

GUIDELINES FOR ESTABLISHING A NATIVE PLANTING BY SEED

Successful establishment of a native planting requires proper site preparation, the right plant selection based on the conditions of your site, the best method and time of installation, and a diligent maintenance schedule for the first three years after installation. These guidelines should be helpful in planning and implementing a successful native plant project.

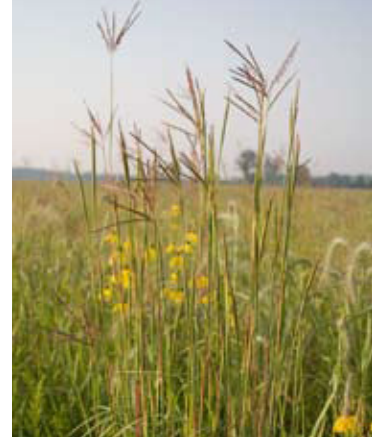
STEP 1: Project Planning & Design

The time you take to properly plan and design your project will pay off and result in a more successful and long lasting native plant establishment which will offer the environmental, economical and aesthetic benefits you are trying to achieve. The tips listed below will be helpful as you plan your project.

Determine the site conditions

- **Soil type:** Look at and feel the soil and determine whether you have sand, loam, clay, or organic soil. Sandy soil is gritty and will not stick together or clod. Loamy soils stick together, but will easily crumble. Clay soil is sticky with little or no grittiness and will form a hard clod that will not easily crumble. Organic soil, or muck, is dark black in color, is frequently mixed with mineral soil (sand, loam or clay) and occurs on former wetlands. Be sure to choose species based on your soil type.
- **Hydrology or Moisture level:** Determine if the site is dry, medium or wet in nature. Does the area puddle and retain water or does water drain quickly after rainfall? Is the site in a low-lying area or upland? Is the site near a river, lake or spring? Choose species that would thrive at your site. Species composition differs greatly between dry prairie, mesic prairie, wet prairie, and wetland habitats.
- **Topography:** Determine the slope of the site. The slope may influence the moisture levels and/or sun exposure. Keep in mind that steeper slopes may limit the methods of installation.
- **Sun exposure:** Be aware of how much sun the area will receive. Most sun-loving plants need at least a half-day of sun. If you have less than a half-day of sun, you need to select plants that tolerate part-sun or shade.
- **Existing vegetation:** The site should be inspected closely by someone familiar with the native and non-native plant species found in the area. If specific native species are present in sufficient numbers, the site may

need to be handled as a restoration project, requiring appropriate methods to protect the existing plants. If the site has invasive species present, prepare a plan for the removal of these species prior to the natives being introduced. This is a critical element that should not be overlooked.



Research typical plant species in the area

It is a good idea to research the history of the land prior to European settlement. Maps are available on the Michigan Natural Features Inventory website at <http://web4.msue.msu.edu/mnfi/data/veg1800.cfm>. You should be able to determine the plant community that existed prior to development which would be a good clue as to what plant species will survive on your property. If similar natural areas are present near your site it may be helpful to determine what native species are found there.

Select proper species

Choose a mix of wildflowers and grasses based on your research. Select species that are suitable for your site based on soil type, hydrology, and sun exposure. This will be critical for the success of your native planting. Add as many species as possible for greater diversity. A well-designed mix will contain flowers that bloom at different times throughout the season, will include warm season grasses for structure and diversity, and will attract a variety of wildlife. Your project size, objectives and budget will help determine the level of seed mix that is appropriate for your site.

Obtaining native seed

- **Local Genotype:** Consider purchasing native seed and plants from local or regional sources (Michigan or Great Lakes). Local genotypes are recommended because they are naturally adapted to the area and preserve our local diversity. Members of the Michigan Native Plant Producers Association (MNPPA) produce and provide native seed and plugs that originate from Michigan. MNPPA members are committed to enhancing the diversity and health of Michigan's unique natural heritage.

PLANTING GUIDELINES *continued*

- **Seeding Rates:** You will need to determine the size of the area, in acres or square feet. This will be very important so that you order a sufficient amount of seed. There are 43,560 square feet per acre. You should order a little more seed just to be safe (perhaps 10%). Seeding rates of grasses should range from 3 to 7 lbs per acre, and forbs should range from ½ to 4 lbs per acre, for a total mix of 6–10 lbs of seed per acre. Seeding rates depend on site conditions, preferred showiness, and budget.
- **Cover Crop:** Since natives are slow to germinate and establish, annual cover crops such as seed oats or annual rye, which germinate quickly, are often used to help stabilize the soil and compete against weeds the first year. Seeding rates of the cover crop range from 10 to 40 lbs per acre. This cover crop also acts as a carrier, making the native seed easier to disperse.
- **Pure Live Seed (PLS):** Native seed tends to be quite bulky or fluffy, and may contain a fair amount of inert material. The germination rates can be quite variable, sometimes as low as 50% or less. For these reasons native seed is sometimes sold on a Pure Live Seed (PLS) basis. This means that enough bulk seed is provided to the purchaser to ensure that the correct amount of viable seed is provided. For example, if a customer orders 10 lbs of a species that is only 50% PLS, 20 bulk lbs of the seed would be provided, and the customer would be charged for the 10 PLS lbs of actual, viable seed. Most suppliers sell native grasses this way, and some also do this for native forbs.

Plan the appropriate timing of installation

Planting can be done in the spring, or as a dormant seeding in late fall or winter. Each has its own advantages and disadvantages. As you think about scheduling installation, keep in mind that you should plan on at least a few months and up to 2 years of preparation before seed installation.

- **Spring seeding:** If planting in spring, native seed should be planted between April 15 and June 15. A spring seeding will generally favor the warm season grass species over the forb species during the first year. Many of the forb seeds that do not germinate the first season will appear the second year.
- **Dormant seeding (late fall – winter):** Dormant seeding is timed so that seeds will not germinate until the following spring. Dormant seeding can be done anytime when there is no snow on the ground from late-fall to

mid-winter (mid October – February). Most people choose to plant mid-October through late November to avoid planting in frozen soil. It can work after the ground freezes if a no-till drill is used to cut into the frozen soil. Planting in the winter may be a good idea in areas that are too wet during the rest of the year, or when areas need to be supplemented with new seed. Dormant seeding is generally more favorable to forb species than to grass species.

Caution: Avoid planting in the summer and early fall (July – September). There is a significant risk of heat and drought during the summer months and you might waste a lot of time and money in seed and installation. The soil is warm enough in early-fall for germination to take place, but root and plant growth on the newly sprouted natives is minimal. Because most of these natives are warm season plants, plant growth slows or stops in mid-fall. The result is that the natives are not developed adequately to survive the winter cold temperatures and may experience frost heaving. Often winter survival is poor. Fall plantings should be delayed until the air and soil temperatures have cooled off — usually after mid-October.

STEP 2: Site Preparation

Arguably the most important step in establishing a successful planting is proper site preparation. You may feel hesitant about delaying the installation, but the site preparation is critical for achieving a successful planting. Many people underestimate the amount of weeds in the seed bank. Eradicating the existing non-native and/or invasive species is vital before installation of the native seeds.

You should plan on preparing your site at least one full growing season before installation, and depending on the species on the site, it may require up to two years of preparation. If this process is not done thoroughly, aggressive non-native species will compete (and may ultimately win) against the native plants you wish to establish.

The appropriate site preparation techniques will be dependent on the desirable and undesirable vegetation that already exist on the site. If you determine there is a significant amount of desirable plant life with relatively few non-native invasive species, you should consider restoring or enhancing the site. Remove unwanted species by pulling, spot herbiciding, or burning, and then inter-seed with native seed. If there is too much undesirable vegetation to make rehabilitation worthwhile, one should consider starting fresh. You will need to proceed by eliminating all existing vegetation by either applying herbicides, smothering, cultivating the area, or a combination of these methods.



Site preparation for wetland mitigation, Cincinnati, OH

Eradicating existing vegetation

- **Herbiciding:** If your site is quite large or if there is little or no native vegetation naturally occurring, careful application of herbicide can be an effective tool for vegetation removal.

The number of herbicide treatments will depend on the condition of the site. Agricultural fields of corn or soybeans may only require one or two treatments late-spring, prior to installation. Old fields (fallow or pasture fields) may require several treatments per year for one or two years before installation. All weed species should be eliminated before installation. Use a broad-spectrum, non-persistent glyphosate herbicide. If you have a problem with woody shrubs, vines, or perennial weeds such as Canada Thistle, you may consider adding a broad-leaf herbicide such as 2,4-D to the glyphosate. Always be certain to read the label and follow the manufacturer's instructions when using herbicides.

Caution: Do not plant native seed in fields that have been treated with Atrazine within the last 2 years. Native warm season grasses such as the Bluestems, Indian Grass, and Switchgrass can tolerate Atrazine, however, most wildflower species will not survive. Read herbicide labels carefully to determine time limitations before reseeding after herbicide treatments.

- **Smothering:** On small areas, such as portions of your lawn, you can smother and kill the vegetation without the use of chemical herbicides. Cover the vegetation with black landscaping fabric, leaf compost, or grass clippings, and leave in place for an entire growing season.
- **Cultivating:** Cultivation is labor intensive, and often brings up weed seeds, but you can avoid the use of chemicals if you are willing to cultivate the field beginning in spring and continuing through fall. Cultivate every 2–3 weeks at a depth of 4–5 inches using a harrow, springtooth or rototiller to destroy the roots and kill the weeds. Waiting longer than 2–3 weeks will allow perennial weeds to resprout. Plants with deep rooted rhizomes, such as Canada Thistle and Quackgrass may not be completely eliminated using cultivation for a single season, and may require herbicide treatments in conjunction with the cultivation. After most weeds have been eliminated, the cultivation depth should be made shallow for several months prior to seeding, as a firm soil bed is necessary for native establishment.

Converting lawns

If you wish to convert a section of your lawn to prairie or native garden, you could smother the sod for 2–3 months, cut the sod, or treat with herbicide. An effective and practical method for naturalizing a large area of lawn is to treat with a glyphosate herbicide in mid-spring when the grass is actively growing. Repeat herbicide in summer when some grass reemerges and then introduce seed (in late-fall or the next spring) into the dead sod using a native no-till drill. You could hand broadcast the seed if you first go over the dead sod with a dethatcher to bring up some loose soil. Be sure to set the dethatcher deep enough to bring up loose soil.

Preparing the seed bed

A level, firm seed bed that is relatively free of debris is recommended for proper installation. If your soil is soft and loose, it should be packed down with a heavy roller or culti-packer before and after installation. A good test method for adequate soil firmness is to walk over the seed bed and observe your footprints. If your print sinks in more than ¼ or ½ inch, the seed bed is too soft. If trees have been taken out, be sure to level the ruts and remove limbs and roots prior to seeding. This saves time during installation and prevents damage to equipment.

If the area to be seeded doesn't have much vegetation or old crop debris, most native no-till drills can successfully operate without clogging. Old soybean stubble usually presents little problem, however old corn stalk debris can plug the drill.

STEP 3: Installation

The method of installation will depend on the size of the planting, the condition of the soil, and your budget.

Seeding Methods

- **Hand-broadcasting:** For areas less than an acre or two, you can broadcast the seed by hand if the seed bed is prepared correctly. The mixed native seed can simply be put into a bucket and scattered by hand. Since it is challenging to distribute small quantities of native seed over an area, it is recommended to bulk up the seed mix by using a filler material such as cracked corn, sawdust, peat moss, or vermiculite. Mixed thoroughly with the native seed, it will aid in giving you more quantity to distribute over the site. Cover crop seed, such as annual rye or seed oats also aid in "bulking up" the seed, making it more flowable.

PLANTING GUIDELINES *continued*

Hand crank seeders can be used to scatter seed although some of the native grass and forb seeds are quite fluffy and will not flow through the dispersal holes. If you use a hand crank seeder, you may have to continually stir the seed with your hand to keep it flowing through the dispersal openings.

The goal is to distribute the seed evenly. Scatter the seed carefully and be sure not to run out before covering the entire area. A recommended strategy to accurately distribute the seed would be to divide your total seed mix in half and scatter the first half of the seed over the entire area, then scatter the second half of the mix over the area perpendicular to the first pass. If it is too windy, waiting for wind to decrease is recommended.

The seed should immediately be rolled or raked into the top surface of the soil for best results. If the area is too large to rake by hand, use a tractor or truck to pull a light piece of fence or very light drag.

- **Native No-till Drill:** For larger areas, areas with hard ground, or areas with existing vegetation or debris, a native no-till seed drill is recommended. Truax and Great Plains are the primary brands available. No-till drills cause minimal soil disturbance, and do not require the soil to be tilled before planting. These drills plant seed into rows by opening a shallow groove in the soil. A Truax drill has three seed boxes, one for fluffy seeds (most grasses), another box for very small seeds (many forbs), and a third box for the cover crop or large native seeds.

Calibration of the drill is critical and complicated and requires continual monitoring during installation. Drill adjustment for proper depth of seed placement is also vitally important; adjustments to the drill need to be made on a site-by-site basis, and sometimes with differing soil conditions within the same site. You may wish to hire a firm who specializes in native seed drilling. Many seed dollars are wasted and many projects unsuccessful due to improper knowledge of drill operation.

**No-till drill
seed box**



**Prairie
installation**



Streambank restoration after installation of seed and erosion blankets.

- **Culti-packer native seeder:** For bare soil, you could use a native culti-packer seeder. A culti-packer seeder firms the seed bed first, drops the seed, and then a roller packs the soil to ensure good seed-to-soil contact. These machines are less common, but are preferable to the no-till drill when planting into bare soils.

Watering

Watering is not necessary after fall plantings. Watering following a spring seeding is not essential either, however, the seeds may benefit from watering during the first 3 to 6 weeks after a spring planting, especially if no rain has fallen for 7–10 days. If watering is practical for your site and you decide to water, you will need to continue to water periodically to keep the soil from drying out completely while plant seedlings are establishing. In a dry spring, a quicker establishment may result with supplemental watering.

STEP 4: Post-Planting Management

Controlling weeds is the biggest priority the first three years after an area has been planted with native seed. The native seed you plant will only grow a few inches the first year; weeds will grow much thicker and taller than the natives and can shade out the native seedlings. Diligent weeding the first three years will greatly reduce the amount of weeds you have on your native establishment. Once the native species mature, they should be able to crowd out the weeds on their own.

First Year

Mowing is the primary tool for controlling weeds the first year. Keep the vegetation mowed to a height of 4–6 inches and mow when the vegetation reaches 10–12

inches. This may require mowing about once a month depending on the amount of rainfall. Mowing keeps the weeds from becoming too tall and shading out the natives and it also prohibits the weeds from setting and dropping new seed into the soil. Stop mowing at the end of the growing season (September). Some additional weed growth at this time of year will help protect the seedlings during their first winter.

Hand pulling weeds generally is not recommended the first year because of the risk of pulling out the seedlings and bringing up new weed seeds to sprout. In general, spraying herbicide on a native planting is discouraged. You can, however, consider spot treating with herbicide the aggressive weeds, such as Canada Thistle or Spotted Knapweed that can become very invasive if allowed to persist. Spot spraying needs to be done very carefully by a person who has experience in the use of herbicides as well as in the identification of all of the plant species present. The proper herbicides and rates depend upon the target species as well as the season of the year.

For some plant species hand-wicking with herbicide may be desirable. Mix up a strong solution of the appropriate herbicide and put the solution in a spray bottle or other non-spill container. Wear rubber gloves and put an absorbent cotton glove over the rubber glove on one hand, carefully saturate the cotton glove, and apply the herbicide to the leaves and stems of the plant. Try not to touch any desirable seedlings. It is imperative to closely monitor the gloves to make sure no tears in the rubber gloves allow the herbicide to contact the skin of the applicator.

Second Year

Weeds will often dominate in the second year as well, so continuing to mow is vital. You should mow the vegetation during the second year to a height of about 8 inches. Mow when vegetation reaches 12–18 inches. Some of the natives may be up and blooming but it is worth sacrificing the flowers at this stage to achieve a more successful native planting in the long term. The natives will not be killed by this mowing.

Hand pulling weeds and spot treating with herbicide may be needed and beneficial during the second year. Common competitive weeds in the second year include Spotted Knapweed, Canada Thistle, Burdock, Wild Parsnip, Sweet Clover, and Queen Anne's Lace. Mowing them when they are in full bloom will set them back and prevent them from setting and dropping seeds.

Burning the second year is not usually recommended; normally there is not enough fuel to sustain a fire and the young plants may be damaged by burning.

Third Year and Beyond

Burning the third year, and on a regular basis in future years, is the most important tool to manage the weeds on your property. If burning doesn't occur, a thatch layer can accumulate on the ground and cause poor growth or cause plants to die out completely. Prescribed burning kills or at least reduces weed growth and also stimulates new growth of the native species.

Spring burns in March or April are most effective for most plantings. Only experienced, trained crews should perform the prescribed burn. Be sure to check with your local fire regulations and obtain the appropriate permits. A wide path (10–15 feet) around the perimeter of the native planting, called a burn lane, acts as a firebreak and should be kept mowed throughout the growing season.

After the third year, burning should take place every one to three years. Consider a burn rotation in which only $\frac{1}{2}$ or $\frac{1}{3}$ of the area is burned each year. This will protect over-wintering butterflies, moths, as well as early nesting birds by leaving vital habitat for them to utilize.

If burning is not allowed in your area or it is not an option for other reasons, annual mowing, although not as effective, can be a good substitute. Mow down close to the surface (6 inches) in early spring (February through April). Note that some ground-nesting grassland birds nest as early as April, so the earlier the better.

Spot treating with herbicide may still be needed if weeds persist, however, once your natives are established, they should require minimum maintenance.



Controlled burn