reed canarygrass, may require multiple applications of glyphosate or triclopyr. Perennial weeds not addressed before establishment will be more difficult to remove later. These sites are 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; has wet or saturated soil, standing water, or a high water table; generally populated with wetland and wet meadow species.

FERTILITY

Due to the potential for water contamination, fertilizer is not recommended; however, when topsoil has been depleted or removed, we recommend the addition of organic matter (compost). Adjust soil pH as needed, or 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 where there is standing water 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.

Wetlands are massive nutrient filters that help clean our nation's water supply and protect rivers and oceans from pollution.

GROWING SEASON MAINTENANCE

FIRST GROWING SEASON

When feasible (the ground isn't too slippery or mucky to safely walk), post-planting maintenance will provide the best results for wet meadows and wetlands. Whenever canopy height (overall vegetation) reaches 18"-24", trim the meadow to 8" using a string trimmer. Trimming reduces competition by fast-growing weeds for sunlight and nutrients needed by slower growing perennial natives. Trimming 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 SEASONS

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

Pickerelweed *(Pontederia cordata)* is a native wetland plant that provides food for aquatic wildlife.

ERNMX-131 OBL Wetland Mix

WET MEADOW & WETLAND SITES SEED MIXES	
ERNMX-120	OBL-FACW Perennial Food & Cover Wetland Mix
ERNMX-122	FACW Wetland 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

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. See "Disclaimer," p. 15. For "Expectations of Native Species," see p. 12.

PARTIALLY SHADED SITES

FAST FACTS

Partially Shaded Sites are characterized as having a relative lack of direct sunlight, typically caused by trees and shrubs that reduce their exposure. Examples: Woodland openings and sites associated with bioengineering installations.

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 removed or broken up 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 take place immediately after installation. If installation cannot take place 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 emerging herbaceous species. Note: For understory of longleaf pine plantings, high biomass producing species, such as switchgrass, big bluestem, and indiangrass, should be avoided. Fire can be too hot for longleaf pine seedlings or trees when these species are burned.

FERTILITY

The addition of organic matter (compost) is most important. Check soil pH and adjust with lime as needed, or 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 may be used when sufficient room exists for operation.

Showy Ticktrefoil *(Desmodium canadense)* in a field.

GROWING SEASON MAINTENANCE

FIRST GROWING SEASON

Whenever canopy height (overall vegetation) reaches 18”-24”, trim the meadow to 8” using a brush hog mower or string trimmer. Trimming reduces competition by fast-growing weeds for sunlight, water, and nutrients needed by slower growing perennial natives. A lawn mower is not recommended as the mower height will be too low and native seedlings will be killed.

If bioengineering materials were used on the site, mowing should be above the new growth of these materials. Trimming should cease by mid-September.

Problem weeds should be hand pulled or spot sprayed with an approved herbicide, such as Roundup®, Rodeo®, Garlon®, Garlon® 3A, Sonora™, or Milestone®. Be vigilant in controlling vines or thorny plants if they were not part of the mix. These are more easily pulled early than after they have had two to three months of growth. Examples include bindweed, blackberry, multiflora rose, mile-a-minute, and Japanese hops. Be equally vigilant in the control of other invasive species, such as autumn olive, Canada thistle, and mugwort.

SECOND & SUBSEQUENT GROWING SEASONS

Prior to new spring growth reaching 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, stimulating emergence and growth of herbaceous native plants and reducing invasion of woody undergrowth. 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. Be vigilant in controlling vines or thorny plants if they were not part of the mix. These are more easily pulled early than after they have had two to three months of growth. Examples include bindweed, blackberry, multiflora rose, mile-a-minute, and Japanese hops. Be equally vigilant in the control of other invasive species, such as autumn olive, Canada thistle, and mugwort.

Woodland openings can be developed to provide crucial early successional habitat between old growth forests and adjoining grasslands.

SPECIAL CIRCUMSTANCES

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

Blunt Broom Sedge *(Carex scoparia)* provides food and cover for songbirds, ruffed grouse, and ducks.

Indianhemp *(Apocynum cannabinum)* is attractive to butterflies and songbirds.

Partridge Pea *(Chamaecrista fasciculata)* is found along wooded edges and provides great pollinator value in late summer and early fall.

PARTIALLY SHADED SITES SEED MIXES

ERNMX-132	**Right-of-Way Non-Native Woods Mix**
ERNMX-132-1	**Right-of-Way Native 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. See "Disclaimer," p. 15. For "Expectations of Native Species," see p. 12.

STORMWATER MANAGEMENT SITES

FAST FACTS

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 mimicking the natural rate of runoff or groundwater recharge.

ABOUT STORMWATER MANAGEMENT SITES

Stormwater management sites (e.g., 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 to vegetate stormwater management sites. Erosion control fabric, mulch, or hydromulch is necessary to control erosion during and after construction.

Examples: Detention basins - temporarily impound run-off water, allowing for release at controlled rates; retention basins - stormwater management facilities with permanent impoundment or pool for improving water quality; 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 may be selected that meet critical objectives and extreme conditions of the site. 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.

To avoid stand failure, select a seed mix appropriate for the site's hydrology (moisture status). 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.

Stormwater basin utilizing ERNMX-126 Retention Basin Floor Mix - Low Maintenance.

Stormwater basin utilizing ERNMX-127 Retention Basin Wildlife Mix

An urban rain garden catch basin utilizing ERNMX-180 Rain Garden Mix.

SITE PREPARATION

Prior to planting the site, invasive species, particularly those adapted to wet conditions, should be removed or sprayed using an approved herbicide by a licensed spray technician. 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 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 (easy to crumble), high in organic matter, and completed without compaction by heavy equipment. An excavator may be used to dig and drop each area of the bottom soil in a loose manner. Lime or compost can then be incorporated. The excavation machine does not move over the finished surface thereby avoiding unnecessary compaction. Native vegetation can be planted or seeded over this uneven absorbent surface.

SEEDING AND PLANTING METHODS

Seeding and planting should begin immediately upon completion of the structure while the soil is still friable and before weeds emerge. Plan seeding and planting before the basin is flooded or allow the basin to drain 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). If broadcasting seed, see Seeding Methods on p. 19. If the soil is dry, incorporate the seed into the soil with a garden rake. Oats, Japanese millet, or rye can provide temporary vegetation to protect the soil until permanent vegetation is established. Using such native species as *Elymus virginicus* (Virginia Wildrye) can create an intermediate cover that is succeeded by 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 to allow sunlight to reach the ground. If the site is a retention basin, refer to the Wet Meadow & Wetland Sites Establishment Guide, p. 42.

Transplanted seedlings and shrubs may need to be watered until they become well-rooted. Irrigating seeded areas is beneficial until seedlings become established.

GROWING SEASON MAINTENANCE

FIRST GROWING SEASON

Whenever canopy height (overall vegetation) reaches 18”-24”, use a brush hog mower or string trimmer to trim the meadow to 8”. Trimming reduces competition by fast-growing weeds for sunlight, water, and nutrients needed by slower growing perennial natives. A lawn mower is not recommended as the mower height will be too low and native seedlings will be killed.

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 with an approved herbicide, such as Rodeo®, Garlon® 3A, or Milestone® (do not use Milestone® where standing water is present). Be vigilant about controlling vines or thorny plants if they were not part of the mix. These are more easily pulled early than after they have had two to three months of growth. Examples include bindweed, blackberry, multiflora rose, mile-a-minute, and Japanese hops. Be equally vigilant in the control of other invasive species, such as autumn olive and Japanese knotweed.

SECOND & SUBSEQUENT GROWING SEASONS

Prior to new spring growth reaching 2” (e.g., shortly after forsythia or redbud blooms), trim any material standing from the previous year close to the ground (approximately 2”). If the seed mix included sedges, trimming should be no lower than 2” above the crowns that produced the prior year’s growth. This will allow the soil to warm more quickly, stimulating emergence and growth of native plants and reducing the likelihood of shrub invasion.

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 with an approved herbicide, such as Rodeo®, Garlon® 3A, or Milestone®. Be vigilant about controlling vines or thorny plants if they were not part of the mix. These are more easily pulled early than after two to three months of growth. Examples include bindweed, blackberry, multiflora rose, mile-a-minute, and Japanese hops. Be equally vigilant in the control of other invasive species, such as autumn olive and Japanese knotweed.

SPECIAL CIRCUMSTANCES - SECOND GROWING SEASON

If there is a heavy infestation of ragweed or foxtail in the second growing season, trim the meadow to 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 should be removed as needed. The site should be reseeded after silt removal. Close mowing throughout the growing season or extensive chemical use is not conducive to water quality improvement and wildlife habitat.

STORMWATER MANAGEMENT SITES SEED MIXES	
ERNMX-126	Retention Basin Floor Mix - Low Maintenance
ERNMX-127	Retention Basin Wildlife Mix
ERNMX-128	Seasonally Flooded Wildlife Food 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. See “Disclaimer,” p. 15. For “Expectations of Native Species,” see p. 12.

SOUTHEASTERN U.S. SITES

FAST FACTS

Southeastern U.S. sites include regions within Alabama, the Carolinas, southern Virginia, Georgia, Mississippi, 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.

A Florida meadow

SITE PREPARATION

If the site was previously a lawn or crop field to which herbicides were applied, it is important to allow the appropriate time interval for the herbicide residues to break down prior to planting. Some herbicide residues can prevent seedlings from germinating.

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. While any of these methods may control existing weeds, they will not kill all weed seeds lying dormant in the soil. Seeds of such species as velvetleaf and pokeweed may germinate many decades after the species last flowered on the site.

When using the tillage strategy, a site is disc harrowed every two weeks for one to two months. The underlying principle 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 some dormant weed seeds that will be killed with subsequent tillage. Planting should not take place 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 strategy should be utilized during a growing season when the intent is to fall plant the same year or spring plant the following year.

Use of an approved herbicide, such as glyphosate (Roundup® or Rodeo®), by a licensed spray technician is the most common and least time-intensive method for the control of existing vegetation. Since herbicides are most effective on actively growing plant tissues, they are very effective on new growth in the spring. Spraying should begin when growth reaches 6". A follow-up spray application one to two weeks later will address skips or persistent species. If substantial plant tissue remains 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 prevent reinfestation of some weed species, use of an appropriate selective herbicide in conjunction with a seed mix tolerant of that herbicide may be necessary.

SANDY SOILS

Sandy soils behave differently under cultivation than those containing clay. 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 been proven effective in the Southeast. High sand content in these soils 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/her 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 5.5.

CLAY-RICH SOILS

Without topsoil, soils containing high clay levels can be as hard as brick and pose a formidable challenge for 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. They are often iron-rich, leading to a distinctive red color. To prevent the clay from hardening after a rain from which seedlings cannot emerge, increase soil organic matter by incorporating 1”-2” of well-decomposed organic matter or compost and working it 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 and carry the seed away with it. These initial preparations are critical for 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 planting method. Even with additional 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 temperatures are 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 soil pH and adjust with lime, as needed, to achieve a pH of at least 5.5.

SEEDING METHOD

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

Spiked Wild Indigo *(Baptisia albescens)* in a South Carolina pine flatwoods.

Quail-friendly planting featuring Partridge Pea *(Chamaecrista fasciculata)*, Beaked Panicgrass *(Panicum anceps)*, Blackeyed Susan *(Rudbeckia hirta)*, and Little Bluestem *(Schizachyrium scoparium)*.

GROWING SEASON MAINTENANCE

MAINTENANCE

Refer to Upland & Meadow Sites maintenance, p. 23.

When spot spraying in soils with low organic matter and high sand levels, begin with lower than recommended concentrations of herbicides for weed control to avoid valuable crop burnout. 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.

SOUTHEASTERN U.S. SITES SEED MIXES	
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. See "Disclaimer," p. 15. For "Expectations of Native Species," see p. 12.

OBSTACLES TO SUCCESSFUL MEADOW ESTABLISHMENT

FAST FACTS

For more than 20 years, we have had the opportunity to visit sites or see photographic evidence of many native meadows that failed to establish successfully. As a result, we have found some repetitive themes relating to these failures - site conditions, weeds, excessive cover crop seeding rates, or use of an inappropriate cover or companion crop.

Stand failure in central Pennsylvania caused by excess application of Annual Ryegrass *(Lolium multiflorum)*.

OBSTACLES TO A SUCCESSFUL ESTABLISHMENT

POOR SITE CONDITIONS

- Poor pre-plant weed control: Native species require bare ground to germinate and grow and will 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. Microorganisms that decompose mulch or compost consume nitrogen, a nutrient essential to plant growth. This results in a nitrogen-deficient environment in which a seedling will grow poorly or not at all. If using compost, be certain it has decomposed to where the parent material is unrecognizable.
- Soil compaction: If the tip of a crowbar or piece of rebar cannot be pressed 3" deep into the soil, there is compaction which will result in 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 6" deep.
- Herbicide residues, including pre-emergent herbicides, from the previous year: Generally, occurs on sites that were previously lawns with a lawn service contract for weed control within 12 months of planting. Also problematic is when the site was a crop field to which herbicides, such as Atrazine (atrazine), Princep® (simazine), Milestone® (aminopyralid), Sonora™ (clopyralid), Resolve® Q (rimsulfuron), Cimarron® (metsulfuron methyl), or Synchrony® XP (chlorimuron ethyl), were applied within 12 months of planting.

Stand failure caused by soil compaction at a landfill in northwestern Pennsylvania.

- Excessively high or low soil pH: For many plant species native to eastern North America, availability of many nutrients essential to plant growth is limited in soils with pH less than 4.5 or greater than 7.5. Ideal pH is 5.5-7.0. When pH is outside this range, species tolerant of the site's pH should be chosen (pH can be raised with lime or lowered with sulfur).

Canada thistle in a wetland restoration site.

- Drought within two to six weeks after planting: Seeds cannot germinate without water and seedlings do not grow/survive without water. In drought-prone areas, we recommend planting between late October or when soil temperatures are less than 55ºF (13°C) at 3" deep and in spring when forsythia or redbud bloom.
- Erosion (on steep slopes): Failure to use erosion control blankets or toe them in at the top of the slope. Erosion is also a problem on slopes where final tracking of the soil was not 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, Japanese hops, kudzu, or invasive shrub species not controlled prior to planting or volunteered from dormant seed when the soil was prepared for planting. These species can smother desirable but slower growing perennial natives.
- Use of borrowed topsoil infested with seeds of invasive species.

- Wildlife: Geese can eat seeds, seedlings, and mature plants while deer can be devastating to some wildflowers. If up to five deer are regularly observed in the area, it may be wise to plant a deer-resistant mix. If the deer population is sufficient to make growing a garden or fruit trees difficult, it may be impossible to grow wildflowers on the site. The same is true if a deer population of 20 or more is regularly observed in the area.
- Lack of proper maintenance: Letting annual ryegrass cover crop or weeds, such as foxtail or ragweed, smother native seedlings during the first full growing season. Avoid this by trimming the meadow to 8" whenever growth exceeds 18"-24".
- Failure to control invasive or problem species prior to planting or after germination: If there are vines or spiny plants in the landscape that were not planted, be vigilant in controlling them.

APPLICATION OF A COVER CROP AT AN EXCESSIVE RATE

Issues with an excessive rate of cover crop have generally been confined to the use of annual ryegrass. Excessive annual ryegrass applied to sites planted with native species smothers growth of the native meadow. We have not had complaints when annual ryegrass was used at 10-12 lb per acre.

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. Bahiagrass or bermudagrass as a cover crop 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 already present on the site, control these species by spot spraying with Roundup® (glyphosate).

If a legume is desired in a meadow mix, we recommend such native legumes as *Baptisia alba* (White Wild Indigo), *Baptisia albescens* (Spiked Wild Indigo), *Baptisia australis* (Blue False Indigo), *Baptisia tinctoria* (Yellow 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 Senna), and *Senna marilandica* (Maryland Senna).

An abundance of Canada geese can decimate seeds and seedlings.

Green foxtail smothered native seedlings during the first full growing season of this planting.

Japanese hops can quickly overtake a native planting if not controlled early.

WHAT IS THE APPROPRIATE COVER CROP FOR A MEADOW?

We recommend the following cover crops and seeding rates:

- **Grain Oats:** 30 lb per acre; planted January through July (areas north of the Mason-Dixon Line), January through April (areas south of the Mason-Dixon Line).
- **Grain Rye:** 30 lb per acre; planted August through December (areas north of the Mason-Dixon Line), September through December (areas south of the Mason-Dixon Line), and September through April (moist sites).
- **Annual Rye:** 10-12 lb per acre; planted year-round (dry sites).
- **Brown Top Millet:** 10 lb per acre; planted May through August (dry sites south of the Mason-Dixon Line).
- **Japanese Millet:** 10 lb per acre; planted May through August (wet sites).

These seeding rates are based on our experience with native meadows as well as 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 seedings when there is a need. Grain cover crops can reduce competition from aggressive weeds because they grow quickly and reduce the potential for erosion by providing quick cover. We generally do not recommend annual ryegrass as it is too aggressive and volunteer seedlings can be persistent. When using annual ryegrass with native species, do not exceed 12 lb per acre.

PROBLEM WEEDS FOR UPLAND MEADOWS

In much of our market area, crabgrass, giant foxtail, green foxtail, and ragweed can smother a meadow in the establishment year. If overtaken by these weeds, use a brush hog mower or string trimmer to trim the meadow to 8". Trimming below 4" will kill seedlings of many native species. A lawn mower is not recommended. For more information on weed control, see the Weeds of Meadows QR code on page 25.

Need it fast? Talk to a pro today to see what is in stock and ready to ship!

Ernst Seeds

BIOMASS OVERVIEW

BIOMASS OVERVIEW

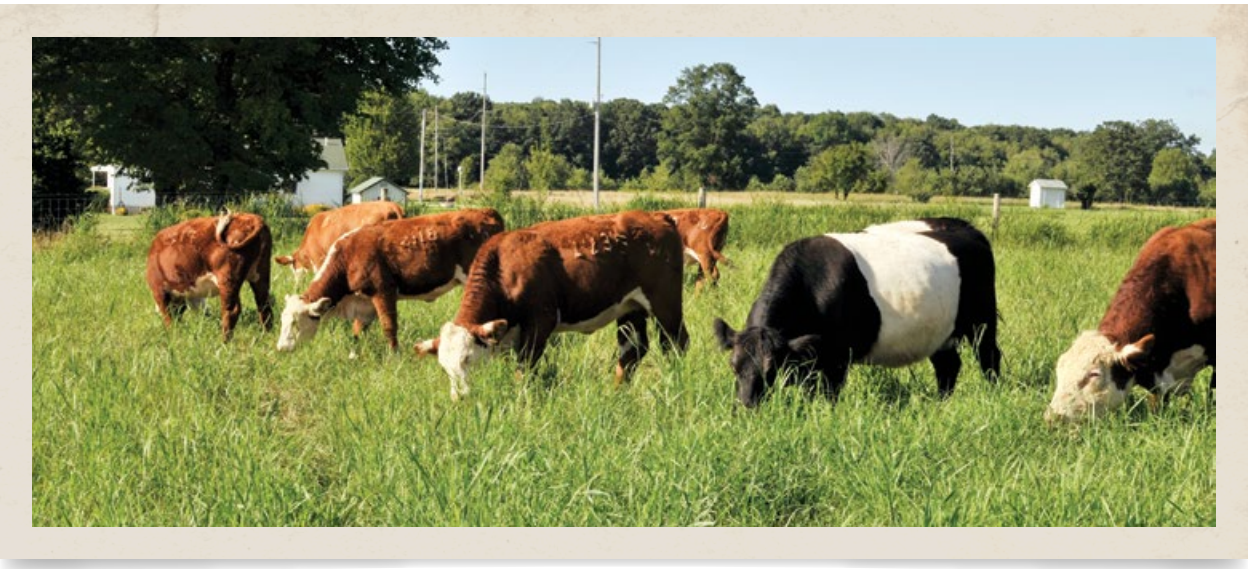
Ernst Seeds is one of the largest switchgrass seed producers in the country, having more than 35 years' experience in the establishment, management, and harvest of native warm season grass seed and biomass. Switchgrass, as well as other native warm season grasses, has attracted much attention as a potential source of alternative energy and sustainable fiber due to the following:

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

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

A mix of switchgrass varieties adapted to your area can better acclimate to seasonal variation and soil conditions than a single variety. Diverse genetic material will allow the overall stand to thrive in a wider range of moistures, soil types, disease pressures, and weather.

Commonly, mixes that include other native grasses, such as *Andropogon gerardii* (Big Bluestem), *Sorghastrum nutans* (Indiangrass), *Schizachyrium scoparium* (Little Bluestem), *Panicum amarum* (Coastal Panicgrass), and *Spartina spp.* (Cordgrass spp.), may create a biomass product that will satisfy many conservation program requirements while also being able to be marketed.



Switchgrass makes a highly effective livestock forage and is increasingly used as a stand-alone grazing stock and in diverse native grazing seed mixes.

SELECTING THE RIGHT BIOMASS VARIETIES

Our supply of switchgrass seed comes from various sources, including our licensing of the varieties produced by intensive breeding programs at numerous institutions and 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 for erosion control, wildlife plantings, and in the Conservation Reserve Program (CRP). The new varieties, including 'Mt. Airy', 'BoMaster', 'Timber', 'Liberty', 'Independence', 'Shawnee', and RC Chippewa, have significant yield improvements and were bred with a focus on forage and biomass production.

FORAGE

As with several other native warm season grasses, switchgrass can produce high-quality forage. Used in a system of rotational grazing, switchgrass allows for robust growth during hot summer months. University of Tennessee findings suggest that the crude protein of this forage can be as high as 16%-17%.

Ground switchgrass straw has been used as a forage extender in livestock feeds in that it works to increase bulk and dilute protein in operations with sources of high-protein feed.

NUTRIENT RUN-OFF PREVENTION

Switchgrass has extensive roots, growing as deep as 5'-6'. In addition to serving as a superior soil stabilizer in erosion control, switchgrass and its root system form a tremendous ecological filter, soaking up such nutrients as nitrogen and sequestering carbon dioxide. One of the best methods for protecting streams from sedimentation and nutrient runoff from agricultural activity is the planting of switchgrass buffers.

Calvin Ernst with a mature stand of Switchgrass *(Panicum virgatum)*.

As a riparian buffer, the extensive root system and nutrient-filtering qualities of switchgrass make it a powerful option.

POULTRY AND DAIRY BEDDING

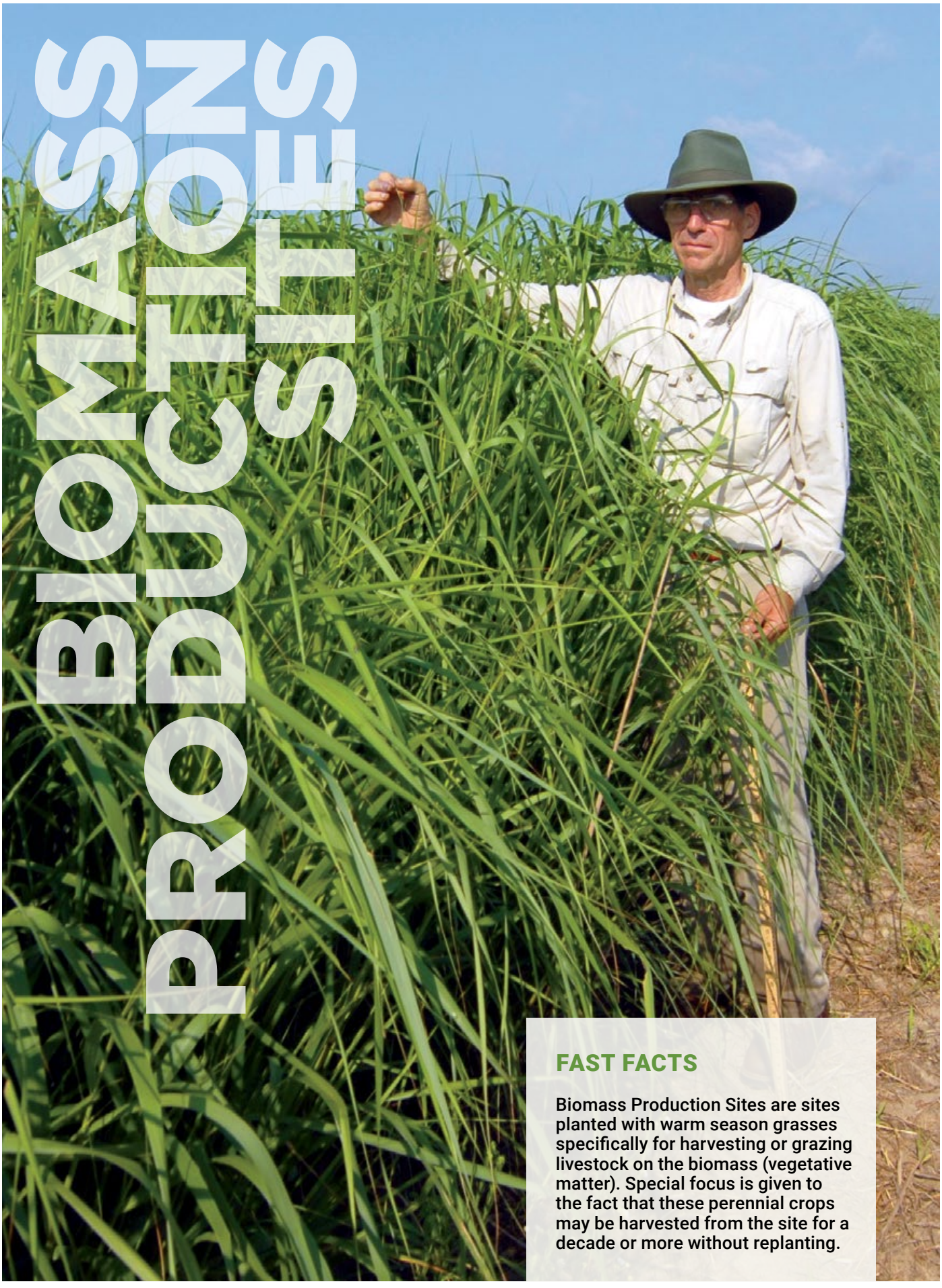
Numerous studies have shown ground switchgrass to be easy on the pads of chicken feet, highly absorbent, and may represent a benefit over other beddings in the reduction of ammonia. From a cost perspective, producers can grow switchgrass on their own marginal land, then harvest and process it for their own bedding uses. In addition to helping to control noise and water pollution, switchgrass can aid in making areas of marginal ground productive by supplying sustainable bedding.

Chick nestled in ground Switchgrass bedding.

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

For information on preparing a field for the establishment and production of native biomass, please visit the following pages. For more information, please consult the Native Biomass FAQs at www.ernstseed.com.

BIOMASS PRODUCTION SITES



FAST FACTS

Biomass Production Sites are sites planted with warm season grasses specifically for harvesting or grazing livestock on the biomass (vegetative matter). Special focus is given to the fact that these perennial crops may be harvested from the site for a decade or more without replanting.

ADAPTING A FIELD FOR BIOMASS PRODUCTION

Every field has unique characteristics to 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.

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

Switchgrass can tolerate 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. Soil tests are required to determine soil fertility levels. Fertility levels referred to as moderate are generally adequate for biomass production. Fertilizer is not recommended for soils with moderate fertility levels. Adding nitrogen in the second and subsequent years is recommended based on expected yields.

Switchgrass grows through corn stubble, reducing its need for weed control.

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

No till or minimum till are the most effective means of seeding new warm season grasses. A limiting factor 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.

Tilling a field going to warm season grasses corrects surface roughness and incorporates crop residue before planting. The field surface 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 prior to planting. Mowing or burning existing vegetation will produce new vegetative growth. Roundup® and a systemic broadleaf herbicide can then be sprayed to effectively kill undesirable species. Identify weeds present and use label rates to control weeds with one or more applications. Once controlled, seeding like a conventional hayfield may proceed.

Planting switchgrass in rows makes it easier to identify the plant in emerging stands.

A prescribed burn of existing vegetation prior to establishment of warm season grasses.

Application of Roundup® and systemic broadleaf herbicides is an important step in controlling weeds.

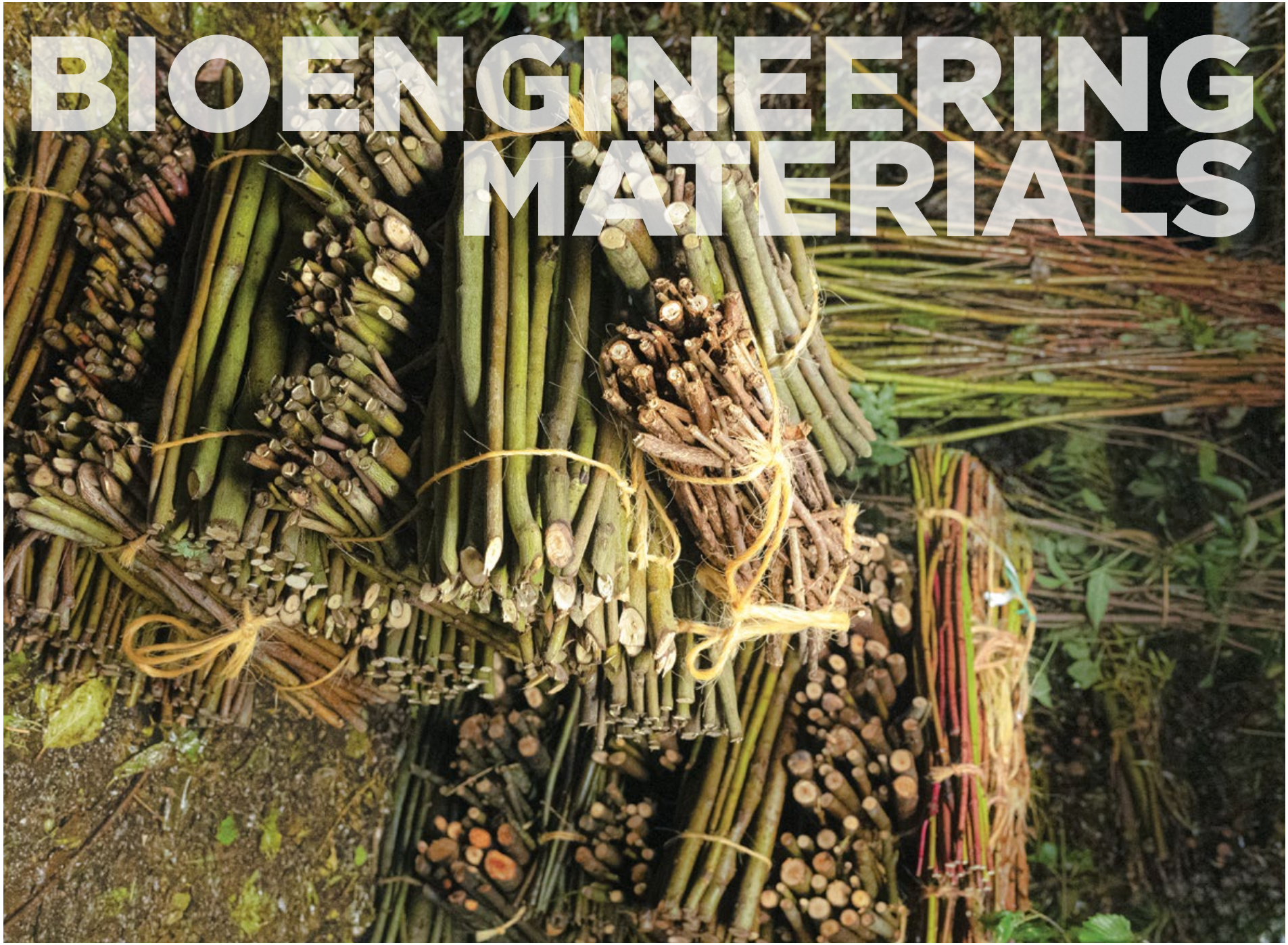
NATIVE SEEDLING GALLERY

Identify native seedlings with this photo guide.

Seedling images of easily recognized species in our:

- **Upland Meadow Mixes**
- **Riparian Meadow Mixes**
- **Wetland Mixes**

BIOENGINEERING MATERIALS



BIOENGINEERING MATERIALS

SOIL BIOENGINEERING

Soil bioengineering is the term for using 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 several 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.

Live stakes installed and sprouting new growth.

BIOENGINEERING MATERIALS & STREAM RESTORATION TECHNIQUES

Ernst 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.

HELPFUL TIPS FOR A BIOENGINEERING PROJECT

Ernst Conservation Seeds' bioengineering products are dormant live material. Therefore, if installation cannot take place immediately upon arrival at the site, these products must be stored properly. Place in a cool, wet place out of direct sunlight, such as under straw or burlap. Open any pallets, boxes, and plastic bags so the material can be watered thoroughly. Do not allow the material to dry out. Soaking before planting significantly increases survival and growth rate.

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.

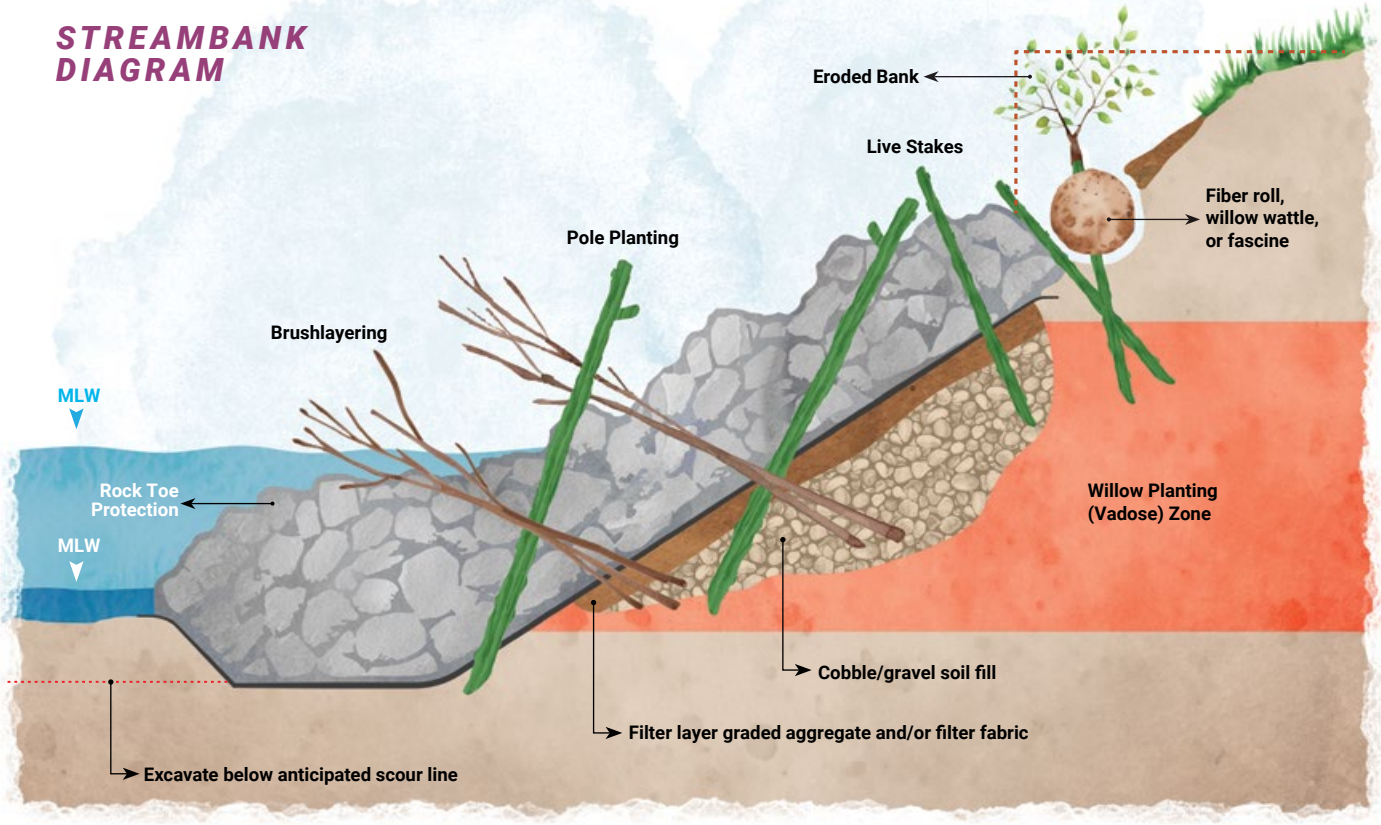
Overseeding and mulching a completed bioengineered project with the appropriate seed mixes protects the soil surface from erosion while adding biodiversity to the site.

EXCELLENT MIXES FOR THIS PURPOSE	
ERNMX-137	Specialized Wetland Mix for Shaded OBL-FACW Areas
ERNMX-138	Wildlife Food & Shelter Mix
ERNMX-178	Riparian Buffer Mix

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

TURNAROUND TIME
Since we custom cut your order, we require at least two-weeks' notice when bioengineering orders are placed.

STREAMBANK DIAGRAM



WE PRODUCE BIOENGINEERING MATERIALS IN THESE FAST-ROOTING SPECIES:

BOTANICAL NAME	COMMON NAME	PLANT TYPE
Cephalanthus occidentalis	Buttonbush	Native Shrub
Cornus amomum	Silky Dogwood	Native Shrub
Cornus sericea	Red Osier Dogwood	Native Shrub
Platanus occidentalis	American Sycamore	Native Tree
Salix amygdaloides	Peachleaf Willow	Native Tree
Salix discolor	Pussy Willow	Native Tree
Salix exigua ssp. interior	Sandbar Willow	Native Shrub
Salix lucida	Shining Willow	Native Shrub
Salix nigra	Black Willow	Native Tree
Salix purpurea	Streamco Willow	Naturalized Shrub
Salix sericea	Silky Willow	Native Shrub
Salix x cottetii	Bankers' Dwarf Willow	Naturalized Shrub
Sambucus canadensis	Elderberry	Native Shrub
Viburnum dentatum	Arrowwood	Native Shrub
Viburnum lentago	Nannyberry	Native Shrub

For more information on the species listed above, refer to Partially Shaded Sites, p. 46.

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.

LIVE STAKES

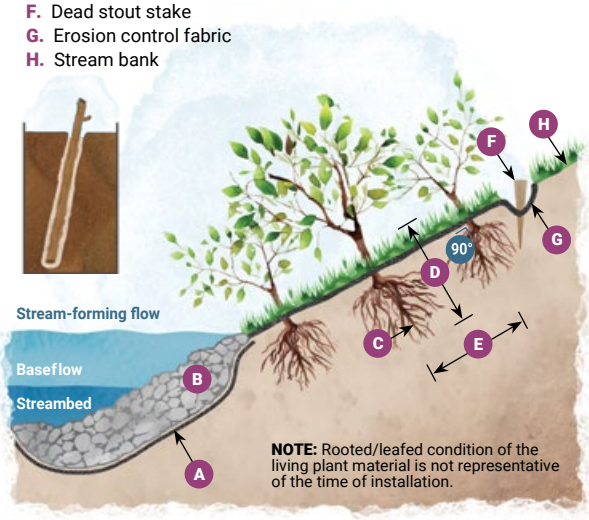
Stakes are dormant, live woody cuttings of a species with the branches trimmed off. Live staking performs an important function in creating a root mat that stabilizes the soil by reinforcing and binding soil particles together. Stake establishment also improves aesthetics and provides a habitat for wildlife. Live stakes may be used on their own to secure other bioengineering materials or as an anchor for erosion control and geo-fabric. Stakes or poles may 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 the material to dry out. Soaking before planting significantly increases survival and growth rate. Drive a pilot hole into firm soil and plant 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 before watering. Irrigation may be necessary if a long dry spell or hot weather is expected following installation.

SIZES: 1/4"-1"diameter; 2'-4' lengths.

CROSS-SECTION DIAGRAM
(not to scale)

A. Geotextile fabric
B. Toe protection
C. Live cutting 1/2" to 1 1/2" dia.
D. 2' to 3'
E. 2' to 3' *(triangular spacing)*
F. Dead stout stake
G. Erosion control fabric
H. Stream bank



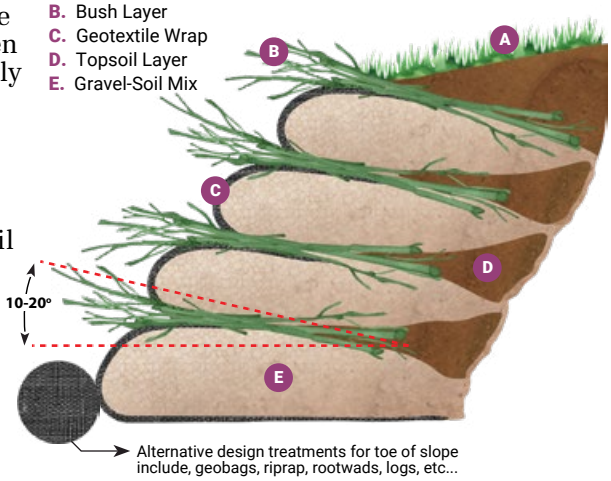
BRUSH (BRANCH) LAYERS

Brush (branch) layers are living branches placed on a terrace along the 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 geo-fabric. Starting at the bottom of the slope, secondary brush (branch) layers may be added every 3'-4' proceeding up the slope. Straw mulching the finished surface is recommended for moisture retention and additional erosion control. Planting should be during the dormant season.

SIZES: 3 linear ft per bundle, 3'-6' lengths, 28-36 branches per bundle.

A. Native Plants
B. Bush Layer
C. Geotextile Wrap
D. Topsoil Layer
E. Gravel-Soil Mix

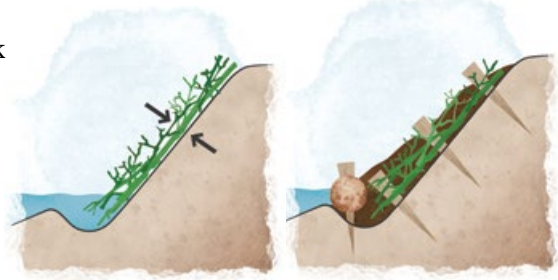


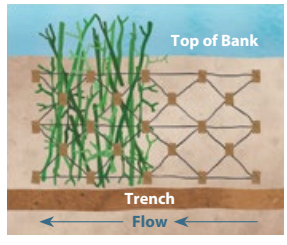
BRUSH MATTRESSES

Brush mattresses are living branches layered 1-2 branches thick in a crisscross pattern on a streambank to form a living ground cover. The mattress formed protects the bank surface until the branches root and native vegetation is 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. Place a thin layer of soil over the entire area to encourage rooting. Irrigation is necessary immediately following installation.

SIZES: 1/4"-3" diameter x random length x 1-2 or 3-4 branches thick.





A 5’ Wattle, ready to ship.

WATTLES/FASCINES

Wattles or 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 that 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 and quickly stabilize the bank.

INSTALLATION NOTES: This technique is simple, effective, and 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 may also be used in conjunction with dead stakes to secure the material. Straw mulching the site following installation retains moisture and reduces surface erosion. Irrigation is necessary after installation if the soil is dry.

SIZES: 5’ or 6’ lengths are recommended for ease of handling; available in the following diameters: 4”-5”, 6”-8”, 9”-12” (custom lengths and diameters are available).

Dead Wedge Stakes

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.

SIZES: 1-1/4” x 3-1/4” x 2-1/2’ long.

LIVE WHIPS

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

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 may 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, consider the 3’ depth; therefore, install a 6’ whip at least 2’ into the moist soil behind the stone and 1’ above the surface of the riprap).

SIZES: 3/8”-1” diameter; 4’-6’ lengths.

SPECIES WE OFFER

FAST FACTS

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 considered to be the most significant foundation of an effective native restoration or reclamation project. To ensure that our customers receive a quality product, all our seeds are harvested, conditioned, and tested under the highest quality standards.

In addition to 10,000 acres of native seed production at Ernst, we also supply seed from some of North America's top producers and collectors.

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

Herbaceous Perennial

Acorus americanus
SWEETFLAG

Native
Rhizomatous species; sometimes misnamed Acorus calamus, an introduced species; provides food and cover for wildlife.

HABITAT: Swamps, shallow pond water, wet meadows.

CHARACTERISTICS:
Height: Up to 5.6 ft.
Shade Tolerance: Full Sun
Drought Tolerance: No
pH: 5.6-7.2
Bloom Period: Spring/Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 70,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Agrostis alba
REDTOP

Naturalized
Rhizomatous sod-forming species; 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.

CHARACTERISTICS:
Height: Up to 4.7 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 4.5-8.0
Bloom Period: Summer

Approx Seeds Per Lb: 4,851,000
Seeding Rate: Up to 25% of a mix; up to 40 lb per acre alone

Herbaceous Perennial

Agrostis hyemalis
WINTER BENTGRASS

Native
Bunchgrass; good for partially drained soils on moderately shaded roadsides; provides winter grazing for wildlife.

HABITAT: Roadsides, meadows, fields, moist to dry open, sterile soils.

CHARACTERISTICS:
Height: Up to 2.5 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 5.0-7.5
Bloom Period: Spring/Fall

Approx Seeds Per Lb: 8,500,000
Seeding Rate: Up to 30 lb per acre alone; up to 2.4 lb per acre in a steep slope mix

Herbaceous Perennial

Agrostis perennans
AUTUMN BENTGRASS

Native
Rhizomatous species; adapted to mesic to dry areas, including steep slopes and forests with dappled to full sun; provides winter grazing for wildlife.

HABITAT: Dry open ground, areas in light shade.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 5.5-7.5
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 8,000,000
Seeding Rate: Up to 30 lb per acre alone; up to 2.4 lb per acre in a steep slope mix

Herbaceous Perennial

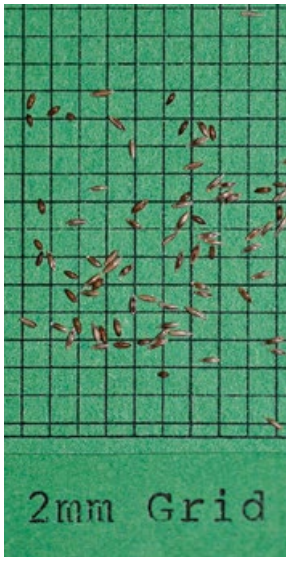
Agrostis stolonifera
CREEPING BENTGRASS

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

HABITAT: Wet meadows, shores, wet to dry fields, roadsides.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.1-7.5
Bloom Period: Spring/Fall

Approx Seeds Per Lb: 6,130,000
Seeding Rate: Up to 5% of a fine fescue mix; up to 40 lb per acre alone



Herbaceous Perennial

Agrostis tenuis
COLONIAL BENTGRASS

Naturalized
Rhizomatous species; provides erosion control; naturalized in many areas of the northeastern U.S. where sheep were grazed.

HABITAT: Cultivated in pastures, lawns, dry open ground, along roadsides.

CHARACTERISTICS:
Height: Up to 2.2 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 4.9-7.5
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 6,130,000
Seeding Rate: Up to 5% of a fescue mix; up to 40 lb per acre alone

Alisma subcordatum
MUD PLANTAIN

Native
Grows quickly in early spring; produces seed in the fall; ideal for vernal pools; provides food for pheasants and waterfowl.

HABITAT: Marshes, stream sides, muddy shores, pond margins, shallow water.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: No
Pollinator Value: Low
pH: 5.0-7.0
Bloom Period: Spring/Fall
Flower Color(s): White

Approx Seeds Per Lb: 825,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Allium cernuum
NODDING ONION

Native
Bulb-forming species; ideal ornamental for rock gardens; readily reseeds itself.

HABITAT: Dry rocky slopes, wood borders, rocky banks, prairies; often limestone outcrops.

CHARACTERISTICS:
Height: Up to 2 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): White, Pink

Approx Seeds Per Lb: 123,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Alopecurus arundinaceus
CREEPING FOXTAIL

Naturalized
Rhizomatous species; ideal for pipeline restoration where wildlife is desired; provides seed, forage, and cover for wildlife and domestic animals.

HABITAT: Wet hay meadows, margins of lakes and ponds, waterways.

CHARACTERISTICS:
Height: Up to 3.9 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 5.5-8.4
Bloom Period: Spring

Approx Seeds Per Lb: 786,000
Seeding Rate: Up to 10% of a mix

Herbaceous Perennial

Andropogon gerardii
BIG BLUESTEM

Native
Warm season bunchgrass; used for erosion control in sand and gravel pits, mine spoil, and on roadsides; contributes to diversified biomass production; high quality livestock forage; provides food and cover for wildlife.

HABITAT: Riverbanks, roadsides, meadows, open woods, savannas, tallgrass prairies.

CHARACTERISTICS:
Height: Up to 6 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 6.0-7.5
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 144,000
Seeding Rate: Up to 30% of a mix; up to 10 PLS lb per acre alone

Herbaceous Perennial

Andropogon ternarius
SPLITBEARD BLUESTEM

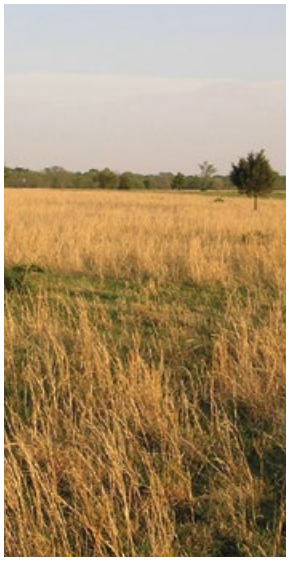
Native
Warm season bunchgrass; white seedheads stand out in upland habitats of the southern half of the U.S.

HABITAT: Pinelands, sandhills, old fields.

CHARACTERISTICS:
Height: Up to 3.9 ft.
Shade Tolerance: Shade
Drought Tolerance: High
pH: 4.0-7.5
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 216,000
Seeding Rate: Up to 10% of a mix; up to 10 PLS lb per acre alone

Herbaceous Perennial



Andropogon virginicus
BROOMSEDGE

Native
Warm season bunchgrass; historically used to make brooms; stiff straw stays erect on road cuts during the winter; provides cover for wildlife.

HABITAT: Pastures, open woods, old fields, hillsides, open ground with dry infertile soils.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 4.9-7.0
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 800,000
Seeding Rate: Up to 2.5% of a mix; up to 10 PLS lb per acre alone

Herbaceous Perennial

Herbaceous Perennial

Anthoxanthum odoratum
SWEET VERNALGRASS

Naturalized
Dense, clump-forming cool season bunchgrass; sweet fragrance of freshly mowed hay when crushed.

HABITAT: Open fields, meadows, roadsides; grows primarily in poor soils.

CHARACTERISTICS:
Height: Up to 2.4 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 738,000
Seeding Rate: Up to 3% of a mix

Herbaceous Perennial

Bouteloua curtipendula
SIDEOATS GRAMA

Native
Fast-emerging warm season bunchgrass; used in 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: Dry woods, dry calcareous clearings, dry prairies, sandhills.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 5.5-8.5
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 159,000
Seeding Rate: Up to 35% of a mix; up to 10 PLS lb per acre alone

Herbaceous Perennial

Bouteloua gracilis
BLUE GRAMA

Native
Fast-emerging warm season bunchgrass; used in dry highway medians, recreation area plantings, and in pure stands for erosion control; provides food for wildlife.

HABITAT: Dry prairies, sandhills.

CHARACTERISTICS:
Height: Up to 1.8 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 6.6-8.4
Bloom Period: Summer

Approx Seeds Per Lb: 724,000
Seeding Rate: Up to 10% of a mix; up to 6 PLS lb per acre alone

Herbaceous Perennial

Herbaceous Perennial

Bromus inermis
SMOOTH BROME

Naturalized
Sod-forming cool season grass; provides food for livestock.

HABITAT: Roadsides; grows best in well-drained fine-textured soils.

CHARACTERISTICS:
Height: Up to 3.4 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 5.5-8.0
Bloom Period: Summer

Approx Seeds Per Lb: 143,000
Seeding Rate: Up to 15% of a mix

Herbaceous Perennial

Calamagrostis canadensis
CANADA BLUEJOINT

Native
Rhizomatous grass; provides food and cover for deer, muskrats, and moose.

HABITAT: Swamps, wet meadows.

CHARACTERISTICS:
Height: Up to 4.6 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 4.5-8.0
Bloom Period: Summer

Approx Seeds Per Lb: 3,837,000
Seeding Rate: Up to 0.5% of a mix; up to 2 PLS lb per acre alone

Herbaceous Perennial

Carex comosa
COSMOS SEDGE

Native
Bunch-type sedge; provides food and cover for wildlife.

HABITAT: Swamps, marshes, swales.

CHARACTERISTICS:
Height: Up to 4 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 4.6-7.5
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 480,000
Seeding Rate: Up to 10% of a mix

Carex crinita
FRINGED SEDGE

Native
Bunch-type sedge; provides food and cover for songbirds, ruffed grouse chicks, ducks, and moose.

HABITAT: Moist to wet woods, thickets, marshes, ditches, streambanks.

CHARACTERISTICS:
Height: Up to 4.8 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 4.0-7.5
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 720,000
Seeding Rate: Up to 10% of a mix

Herbaceous Perennial

Carex intumescens
STAR SEDGE

Native
Bunch-type sedge; provides food and cover for wildlife.

HABITAT: Wet woods, meadows, swamps.

CHARACTERISTICS:
Height: Up to 2.7 ft.
Shade Tolerance: Shade
Drought Tolerance: No
pH: 4.8-6.9
Bloom Period: Spring/Fall

Approx Seeds Per Lb: 25,876
Seeding Rate: Up to 10% of a mix

Herbaceous Perennial

Carex frankii
FRANK'S SEDGE

Native
Very rhizomatous sedge; establishes quickly from seed; provides food for wildlife.

HABITAT: Swamps, wet woods, streambanks, ditches.

CHARACTERISTICS:
Height: Up to 2.6 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
pH: 5.9-7.2
Bloom Period: Spring/Fall

Approx Seeds Per Lb: 500,000
Seeding Rate: Up to 10% of a mix

Herbaceous Perennial

Carex lupulina
HOP SEDGE

Native
Bunch-type sedge; ducks enjoy the large seed grains; provides food and cover for wildlife.

HABITAT: Swamps, wet woods.

CHARACTERISTICS:
Height: Up to 3.9 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 6.2-7.0
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 94,700
Seeding Rate: Up to 15% of a mix

Herbaceous Perennial

Carex grayi
GRAY'S SEDGE

Native
Bunch-type sedge; may be used for ornamental purposes in shaded areas; provides food and cover for wildlife.

HABITAT: Swamps, wet woods.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
pH: 5.7-7.2
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 19,000
Seeding Rate: Up to 10% of a mix

Herbaceous Perennial

Carex lurida
LURID SEDGE

Native
Bunch-type sedge; provides food and cover for songbirds, ruffed grouse chicks, ducks, and moose.

HABITAT: Swamps, bogs, wet meadows, wet woods.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 4.9-6.8
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 250,000
Seeding Rate: Up to 20% of a mix

Herbaceous Perennial

Herbaceous Perennial

Carex pensylvanica
PENNSYLVANIA SEDGE

Native
Alternative stoloniferous sedge; tolerates sandy soils; ideal ground cover in a mature deciduous forest; may need prescribed fire to form a sod.

HABITAT: Open woods, wooded slopes.

CHARACTERISTICS:
Height: Up to 1.5 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 320,000
Seeding Rate: Available as plants only

Herbaceous Perennial

Carex scoparia
BLUNT BROOM SEDGE

Native
Bunch-type sedge; provides food and cover for songbirds, ruffed grouse chicks, ducks, and moose.

HABITAT: Swamps, wet meadows, moist open ground.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Shade
Drought Tolerance: No
pH: 4.6-6.9
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 1,344,000
Seeding Rate: Up to 15% of a mix

Herbaceous Perennial

Carex shortiana
SHORT'S SEDGE

Native
Bunch-type sedge; shortest sedge we grow; discovered by botanist Charles Wilkins Short; provides food and cover for wildlife.

HABITAT: Calcareous wet meadows, rich woods, swamps.

CHARACTERISTICS:
Height: Up to 2.8 ft.
Shade Tolerance: Moderate
Drought Tolerance: No
pH: 4.7-6.9
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 1,000,000
Seeding Rate: Up to 10% of a mix

Herbaceous Perennial

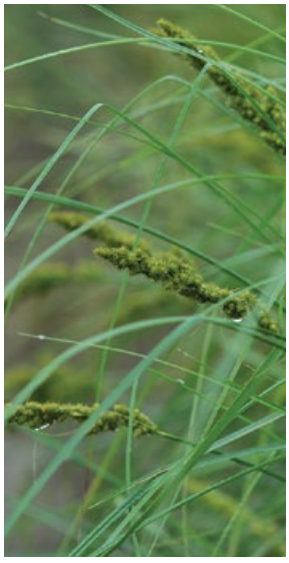
Carex stricta
TUSSOCK SEDGE

Native
Tussock-forming sedge; provides habitat for turtles; source of food and cover for wildlife.

HABITAT: Swamps, streambanks, wet meadows.

CHARACTERISTICS:
Height: Up to 4 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
pH: 3.5-7.0
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 1,800,000
Seeding Rate: Up to 2% of a mix



Herbaceous Perennial

Carex vulpinoidea
FOX SEDGE

Native
Clump-forming bunch-type sedge; often the earliest sedge to establish from seed; provides food and cover for wildlife.

HABITAT: Moist meadows, marshes, ditches.

CHARACTERISTICS:
Height: Up to 3.2 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 6.8-8.9
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 1,297,000
Seeding Rate: Up to 35% of a mix

Herbaceous Perennial

Chasmanthium latifolium
RIVER OATS

Native
Decorative bunchgrass; adds variety and texture to wildflower mixes; great for riparian sites; provides food and cover for wildlife.

HABITAT: Riverbanks, alluvial woods.

CHARACTERISTICS:
Height: Up to 4 ft.
Shade Tolerance: Shade
Drought Tolerance: Moderate
pH: 5.0-7.0
Bloom Period: Spring/Fall

Approx Seeds Per Lb: 90,000
Seeding Rate: Up to 40% of a mix

Cinna arundinacea
WOOD REEDGRASS

Native
Bunch-type grass; excellent cover in forested wetlands; provides forage for wildlife.

HABITAT: Wet woods, swamps.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
pH: 4.0-8.5
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 1,000,000
Seeding Rate: Up to 10% of a mix

Herbaceous Perennial

Dactylis glomerata
ORCHARDGRASS

Naturalized
Cool season bunchgrass with a dense root system; reliable grass for many grazing programs; provides excellent livestock forage.

HABITAT: Open fields, meadows, roadsides with well-drained medium-textured soils.

CHARACTERISTICS:
Height: Up to 4.1 ft.
Shade Tolerance: Shade
Drought Tolerance: Moderate
pH: 5.0-7.5
Bloom Period: Spring/Fall

Approx Seeds Per Lb: 427,000
Seeding Rate: Up to 10 lb per acre alone

Herbaceous Perennial

Cyperus esculentus
CHUFA

Native
Rhizomatous species; tubers are eaten by wildlife that dig them from the soil.

HABITAT: Moist ground of fields, meadows, lawns, gardens.

CHARACTERISTICS:
Height: Up to 2.6 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 5.0-7.0
Bloom Period: Summer/Fall

Seeding Rate: Up to 5 lb per acre in a mix

Herbaceous Perennial

Deschampsia cespitosa
TUFTED HAIRGRASS

Native
Clump-forming grass.

HABITAT: Wet or boggy ground.

CHARACTERISTICS:
Height: Up to 3.5 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
pH: 3.5-7.5
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 1,100,000
Seeding Rate: Up to 1.3% of a mix; up to 0.25 lb per acre in a wildflower mix

Herbaceous Perennial

Herbaceous Annual

Echinochloa muricata
BARNYARDGRASS

Native
Excellent bunchgrass 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:
Height: Up to 4.4 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Summer/Fall

Seeding Rate: Up to 10 lb per acre as a cover crop

Herbaceous Perennial

Elymus canadensis
CANADA WILDRYE

Native
Short-lived cool season bunchgrass; establishes quickly in disturbed areas; used for soil stabilization; provides food and cover for wildlife.

HABITAT: Alluvial thickets, streambanks, meadows; establishes best in well-drained soils.

CHARACTERISTICS:
Height: Up to 3.8 ft.
Shade Tolerance: Shade
Drought Tolerance: Moderate
pH: 5.0-7.9
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 114,000
Seeding Rate: Up to 20% of a mix; up to 10 PLS lb per acre alone

Herbaceous Perennial

Elymus hystrix
BOTTLEBRUSH GRASS

Native
Short-lived cool season bunchgrass; used for soil stabilization; provides food and cover for wildlife.

HABITAT: Dry to mesic forests, woods.

CHARACTERISTICS:
Height: Up to 4.3 ft.
Shade Tolerance: Shade
Drought Tolerance: Unknown
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 75,000
Seeding Rate: Up to 20% of a mix; up to 10 PLS lb per acre alone

Herbaceous Perennial

Elymus riparius
RIVERBANK WILDRYE

Native
Short-lived cool season bunchgrass; used for soil stabilization, often mixed with Virginia Wildrye; provides food and cover for wildlife.

HABITAT: Alluvial flats, meadows, streambanks, wet rich woods.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
pH: 4.5-7.2
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 125,000
Seeding Rate: Up to 20% of a mix; up to 10 PLS lb per acre alone

Herbaceous Perennial

Elymus virginicus
VIRGINIA WILDRYE

Native
Short-lived cool season bunchgrass; used for soil stabilization and revegetation of wetlands, often found with Riverbank Wildrye; provides food and cover for wildlife.

HABITAT: Moist woods, meadows, riverbanks.

CHARACTERISTICS:
Height: Up to 4.2 ft.
Shade Tolerance: Shade
Drought Tolerance: Moderate
pH: 5.0-7.0
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 73,000
Seeding Rate: Up to 20% of a mix; up to 10 PLS lb per acre alone

Herbaceous Perennial

Eragrostis curvula
WEEPING LOVEGRASS

Naturalized
Fast-establishing warm season bunchgrass; grows south of the Mason-Dixon Line; used for soil stabilization on steep slopes.

HABITAT: Sandy roadsides, fields.

CHARACTERISTICS:
Height: Up to 4.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 4.5-8.5
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 1,482,000
Seeding Rate: Up to 5% of a mix; up to 3-5 PLS lb per acre alone

Eragrostis hirsuta
BIGTOP LOVEGRASS

Native
Bunchgrass; attractive addition to upland meadows; early fall color.

HABITAT: Open disturbed habitats, clearings, roadsides, fields, open woods.

CHARACTERISTICS:
Height: Up to 3.6 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Unknown
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 1,000,000
Seeding Rate: Up to 2% of a mix; up to 8 PLS lb per acre alone

Herbaceous Perennial

Eragrostis spectabilis
PURPLE LOVEGRASS

Native
Low-growing, short-rhizomed bunchgrass; grows well in open areas; 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.

CHARACTERISTICS:
Height: Up to 2.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 4.0-7.5
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 1,000,000
Seeding Rate: Up to 2% of a mix; up to 8 PLS lb per acre alone

Herbaceous Perennial

Festuca arundinacea
TALL FESCUE

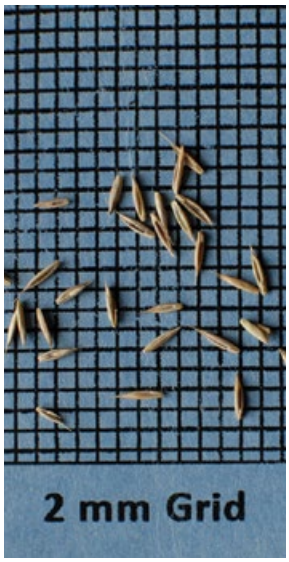
Naturalized
Cool season bunchgrass; used for mine reclamation, stabilizing grassed waterways, slopes, lawns, and recreation areas.

HABITAT: Low fertility acidic, clay, loamy, or sandy soils.

CHARACTERISTICS:
Height: Up to 2.5 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
pH: 5.0-9.0
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 227,000
Seeding Rate: Up to 35% of a mix; up to 300 lb per acre alone

Herbaceous Perennial



Festuca ovina
SHEEP FESCUE

Naturalized
Fine-leaved cool season bunchgrass; adds texture to landscapes; used for reclamation, banks, and pastures.

HABITAT: Open woods, dry fields, roadsides.

CHARACTERISTICS:
Height: Up to 2 ft.
Shade Tolerance: Moderate
Drought Tolerance: High
pH: 5.5-7.5
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 565,000
Seeding Rate: Up to 35% of a mix; up to 25 lb per acre in a wildflower mix; up to 220 lb per acre alone

Herbaceous Perennial

Festuca rubra
CREEPING RED FESCUE

Native
Sod-forming species; used for a no-mow cover and erosion control; provides habitat for wildlife.

HABITAT: Dry woods, roadsides, open ground.

CHARACTERISTICS:
Height: Up to 1 ft.
Shade Tolerance: Shade
Drought Tolerance: Moderate
pH: 5.0-7.5
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 454,000
Seeding Rate: Up to 35% of a mix; up to 220 lb per acre alone

Herbaceous Perennial

Festuca rubra ssp. commutata
CHEWINGS FESCUE

Naturalized
Fine-leaved fescue; used for erosion control on slopes, waterways, and reclamation areas.

HABITAT: Well-drained acidic soils.

CHARACTERISTICS:
Height: Up to 1.2 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 500,000
Seeding Rate: Up to 35% of a mix; up to 220 lb per acre alone

Herbaceous Perennial

Herbaceous Perennial

Glyceria canadensis
RATTLESNAKE GRASS

Native
Cool season bunchgrass; ornamental seedheads resemble a rattlesnake's tail; provides food for waterfowl, muskrats, and deer.

HABITAT: Marshes, swamps, wet woods.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.0-8.5
Bloom Period: Summer

Approx Seeds Per Lb: 1,184,000
Seeding Rate: Up to 2% of a mix; up to 2 lb per acre alone

Herbaceous Perennial

Glyceria grandis
AMERICAN MANNAGRASS

Native
Decorative, wetland cool season bunchgrass; provides food for waterfowl, muskrats, and deer.

HABITAT: Swamps, marshes, wet meadows, shallow water, brooksides.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 659,000
Seeding Rate: Up to 5% of a mix

Herbaceous Perennial

Glyceria striata
FOWL MANNAGRASS

Native
Rhizomatous cool season bunchgrass; stays green through winter; provides food for waterfowl, muskrats, and deer.

HABITAT: Marshes, wet woods, swamps, bogs.

CHARACTERISTICS:
Height: Up to 3.7 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
pH: 4.0-8.0
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 1,540,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Juncus effusus
SOFT RUSH

Native
Bunch-type grass with a wide geographic distribution; provides spawning grounds for bluegills in shallow water; source of food and cover for songbirds and waterfowl.

HABITAT: Swamps, moist fields, floodplains, shores, ditches.

CHARACTERISTICS:
Height: Up to 3.8 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 5.5-8.8
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 45,359,000
Seeding Rate: Up to 3% of a mix

Herbaceous Perennial

Juncus tenuis
PATH RUSH

Native
Bunch-type grass; tolerates foot traffic but not close mowing; used for nest material.

HABITAT: Moist to dry, often heavily compacted, soils of woods, fields, paths.

CHARACTERISTICS:
Height: Up to 2.2 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 4.5-7.0
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 29,000,000
Seeding Rate: Up to 3% of a mix

Herbaceous Perennial

Koeleria macrantha
JUNEGRASS

Native
Cool season bunchgrass; provides good spring forage for livestock and deer; provides food for small mammals and upland game birds.

HABITAT: Open woods, dry soils.

CHARACTERISTICS:
Height: Up to 2 ft.
Shade Tolerance: Shade
Drought Tolerance: High
pH: 6.0-8.0
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 2,315,000
Seeding Rate: Up to 1.5% of a mix

Leersia oryzoides
RICE CUTGRASS

Native
Very rhizomatous warm season grass; 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 habitat for invertebrates.

HABITAT: Marshes, bogs, wet meadows.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.1-8.8
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 498,000
Seeding Rate: Up to 5% of a mix

Herbaceous Perennial

Lolium multiflorum
ANNUAL RYEGRASS

Naturalized
Short-lived cool season bunchgrass; 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.

CHARACTERISTICS:
Height: Up to 2.6 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 5.0-7.9
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 217,000
Seeding Rate: Up to 10% of a mix; of a turf mix; up to 12 lb per acre as a companion crop with natives

Herbaceous Perennial

Onoclea sensibilis
SENSITIVE FERN

Native
Rhizomatous fern; provides shelter for salamanders and frogs.

HABITAT: Marshes, swamps, moist open woods, wet meadows.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Fall

Approx Seeds Per Lb: 6,000,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Panicum amarum
COASTAL PANICGRASS

Native
Warm season bunchgrass; used for the stabilization of coastal dunes, wind erosion control, and reclamation of gravel and mine areas; provides food and cover for wildlife.

HABITAT: Sandy shores, dune grasslands.

CHARACTERISTICS:
Height: Up to 6.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 5.0-7.5
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 325,000
Seeding Rate: Up to 30% of a mix; up to 8 PLS lb per acre alone

Herbaceous Perennial

Panicum anceps
BEAKED PANICGRASS

Native
Bunchgrass; provides food and cover for wildlife; forage is of good value for cattle; seeds are eaten by upland birds.

HABITAT: Moist sandy soils of ditches, fields, savannas, low pinelands.

CHARACTERISTICS:
Height: Up to 3.8 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 225,000
Seeding Rate: Up to 30% of a mix; up to 10 PLS lb per acre alone

Herbaceous Perennial

Panicum clandestinum
DEERTONGUE

Native
Warm season bunchgrass with a fibrous root system; excellent for erosion control and revegetation of acid mine spoil and pipelines through wooded areas; good component of a streambank stabilization mix.

HABITAT: Moist soils of woodland edges and clearings.

CHARACTERISTICS:
Height: Up to 4.2 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 4.0-7.5
Bloom Period: Spring/Fall

Approx Seeds Per Lb: 350,000
Seeding Rate: Up to 3% of a mix; up to 8 PLS lb per acre alone

Herbaceous Perennial

Herbaceous Perennial

Panicum rigidulum
REDTOP PANICGRASS

Native
Bunchgrass; attractive seedheads and red foliage in late summer and early fall; common component of wetlands in the Southeast; palatable for livestock.

HABITAT: Wet soils of marshes, alluvial swamps, ditches, low woods.

CHARACTERISTICS:
Height: Up to 4.2 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.0-7.5
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 797,000
Seeding Rate: Up to 35% of a mix

Herbaceous Perennial

Panicum virgatum
SWITCHGRASS

Native
Rhizomatous warm season bunchgrass; used for biomass, soil stabilization on strip mine spoil and dikes, and in buffer strips for nutrient uptake; provides pasture and hay for cattle and sheep; source of food and cover for wildlife.

HABITAT: Brackish marshes, riverside prairies, open woods, prairies.

CHARACTERISTICS:
Height: Up to 5.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 4.5-8.0
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 259,000
Seeding Rate: Up to 30% of a mix; up to 8 PLS lb per acre alone

Herbaceous Perennial

Peltandra virginica
ARROW ARUM

Native
Bunch-type species; seeds must be stored cold and wet; seed pods containing numerous large seeds that ripen in the fall are a source of food for wood ducks, muskrats, and rails; foliage provides cover for aquatic mammals, wading birds, and waterfowl.

HABITAT: Swamps, stream or lake edges, tidal marshes.

CHARACTERISTICS:
Height: Up to 1.6 ft.
Shade Tolerance: Moderate
Drought Tolerance: No
pH: 5.0-8.8
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 600
Seeding Rate: Up to 0.5 lb per 1,000 sq ft

Herbaceous Perennial

Poa palustris
FOWL BLUEGRASS

Native
Cool season bunchgrass; establishes quickly in wetlands and retention basins; provides food and cover for wildlife.

HABITAT: Wet meadows, damp soils.

CHARACTERISTICS:
Height: Up to 4.5 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 4.9-7.5
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 1,900,000
Seeding Rate: Up to 25% of a mix; up to 10 lb per acre in a wet meadow mix; up to 160 lb per acre alone (lawns)

Herbaceous Perennial

Poa trivialis
ROUGH BLUEGRASS

Naturalized
Cool season bunchgrass; good for use in detention basins; grows well in early spring; provides food and cover for wildlife.

HABITAT: Wet meadows, moist woods, roadsides.

CHARACTERISTICS:
Height: Up to 3.4 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
pH: 4.8-7.5
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 2,500,000
Seeding Rate: Up to 25% of a mix; up to 160 lb per acre alone (lawns)

Herbaceous Perennial

Pontederia cordata
PICKERELWEED

Native
Ornamental wetland bunchgrass; seeds must be stored cold and wet; provides food for wildlife.

HABITAT: Marshes, swampy edges of lakes and streams, along tidal shores.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: No
Pollinator Value: High
pH: 4.9-8.7
Bloom Period: Spring/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 5,000
Seeding Rate: Up to 10 lb per acre

Herbaceous Perennial

Puccinellia distans
ALKALIGRASS

Naturalized
Bunchgrass; used for erosion control and along roadsides where salt runoff is prevalent.

HABITAT: Roadsides, disturbed sites.

CHARACTERISTICS:
Height: Up to 2 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Unknown
Bloom Period: Spring/Fall

Approx Seeds Per Lb: 1,200,000
Seeding Rate: Up to 20% of a mix

Herbaceous Perennial

Schizachyrium scoparium
LITTLE BLUESTEM

Native
Long-lived bunchgrass; dense roots can grow to 8' deep; good for upland meadows where sight lines are important; used for erosion control on droughty sites; provides summer forage for livestock; source of food and cover for wildlife; grows with open exposed surfaces that host ground nesting pollinators.

HABITAT: Old fields, roadsides, riverside prairies, open woods, slopes, meadows.

CHARACTERISTICS:
Height: Up to 4.4 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 5.0-8.4
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 241,000
Seeding Rate: Up to 30% of a mix; up to 10 PLS lb per acre alone

Herbaceous Perennial

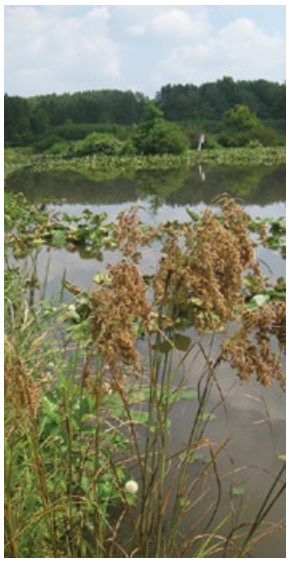
Scirpus atrovirens
GREEN BULRUSH

Native
Bunch-type species; provides cover for wildlife in wet areas.

HABITAT: Moist meadows, marshes, floodplain forests, ditches; tolerates clay and silt soils found in wet areas.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 4.0-8.0
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 11,300,000
Seeding Rate: Up to 1% of a mix



Herbaceous Perennial

Scirpus cyperinus
WOOLGRASS

Native
Bunch-type species; stands tall in marshes; provides food and cover for waterfowl and muskrats.

HABITAT: Moist meadows, marshes, swamps, shores, ditches.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 4.8-7.2
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 36,000,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

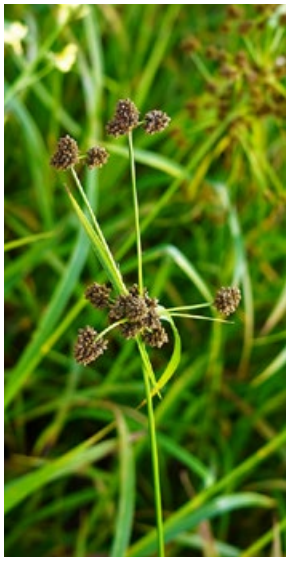
Scirpus expansus
WOOD BULRUSH

Native
Very rhizomatous species; provides cover for wildlife.

HABITAT: Marshes, wet meadows, swamps, swales.

CHARACTERISTICS:
Height: Up to 5.6 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 10,000,000
Seeding Rate: Up to 1% of a mix



Herbaceous Perennial

Scirpus hattorianus
NORTHERN BULRUSH

Native
Clump-forming species.

HABITAT: Swamps, bogs, moist meadows, riverbanks, ditches.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 36,000,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Scirpus pendulus
BROWN BULRUSH

Native
Bunch-type species; used for wildlife habitat.

HABITAT: Wet meadows, marshes, swales, ditches.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Full Sun
Drought Tolerance: No
pH: 4.9-7.0
Bloom Period: Spring

Approx Seeds Per Lb: 30,000,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Scirpus validus
SOFTSTEM BULRUSH

Native
Rhizomatous species; provides spawning grounds for fish in shallow water; source of food for waterfowl and muskrats.

HABITAT: Swamps, wet ditches, mud flats, pond and lake margins.

CHARACTERISTICS:
Height: Up to 8.1 ft.
Shade Tolerance: Full Sun
Drought Tolerance: No
pH: 5.4-7.5
Bloom Period: Summer/Fall
Flower Color(s): Red

Approx Seeds Per Lb: 496,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Sisyrinchium angustifolium
NARROWLEAF BLUE EYED GRASS

Native
Clump-forming species; early season food source for pollinators.

HABITAT: Damp woods, floodplains, grassy places, meadows.

CHARACTERISTICS:
Height: Up to 1.6 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Pollinator Value: Medium
pH: 5.0-7.0
Bloom Period: Spring/Summer
Flower Color(s): Blue

Approx Seeds Per Lb: 757,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Sorghastrum nutans
INDIANGRASS

Native
Attractive warm season bunchgrass; good for erosion control, landscaping, and roadside beautification; provides food and cover for wildlife.

HABITAT: Riverside prairies, moist or dry fields, open woods, roadsides, serpentine barrens; grows best in deep well-drained soils.

CHARACTERISTICS:
Height: Up to 6 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 4.8-8.0
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 175,000
Seeding Rate: Up to 30% of a mix; up to 8 PLS lb per acre alone

Herbaceous Perennial

Sparganium americanum
EASTERN BUR REED

Native
Rhizomatous, emergent aquatic plant; provides food for waterfowl, muskrats, and beavers.

HABITAT: Muddy shores, shallow water rivers, streams, swamps, ponds.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: No
pH: 4.9-7.3
Bloom Period: Spring/Fall
Flower Color(s): Green

Approx Seeds Per Lb: 50,000
Seeding Rate: Up to 20% of a mix

Herbaceous Perennial

Sparganium eurycarpum
GIANT BUR REED

Native
Rhizomatous, emergent aquatic plant; provides food and cover for waterfowl, pheasants, muskrats, and beavers.

HABITAT: Bogs, swamps, lake margins, ditches, swampy meadows.

CHARACTERISTICS:
Height: Up to 4 ft.
Shade Tolerance: Moderate
Drought Tolerance: No
pH: 5.0-8.5
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 1,500
Seeding Rate: Up to 20% of a mix

Spartina pectinata
PRAIRIE CORDGRASS

Native
Aggressive, rhizomatous warm season grass; root system provides erosion control on streambanks; source of cover for waterfowl, songbirds, and small mammals.

HABITAT: Marshes, wet prairies, shores, riverside prairies.

CHARACTERISTICS:
Height: Up to 6.1 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 6.0-8.5
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 639,000
Seeding Rate: Up to 5% of a mix; up to 8 PLS lb per acre alone

Herbaceous Perennial

Sporobolus asper
ROUGH DROPSEED

Native
Warm season bunchgrass; survives in very poor soil conditions with little organic matter.

HABITAT: Dry sandy soils.

CHARACTERISTICS:
Height: Up to 3.9 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 5.5-7.0
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 760,000
Seeding Rate: Up to 5% of a mix

Herbaceous Perennial

Sporobolus cryptandrus
SAND DROPSEED

Native
Early emerging warm season bunchgrass; provides food and cover for wildlife.

HABITAT: Dry sandy soils.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 6.6-8.0
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 5,600,000
Seeding Rate: Up to 0.1% of a mix

Herbaceous Perennial

Sporobolus heterolepis
PRAIRIE DROPSEED

Native
Decorative, fine-textured warm season bunchgrass; may be difficult to germinate; provides food and cover for wildlife.

HABITAT: Dry open ground.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
pH: 6.0-7.2
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 1,200,000
Seeding Rate: Up to 3% of a mix

Herbaceous Perennial

Tradescantia ohiensis
OHIO SPIDERWORT

Native
Attractive clump-forming species; blooms open during the morning hours from spring through summer; flowers close in warm temperatures.

HABITAT: Meadows, prairies, thickets, dry rocky woodlands, floodplain forests.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Spring/Summer
Flower Color(s): Blue, Purple

Approx Seeds Per Lb: 128,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Tradescantia subaspera
ZIGZAG SPIDERWORT

Native
Attractive clump-forming species; flowers close in warm temperatures.

HABITAT: Mesic to dry forests and woodlands.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer
Flower Color(s): Blue, Purple

Approx Seeds Per Lb: 128,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Herbaceous Perennial

Tradescantia virginiana
VIRGINIA SPIDERWORT

Native
Attractive, late spring clump-forming species; more compact than Ohio Spiderwort; flowers close in warm temperatures.

HABITAT: Prairies, mesic to dry upland forests, floodplain forests.

CHARACTERISTICS:
Height: Up to 2.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
Pollinator Value: High
pH: 4.0-8.0
Bloom Period: Spring/Summer
Flower Color(s): Blue, Purple

Approx Seeds Per Lb: 175,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Tridens flavus
PURPLETOP

Native
Warm season bunchgrass; adds late season color to native landscapes; used for soil stabilization; provides food and cover for wildlife.

HABITAT: Meadows, old fields, open woods, roadsides; tolerates low quality roadside and field soils.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 4.5-6.5
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 465,000
Seeding Rate: Up to 15% of a mix; up to 10 PLS lb per acre alone drill seeded; up to 20 PLS lb per acre alone broadcast seeded

Herbaceous Perennial

Tripsacum dactyloides
EASTERN GAMAGRASS

Native
Warm season bunchgrass; plant in the fall as a dormant seeding with germination occurring in the spring; requires great patience as the seeds have high levels of dormancy; outstanding forage producer; provides food and cover for wildlife.

HABITAT: Riverside prairies, meadows, swamps, wet shores, open fields.

CHARACTERISTICS:
Height: Up to 9.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.1-7.5
Bloom Period: Spring/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 7,000
Seeding Rate: Up to 50% of a mix; up to 20 PLS lb per acre alone

Herbaceous Annual

Zizania aquatica
WILDRICE

Native
Bunchgrass; seeds must be kept moist and require 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.

CHARACTERISTICS:
Height: Up to 7.8 ft.
Shade Tolerance: Full Sun
Drought Tolerance: No
pH: 6.4-7.4
Bloom Period: Summer/Fall

Approx Seeds Per Lb: 11,000
Seeding Rate: Up to 10 lb per acre when used with a mix; up to 40 lb per acre alone

Herbaceous Perennial

Achillea millefolium
COMMON YARROW

Native
Species with a long bloom period.

HABITAT: Roadsides, fields, waste areas.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
pH: 6.0-8.0
Bloom Period: Spring/Fall
Flower Color(s): White

Approx Seeds Per Lb: 2,852,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Agastache foeniculum
ANISE (LAVENDER) HYSSOP

Native
Provides food for pollinators.

HABITAT: Dry upland woods and prairies.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
Bloom Period: Summer/Fall
Flower Color(s): Blue

Approx Seeds Per Lb: 1,540,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Agrimonia parviflora
SMALL FLOWERED AGRIMONY

Native
Adds structure and texture to wetlands.

HABITAT: Bogs, moist woods, thickets; tolerates poor soils.

CHARACTERISTICS:
Height: Up to 4.6 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 6.0-8.0
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 288,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Anemone canadensis
CANADIAN ANEMONE

Native
Very attractive rhizomatous species.

HABITAT: Sandy shores, thickets, damp prairies, wet meadows.

CHARACTERISTICS:
Height: Up to 2.3 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 131,660
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Apocynum cannabinum
INDIANHEMP

Native
Spreads by underground roots; used by Native Americans to make rope; may be allelopathic; stem fiber is used by songbirds and orioles to build nests; flowers are attractive to butterflies.

HABITAT: Woods, old fields, sandy flats, limestone bluffs, open ground.

CHARACTERISTICS:
Height: Up to 3.8 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
Pollinator Value: Very High
pH: 4.5-7.0
Bloom Period: Spring/Fall

Approx Seeds Per Lb: 500,000
Seeding Rate: Up to 0.3% of a mix

Herbaceous Perennial

Aquilegia canadensis
EASTERN COLUMBINE

Native
One of the first flowers to bloom in the spring; nectar source for hummingbirds.

HABITAT: Cliffs, rocky slopes, dry woods; usually calcareous.

CHARACTERISTICS:
Height: Up to 3.6 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Pollinator Value: Low
pH: 5.0-8.0
Bloom Period: Spring/Summer
Flower Color(s): Red

Approx Seeds Per Lb: 504,000
Seeding Rate: Up to 1.3% of a mix

Herbaceous Perennial

Asclepias incarnata
SWAMP MILKWEED

Native
Decorative rhizomatous species with a fragrance of bubble gum; essential food source for monarch butterfly caterpillars; we observe more chrysalises on this milkweed species than on any other in our production fields.

HABITAT: Swamps, floodplains, wet meadows.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Full Sun
Drought Tolerance: No
Pollinator Value: Very High
pH: 5.0-8.0
Bloom Period: Summer/Fall
Flower Color(s): Pink

Approx Seeds Per Lb: 153,760
Seeding Rate: Up to 3% of a mix

Herbaceous Perennial

Asclepias syriaca
COMMON MILKWEED

Native
Decorative species with a fragrance resembling a lilac; spreads from underground roots; essential food source for monarch butterfly caterpillars and other beneficial insects.

HABITAT: Fields, open ground, along roadsides.

CHARACTERISTICS:
Height: Up to 6.5 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer
Flower Color(s): Purple

Approx Seeds Per Lb: 70,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Asclepias tuberosa
BUTTERFLY MILKWEED

Native
Showy clump-forming species with tuberous roots; essential food source for monarch butterfly caterpillars.

HABITAT: Dry woods, abandoned fields, roadsides, shale barrens; grows best in well-drained soils.

CHARACTERISTICS:
Height: Up to 2.9 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
Pollinator Value: Very High
pH: 4.8-6.8
Bloom Period: Spring/Fall
Flower Color(s): Orange

Approx Seeds Per Lb: 70,000
Seeding Rate: Up to 2.5% of a mix

Herbaceous Perennial

Aster divaricatus
WHITE WOOD ASTER

Native
Rhizomatous species; widely distributed in wooded areas; provides food and habitat for wildlife.

HABITAT: Dry woods.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 670,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Aster ericoides
WHITE HEATH ASTER

Native
Attractive rhizomatous, late summer to fall blooming species.

HABITAT: Dry open places, meadows, old fields, thickets; grows best in well-drained soils.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 2,256,000
Seeding Rate: Up to 2% of a mix; up to 5 PLS lb per acre alone

Herbaceous Perennial

Aster laevis
SMOOTH BLUE ASTER

Native
Provides attractive late summer color in meadows; sought by deer for browse.

HABITAT: Dry woods, rocky ledges, roadsides.

CHARACTERISTICS:
Height: Up to 3.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: Very High
pH: 5.8-7.8
Bloom Period: Summer/Fall
Flower Color(s): Blue, Purple

Approx Seeds Per Lb: 1,014,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Aster lateriflorus
CALICO ASTER

Native
Attractive clump-forming species; provides food and cover for wildlife.

HABITAT: Dry open places, open woods.

CHARACTERISTICS:
Height: Up to 4.1 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: Very High
pH: 5.2-7.5
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 800,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Aster novae-angliae
NEW ENGLAND ASTER

Native
Brilliant flowers stand out from a distance; provides food and cover for wildlife.

HABITAT: Fields, roadsides, moist meadows.

CHARACTERISTICS:
Height: Up to 6.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 1,100,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Aster lowrieanus
LOWRIE'S BLUE WOOD ASTER

Native
Source of food for pollinators.

HABITAT: Dry to mesic woodlands.

CHARACTERISTICS:
Height: Up to 4.8 ft.
Shade Tolerance: Moderate
Drought Tolerance: No
pH: 5.7-7.5
Bloom Period: Summer/Fall
Flower Color(s): Blue

Approx Seeds Per Lb: 2,000,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Aster oblongifolius
AROMATIC ASTER

Native
Longest blooming of our native asters, lasting up to and sometimes beyond two months; small oblong leaves have a lemony scent.

HABITAT: Dry open places, calcareous hillsides, cliffs, bluffs.

CHARACTERISTICS:
Height: Up to 2.8 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer/Fall
Flower Color(s): Blue, Purple

Approx Seeds Per Lb: 816,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Aster macrophyllus
BIGLEAF ASTER

Native
Showy rhizomatous species; source of color along wooded borders; provides habitat for wildlife.

HABITAT: Woods, rocky slopes, woodland edges; grows best in fertile soils.

CHARACTERISTICS:
Height: Up to 4 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
Pollinator Value: Very High
pH: 4.9-6.9
Bloom Period: Summer/Fall
Flower Color(s): Blue, Purple

Approx Seeds Per Lb: 800,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Aster pilosus
HEATH ASTER

Native
Aggressive rhizomatous species; establishes quickly on disturbed sites and rights-of-way.

HABITAT: Dry fields, open woods, vacant lots, roadsides.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Shade
Drought Tolerance: Moderate
Pollinator Value: Very High
pH: 5.4-7.0
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 700,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Aster prenanthoides
ZIGZAG ASTER

Native
Rhizomatous species; tolerates urban habitats.

HABITAT: Steambanks, wet meadows, low woods.

CHARACTERISTICS:
Height: Up to 3.4 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: Very High
pH: 5.5-7.2
Bloom Period: Summer/Fall
Flower Color(s): Blue, Purple

Approx Seeds Per Lb: 700,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Aster spectabilis
SHOWY ASTER

Native
Attractive rhizomatous species; one of the prettiest asters to add to landscapes.

HABITAT: Woodland borders, pine barrens, clearings, roadsides, dry sandy soils.

CHARACTERISTICS:
Height: Up to 2.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): Purple, Blue

Approx Seeds Per Lb: 630,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Aster puniceus
PURPLESTEM ASTER

Native
Attractive rhizomatous species; adds color to FACW and OBL meadows; provides food for deer.

HABITAT: Swamps, wet meadows, riverbanks, moist roadsides.

CHARACTERISTICS:
Height: Up to 7.1 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
Pollinator Value: Very High
pH: 4.5-7.5
Bloom Period: Summer/Fall
Flower Color(s): Blue, Purple

Approx Seeds Per Lb: 700,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Aster umbellatus
FLAT TOPPED WHITE ASTER

Native
Decorative rhizomatous component of wet meadows.

HABITAT: Floodplains, swamps, moist woods, moist fields.

CHARACTERISTICS:
Height: Up to 6.9 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 1,072,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Aster sagittifolius
ARROWLEAF ASTER

Native
Rhizomatous species.

HABITAT: Woodland edges, streambanks, open areas, roadside slopes.

CHARACTERISTICS:
Height: Up to 4.4 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 1,487,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial Legume

Baptisia alba
WHITE WILD INDIGO

Native
Slow-developing legume; lasts for many years in low fertility soils.

HABITAT: Open upland woods, prairies.

CHARACTERISTICS:
Height: Up to 4.4 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 25,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial Legume

Baptisia australis
BLUE FALSE INDIGO

Native
Long-lived legume; historically used as a dye; may be used as a specimen plant.

HABITAT: Open woods, riverbanks, sandy floodplains.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Spring/Summer
Flower Color(s): Purple

Approx Seeds Per Lb: 22,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial Legume

Baptisia pendula
LARGELEAF WILD INDIGO

Native
Rhizomatous early spring legume.

HABITAT: Flatwoods, open woods, clearings.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 25,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial Legume

Baptisia tinctoria
YELLOW FALSE INDIGO

Native
Essential food source for frosted elfin butterfly caterpillars.

HABITAT: Dry sandy soils, clearings, dry open woods.

CHARACTERISTICS:
Height: Up to 3.2 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
Pollinator Value: Medium
pH: 5.8-7.0
Bloom Period: Spring/Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 300,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Annual

Bidens aristosa
SHOWY TICKSEED SUNFLOWER (BUR MARIGOLD)

Native
Reseeding annual in disturbed soils; provides aggressive first-year cover in wet meadows; seeds are eaten by wildlife.

HABITAT: Meadows, fields, roadsides, ditches.

CHARACTERISTICS:
Height: Up to 4.6 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Pollinator Value: Medium
pH: 5.0-7.0
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 130,000
Seeding Rate: Up to 2% of a mix

Herbaceous Annual

Bidens cernua
NODDING BUR MARIGOLD

Native
Reseeding annual persistent in disturbed saturated soils; not for use in residential settings as seeds attach themselves to clothing; provides food and cover for wildlife.

HABITAT: Swamps, wet shores, ditches.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Pollinator Value: Medium
pH: 5.1-7.0
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 43,324
Seeding Rate: Up to 2% of a mix

Herbaceous Annual

Bidens frondosa
BEGGARTICK

Native
Reseeding annual in disturbed wetlands; not for use in residential settings as seeds attach themselves to clothing; provides food and cover for wildlife and ducks.

HABITAT: Moist open ground, streambanks, roadsides.

CHARACTERISTICS:
Height: Up to 3.9 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Pollinator Value: Medium
pH: 5.2-7.2
Bloom Period: Summer/Fall
Flower Color(s): Yellow, Orange

Approx Seeds Per Lb: 195,300
Seeding Rate: Up to 1.3% of a mix

Herbaceous Perennial

Blephilia ciliata
DOWNY PAGODA PLANT

Native
Our earliest blooming mint; a beautiful addition to landscapes.

HABITAT: Dry woods, fields.

CHARACTERISTICS:
Height: Up to 2.4 ft.
Shade Tolerance: Moderate
Drought Tolerance:
Pollinator Value: High
Bloom Period: Spring/Summer
Flower Color(s): Purple, White

Approx Seeds Per Lb: 6,400,000
Seeding Rate: Up to 0.2% of a mix

Herbaceous Annual

Centaurea cyanus
BACHELOR'S BUTTON - BLUE

Naturalized
Blooms in early spring if sown in the fall.

HABITAT: Meadows, flower beds.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Fall
Flower Color(s): Blue

Approx Seeds Per Lb: 90,000
Seeding Rate: Up to 11% of a mix

Herbaceous Annual Legume

Chamaecrista fasciculata
PARTRIDGE PEA

Native
Bunch-type, readily reseeding annual in disturbed upland sites; foliage is nutritious but can be poisonous and should be considered potentially dangerous to cattle; fruit and seeds can irritate the digestive tract of livestock; seeds are a source of food for quail.

HABITAT: Riverbanks, sandy soils, clearings, roadsides.

CHARACTERISTICS:
Height: Up to 2.6 ft.
Shade Tolerance: Shade
Drought Tolerance: Moderate
Pollinator Value: High
pH: 5.5-7.5
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 65,000
Seeding Rate: Up to 3% of a mix

Herbaceous Annual Legume

Chamaecrista nictitans
SENSITIVE PEA

Native
Tap-rooted legume; can help to increase nitrogen availability in some soils; fruit and seeds can irritate the digestive tract of livestock; seeds provide food for quail, doves, and turkey; attracts parasitoid wasps that control plant-eating insects.

HABITAT: Fields, roadsides, clearings, near rivers, woodlands.

CHARACTERISTICS:
Height: Up to 1.5 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 206,570
Seeding Rate: Up to 1% of a mix

Herbaceous Biennial/ Perennial

Cheiranthus allionii
WALLFLOWER

Naturalized
Decorative early blooming component in wildflower mixes.

HABITAT: Fields, meadows.

CHARACTERISTICS:
Height: Up to 1.5 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring
Flower Color(s): Yellow, Orange, Red

Approx Seeds Per Lb: 345,000
Seeding Rate: Up to 3% of a mix

Herbaceous Perennial

Chrysanthemum maximum
SHASTA DAISY

Naturalized
Attractive component of naturalized meadow mixes.

HABITAT: Gardens, meadows.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Unknown
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 400,000
Seeding Rate: Up to 2.5% of a mix

Herbaceous Perennial

Cichorium intybus
BLUE CHICORY

Naturalized
Attractive bunch-type species; persistent on roadsides and in compacted soils; blooms last all day.

HABITAT: Fields, roadsides, waste ground.

CHARACTERISTICS:
Height: Up to 3.4 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 6.0-7.5
Bloom Period: Spring/Fall
Flower Color(s): Blue

Approx Seeds Per Lb: 426,400
Seeding Rate: Up to 2.5% of a mix

Herbaceous Perennial

Cimicifuga racemosa
BLACK COHOSH

Native
Pronged blooms enhance the aesthetics of woodland edges; provides food for pollinators, such as the rusty patch bumblebee.

HABITAT: Moist or dry woods.

CHARACTERISTICS:
Height: Up to 8.1 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Summer
Flower Color(s): White

Approx Seeds Per Lb: 131,660
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial Vine

Clematis virginiana
VIRGIN'S BOWER

Native
Hardy vine to include in wetland margins; attractive when in bloom and when seed is ripening.

HABITAT: Thickets, streambanks, low woods.

CHARACTERISTICS:
Height: Up to 16.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
Pollinator Value: Medium
pH: 5.0-6.8
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 192,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Annual

Coreopsis basalis
GOLDENMANE TICKSEED

Native
Adds early and mid-season color to southeastern landscapes.

HABITAT: Fields and roadsides in sandy soils.

CHARACTERISTICS:
Height: Up to 3.1 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Spring/Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 500,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Coreopsis grandiflora
LARGEFLOWER TICKSEED

Native
Showy component in wildflower meadows.

HABITAT: Roadsides, upland woods.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
Pollinator Value: Medium
Bloom Period: Spring/Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 200,000
Seeding Rate: Up to 3% of a mix

Herbaceous Perennial

Coreopsis lanceolata
LANCELEAF COREOPSIS

Native
Popular for wildflower meadows and along roadsides.

HABITAT: Soils, thickets, fields, clearings, roadsides.

CHARACTERISTICS:
Height: Up to 2.4 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
Pollinator Value: Medium
pH: 6.0-7.0
Bloom Period: Spring/Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 221,000
Seeding Rate: Up to 3% of a mix

Herbaceous Annual

Coreopsis tinctoria
PLAINS COREOPSIS

Native
Showy annual; produces flowers in a short period of time on low fertility sites.

HABITAT: Fields, meadows, roadsides, occasionally escaping to yards.

CHARACTERISTICS:
Height: Up to 3.6 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Pollinator Value: Medium
pH: 5.2-7.8
Bloom Period: Spring/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 3,222,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Coreopsis tripteris
TALL COREOPSIS

Native
Long-lived species; very tolerant of competition.

HABITAT: Old fields, thickets, woodland edges, roadsides, moist low places.

CHARACTERISTICS:
Height: Up to 8.1 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 200,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial Legume

Coronilla varia
CROWNVETCH

Naturalized
Rhizomatous legume; good for controlling erosion on steep, dry rocky slopes; seeds are persistent in soils; can be aggressive in natural areas.

HABITAT: Rocky slopes, shallow, well-drained low fertility soils.

CHARACTERISTICS:
Height: Up to 2.6 ft.
Shade Tolerance: Moderate
Drought Tolerance: High
pH: 5.0-7.5
Bloom Period: Summer/Fall
Flower Color(s): Pink

Approx Seeds Per Lb: 140,000
Seeding Rate: Up to 50% of a mix; 8-15 lb per acre alone

Herbaceous Annual

Cosmos bipinnatus
COSMOS

Naturalized
Robust with intense color; ideal for showy roadside plantings; attracts butterflies.

HABITAT: Disturbed sites, fields, roadsides.

CHARACTERISTICS:
Height: Up to 6 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Unknown
Bloom Period: Summer/Fall
Flower Color(s): Mixed

Approx Seeds Per Lb: 72,000
Seeding Rate: Up to 13% of a mix

DO THE MATH | *Calculate twice, order once.*

Ernst Seeds conditions and prepares seed to the highest standard and sells it in bulk or pure live seed (PLS) quantities. PLS refers to the percentage of live seed by weight in a seed lot having the potential to develop into a seedling. Calculate how much bulk seed you need by using the following calculations:

HOW TO CALCULATE PLS

Percent Total Germination =
(Germination + Hard Seed + Dormant Seed)

70 + 15 + 5 = 90% Total Germination
Use that figure and the purity percentage to calculate the PLS percentage.

Multiply Total Germination by Purity / 100 = PLS %
(95% X 90%)/100 = 85.5% of Pure Live Seed

What Does This Mean?

85.5% of this seed lot by weight has the potential to grow. If 10 pounds of pure live seed is needed on a site, the quantity of bulk seed needed is determined by:

100 / PLS = Pounds of bulk seed needed to produce 1 lb of PLS

100 / 85.5 = 1.16 lbs of bulk seed X 10 lbs = 11.6 lbs of bulk seed

Herbaceous Annual

Cosmos sulphureus
SULPHUR COSMOS

Naturalized
Attractive summer color lasts into the fall.

HABITAT: Gardens, roadsides, other disturbed habitats.

CHARACTERISTICS:
Height: Up to 6.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 60,000
Seeding Rate: Up to 15% of a mix

Herbaceous Biennial

Daucus carota
QUEEN ANNE'S LACE

Naturalized
Persistent in meadows with poor soils; attracts butterflies.

HABITAT: Roadsides, old fields, gardens, open ground.

CHARACTERISTICS:
Height: Up to 4.6 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Fall
Flower Color(s): White

Approx Seeds Per Lb: 454,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial Legume

Dalea candida
WHITE PRAIRIE CLOVER

Native
Legume that supplies nitrogen to meadow soils; produces nutritious forage for deer; seeds are eaten by birds.

HABITAT: Dry prairies, dry upland woods.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: No
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 278,000
Seeding Rate: Up to 1% of a mix

Herbaceous Annual

Delphinium ajacis
ROCKET LARKSPUR

Naturalized
Attractive tap-rooted species.

HABITAT: Gardens, roadsides, other disturbed habitats.

CHARACTERISTICS:
Height: Up to 2.9 ft.
Shade Tolerance: Moderate
Drought Tolerance: No
Bloom Period: Spring/Fall
Flower Color(s): Blue, White, Pink

Approx Seeds Per Lb: 140,000
Seeding Rate: Up to 5% of a mix

Herbaceous Perennial Legume

Dalea purpurea
PURPLE PRAIRIE CLOVER

Native
Legume that fixes nitrogen in prairie and meadow soils; excellent forage for wildlife.

HABITAT: Dry prairies, open glades.

CHARACTERISTICS:
Height: Up to 3.1 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
pH: 6.0-8.0
Bloom Period: Spring/Summer
Flower Color(s): Purple

Approx Seeds Per Lb: 300,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial Legume

Desmanthus illinoensis
ILLINOIS BUNDLEFLOWER

Native
Legume with a deep taproot; fixes nitrogen in prairie and meadow soils that can be used by plants.

HABITAT: Prairies, roadsides, meadows, riverbanks.

CHARACTERISTICS:
Height: Up to 6 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 5.0-8.0
Bloom Period: Summer
Flower Color(s): White

Approx Seeds Per Lb: 85,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial Legume

Desmodium canadense
SHOWY TICKTREFOIL

Native
Nitrogen-fixing legume; not for use in residential settings as seeds attach themselves to clothing; seeds provide food for ground birds and small animals; attracts native pollinators.

HABITAT: Open woods, meadows, thickets, riverbanks.

CHARACTERISTICS:
Height: Up to 4.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 72,500
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial Legume

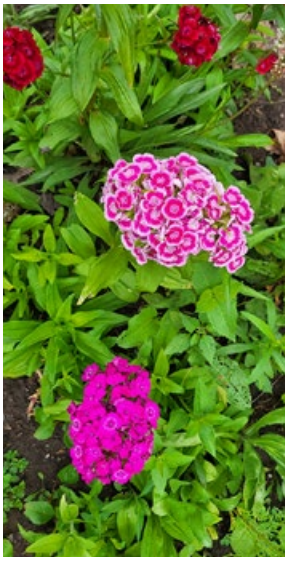
Desmodium paniculatum
PANICLEDLEAF TICKTREFOIL

Native
Nitrogen-fixing legume; not for use in residential settings as seeds attach themselves to clothing; seeds provide food for wildlife; attracts native pollinators.

HABITAT: Dry woods, fields.

CHARACTERISTICS:
Height: Up to 3.7 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
Pollinator Value: Low
pH: 6.0-7.0
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 200,000
Seeding Rate: Up to 1% of a mix



Herbaceous Perennial

Dianthus barbatus
SWEETWILLIAM

Naturalized
Food source for hummingbirds and butterflies.

HABITAT: Gardens, roadsides, other disturbed habitats; grows best in fertile, moist well-drained soils.

CHARACTERISTICS:
Height: Up to 1.9 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Bloom Period: Spring/Summer
Flower Color(s): Red, Pink, White

Approx Seeds Per Lb: 440,000
Seeding Rate: Up to 2.5% of a mix

Herbaceous Perennial

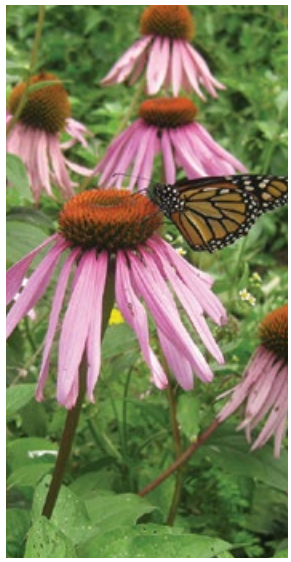
Echinacea pallida
PALE PURPLE CONEFLOWER

Native
Attractive in wildflower meadows.

HABITAT: Dry open spaces.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 6.5-7.2
Bloom Period: Summer
Flower Color(s): Pink, Purple

Approx Seeds Per Lb: 106,000
Seeding Rate: Up to 7% of a mix



Herbaceous Perennial

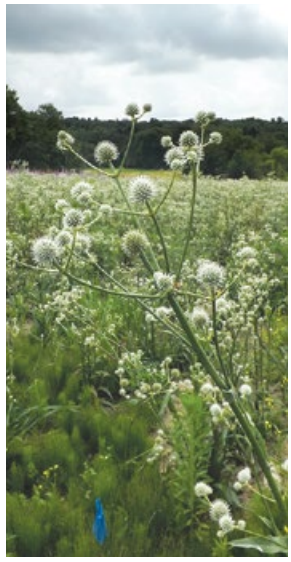
Echinacea purpurea
PURPLE CONEFLOWER

Native
Source of herbal remedy; attractive species in meadows and along roadsides.

HABITAT: Open woods, open meadows, prairies, roadsides; grows best in moist well-drained soils.

CHARACTERISTICS:
Height: Up to 5.2 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
Pollinator Value: High
pH: 6.5-7.2
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 115,664
Seeding Rate: Up to 7% of a mix



Herbaceous Perennial

Eryngium yuccifolium
RATTLESNAKE MASTER

Native
Creates visual texture in native meadows; essential food source for the rare rattlesnake master borer moth.

HABITAT: Moist woods, moist or dry sandy soils, meadows, barrens.

CHARACTERISTICS:
Height: Up to 4.7 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer
Flower Color(s): White

Approx Seeds Per Lb: 178,000
Seeding Rate: Up to 2% of a mix

Eupatorium coelestinum MISTFLOWER

Native
Rhizomatous, low-growing, late fall flower in wetland margins.

HABITAT: Floodplain forests, old fields, meadows, streambanks.

CHARACTERISTICS:
Height: Up to 3.1 ft.
Shade Tolerance: Shade
Drought Tolerance: Moderate
Pollinator Value: Very High
pH: 5.5-7.5
Bloom Period: Summer/Fall
Flower Color(s): Blue

Approx Seeds Per Lb: 1,500,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Eupatorium perfoliatum BONESET

Native
Beautiful, hardy component of wetlands; seeds are eaten by swamp sparrows.

HABITAT: Floodplains, swamps, bogs, streambanks, wet meadows.

CHARACTERISTICS:
Height: Up to 5.3 ft.
Shade Tolerance: Unknown
Drought Tolerance: No
Pollinator Value: Very High
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 2,880,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Eupatorium fistulosum JOE PYE WEED

Native
Showy, rhizomatous, hollow-stemmed Joe Pye Weed.

HABITAT: Floodplains, meadows, moist thickets, roadsides.

CHARACTERISTICS:
Height: Up to 7.7 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Pollinator Value: High
pH: 4.5-7.0
Bloom Period: Summer/Fall
Flower Color(s): Pink, Purple

Approx Seeds Per Lb: 2,000,000
Seeding Rate: Up to 0.3% of a mix

Herbaceous Perennial

Euthamia graminifolia GRASSLEAF GOLDENROD

Native
Rhizomatous species; provides food and cover for wildlife.

HABITAT: Wet meadows, riparian areas; tolerates poor soils.

CHARACTERISTICS:
Height: Up to 4.1 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 5,600,000
Seeding Rate: Up to 0.2% of a mix

Herbaceous Perennial

Eupatorium maculatum SPOTTED JOE PYE WEED

Native
Source of food for pollinators.

HABITAT: Floodplains, swamps, alluvial thickets.

CHARACTERISTICS:
Height: Up to 6.1 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 1,440,000
Seeding Rate: Up to 0.3% of a mix

Herbaceous Perennial

Gaillardia aristata PERENNIAL GAILLARDIA (BLANKETFLOWER)

Native
Attractive bunch-type, daisy-like flower for meadows and along roadsides.

HABITAT: Plains, prairies, meadows, along roadsides.

CHARACTERISTICS:
Height: Up to 2.2 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 5.5-7.9
Bloom Period: Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 186,436
Seeding Rate: Up to 10% of a mix

Herbaceous Perennial

Herbaceous Annual/ Biennial/Perennial

Gaillardia pulchella ANNUAL GAILLARDIA (INDIAN BLANKET)

Native
Showy bunch-type species in annual wildflower beds.

HABITAT: Dry sandy places, meadows, open areas.

CHARACTERISTICS:
Height: Up to 2 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 7.0-8.5
Bloom Period: Spring/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 238,144
Seeding Rate: Up to 10% of a mix

Herbaceous Biennial

Gaura biennis BIENNIAL BEEBLOSSOM

Native
Adds diversity to meadow mixes.

HABITAT: Moist meadows, streambanks, floodplains, roadside thickets.

CHARACTERISTICS:
Height: Up to 6.1 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Bloom Period: Summer/Fall
Flower Color(s): Pink, White

Approx Seeds Per Lb: 43,130
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Geum canadense WHITE AVENS

Native
Small seedheads provide visual texture to the landscape.

HABITAT: Dry or moist woods, roadsides.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
Pollinator Value: Medium
pH: 4.5-7.5
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 400,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Geum laciniatum ROUGH AVENS

Native
Rough burr-like heads add texture to landscapes.

HABITAT: Woods, swamps, bogs, wet ditches.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 5.0-7.0
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 400,000
Seeding Rate: Up to 2% of a mix; up to 6 lb per acre in a mix

Herbaceous Annual

Gypsophila elegans ANNUAL BABY'S BREATH

Naturalized
Fine-textured, fast-growing species; blooms 60 days after seeding.

HABITAT: Gardens, meadows.

CHARACTERISTICS:
Height: Up to 2 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Bloom Period: Summer
Flower Color(s): White

Approx Seeds Per Lb: 375,000
Seeding Rate: Up to 2.5% of a mix

Herbaceous Perennial

Helenium autumnale COMMON SNEEZEWEED

Native
Attractive late season bloomer.

HABITAT: Swamps, moist riverbanks, alluvial thickets, wet fields.

CHARACTERISTICS:
Height: Up to 5.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
Pollinator Value: High
pH: 4.0-7.5
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 1,464,500
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Helianthus angustifolius NARROWLEAF SUNFLOWER

Native
Clump-forming species; latest blooming sunflower we carry; small seeds are eaten by birds; nectar is food for migrating monarch butterflies.

HABITAT: Ditches, savannas, marshes, wet meadows, pine barrens.

CHARACTERISTICS:
Height: Up to 6.1 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
Pollinator Value: High
pH: 4.0-7.0
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 504,000
Seeding Rate: Up to 2% of a mix

Herbaceous Annual

Helianthus annuus COMMON SUNFLOWER

Native
Reseeding annual; provides food for songbirds.

HABITAT: Meadows, roadsides.

CHARACTERISTICS:
Height: Up to 10.2 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 5.5-7.8
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 46,900
Seeding Rate: Up to 10% of a mix

Herbaceous Perennial

Helianthus maximilianii MAXIMILIAN'S SUNFLOWER

Native
Clump-forming species; tall shielding growth provides food and cover for birds.

HABITAT: Prairies, old fields, railroad tracks, urban open ground.

CHARACTERISTICS:
Height: Up to 9.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 6.0-8.0
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 196,300
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Heliopsis helianthoides OXEYE SUNFLOWER

Native
Vigorous clump-forming species with a long bloom period; provides food and cover for birds.

HABITAT: Fields, woods, floodplains, streambanks.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Spring/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 102,000
Seeding Rate: Up to 2% of a mix; of a meadow mix

Herbaceous Perennial

Hibiscus moscheutos CRIMSONEYED ROSEMALLOW

Native
Showy long-lived species in wet meadows and at the water's edge.

HABITAT: Alluvial meadows, swamp forest edges, brackish marshes.

CHARACTERISTICS:
Height: Up to 6.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: No
Pollinator Value: Low
pH: 4.0-7.5
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 200,000
Seeding Rate: Up to 3% of a mix

Herbaceous Perennial

Hypericum perforatum COMMON ST. JOHNSWORT

Naturalized
Source of herbal St. Johnswort; not for use in native mixes; seeds are persistent in soils.

HABITAT: Fields, roadsides, open spaces; tolerates poor soils.

CHARACTERISTICS:
Height: Up to 2.6 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 4,540,000
Seeding Rate: Up to 0.1% of a mix

Herbaceous Perennial Legume

Lathyrus sylvestris
FLAT PEA

Naturalized
Hardy rhizomatous legume; excellent for soil stabilization in infertile soils; seed must be incorporated into the soil to achieve successful establishment.

HABITAT: Borders of fields and thickets.

CHARACTERISTICS:
Height: Up to 6.5 ft.
Shade Tolerance: Shade
Drought Tolerance: High
pH: 5.0-7.8
Bloom Period: Summer
Flower Color(s): Purple, Pink, White

Approx Seeds Per Lb: 8,000
Seeding Rate: Up to 60% of a mix; up to 20 lb per acre alone with 15 lb per acre of tall fescue

Herbaceous Perennial Legume

Lespedeza capitata
ROUNDHEAD LESPEDEZA

Native
Clump-forming legume; provides food for birds and small ground animals.

HABITAT: Dry open woods, sand dunes, prairies.

CHARACTERISTICS:
Height: Up to 5.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
Pollinator Value: Low
pH: 5.7-8.2
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 174,000
Seeding Rate: Up to 3% of a mix

Herbaceous Perennial Legume

Lespedeza virginica
SLENDER LESPEDEZA

Native
Clump-forming legume; our prettiest native Lespedeza; attractive flowers and foliage add color to native meadows; prolific producer of seeds eaten by game birds.

HABITAT: Open woods, roadsides, fields.

CHARACTERISTICS:
Height: Up to 3.8 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Low
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 175,000
Seeding Rate: Up to 3% of a mix; up to 10 PLS lb per acre alone

Herbaceous Perennial

Liatris spicata
MARSH BLAZING STAR

Native
Corm-forming species; flowers have a feathery appearance.

HABITAT: Moist fields, fencerows, roadsides.

CHARACTERISTICS:
Height: Up to 6.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Pollinator Value: High
pH: 5.6-7.5
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 100,000
Seeding Rate: Up to 5% of a mix

Herbaceous Perennial

Linum perenne
PERENNIAL BLUE FLAX

Naturalized
Short stature and intense blue flowers make this a great species.

HABITAT: Naturalized along roadsides.

CHARACTERISTICS:
Height: Up to 2.3 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Summer
Flower Color(s): Blue

Approx Seeds Per Lb: 295,000
Seeding Rate: Up to 3% of a mix

Herbaceous Perennial

Lobelia siphilitica
GREAT BLUE LOBELIA

Native
Decorative species with indeterminate blooms.

HABITAT: Swamps, moist meadows, streambanks, ditches.

CHARACTERISTICS:
Height: Up to 4.5 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): Blue

Approx Seeds Per Lb: 7,760,000
Seeding Rate: Up to 0.3% of a mix

Herbaceous Perennial Legume

Lotus corniculatus
BIRD'S FOOT TREFOIL, 'NORCEN'

Naturalized
Excellent for controlling erosion on strip mines and landfills; provides good livestock forage.

HABITAT: Fields, roadsides, meadows.

CHARACTERISTICS:
Height: Up to 2.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 5.0-8.0
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 369,800
Seeding Rate: Up to 30% of a mix; up to 15 lb per acre alone

Herbaceous Perennial

Ludwigia alternifolia
SEEDBOX

Native
Four-sided seedheads add texture to winter landscapes.

HABITAT: Wet woods, swampy fields.

CHARACTERISTICS:
Height: Up to 3.7 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 20,800,000
Seeding Rate: Up to 0.2% of a mix

Herbaceous Perennial

Ludwigia maritima
SEASIDE PRIMROSE WILLOW

Native
Nice addition to a southeast coastal plain wetland mix.

HABITAT: Savannas, ditches, low pinelands.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 20,000,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Lycopus americanus
AMERICAN WATER HOREHOUND

Native
Adds diversity to wet meadows and wetlands.

HABITAT: Wet ditches, swamps, moist thickets, fields, shaded hillsides.

CHARACTERISTICS:
Height: Up to 3.1 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
Pollinator Value: High
pH: 5.2-7.8
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 3,025,300
Seeding Rate: Up to 0.4% of a mix

Herbaceous Perennial

Mimulus ringens
SQUARE STEMMED MONKEYFLOWER

Native
Rhizomatous species; reseeds itself in open wet areas; provides cover for wildlife; indeterminate snapdragon-like blooms are attractive to native pollinators.

HABITAT: Wet open ground of swamps, meadows, shores.

CHARACTERISTICS:
Height: Up to 4.1 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 22,900,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Monarda fistulosa
WILD BERGAMOT

Native
Showy rhizomatous species; often used as an ornamental.

HABITAT: Fields, brushy thickets, prairies, roadsides.

CHARACTERISTICS:
Height: Up to 4 ft.
Shade Tolerance: Moderate
Drought Tolerance: No
Pollinator Value: High
pH: 6.0-8.0
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 1,272,500
Seeding Rate: Up to 0.5% of a mix

Herbaceous Annual/ Biennial/Perennial

Monarda punctata SPOTTED BEEBALM

Native
Species with a pleasant fragrance.

HABITAT: Dry sandy and Coastal Plain soils, sandy upland forests, forest edges, fields, roadsides.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Unknown
Drought Tolerance: High
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 1,472,000
Seeding Rate: Up to 1% of a mix

Herbaceous Biennial

Oenothera biennis EVENING PRIMROSE

Native
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.

HABITAT: Fields, prairies, roadsides, waste areas.

CHARACTERISTICS:
Height: Up to 5.1 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: Medium
pH: 5.0-7.0
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 1,376,000
Seeding Rate: Up to 0.2% of a mix

Herbaceous Perennial

Oenothera speciosa SHOWY EVENING PRIMROSE

Native
Large flowers open in the evening.

HABITAT: Dry open places, roadsides.

CHARACTERISTICS:
Height: Up to 2 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Summer
Flower Color(s): White, Pink

Approx Seeds Per Lb: 3,436,000
Seeding Rate: Up to 0.6% of a mix

Herbaceous Annual

Papaver rhoeas CORN POPPY

Naturalized
Creates an early field of color a year after seeding.

HABITAT: Roadsides, meadows, gardens.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Fall
Flower Color(s): Red

Approx Seeds Per Lb: 3,179,000
Seeding Rate: Up to 0.8% of a mix

Herbaceous Perennial

Penstemon canescens EASTERN GRAY BEARDTONGUE

Native
One of our earliest blooming herbaceous species; provides strikingly beautiful early season color.

HABITAT: Cliffs, woods, shale outcrops.

CHARACTERISTICS:
Height: Up to 2.6 ft.
Shade Tolerance: Moderate
Drought Tolerance: High
Pollinator Value: High
Bloom Period: Spring/Summer
Flower Color(s): Purple

Approx Seeds Per Lb: 2,326,000
Seeding Rate: Up to 0.7% of a mix; up to 1 PLS lb per acre alone

Herbaceous Perennial

Penstemon digitalis TALL WHITE BEARDTONGUE

Native
Durable early clump-forming species; found in many of our meadow mixes.

HABITAT: Meadows, old fields, roadsides.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Shade
Drought Tolerance: High
Pollinator Value: High
pH: 5.5-7.0
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 400,000
Seeding Rate: Up to 4% of a mix

Penstemon hirsutus
HAIRY BEARDTONGUE

Native
Our shortest and earliest blooming Penstemon; attractive addition to short grass meadows.

HABITAT: Dry fields, woods, roadside banks, rocky slopes.

CHARACTERISTICS:
Height: Up to 2.8 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Spring/Summer
Flower Color(s): Purple

Approx Seeds Per Lb: 3,877,000
Seeding Rate: Up to 0.4% of a mix

Herbaceous Perennial

Penstemon laevigatus
APPALACHIAN BEARDTONGUE

Native
Provides early season bloom to meadows in full sun to partial shade.

HABITAT: Meadows, woods, roadsides.

CHARACTERISTICS:
Height: Up to 3.8 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Spring/Summer
Flower Color(s): Purple

Approx Seeds Per Lb: 350,000
Seeding Rate: Up to 4.5% of a mix

Herbaceous Perennial

Penthorum sedoides
DITCH STONECROP

Native
Stoloniferous species; adds texture to wet landscapes; provides erosion control and habitat for wildlife.

HABITAT: Low wet ground, ditches.

CHARACTERISTICS:
Height: Up to 2.5 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
Pollinator Value: High
pH: 5.0-7.0
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 45,000,000
Seeding Rate: Up to 0.2% of a mix

Herbaceous Perennial

Polygonum pensylvanicum
PENNSYLVANIA SMARTWEED

Native
Acts as a cover crop in floodplain areas and on wetland sites; provides food and cover for wildlife.

HABITAT: Meadows, fields, waste places, moist ditches.

CHARACTERISTICS:
Height: Up to 5.7 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: Medium
pH: 4.0-8.5
Bloom Period: Spring/Fall
Flower Color(s): Pink

Approx Seeds Per Lb: 126,100
Seeding Rate: Up to 2% of a mix

Herbaceous Annual

Polygonum sagittatum
ARROWLEAF TEARTHUMB

Native
Fast-growing vine; not for use in residential settings as the prickly stems can cut the skin; provides food for waterfowl.

HABITAT: Wet meadows, bogs, marshes.

CHARACTERISTICS:
Height: Up to 6.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
Pollinator Value: Medium
pH: 4.0-8.5
Bloom Period: Spring
Flower Color(s): Pink

Approx Seeds Per Lb: 125,000
Seeding Rate: Up to 2% of a mix

Herbaceous Annual/ Perennial Vine

Pycnanthemum incanum
HOARY MOUNTAINMINT

Native
Rhizomatous, sweet-scented upland mint species; attractive to many diverse pollinators.

HABITAT: Upland woods, old fields, thickets, barrens.

CHARACTERISTICS:
Height: Up to 3.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer/Fall
Flower Color(s): Purple

Seeding Rate: Up to 0.4% of a mix

Herbaceous Perennial

Pycnanthemum tenuifolium
NARROWLEAF MOUNTAINMINT

Native
Rhizomatous mint species.

HABITAT: Dry soils of prairies and upland woods, moist old fields, floodplains, sandy streambanks.

CHARACTERISTICS:
Height: Up to 2.6 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer
Flower Color(s): White

Approx Seeds Per Lb: 5,336,000
Seeding Rate: Up to 0.4% of a mix

Herbaceous Perennial

Pycnanthemum virginianum
VIRGINIA MOUNTAINMINT

Native
Rhizomatous mint species; stems and leaves are fragrant when crushed; also referred to as mountain thyme.

HABITAT: Upland woods, moist prairies.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 3,872,000
Seeding Rate: Up to 0.4% of a mix

Herbaceous Perennial

Ratibida columnifera
YELLOW PRAIRIE CONEFLOWER

Native
Attractive tap-rooted speces in a perennial wildflower mix; source of food for birds and pollinators.

HABITAT: Dry open places, including prairies.

CHARACTERISTICS:
Height: Up to 3.7 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 5.9-7.0
Bloom Period: Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 737,100
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Ratibida pinnata
GREY HEADED CONEFLOWER

Native
Long-lasting showy flowers; provides food and cover for wildlife.

HABITAT: Dry prairies, dry woods, old fields.

CHARACTERISTICS:
Height: Up to 3.7 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: Medium
pH: 5.6-6.8
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 427,500
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Rudbeckia fulgida var. fulgida
ORANGE CONEFLOWER

Native
Provides decorative late summer to fall color.

HABITAT: Dry to moist woodlands, meadows.

CHARACTERISTICS:
Height: Up to 3.4 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Summer/Fall
Flower Color(s): Yellow, Orange

Approx Seeds Per Lb: 500,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Rudbeckia triloba
BROWNEYED SUSAN

Native
Provides late summer color and texture to landscapes; provides food for birds.

HABITAT: Old fields, rocky slopes, woodland edges.

CHARACTERISTICS:
Height: Up to 4.5 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Summer/Fall
Flower Color(s): Yellow, Orange

Approx Seeds Per Lb: 536,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Biennial

Rudbeckia hirta
BLACKEYED SUSAN

Native
Most common native flower in our meadows; provides food and cover for birds.

HABITAT: Fields, meadows, roadsides.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: Medium
pH: 6.0-7.0
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 1,575,700
Seeding Rate: Up to 3% of a mix

Herbaceous Annual/ Biennial/Perennial

Saururus cernuus
LIZARD'S TAIL

Native
Beautiful wetland wildflower.

HABITAT: Marshes, swamps.

CHARACTERISTICS:
Height: Up to 3.7 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Summer
Flower Color(s): White

Approx Seeds Per Lb: 100,000
Seeding Rate: Up to 3% of a mix

Herbaceous Perennial

Rudbeckia subtomentosa
SWEET BLACKEYED SUSAN

Native
Provides food and cover for birds; nectar source for bees.

HABITAT: Prairies, low ground.

CHARACTERISTICS:
Height: Up to 6 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 712,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Senna hebecarpa
WILD SENNA

Native
Robust legume with sturdy growth; provides food for birds; excellent food source for bumblebees.

HABITAT: Streambanks, moist old fields, moist open woods.

CHARACTERISTICS:
Height: Up to 6.1 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 20,000
Seeding Rate: Up to 1.5% of a mix

Herbaceous Perennial Legume

Herbaceous Perennial Legume

Senna marilandica
MARYLAND SENNA

Native
Robust long-lived legume with sturdy growth; provides food and cover for wildlife.

HABITAT: Dry roadsides, rocky woodlands, streambanks.

CHARACTERISTICS:
Height: Up to 5.9 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
Pollinator Value: Medium
pH: 4.0-7.0
Bloom Period: Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 20,500
Seeding Rate: Up to 1.5% of a mix

Herbaceous Perennial

Silphium asteriscus var. laevicaule
STARRY ROSINWEED

Native
Clump-forming species; seeds provide food for birds.

HABITAT: Woodlands, old fields, thickets.

CHARACTERISTICS:
Height: Up to 7.2 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 20,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Silphium perfoliatum
CUP PLANT

Native
Robust long-lived species; best established by planting in the fall as a dormant seeding with germination occurring in the spring; may be used as forage for domestic animals with multiple cuts; high potential as a bioenergy crop; provides food for birds and wildlife.

HABITAT: Floodplains, abandoned fields, moist meadows.

CHARACTERISTICS:
Height: Up to 8.5 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Pollinator Value: High
pH: 4.5-7.5
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 22,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Silphium terebinthinaceum
PRAIRIE DOCK

Native
Adds texture to landscapes; seeds provide food for birds.

HABITAT: Prairies.

CHARACTERISTICS:
Height: Up to 10.8 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 17,000
Seeding Rate: Up to 5% of a mix

Herbaceous Perennial

Silphium trifoliatum
WHORLED ROSINWEED

Native
Clump-forming species; seeds provide food for birds; source of nectar for butterflies.

HABITAT: Roadsides, dry fields, meadows.

CHARACTERISTICS:
Height: Up to 8.1 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 20,800
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Solidago bicolor
WHITE GOLDENROD

Native
Clump-forming species; survives on low fertility sites and road cuts.

HABITAT: Dry woods, wooded banks, shale barrens.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 1,649,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Solidago canadensis
CANADA GOLDENROD

Native
Aggressive rhizomatous species; does well with switchgrass and big bluestem; dominant robust vegetation adds diversity to native landscapes; provides cover for wildlife. (Note: Our harvest of this species from natural stands includes the species Solidago gigantea and Solidago altissima).

HABITAT: Moist or dry open places, fields, roadsides.

CHARACTERISTICS:
Height: Up to 6.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: Very High
pH: 4.8-7.5
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 4,600,000
Seeding Rate: Up to 0.2% of a mix

Herbaceous Perennial

Solidago odora
LICORICE SCENTED GOLDENROD

Native
Showy addition to landscapes; leaves have a scent resembling black licorice when crushed.

HABITAT: Dry open woods, sandy soils.

CHARACTERISTICS:
Height: Up to 5.4 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 2,268,000
Seeding Rate: Up to 0.3% of a mix

Herbaceous Perennial

Solidago juncea
EARLY GOLDENROD

Native
First goldenrod of the season to bloom; beautiful mid-summer addition to meadows.

HABITAT: Open woods, fields, meadows, roadsides.

CHARACTERISTICS:
Height: Up to 4.2 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 2,538,000
Seeding Rate: Up to 0.3% of a mix

Herbaceous Perennial

Solidago patula
ROUGHLEAF GOLDENROD

Native
Provides cover for wildlife.

HABITAT: Swamps, wet meadows, floodplains, moist woods.

CHARACTERISTICS:
Height: Up to 6.5 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Pollinator Value: Very High
pH: 4.5-7.0
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 700,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Solidago nemoralis
GRAY GOLDENROD

Native
Our shortest goldenrod; food source for pollinators.

HABITAT: Fields, open woods, roadsides in low fertility soils.

CHARACTERISTICS:
Height: Up to 3.7 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: Very High
pH: 6.5-7.5
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 1,008,000
Seeding Rate: Up to 0.7% of a mix

Herbaceous Perennial

Solidago riddellii
RIDDELL'S GOLDENROD

Native
Attractive rhizomatous species; provides cover for wildlife.

HABITAT: Swamps, wet meadows, moist prairies.

CHARACTERISTICS:
Height: Up to 4.1 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 1,544,000
Seeding Rate: Up to 0.5% of a mix

Herbaceous Perennial

Solidago rigida
STIFF GOLDENROD

Native
Attractive rhizomatous species with robust growth; provides food and cover for wildlife.

HABITAT: Dry open woods, prairies.

CHARACTERISTICS:
Height: Up to 5.7 ft.
Shade Tolerance: Moderate
Drought Tolerance: High
Pollinator Value: Very High
pH: 5.0-7.5
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 1,009,000
Seeding Rate: Up to 0.7% of a mix

Herbaceous Perennial

Solidago rugosa
WRINKLELEAF GOLDENROD

Native
Rhizomatous species; dense stems provide cover for wildlife.

HABITAT: Fields, woods, floodplains, thickets, roadsides, open ground.

CHARACTERISTICS:
Height: Up to 6.1 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
Pollinator Value: Very High
pH: 5.0-7.5
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 1,000,000
Seeding Rate: Up to 0.7% of a mix

Herbaceous Perennial

Solidago speciosa
SHOWY GOLDENROD

Native
Source of nectar for migrating monarch butterflies.

HABITAT: Open woods, prairies, fields, plains.

CHARACTERISTICS:
Height: Up to 5.7 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 1,340,000
Seeding Rate: Up to 0.6% of a mix

Herbaceous Biennial/ Perennial

Verbena hastata
BLUE VERVAIN

Native
Easily seeded in wetlands.

HABITAT: Moist meadows, floodplains, wet ditches, roadsides.

CHARACTERISTICS:
Height: Up to 5.7 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 1,488,000
Seeding Rate: Up to 4% of a mix

Herbaceous Annual/ Perennial

Verbena stricta
HOARY VERVAIN

Native
Adds texture and color to open landscapes.

HABITAT: Prairies, barrens, fields, roadsides; tolerates poor soils.

CHARACTERISTICS:
Height: Up to 3.8 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer
Flower Color(s): Purple

Approx Seeds Per Lb: 527,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Verbena urticifolia
WHITE VERVAIN

Native
Adds texture to meadows.

HABITAT: Thickets, moist fields, meadows, open places.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 1,008,000
Seeding Rate: Up to 1% of a mix

Verbesina alternifolia
WINGSTEM

Native
Aggressive growth provides cover in wet meadows.

HABITAT: Moist wooded slopes, shaded lowlands, riverbanks.

CHARACTERISTICS:
Height: Up to 9.8 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 145,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Vernonia noveboracensis
NEW YORK IRONWEED

Native
Aggressive growth provides cover; seeds provide food for birds.

HABITAT: Streambanks, wet fields, pastures, meadows.

CHARACTERISTICS:
Height: Up to 6.9 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
Pollinator Value: High
pH: 4.5-8.0
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 300,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Vernonia angustifolia
TALL IRONWEED

Native
Showy clump-forming species.

HABITAT: Savannas, pine barrens, sandy woods, old fields.

CHARACTERISTICS:
Height: Up to 3.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer
Flower Color(s): Purple

Approx Seeds Per Lb: 300,000
Seeding Rate: Up to 2% of a mix

Herbaceous Perennial

Veronicastrum virginicum
CULVER'S ROOT

Native
Showy rhizomatous species.

HABITAT: Moist meadows, thickets, swamps.

CHARACTERISTICS:
Height: Up to 5.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Summer
Flower Color(s): Pink, White

Approx Seeds Per Lb: 7,761,000
Seeding Rate: Up to 0.1% of a mix

Herbaceous Perennial

Vernonia gigantea
GIANT IRONWEED

Native
Aggressive growth provides nesting habitat for woodcock; seeds are a source of food for birds.

HABITAT: Moist fields, wet woods, floodplains, meadows.

CHARACTERISTICS:
Height: Up to 9.8 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: High
Bloom Period: Summer/Fall
Flower Color(s): Purple

Approx Seeds Per Lb: 320,000
Seeding Rate: Up to 1% of a mix

Herbaceous Perennial

Viola cornuta
JOHNNY JUMPUP

Naturalized
Pansy-like miniature species; added to mixes for early spring color.

HABITAT: Dry meadows.

CHARACTERISTICS:
Height: Up to 0.5 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring/Summer
Flower Color(s): White, Purple

Approx Seeds Per Lb: 796,000
Seeding Rate: Up to 2% of a mix

Herbaceous Annual

Herbaceous Perennial

Zizia aurea
GOLDEN ALEXANDERS

Native
One of our earliest blooming natives; early source of food for pollinators.

HABITAT: Wooded bottomlands, streambanks, moist meadows, floodplains.

CHARACTERISTICS:
Height: Up to 2.6 ft.
Shade Tolerance: Moderate
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Spring/Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 172,000
Seeding Rate: Up to 2% of a mix

Woody Deciduous Shrub

Amorpha canescens
LEADPLANT

Native
Source of food for wildlife and pollinators.

HABITAT: Sandy open woods, dry prairies.

CHARACTERISTICS:
Height: Up to 3.9 ft.
Shade Tolerance: Shade
Drought Tolerance: High
pH: 5.5-8.0
Bloom Period: Summer
Flower Color(s): Purple

Approx Seeds Per Lb: 195,000
Seeding Rate: Up to 0.4% of a mix

Woody Deciduous Shrub

Amorpha fruticosa
RIVER LOCUST

Native
Provides food and cover for wildlife; source of food for bees.

HABITAT: Alluvial soils along streams, rivers, other moist areas.

CHARACTERISTICS:
Height: Up to 16.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 5.0-8.5
Bloom Period: Spring/Summer
Flower Color(s): Purple

Approx Seeds Per Lb: 77,000
Seeding Rate: Up to 1% of a mix

Woody Deciduous Shrub

Amorpha herbacea
CLUSTERSPIKE FALSE INDIGO

Native
Attractive plant architecture and flowers.

HABITAT: Sandy fields, ridges, open woodlands; generally on the Coastal Plain.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Very High
Bloom Period: Spring/Summer
Flower Color(s): Blue, White

Approx Seeds Per Lb: 100,000
Seeding Rate: Up to 0.8% of a mix

Woody Deciduous Shrub

Cephalanthus occidentalis
BUTTONBUSH

Native
Produces an abundance of seed favored by ducks; good source of nectar for butterflies and bees.

HABITAT: Low wet ground, swamps, bogs, streambanks, lake edges.

CHARACTERISTICS:
Height: Up to 9.8 ft.
Shade Tolerance: Shade
Drought Tolerance: Moderate
pH: 4.7-8.6
Bloom Period: Summer
Flower Color(s): White

Approx Seeds Per Lb: 134,000
Seeding Rate: Up to 0.6% of a mix; of a wetland mix

Woody Deciduous Shrub

Cornus amomum
SILKY DOGWOOD

Native
Thick, low vegetation provides excellent habitat for wildlife; abundant fruit is eaten by birds; blue berries in the fall.

HABITAT: Moist woods, fields, swamps, riparian areas.

CHARACTERISTICS:
Height: Up to 9.8 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Pollinator Value: Medium
pH: 5.0-7.0
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 12,000
Seeding Rate: Up to 6.3% of a mix

Woody Deciduous Tree

Cornus florida
FLOWERING DOGWOOD

Native
Ornamental tree for woodland borders; provides abundant food for birds; red fruit.

HABITAT: Woods, woodland edges.

CHARACTERISTICS:
Height: Up to 39 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
Pollinator Value: Medium
pH: 4.8-7.7
Bloom Period: Spring/Summer
Flower Color(s): Pink, White

Approx Seeds Per Lb: 4,500
Seeding Rate: Up to 5.6% of a mix

Woody Deciduous Shrub

Cornus racemosa
GRAY DOGWOOD

Native
Attractive rhizomatous shrub; thick, low vegetation provides excellent habitat for wildlife; fruit is a fall and winter food source for birds; white berries on red panicles.

HABITAT: Moist meadows, thickets, streambanks, roadsides.

CHARACTERISTICS:
Height: Up to 16.3 ft.
Shade Tolerance: Shade
Drought Tolerance: Moderate
Pollinator Value: High
pH: 4.8-7.4
Bloom Period: Summer
Flower Color(s): White

Approx Seeds Per Lb: 13,000
Seeding Rate: Up to 5.8% of a mix

Woody Deciduous Tree/Shrub

Cornus sericea
RED OSIER DOGWOOD

Native
Attractive stoloniferous shrub; thick, low vegetation provides excellent habitat for wildlife; bright red stems add winter color; abundant white fruit is eaten by birds.

HABITAT: Moist woods, moist meadows, thickets, riparian areas, swamps.

CHARACTERISTICS:
Height: Up to 9.8 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
Pollinator Value: Medium
pH: 4.8-7.5
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 18,000
Seeding Rate: Up to 4.2% of a mix

Woody Deciduous Shrub

Hamamelis virginiana
WITCHHAZEL

Native
Provides mid-story habitat; nuts provide fall food for wildlife.

HABITAT: Moist woods, brushy fields.

CHARACTERISTICS:
Height: Up to 16.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 4.5-6.2
Bloom Period: Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 11,000
Seeding Rate: Up to 6.8% of a mix

Woody Deciduous Shrub

Ilex verticillata
WINTERBERRY

Native
Red berries provide fall and winter food for wildlife.

HABITAT: Swamps, bogs, moist woods, wet shores.

CHARACTERISTICS:
Height: Up to 16.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Pollinator Value: Low
pH: 4.5-7.5
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 92,000
Seeding Rate: Up to 0.8% of a mix

Woody Deciduous Vine

Parthenocissus quinquefolia
VIRGINIA CREEPER

Native
High-growing vine; produces black fruit in the fall.

HABITAT: Woods, fields, woodland edges.

CHARACTERISTICS:
Height: Up to 49 ft.
Shade Tolerance: Moderate
Drought Tolerance: High
Pollinator Value: Low
pH: 5.0-7.5
Bloom Period: Spring/Summer
Flower Color(s): Green

Approx Seeds Per Lb: 18,000
Seeding Rate: Up to 1% of a mix

Woody Deciduous Tree

Platanus occidentalis
AMERICAN SYCAMORE

Native
Large riverbank tree; provides shade and cover for riparian shrubs and forbs.

HABITAT: Streambanks, low woods, floodplains.

CHARACTERISTICS:
Height: Up to 162.5 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 4.9-6.5
Bloom Period: Spring/Summer

Approx Seeds Per Lb: 192,000
Seeding Rate: Up to 0.1% of a mix

Woody Deciduous Tree

Prunus serotina
WILD BLACK CHERRY

Native

One of North America's most valuable hardwoods; provides food (fruit) and nesting sites for wildlife; source of food for caterpillars of 300 species of moths and butterflies eaten by birds; produces purplish-black berries in the fall.

HABITAT: Woods, fencerows.

CHARACTERISTICS:
Height: Up to 97.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: High
pH: 4.0-7.5
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 4,800
Seeding Rate: Up to 5.2% of a mix

Woody Deciduous Shrub

Prunus virginiana
CHOKECHERRY

Native

Creates intermediate to mid-story habitat for nesting; abundant fruit provides summer and fall food for birds; host to many native caterpillars that are also food for birds; dark red to purple berries in the summer and fall.

HABITAT: Rocky upland woods, roadsides.

CHARACTERISTICS:
Height: Up to 32.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: High
pH: 5.2-8.4
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 5,000
Seeding Rate: Up to 5% of a mix

Woody Deciduous Shrub

Rhus typhina
STAGHORN SUMAC

Native

Bark provides winter food for cottontail rabbits; red fruit is an emergency winter food source for birds, including wild turkey.

HABITAT: Dry open fields, roadsides, woodland edges.

CHARACTERISTICS:
Height: Up to 32.5 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Summer
Flower Color(s): Green

Approx Seeds Per Lb: 60,000
Seeding Rate: Up to 1.3% of a mix

Woody Deciduous Tree

Robinia pseudoacacia
BLACK LOCUST

Native

Provides nitrogen and cover for successive vegetation; good honey producer.

HABITAT: Reclamation sites, floodplains, thickets, fencerows; develops quickly in poor soils.

CHARACTERISTICS:
Height: Up to 97.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 4.6-8.2
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 24,000
Seeding Rate: Up to 1% of a mix

Woody Deciduous Tree

Salix amygdaloides
PEACHLEAF WILLOW

Native

Good bioengineering material; fibrous roots grow into the water table to stabilize the streambank; leaf drops replenish organic life in streams; provides shade and habitat for wildlife.

HABITAT: Riparian areas, wetlands.

CHARACTERISTICS:
Height: Up to 65 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 6.0-8.0
Bloom Period: Spring

Seeding Rate: Space live stakes on 3'-6' centers; may be used as larger live post plantings

Woody Deciduous Tree

Salix discolor
PUSSY WILLOW

Native

Good bioengineering material; early show of catkins is the first sign of spring; provides habitat for wildlife.

HABITAT: Wetlands, moist or wet woods.

CHARACTERISTICS:
Height: Up to 22.8 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
pH: 4.0-7.0
Bloom Period: Spring

Seeding Rate: Space live stakes on 3' centers

Woody Deciduous Shrub

Salix exigua ssp. interior
SANDBAR WILLOW

Native

Rhizomatous species; excellent bioengineering material; tolerant of ice and debris loading from streamflow; provides habitat for wildlife.

HABITAT: Sandbars, sandy or gravel streambanks, waterways.

CHARACTERISTICS:
Height: Up to 19.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 4.0-7.8
Bloom Period: Spring

Seeding Rate: Space live stakes on 3' centers

Woody Deciduous Shrub

Salix lucida
SHINING WILLOW

Native

Good bioengineering material; well-suited for wetland restoration; provides streambank erosion protection and habitat for wildlife.

HABITAT: Wetlands, streambanks.

CHARACTERISTICS:
Height: Up to 19.5 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 5.8-7.2
Bloom Period: Spring
Flower Color(s): Yellow

Seeding Rate: Space live stakes on 3' centers

Woody Deciduous Tree

Salix nigra
BLACK WILLOW

Native

Stems can be brittle, making this only a fair bioengineering material; leaf drops replenish organic life in streams; provides shade and habitat for wildlife.

HABITAT: Wet meadows, riparian areas.

CHARACTERISTICS:
Height: Up to 65 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 4.8-8.0
Bloom Period: Spring/Summer

Seeding Rate: Space live stakes on 3' centers

Woody Deciduous Shrub

Salix purpurea
STREAMCO WILLOW

Naturalized

Excellent early rooting bioengineering material; leaf drops replenish organic life in streams; provides shade to small streams and habitat for wildlife.

HABITAT: Streambanks, riparian areas.

CHARACTERISTICS:
Height: Up to 16.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: No
pH: 5.5-7.5
Bloom Period: Spring

Seeding Rate: Space live stakes on 3' centers

Woody Deciduous Shrub

Salix sericea
SILKY WILLOW

Native

Excellent bioengineering material; provides dense habitat for wildlife.

HABITAT: Wetlands, streambanks, riparian areas.

CHARACTERISTICS:
Height: Up to 13 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 5.2-7.0
Bloom Period: Spring

Seeding Rate: Space live stakes on 3' centers

Woody Deciduous Shrub

Salix x cottetii
DWARF WILLOW

Naturalized

Excellent bioengineering material; ideal for utility stream crossings; tolerant of ice and debris loading from streamflow; resilient species that will recover from vehicle disturbance; provides good habitat for wildlife.

HABITAT: Streambanks.

CHARACTERISTICS:
Height: Up to 8 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 5.5-7.5
Bloom Period: Spring

Seeding Rate: Space live stakes on 2' centers

Woody Deciduous Shrub

Sambucus canadensis
ELDERBERRY

Native
Purplish-black berries provide an excellent source of summer food for wildlife.

HABITAT: Woods, moist fields, streambanks, moist roadsides.

CHARACTERISTICS:
Height: Up to 13 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
Pollinator Value: Medium
pH: 5.0-8.9
Bloom Period: Summer
Flower Color(s): White, Yellow

Approx Seeds Per Lb: 292,000
Seeding Rate: Up to 0.3% of a mix

Woody Deciduous Shrub

Viburnum lentago
NANNYBERRY

Native
Dense foliage provides cover; bluish-black fruit is a food source for wildlife.

HABITAT: Woods, wetlands, roadsides.

CHARACTERISTICS:
Height: Up to 32.5 ft.
Shade Tolerance: Shade
Drought Tolerance: Low
Pollinator Value: Medium
pH: 5.0-7.0
Bloom Period: Spring/Summer
Flower Color(s): Pink, White

Approx Seeds Per Lb: 7,843
Seeding Rate: Up to 9.6% of a mix

Woody Deciduous Shrub

Viburnum dentatum
ARROWWOOD

Native
Provides late summer and fall food, cover, browse, and nesting sites for birds; produces bluish-black fruit.

HABITAT: Wet woods, swamps.

CHARACTERISTICS:
Height: Up to 16.3 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Pollinator Value: Medium
Bloom Period: Spring/Summer
Flower Color(s): Pink, White

Approx Seeds Per Lb: 20,000
Seeding Rate: Up to 3.8% of a mix; space rooted seedlings on 6' centers

Woody Deciduous Shrub

Viburnum trilobum
AMERICAN CRANBERRY

Native
Red berries provide early winter food for wildlife.

HABITAT: Wetlands, wet woods.

CHARACTERISTICS:
Height: Up to 16.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: No
Pollinator Value: Medium
pH: 5.5-7.5
Bloom Period: Spring/Summer
Flower Color(s): White

Approx Seeds Per Lb: 13,600
Seeding Rate: Up to 5.5% of a mix

Herbaceous Perennial

Arrhenatherum elatius ssp. elatius
TALL OATGRASS, 'RUFFNER'

Naturalized
Bunchgrass with a pronounced cool season growth habit; used for forage and as a cover crop; 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.

CHARACTERISTICS:
Height: Up to 6.5 ft.
Shade Tolerance: Moderate
Drought Tolerance: Moderate
pH: 5.0-7.0
Bloom Period: Summer

Approx Seeds Per Lb: 189,000
Seeding Rate: Up to 10 lb per acre when direct drilled; up to 20 lb per acre when broadcast seeded

Herbaceous Annual

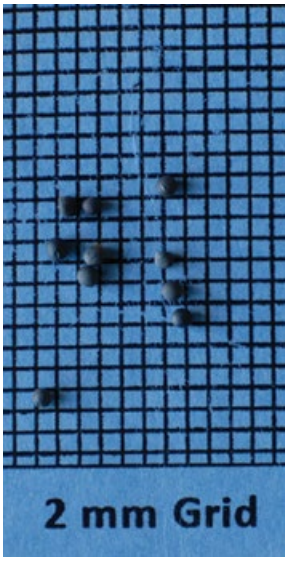
Avena sativa
OATS

Naturalized
Small bunch-type cereal grain for human and animal consumption; 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.

CHARACTERISTICS:
Height: Up to 4 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.3-8.5
Bloom Period: Summer

Approx Seeds Per Lb: 19,000
Seeding Rate: Up to 90 lb per acre as a grain crop; up to 30 lb per acre as a cover crop with a perennial planting



Herbaceous Annual/Biennial

Brassica napus
FORAGE BRASSICA, 'WINFRED'

Naturalized
Blooms in the spring if planted in the fall; blooms 70 days post-planting if planted in the spring; leafy growth is palatable for deer, cattle, and sheep.

HABITAT: Food plots, forage (pastures)

CHARACTERISTICS:
Height: Up to 1.8 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.5-7.5
Bloom Period: Spring
Flower Color(s): Yellow

Approx Seeds Per Lb: 157,000
Seeding Rate: Up to 8 lb per acre when direct drilled

Herbaceous Annual

Brassica napus
FORAGE RAPE, 'BONAR'

Naturalized
Late maturing, high yielding forage rape; blooms in the spring if planted in the fall; blooms 70 days post-planting if planted in the spring; 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:
Height: Up to 2.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 6.0-7.2
Bloom Period: Spring/Summer

Seeding Rate: Up to 5 lb per acre when direct drilled

Herbaceous Annual

Brassica rapa
FORAGE TURNIP, 'APPIN'

Naturalized
Also referred to as 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:
Height: Up to 3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Bloom Period: Spring

Approx Seeds Per Lb: 192,800
Seeding Rate: Up to 5 lb per acre when direct drilled

Herbaceous Annual/Biennial

Brassica rapa
PURPLE TOP TURNIP

Naturalized
Tap-rooted species; leaves are high in protein; highly palatable and digestible for deer.

HABITAT: Grows best in moderately drained, medium to high fertility soils.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
Bloom Period: Spring

Seeding Rate: Up to 4 lb per acre when direct drilled

Herbaceous Perennial

Cichorium spp.
CHICORY

Naturalized
High-yielding tap-rooted species; not for ornamental purposes; selected for intense grazing, less bolting, and better disease resistance; 20% protein; suitable for all wildlife and production livestock; excellent forage quality.

HABITAT: Grows best in moderately drained, medium to high fertility soils.

CHARACTERISTICS:
Height: Up to 2 ft.
Shade Tolerance: Unknown
Drought Tolerance: High
pH: 5.6-6.5
Bloom Period: Summer

Seeding Rate: Up to 2 lb per acre in a mix; up to 5 lb per acre alone

Herbaceous Annual

Echinochloa crusgalli var. frumentacea
JAPANESE MILLET

Naturalized
Warm season bunchgrass; used for erosion control and as a fast-growing summer companion crop; seed in the spring or summer; after growth, may be flooded to a depth of 18" during waterfowl migration season; provides food for wildlife and a favorite of waterfowl.

HABITAT: Well-drained soils, but thrives in wetlands.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 4.7-7.4
Bloom Period: Summer

Approx Seeds Per Lb: 143,000
Seeding Rate: Up to 30 lb per acre as a grain crop; up to 10 lb per acre as a companion crop

Herbaceous Annual

Fagopyrum esculentum
BUCKWHEAT

Naturalized
Tap-rooted, renovation grain cover crop for low productivity land; builds organic matter that decays rapidly 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:
Height: Up to 3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 5.0-8.5
Bloom Period: Summer

Approx Seeds Per Lb: 20,000
Seeding Rate: Up to 75 lb per acre alone (not recommended as a companion crop)

Herbaceous Perennial

Festuca elatior x Lolium perenne
FESTULOLIUM, 'DUO'

Naturalized
Endophyte-free, high sugar cross between meadow fescue and a tetraploid perennial ryegrass; excellent palatability.

HABITAT: Fertile soils.

CHARACTERISTICS:
Height: Up to 2.7 ft.
Shade Tolerance: Unknown
Drought Tolerance: Moderate
Bloom Period: Summer

Approx Seeds Per Lb: 227,000
Seeding Rate: Up to 25 lb per acre in a mix; up to 30 lb per acre alone

Herbaceous Annual

Helianthus spp.
PEREDOVIK SUNFLOWER

Naturalized
Grain is used for oil and meal; meal provides quality livestock feed; extremely popular food source for birds; may be left in the field for winter bird food.

HABITAT: Food plots

CHARACTERISTICS:
Height: Up to 9.8 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 6.0-7.5
Bloom Period: Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 7,000
Seeding Rate: Up to 10% of a food plot mix; up to 20 lb per acre alone or 0.5 lb per 1,000 sq ft

Herbaceous Perennial
Legume

Medicago sativa
ALFALFA

Naturalized
Hardy component of right-of-way mixes; grows quickly after mowing; good livestock and wildlife forage.

HABITAT: Well-drained high fertility soils.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 6.0-8.5
Bloom Period: Spring
Flower Color(s): Purple

Approx Seeds Per Lb: 227,000
Seeding Rate: Up to 10 lb per acre in a mix; up to 20 lb per acre alone

Herbaceous Biennial Legume

Melilotus alba
WHITE BLOSSOM SWEETCLOVER

Naturalized
Tap-rooted legume; source of nectar and pollen for bees.

HABITAT: Roadsides, waste places.

CHARACTERISTICS:
Height: Up to 9.8 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 259,000
Seeding Rate: Up to 5 lb per acre in a mix; up to 20 lb per acre alone

Herbaceous Biennial Legume

Melilotus officinalis
YELLOW BLOSSOM SWEETCLOVER

Naturalized
Tap-rooted legume; builds soil organic matter on low fertility sites; source of nectar and pollen for honeybees.

HABITAT: Mine spoil, roadsides, waste places.

CHARACTERISTICS:
Height: Up to 6.5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 5.0-8.0
Bloom Period: Summer
Flower Color(s): Yellow

Approx Seeds Per Lb: 259,000
Seeding Rate: Up to 5 lb per acre in a mix; up to 20 lb per acre alone

Herbaceous Perennial Legume

Onobrychis viciifolia
SAINFOIN

Naturalized
Provides forage for deer, elk, cattle, and sheep; do not graze for two seasons following planting.

HABITAT: Hay fields, wildlife food plots; less persistent in moist soils.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 6.0-8.5
Bloom Period: Spring/Summer
Flower Color(s): Red

Approx Seeds Per Lb: 30,000
Seeding Rate: Up to 25% of a mix; up to 34 lb per acre alone

Herbaceous Annual

Panicum miliaceum
WHITE PROSO MILLET

Naturalized
Grain for human and livestock consumption; seeds are one of the most attractive foods for birds.

HABITAT: Well-drained loamy soils; tolerates various soil conditions.

CHARACTERISTICS:
Height: Up to 3.3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.8-6.8
Bloom Period: Summer

Seeding Rate: Up to 35% of a mix; up to 20 lb per acre alone

Herbaceous Perennial

Phleum pratense
TIMOTHY

Naturalized
Bunch-type grass; excellent forage for horses and other livestock.

HABITAT: Fields, open areas; moderate fertility requirements.

CHARACTERISTICS:
Height: Up to 4.9 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 5.5-7.0
Bloom Period: Summer/Fall
Flower Color(s): Yellow

Approx Seeds Per Lb: 1,230,000
Seeding Rate: Up to 90% of a mix; up to 10 lb per acre alone

Herbaceous Annual Legume

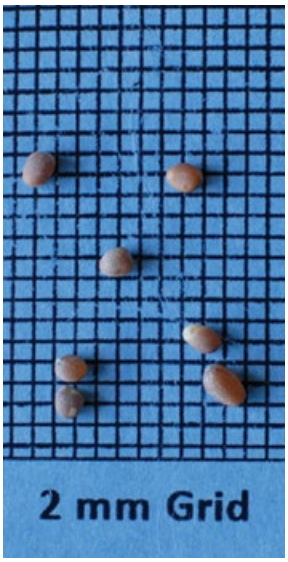
Pisum arvense
AUSTRIAN WINTER PEA

Naturalized
Cold-tolerant cool season legume; used for erosion control as a cover crop or temporary hay crop; 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:
Height: Up to 4 ft.
Shade Tolerance: Unknown
Drought Tolerance: Unknown
Bloom Period: Spring

Seeding Rate: Up to 50% of a mix; up to 60 lb per acre alone



Herbaceous Annual

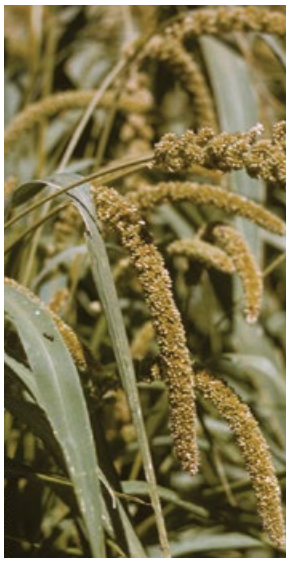
Raphanus sativus
RADISH, 'GROUNDHOG'

Naturalized
Species with a taproot that can reach a depth of 6'; root exudates help to suppress nematodes; plant at least 60 days prior to frost.

HABITAT: Cultivated; occasionally escapes to roadsides or old fields.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Unknown
Bloom Period: Spring
Flower Color(s): Pink, Purple, White

Seeding Rate: Up to 10 lb per acre drilled with up to 30 lb per acre of grain rye



Herbaceous Annual

Setaria italica
GERMAN MILLET

Naturalized
Warm season bunchgrass; used as a cover crop and for pasture and haylage; good supplemental hay for cattle and sheep; seed in the spring or summer; provides food for wildlife.

HABITAT: Grows best in well-drained loamy soils with low moisture.

CHARACTERISTICS:
Height: Up to 5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.3-6.9
Bloom Period: Summer
Flower Color(s): White

Approx Seeds Per Lb: 217,000
Seeding Rate: Up to 30 lb per acre as a grain crop; up to 10 lb per acre as a cover crop

Herbaceous Perennial

Sanguisorba minor
SMALL BURNET

Naturalized
Very attractive to deer for its herbal taste.

HABITAT: Sunny flatlands to open slopes in well-drained soils.

CHARACTERISTICS:
Height: Up to 2.3 ft.
Shade Tolerance: Moderate
Drought Tolerance: Low
pH: 6.0-8.0
Bloom Period: Spring/Summer
Flower Color(s): Red

Approx Seeds Per Lb: 48,700
Seeding Rate: Up to 10% of a food plot mix; up to 2 lb per acre with clover

Herbaceous Annual

Sorghum spp.
SORGHUM/RED MILO

Naturalized
Early maturing species; most attractive to mourning doves in the fall; makes emergency food for turkey, pheasants, and deer during the winter.

HABITAT: Cultivated fields.

CHARACTERISTICS:
Height: Up to 5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: High
pH: 5.5-7.5
Bloom Period: Summer

Approx Seeds Per Lb: 27,000
Seeding Rate: Up to 50% of a mix; up to 30 lb per acre with a grain drill or when broadcast seeded

Herbaceous Annual

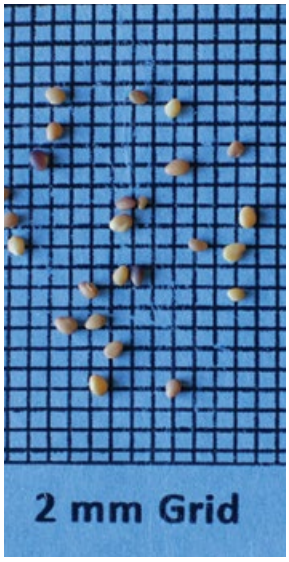
Secale cereale
RYE

Naturalized
Bunch-type winter companion or cover crop; used 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.

HABITAT: More productive than other cereals in infertile sandy or acidic soils.

CHARACTERISTICS:
Height: Up to 5 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 4.5-8.2
Bloom Period: Spring
Flower Color(s): Yellow

Approx Seeds Per Lb: 18,000
Seeding Rate: Up to 90 lb per acre as a grain crop; up to 30 lb per acre as a cover crop with a perennial planting



Herbaceous Annual Legume

Trifolium alexandrinum
BERSEEM CLOVER

Naturalized
Forage legume for deer and livestock.

HABITAT: Hay fields, food plots.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 6.5-8.0
Bloom Period: Summer
Flower Color(s): White

Approx Seeds Per Lb: 207,000
Seeding Rate: Up to 20% in a mix with alfalfa; up to 14 lb per acre drill seeded

Herbaceous Perennial Legume

Trifolium hybridum
ALSIKE CLOVER

Naturalized
Winter-hardy legume; provides forage for domestic animals and food and cover for wildlife.

HABITAT: Meadows, disturbed areas; tolerates low fertility.

CHARACTERISTICS:
Height: Up to 4 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.6-7.5
Bloom Period: Spring/Summer
Flower Color(s): Pink, White

Approx Seeds Per Lb: 680,000
Seeding Rate: Up to 25% of a mix; up to 10 lb per acre alone

Herbaceous Perennial Legume

Trifolium repens
WHITE CLOVER

Naturalized
Good, stoloniferous, erosion control cover crop; grows again after mowing or grazing; highly palatable as food for wildlife and domestic animals; source of food for honeybees.

HABITAT: Moist soils, lawns, field borders.

CHARACTERISTICS:
Height: Up to 1 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.2-8.0
Bloom Period: Summer/Fall
Flower Color(s): White

Approx Seeds Per Lb: 712,000
Seeding Rate: Up to 10% of a mix; up to 10 lb per acre alone

Herbaceous Annual Legume

Trifolium incarnatum
CRIMSON CLOVER

Naturalized
Used as a winter companion or cover crop in pasture, hay, and silage mixes and for erosion control; seed in the fall or early spring south of I-64; plow under before the next crop is planted; provides food for honeybees.

HABITAT: Sandy and clay-like soils.

CHARACTERISTICS:
Height: Up to 2.6 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 6.0-7.0
Bloom Period: Spring/Summer
Flower Color(s): Red

Approx Seeds Per Lb: 150,000
Seeding Rate: Up to 10 lb per acre as a companion crop with a wildflower mix; up to 30 lb per acre alone

Herbaceous Annual

Urochloa ramosa
BROWN TOP MILLET

Naturalized
Short-lived species 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.

CHARACTERISTICS:
Height: Up to 3 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 5.5-6.9
Bloom Period: Summer

Approx Seeds Per Lb: 75,000
Seeding Rate: Up to 20 lb per acre when direct drilled; up to 30 lb per acre when broadcast seeded; up to 10 lb per acre as a cover crop

Herbaceous Perennial Legume

Trifolium pratense
RED CLOVER

Naturalized
Short-lived legume; used as hay, pasture, and silage for domestic animals, or as 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.

CHARACTERISTICS:
Height: Up to 2.6 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Low
pH: 6.0-7.6
Bloom Period: Spring/Summer
Flower Color(s): Pink

Approx Seeds Per Lb: 272,000
Seeding Rate: Up to 25% of a mix; up to 10 lb per acre alone

Herbaceous Biennial Legume

Vicia villosa
HAIRY VETCH

Naturalized
Builds nitrogen and organic matter in fields and gardens; seed in early fall after row crop is harvested; likely to freeze at -30 degrees F.

HABITAT: Well-drained soils.

CHARACTERISTICS:
Height: Up to 7 ft.
Shade Tolerance: Full Sun
Drought Tolerance: Moderate
pH: 6.0-7.5
Bloom Period: Spring
Flower Color(s): Purple

Approx Seeds Per Lb: 16,000
Seeding Rate: Up to 10 lb per acre in a mix with up to 50 lb per acre of grain rye

INDEX TO SCIENTIFIC/COMMON NAMES

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ACKNOWLEDGMENTS

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Missouri Botanical Garden Plant Finder Tool.

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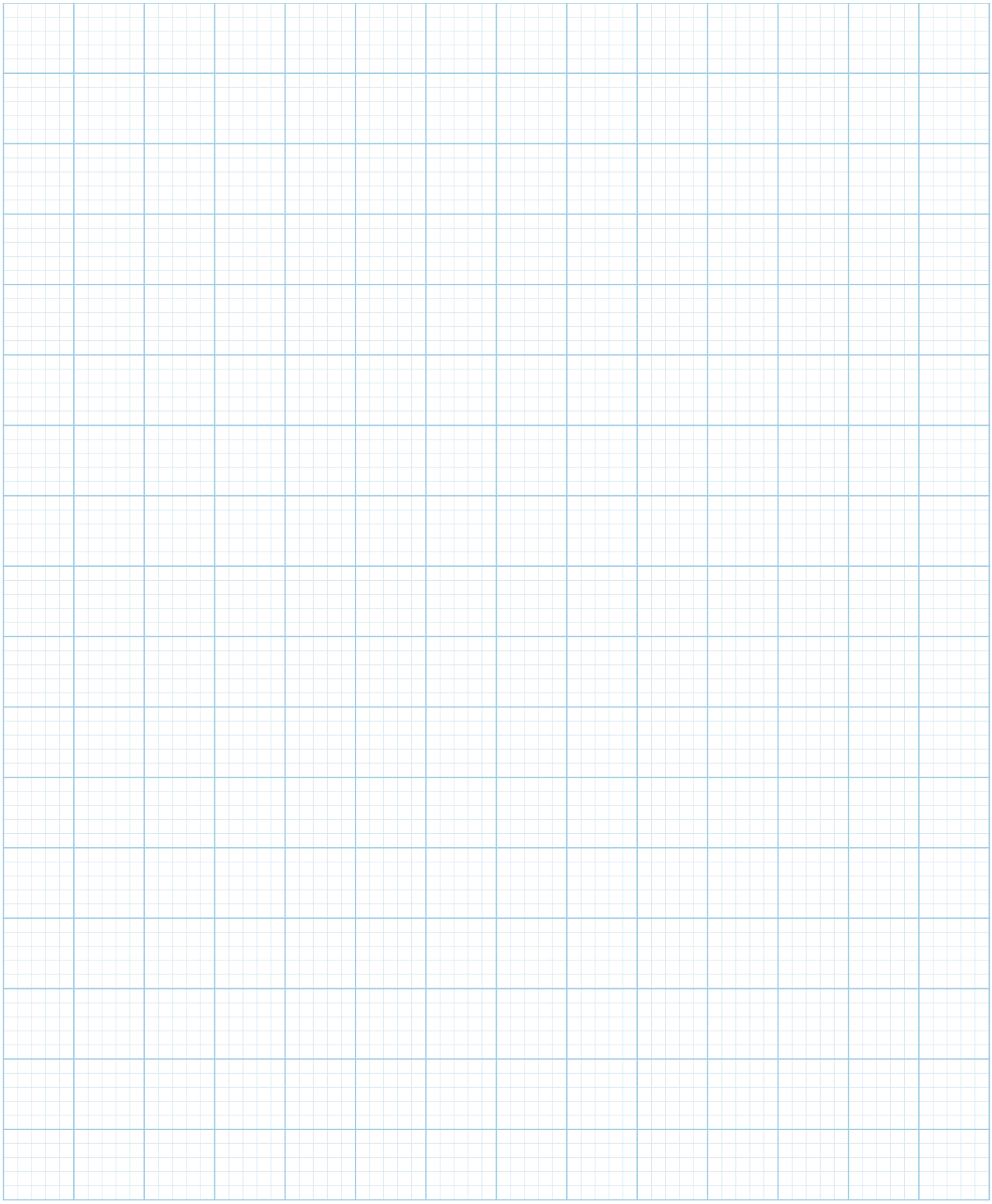

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