Guide to Establishing a Native Seed Mix

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OTTAWA CONSERVATION DISTRICT

Visit www.ottawacd.org/store/ to purchase Pheasants Forever Michigan native seed mixes.

Original guidance document was created by Prairie Moon Nursery in Winona, MN.

Establishing a native plant seed mix is a long-term investment in your landscape and requires some planning. The range of possible site conditions which may be encountered make it impossible to write standard instructions, but these guidelines have the basic information needed for successful establishment in most situations.

When to Plant

TIME	ADVANTAGES	DISADVANTAGES
FALL *October 20 up until the soil is partially frozen. Dates vary by location.*	• Seed overwinters and comes up in spring on its natural schedule when conditions are right. This breaks most seed dormancies naturally over winter. • Flowers have increased spring germination with fall seeding. • Recommended for droughty, sandy soils. A fall seeding allows an earlier germination time in spring, when moisture levels are optimal and before the summer heat. • Recommended for clay and wet soils. Clay and wet soils are easier to work in the fall than in spring. Fall seeding on clay and wet soils encourages earlier germination and better root development prior to the onset of summer. • Fall seedings do not require watering, as the seeding is dormant.	• Warm season grass seed typically exhibits reduced germination. • There is no opportunity for early spring weed control by cultivation or herbiciding. • Be careful on erosion prone sites. Plant erosion prone sites paired with a nurse crop of annual rye or oats to help hold the soil over the fall and winter. Annual Rye is planted at a rate of 15 lbs. per acre in fall (and 5 lbs. per acre in spring).
EARLY SPRING *March – April. Dates vary by location.*	• Results in better flower germination than in late spring. • Spring rains make watering less critical. • Warm season grass seed has better germination than in fall. • Best option for sandy soils if unable to plant in fall.	• Limited opportunity for early cool season weed control. • Clay soils are too wet in the spring, and by the time they can safely be worked, the heat and drought of summer are upon us, which can reduce the success of seedling survival. • Not recommended for heavy soils, as it is difficult to work these soils if wet in spring.
LATE SPRING *May – June. Dates vary by location.*	• More time for good soil preparation - particularly important on heavy soils. • More time for spring weed control prior to seeding. • Optimal time for ideal germination of warm season grasses.	• Increased chance for low moisture conditions or the onset of drought later in season. • Reduced germination of some flower species.

STEP 1: Preparing the Site

To prepare your site for planting, you must first eliminate the existing vegetation, which may consist of perennial weeds, annual weeds, or both. Existing weeds will compete with prairie seeds for nutrients, moisture and sunlight. Although it is nearly impossible to remove all annual weed seeds from the seed bank stored in the soil, it is crucial to kill and/or remove perennial weeds and rhizomes before planting. Perennial weeds such as Quackgrass, Bromegrass, Canada Thistle, Canada Goldenrod and Clover can inhibit the growth and development of your prairie. Eliminating all perennial weeds prior to seeding is essential to success with your prairie. Site preparation options may vary according to the vegetation type that you are converting to a prairie planting and include the methods which are outlined on the proceeding pages.

Options for Preparing an Existing Lawn Site

Smothering Option - Organic

- Cover the site with either black plastic, old carpet, plywood or a thick layer of leaves or newspapers, held in place to prevent blowing. (We do not recommend covering newspapers with topsoil, as the soil may contain numerous weeds).
- Leave in place for a full growing season and remove in the fall or the following spring.
- Prepare bed.

Sod Cutting Option for Lawns Free of Perennial Weeds - Organic

- Remove the top two to three inches of grass and soil with roots using a sod cutter.
- Prepare bed.

Cultivating Option - Organic

- Cultivate with roto tiller, cultivator or similar tool. Do this two to three times at one week intervals to kill the lawn. Remove clumps of sod & thatch to create a smooth seed bed.
- If perennial weeds are present in the lawn, cultivate for a full growing season, at intervals of every two to three weeks. This should kill both the lawn and the perennial weeds.
- Prepare seed bed after all weeds have been killed.

Herbicide Option

- Apply a Glyphosate herbicide when the lawn is actively growing (in fall or spring). Weedy lawns may need further applications of herbicide.
- When the grass has turned brown, turn the soil under to prepare for seeding. Remove clumps of sod & thatch to create a smooth seed bed.

Options for Preparing a Newly Disturbed, or New Construction Site

Areas of bare soil resulting from recent construction may appear weed free at first, but all soils contain an astonishing array of weed seeds that will re-sprout and grow, and may out-compete your seed mix. The best approach is to wait and see what comes up and then kill any weeds prior to installing a seed mix, rather than seeding into a recently cleared/disturbed site. To prepare a new construction site or newly disturbed area, first, allow the weeds to emerge and grow up to a height of one foot. Once the area has sprouted and grown to reveal the existing weed bank, choose a preparation method from the "Options for Preparing an Old Field Site" options below — either Cultivating or Herbiciding. If the existing weed bank is not addressed you will not have a suitable, clean seed bed for the germination and growth of your seed mix.

Options for Preparing an Old Field Site

Fields that have been abandoned and allowed to grow up into grasses and weeds require at least a full year for proper site preparation. Completing two years of weed control is even better, due to the presence of established perennial weeds and weed seeds in the soil. Please do not rush your site preparation if you are planting an old field. It cannot be over-emphasized that you need to eliminate all weeds before seeding. There are two ways you may go about it:

Cultivating Option - Organic

- Mow and rake or burn off the existing vegetation to the ground in late fall or early spring.
- Cultivate to a depth of four to five inches every two to three weeks from spring through fall.
- Before planting, make sure all the existing weeds have been killed. This procedure may require two consecutive years of cultivating to kill pernicious, noxious weeds.
- Plant in fall or the following spring into a prepared bed.

Buckwheat/Winter Wheat Option - Organic

- See addendum on page 7.

Herbicide Option

- Mow and rake or burn the existing vegetation to the ground in late fall or early spring.
- Apply a Glyphosate herbicide three times throughout the growing season at six to eight week intervals (mid-spring, midsummer, early fall), when plants are green and actively growing.
- If perennial weeds are still present on the site after a full year of herbiciding, do not seed. Leave the soil undisturbed over winter, and apply one more herbicide treatment in late spring of the following year to kill

any remaining weeds. (If in doubt that this additional application is sufficient, wait, spray for a second year at six to eight week intervals and seed in the fall.)

- When all the vegetation is dead, work the ground to prepare a seed bed (see specific planting instructions in Step 2. Preparing the final Seed Bed).

Options for Preparing Existing Fields of Corn, Soybeans or Small Grains

Corn and grain fields can easily be converted to prairie immediately after harvest or the following spring. Before planting into corn fields, test the soil for persistent agri-chemicals such as Atrazine. If present, Atrazine can kill germinating prairie wildflower seedlings! To determine if it is present in your soil, perform this simple test: Grow ten oat seeds in a pot with the cornfield soil. In another pot, grow ten oat seeds in potting soil, or unaffected garden soil (this is your experimental "control"). When the oats reach a height of about four inches, those growing in Atrazine-laden soil will stop growing and turn yellow. Oats growing in untreated soil will continue to grow, without yellowing. Compare the oats growing in the cornfield soil with those in the untreated "control" soil to make sure that any positive results for Atrazine are not shared by the oats in the untreated soil. If Atrazine is present, we recommend allowing the site to sit for one to two years before you plant your prairie. If unsure of the site's herbicide history, contact the farmer who owned the land; they must keep records of Atrazine use.

Cultivating Option - Organic

- Mow and rake or burn off the existing vegetation to the ground in late fall or early spring.
- Cultivate to a depth of four to five inches every two to three weeks from spring through fall.
- Before planting, make sure all the existing weeds have been killed.
- Plant in fall or the following spring into a prepared bed (Continue to Step 2. Preparing the final Seed Bed).

Buckwheat/Winter Wheat Option - Organic

- See addendum on page 7.

No-till Option, Fall or Spring Seeding - Organic

- If planting in fall, the seed can be scattered into the dead vegetation without tilling as long as exposed soil is visible below the vegetation. The seed will work its way down into the soil over winter through freeze and thaw cycles, and germinate the following spring. This method is a "dormant seeding." A fall dormant seeding typically results in higher germination of wildflower seeds, but produces lower germination of warm season prairie grasses. Spring seedings result in higher germination of warm season prairie grasses, and somewhat lower germination of certain wildflowers.
- Prairies can be planted in spring using a No-Till Drill or Slit Seeder (Tye, Truax etc). This equipment inserts the seed 1/4 to 1/2 inches into the soil and is suitable for planting large sites.

Herbicide Option

- Spring: Spray once in mid to late spring, this will kill annual weeds. Wait 10 days or until vegetation is brown then plant into a prepared seedbed.
- If problem perennial weeds such as quackgrass, bromegrass, Canada Thistle, and clover are present, treat the field with a Glyphosate three times throughout one full growing season, at six to eight week intervals (same as "Options for Preparing an Old Field Site" above).
- Fall: After crop is harvested, if weedy vegetation is present and is still actively growing, spray with Glyphosate, wait 10 days and plant into a prepared seedbed.
- If the crop is removed late in the season, wait until spring to spray the field when weeds are again green and actively growing. If problem perennial weeds such as Quackgrass, Bromegrass, Canada Thistle, and Clover are present, treat with Glyphosate three times throughout one full growing season, at six to eight week intervals, (same as "Options for Preparing an Old Field Site," above).

STEP 2: Preparing the Final Seed Bed

Achieving good seed to soil contact requires a well-tilled finely graded soil surface prior to planting. The soil should be prepared according to the type of planting method you will use:

Preparing for Hand Broadcast Seeding

If you are seeding a smaller area by hand broadcasting, rake or drag the soil with a rake or drag (a length of chain link fence attached to a garden tractor or ATV works well to smooth soil which has been freshly tilled).

Preparing for Mechanical Seeding

If your site is one half acre or larger, seeding mechanically using a Brillion Drop Seeder or similar implement is ideal. A Brillion's heavy cast iron packing wheels ensure firm seed to soil contact.

If seeding a large site, No-Till Drills or Slit Seeders are best (Tye, Truax, and John Deere, etc). This equipment requires a smooth, level soil surface, with little or no tilling. Tilling will only expose more weed seeds from the seed bank in the soil below, and is not recommended when using no-till drills and slit seeders.

Organic Process

Wait for a good spring rain after the site is fine-graded. This will stimulate weed seeds in the soil to germinate. Five-to-seven

days after the rain, till the soil very lightly, no more than one inch in depth (a field drag works admirably for this job). This will kill the newly germinated weeds before they emerge from the ground. We recommend dragging or tilling in mid-morning of a warm, sunny day, so that the weed seedlings will be killed by the heat of the sun. Plant immediately.

A Final Pre-planting Tip

If planting in late spring or early summer, you can reduce weed densities by applying a Glyphosate herbicide to the site when newly-sprouted weeds are two to three inches tall. Wait 10 days after spraying, till the soil very lightly, less than one inch if possible (tilling deeper will only bring up more weed seeds). Smooth planting surface. Plant immediately.

STEP 3: Planting the Prairie Seed

Hand Broadcasting the Seed

- Start with a freshly tilled seed bed free of rocks or soil clumps greater than two inches in diameter. If seeding in fall, please see the special fall planting tip below.
- Do not plant when your soil is wet, especially in heavy clay soils. Wait until the soil has dried and is workable before planting.
- Mix all seed (including annual rye or oat nurse crop) with a carrier. This carrier can be sawdust, peat moss, or cracked corn. Playground or builders sand is also an option but it can become too heavy. It does not matter what carrier you use; use whatever is most readily available to you. You will need to use two bushel baskets or 2.5 cubic feet of any one of these "carriers" per 1,000 square feet of area you are covering with seed. For one acre this equals filling the bed of a standard pick-up truck with the carrier, (which holds 72 cubic feet). Using this quantity of carrier is critical to achieve even distribution of the prairie seed. Please do not skip this step, or you will quickly run out of seed to cover your site!
- Dampen the seed/carrier mixture with water, just until it is slightly damp to the touch. The water is necessary so the light prairie seed adheres to the carrier which aids in even distribution of the seed.
- After mixing your seed into the light carrier, divide this mixture into two equal parts.
- Hand broadcast one half of the seed mixture over the entire site (i.e. in a north to south direction).
- Hand broadcast the second half of the seed over the site; walking perpendicular to the direction you seeded the first half. This "cross pattern" seeding ensures even seed distribution.
- Rake or drag the area lightly, covering the broadcasted seed/carrier with about 1/4 to 1/2 inch of soil. (Do not bring in topsoil to achieve this, as this will potentially introduce more weed seed on your site).
- Firm the seeded area by rolling the site with a hand roller, cultipacker, tractor or vehicle. Prairie seed requires firm seed to soil contact for good germination.
- Mulch the planting area with approximately one inch of weed free straw or marsh hay (do not use field hay as it contains weeds). Mulch can be laid by hand or blown onto the site mechanically. The mulch will help control erosion on slopes and helps to retain soil moisture during the germination period. If working on gradual slopes or erosion prone sites, cover the mulch with a photo-degradable plastic or natural mesh with one half inch openings to allow for unimpeded wildflower seedling development. Secure the mesh with landscape staples placed at one to two foot intervals.

Mechanical Seeding

On areas greater than one acre, it is more efficient to plant using a broadcast or a no-till planter. The broadcast planter spreads the seed over the soil, whereas the no-till seeders plant the seeds in rows by opening slits in the soil. The broadcast seeder we recommend is the Brillion double box agricultural model, typically used to seed alfalfa and grass mixture, but equipped with native grass bristle brushes in the larger front box rather than the standard steel wire agitators. No-till seeders commonly used for prairie plantings include the Truax drill, the Tye wildflower and native grass seeder, and John Deere seeders. On gradual slopes, mulching and erosion fabric may be necessary to prevent the seed from washing prior to its establishment. For hydro mulching, only use cellulose-based mulch and do not use a tackifier. Although grasses are able to penetrate through a tackifier, the wildflowers typically cannot.

Hydro Seeding

We do not recommend hydro seeding of prairies. Hydro seeding does not achieve firm seed to soil contact and will result in poor germination. We have encountered numerous failures using this method.

Fall Planting Tip

This technique works only on sites that have had all weed eliminated by smothering or herbicide use. If the result of this process reveals dead vegetation which is very sparse with a good deal of mineral soil present below the dead vegetation, you can seed right into this vegetation. First cut down any vegetation with a lawn mower and rake it off, the cut vegetation may impede seed to soil contact. The seed will work its way down into the soil through the freeze and thaw process throughout winter. This method can only be accomplished in the fall. This method will not work in spring as the seed will not be worked into the soil without ground

freeze and thaw. It is important to roll the seeded area so the seed is impacted into the soil.

Watering

This is optional, as prairies will germinate without additional watering, they will simply germinate more slowly without the watering. If watering is possible, water spring and summer seedings regularly during the first six to eight weeks after planting for higher germination and seedling survival. Water just enough to keep the soil moist, every other day for 15 to 30 minutes. Over watering can drown seedlings, especially on heavy clay soils. Water in the early morning, as watering during the day can be ineffective and wasteful. After eight weeks, water only if it does not rain for one week. Afternoon and evening water encourages seedling loss by fungal attack.

STEP 4: Post-Planting Maintenance

Year One

Weed control during the first growing season is essential. The perennial prairie seedlings grow slowly, and are easily out-competed by the faster growing weeds that will inevitably germinate.

- Mow your prairie about once a month during the first growing season. The actual mowing frequency will depend on rainfall in any given year, actual weed density and height.
- Mow the entire planting when weeds reach the height of 12 inches. As a general rule of thumb, anything that grows taller than 12 inches in the first year is most likely a weed. Taller weeds shade out prairie seedlings. Mowing the vegetation at six inches will cut back taller weeds, while leaving the shorter prairie seedlings unharmed.
- To mow, use a string trimmer or weed eater on small areas. On larger areas, a flail mower is the best choice. Flail mowers chop the weeds as they are cut, instead of laying the cut weeds on top of the prairie seedlings. If a flail mower is unavailable, a rotary mower or sickle bar mower may be used.
- In the first season prairie seedlings rarely grow taller than four to six inches, with the possible exception of the Black Eyed Susan. As difficult as it is, we recommend cutting all vegetation, including the tops of the Black Eyed Susans. Cutting will not kill the Black Eyed Susans.
- Be sure to mow weeds before weeds set seed, to prevent further infestation.
- Although tempting, we do not recommend pulling weeds, as this will disturb or destroy the developing prairie seedlings.
- At the end of the first growing season, leave the dead vegetation and or stubble standing, this helps to catch winter snows which helps insulate the soil seedlings and reduce winter frost heaving.

Year Two

During the spring of the second year, mow the standing residual vegetation as close to the ground as possible in mid spring, and rake off any cuttings. Mowing in mid spring helps to set back non-native cool season weeds and grasses such as Quackgrass, Bluegrass, and Bromegrass etc. Timing is very important when mowing your prairie. The optimal date for mowing can vary as much as a month in any given year, due to the differences in weather. However, we can use plants as our calendar to ensure optimal timing. The best time to mow most prairies is when the buds of the Sugar Maple tree (Acer saccharum) begin to break open in spring. This usually will occur sometime between April 1 and May 15, depending on your location and the weather in any given year. This is usually about the time we are mowing our lawns for the first time.

- Removing the vegetation and raking the vegetation encourages soil warming, which triggers the warm season prairie plants to break dormancy.
- If biennial weeds such as Sweet Clover, Burdock, Wild Parsnip, etc. appear, or are a problem, mow again at approximately 12 inches when weeds are in full flower. Make sure to mow the weeds before they make seed! Expect this second mowing for controlling biennial weeds to occur in June, depending on your location.
- Do not mow after new plant growth has reached one foot or taller, as this could damage your prairie plants.

Year Three and Beyond

Burning / Mowing

Beginning in the spring of the third year, your prairie can be burned for the first time to maintain its diversity and vigor. Burning in mid-spring helps to set back non-native cool season weeds and grasses such as Quackgrass, Bluegrass, Bromegrass etc. By waiting until the undesirable plants have initiated spring growth before burning, the fire will destroy their new growth and set them back, favoring the warm season prairie plants, most of which are dormant under the soil.

Burning removes plant litter from the previous year's growth and exposes the soil surface to the warming rays of the sun. This encourages new plant growth and increases flowering and seed production of native flowers and grasses.

Timing is very important when burning your prairie. As with mowing, the optimal date for burning can vary as much as a month in any given year, due to the differences in weather. However, we can use plants as our calendar to ensure optimal

timing. The best time to burn prairies is when the buds of the Sugar Maple tree (Acer saccharum) begin to break open in spring. This usually will occur sometime between April 1 and May 15, depending on your location and the weather in any given year. This is usually about the time we are mowing our lawns for the first time.

- If you cannot or do not wish to burn, we recommend mowing all vegetation to the ground at the same timing as described above. Mowing is about 60% effective at controlling weeds compared to conducting a burn.
- Dry prairies (sandy soil) should be burned in the late fall after most of the native plants have gone dormant, but the non native grasses are still active. Burning in very early spring also can be done successfully on dry prairies.
- It is recommended that you divide your prairie into "management units." Burn or mow one half every other year, alternating from year to year so that each half is burned once every two years. This helps prevent invasion by woody plants, as well as cool season weeds. Burning or mowing less frequently than every other year can result in trees gaining a foothold in your prairie. Burning every year is generally not recommended, as it tends to increase the dominance of warm season prairie grasses and certain prairie flowers.
- Leaving unburned sections of your prairie preserves over-wintering butterfly, moth and other invertebrate pupae and eggs so they can re-populate the ecosystem that year. These species would otherwise be destroyed by burning.
- Do not burn or mow after new plant growth has reached one foot or taller, as this could damage your prairie plants!
- Many ground nesting birds also build their nests in late spring and burning or mowing at this time could destroy some nests. Mid-spring timing of the burning or mowing maintenance leaves sufficient time for birds to re-nest and successfully raise their young.
- Burning or mowing every other year helps to create varying conditions from year to year, maintaining maximum plant and animal diversity.

The First Three Years – What to Expect

Prairie seeds will often germinate over a period of two to three years. Some will appear the first year, while others will come up in the second and even third year after the initial planting. Most perennial prairie flowers and grasses will not begin to flower until their third or fourth full growing season,

Patience is a virtue when establishing a prairie – follow these directions carefully, and give your prairie time to develop. Although your prairie seeding may appear to be a bit of a "weed patch" the first year or two, by the third year numerous flowers and grasses should begin blooming and can crowd out some weeds. Be vigilant in monitoring your prairie for weeds and follow the recommendations for weed control.

Perennial prairie plants devote most of their efforts in the first few years to developing their famous root systems. They will not be readily apparent in the first few years, with little visible above ground growth. However, these busily growing plants are steadily building the incredible root systems that will sustain them in future years. The deep roots of the prairie flowers and grasses give them long-term staying power that allows them to squeeze out annual and biennial weeds, and to return year after year, for decades.

Seed Storage Notes

If you need to store your seed, for more than a few weeks prior to seeding, place the seed inside two sealed Ziploc bags or in a plastic or glass jar with a tight-sealing lid or a similar container. If the volume of seed is too large to fit in a refrigerator, it should be stored in a cool, dry location in a rodent-proof container. Heat and moisture are the enemies of seed viability. When stored in a cool, dry location, most seed will retain good germination rates for one year. Some species can retain good germination for many years when stored properly under refrigeration.