Five Steps to Successful Prairie Establishment

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With more than 40 years of experience in the research and establishment of native plant communities, Neil is an internationally recognized pioneer in the use of North American plants in contemporary landscapes. He is a regular keynote speaker on topics such as establishing prairie meadows, designing with native plants, and the benefits of converting resource-intensive landscapes into self-sustaining ecological sanctuaries.

Prairie meadows are becoming an increasingly popular alternative to traditional high maintenance landscapes. Our native prairie flowers and grasses are stunning both as individuals, and as a complete prairie plant community. Perhaps best of all, the prairie helps us to re-connect with the earth, and creates a haven for the native plants and animals with which we share this beautiful planet.

Prairie meadows require no fertilizers or fungicides and few, if any, herbicides. The prairie grasses and flowers create high quality habitat for birds, butterflies, and other beneficial wildlife. The deep-rooted prairie plants encourage infiltration of rainwater into the soil, helping to reduce stormwater runoff and flooding. Prairies can also serve as excellent buffer strips between maintained turf and wetland areas, such as ponds, waterways, and marshes. The cover provided by the prairie grasses also complements adjacent wetlands, improving the environmental quality of existing water features.

The initial costs of a prairie seeding are often a little higher compared to turf seedings, but significant long term savings result due to greatly

reduced maintenance requirements. Any additional initial costs are usually recovered by the second year. Maintenance savings continue to accrue in following years, yielding very low "life cycle" costs for prairie meadows. Because native prairie flowers and grasses are almost exclusively perennials, they return to bloom year after year. A properly installed and maintained prairie meadow is a self-sustaining plant community that will provide landscape beauty for decades to come.

Installation of prairie meadows is not quite as simple as tilling up the soil and sprinkling some seed in the ground. There are five critical steps that must be followed to ensure success with this new landscaping style. By following each step carefully and completely, outstanding results can be achieved, even by those who have little or no experience in establishing native prairies.

THE FIVE STEPS TO SUCCESSFUL PRAIRIE MEADOW ESTABLISHMENT

1.	**Site Selection**	Sunny, well-ventilated, with low weed densities
2.	**Plant Selection**	Match plants to the soil and growing conditions
3.	**Site Preparation**	Kill ALL the weeds before planting!
4.	**Planting Time & Method**	Spring vs. fall, no-till vs. broadcast, nurse crops
5.	**Post-Planting Management**	Mowing and burning

1. Site Selection

The area to be planted to prairie must be sunny, open, and well-ventilated. Prairie plants require at least a half a day of full sun. Full sun is best, especially for wet soils or heavy clay soils. Good air movement is also critical, as prairie plants are adapted to open sites that are not subject to stagnant air. Poor air circulation in closed in areas can lead to fungal diseases, which are seldom a problem on sunny, open sites.

Areas with a history of heavy weed growth should be avoided, if possible. This is especially true if a site has well-established perennial noxious weeds. A full year or longer will be required to properly prepare such a site for planting. Good candidates for seeding to prairie meadows include areas presently in turf, cornfields, soybean fields, and alfalfa fields. Beware of residual herbicides that may have been applied to agricultural fields. Always check the herbicide history of the past two to three years, and test the soil for residual herbicide activity if in doubt. Areas of open soil that result from new construction are usually good sites for prairies, provided that soil is not compacted or composed of raw subsoil, and that that there are no residual weeds remaining.

Beware of planting meadows in locations with adjacent weedy vegetation that cannot be eliminated or controlled. Although an established prairie meadow is resistant to invasion by most weeds, three to four years of growth is required for full development. During these first few years, weed seeds can blow into the meadow and become established.

Rhizomatous weeds such as quackgrass, Canada goldenrod, and Canada thistle can creep into the meadow from immediately adjacent areas. If herbaceous perennial weeds are located near the new meadow site, they should be mowed once or twice a year before they set seed, or completely eliminated and replaced with non-invasive plants.

If "weed" trees such as Box Elder and Cottonwood occur nearby, they often self-sow aggressively onto open soil. The best solution is to cut them down and replace them with higher quality native trees, thus preventing problems in the prairie and replacing low quality trees with better species.

2. Plant Selection

Every plant is adapted to a certain set of growing conditions. Some will grow only on well-drained sandy or gravelly soils, while others prefer heavy clay. Some require moist soils, while others demand dry growing conditions. A few species can grow in almost any soil, be it dry sand, rich loam, or damp clay.

A prairie meadow is very different from a garden; in a meadow the plants are essentially on their own. A prairie is a low maintenance landscape that requires minimal (but specific) care. The plants of the meadow will have to fight it out with the weeds in the first few years as they become established. Therefore it is essential to select plants that are adapted to the specific site conditions.

To save you time, we have designed prairie seed mixes to match a variety of soil conditions. These mixes are carefully balanced between showy flowers and ornamental grasses. Some people prefer to select specific plants for a given mix. However, it is very important to include a wide variety of different flowers and grasses to ensure year-round interest in the prairie meadow. If a custom-designed seed mix is desired, please feel free

to call us. We specialize in designing prairie mixes to match specific site conditions, and in providing solutions for difficult problem sites.

3. Site Preparation

This is a critical step that, if overlooked, can lead to disaster in short order. This is especially true of areas with a history of weedy growth. All the weeds and existing vegetation must be killed prior to seeding. It takes only a few rhizomes of quackgrass, bromegrass, Canada thistle, or Canada goldenrod to quickly re-colonize the planted area. The mantra for soil preparation when preparing a site for a prairie planting is simple: ***Take No Prisoners!***

There are many different methods of preparing a site for seeding to a prairie meadow:

- Smothering with black or clear plastic for a full growing season
- Smothering with layers of newspapers covered with leaves or grass clippings for a full growing season
- Planting a summer buckwheat smother crop, followed by fall planting of winter wheat
- Repeated deep soil tillage every three weeks for a full growing season
- Sod removal on lawns with no weeds, using a sod-cutter
- Herbicide treatment using Roundup or similar glyphosate herbicide

Pernicious perennial weeds must be killed, requiring year-long smothering, repeated sprayings with herbicides, or repeated tillage with equipment that can uproot and kill perennial weeds. Then weed seeds that are harbored in the soil must also be allowed to germinate, so that they can be killed, either by tillage or by spraying. If a weedy "old- field" is selected for planting to prairie flowers and grasses, one full year of site preparation is a minimum. Sometimes one and a half to two years of site preparation may be required to get weeds under control before planting.

Site Preparation for Old fields with Heavy Weed Rrowth using "Roundup" :

1. Mow field in late July and allow vegetation to re-grow
2. Spray with Roundup at 3% solution in early September when re-growth is one foot tall. If noxious broadleaf weeds such as Canada thistle, Canada goldenrod, or similar are present, mix an appropriate broadleaf herbicide with the Roundup tank mix.
3. Allow area to sit undisturbed over winter. Do not till.
4. When weeds reach one foot tall in following spring, spray with Roundup, and broadleaf herbicide if necessary.
5. If site is uneven, re-grade to prepare final seedbed after spraying. Burn or mow off dead vegetation prior to grading. This will be the final grading before planting. As dormant weed seeds germinate, they will be killed by spraying them during summer.
6. Allow weeds to re-grow. Spray when 6 to 12 inches tall. This will likely be around mid-July.
7. Allow weeds to re-grow one more time, and spray in late August or early September with Roundup ONLY. The site is now ready to seed.
8. Planting can occur any time after Sept 1st. No-till seeding is best, as it minimizes soil disturbance and brings up fewer weeds than tilling and broadcast seeding. Fall seedings are "dormant" seedings, so a nurse crop should be used to hold the soil.
9. On erosion-prone slopes, annual rye (Lolium multiflorum) or oats serves as excellent nurse crops to provide cover and help hold the seed and soil in place. Seed annual rye at a rate of 5 lbs/Acre in spring or early summer, and 15 lbs/Acre in fall. Do not use winter rye (Secale cereale), as it produces toxins in the soil that inhibit germination of other plants. Oats (Avena sativa) can also be used as a nurse crop, seeded at 64 lbs/acre in spring or 128 lbs/acre in fall.

Agricultural fields (corn, soybeans, and small grains) with low weed densities can usually be seeded after only one or two sprayings with Roundup. If perennial weeds are present on such sites, a full year of site preparation prior to seeding is recommended.

Site Preparation for Turf using "Roundup":

1. Spray with Roundup in September. If broadleaf weeds are present, mix broadleaf herbicide into Roundup tank mix.
2. For fall seedings, the dead thatch can be burned off, or thoroughly de-thatched to remove dead grass material. Prairie seed can be distributed directly onto the resulting mineral soil, and winter frost action will position the seed in the lower soil for spring germination. A no-till turf over-seeder can also be used, as described in (5) below.

3. For spring seedings, till dead turf thoroughly after it turns brown after the fall spraying. This will encourage decomposition of thatch over winter in preparation for spring seeding.
4. Allow weeds to germinate in spring. Spray in late May with Roundup ONLY to kill germinated weed seeds.
5. When weeds are dead, seed ASAP with a minimum of soil disturbance. A turf over- seeder can be used for applying the seed. However, calibration of these machines can be difficult when using prairie seeds. To overcome this problem, mix the seed with pelletized lime. This will dilute the seed to ensure more even application, and will also improve the flow of the seed through the machine.

When preparing dead turf for a fall seeding, beware of poor "seed to soil contact" due to thatch buildup in the turf. Thatch can prevent the seed from contact with mineral soil, and must be removed prior to seeding. Thatch can also wick moisture out from the seedbed and cause seedling mortality. Burning the thatch off prior to planting is the best method, as it typically will burn away the thatch and sod below. De-thatching is a good second choice. Irrigating the planting in the spring and summer of the first year during germination can greatly improve seedling development and survival, and is strongly recommended.

4. Planting Time and Method

Prairie seeds can be successfully planted during the following times:

- Spring thaw through June 30
- September 1 through soil freeze-up ("Dormant Seeding")

Planting in July and August is generally not recommended. Drought is common during these months, and late-planted seeds often do not have sufficient time to develop strong root systems before the onset of winter. If irrigation is available, planting can be extended until July 15.

Spring and early summer plantings tend to favor the "warm season" prairie grasses. Many prairie flowers will germinate with spring plantings, while others will remain dormant in the soil and come up the following spring. Watering the planting in the first two months after a spring planting encourages higher seed germination and survival.

Fall plantings are referred to as "Dormant Seedings," as the seeds will not come up in fall when planted, but will overwinter in the soil and germinate the following spring.

Dormant seedings typically result in higher germination of prairie flowers, and lower germination of warm season prairie grasses. Fall seeded prairies do not require watering, as the seed will germinate the next spring when soil moisture in typically optimal.

The inclusion of a fast growing "nurse crop" that germinates in fall, such as annual rye, is generally recommended with fall plantings to help protect the soil from erosion over winter. Annual rye typically kills out over winter in USDA Hardiness Zones 1-5, and usually does not present a

competitive problem in the following spring. In the event that the annual rye does survive the winter, simply keep it mowed to a height of 4-6 inches during the first year as part of the standard weed control program in the initial year of establishment.

Planting Prairie Seeds Can Be Accomplished by a Variety of Methods:

- No-till seeder for multi-acre plantings. Best model: "Truax" Native Seed Drill
- Broadcast seeder (such as "Brillion" double box agricultural model)
- Hand broadcast for small areas of one acre of less

No-till plantings minimize soil disturbance and typically have less weeds. Brillion seeders require soil tillage prior to planting, but provide excellent seed to soil contact. This is particularly important on loose, sandy soils. On very loose soils, it is helpful to run the heavy packer wheels of the Brillion seeder over the seeded area one to two times after the seed has been planted, to further firm the soil. Load the Brillion seeder by placing the fluffy prairie grass seeds and large seeds of the genus Silphium in the larger forward seedbox. Place the non-fluffy, flower seeds and small round grass seeds (Switchgrass and Prairie Dropseed) in the rear "legume" box. Annual rye nurse crop can be pre-mixed with the fluffy prairie grasses and loaded in the front box.

Erosion-prone sites should be planted with a nurse crop and covered with weed-free straw mulch (winter wheat is best) to prevent seed and soil loss. Steep slopes and areas subject to water flow should be protected with erosion blankets, selected to match the

expected water volumes and velocities. Fall planting on erodible sites should be completed by Sept 15 in order to encourage sufficient growth of nurse crops to stabilize the soil.

Hydro-seeding is generally not recommended. Native wildflowers and prairie grasses require firm contact with the soil for good germination. Hydro-seeding places the seeds on the soil surface, where they are more subject to drying out.. Attempts to establish prairie meadows using hydro-seeding have typically resulted in poor results.

That said, hydro-seeding in fall can be effective when done correctly. The seed should be mixed with a minimum of cellulose carrier and no tackifier (a substance added to the hydro-seed slurry to make it stick in place). The seed mixture is blown onto an open, weed-free site. By using little or no carrier material, the seed is placed in contact with the soil. The seed will work its way down into the soil over the winter, just as with hand- broadcast seedings onto prepared, weed-free sites.

Seed Quality: A Critical Factor

There are no seed quality standards enforced by state or federal agencies for prairie flower wildflower seeds at this time. There is tremendous variation in seed quality among seed suppliers. The only guarantee you have is to know your seed suppliers and the quality of the products they offer, and to insist on "Pure Live Seed." This is defined as the amount of bulk seed required to make an equivalent amount of 100% pure seed with a 100% germination rate. The success of your planting is a direct function of the quality of the seed you plant. Do not accept cheap, low quality seed.

5. Post Planting Management

Prairies are low maintenance, but not "No Maintenance." A few simple maintenance procedures are all that is usually required for success. In the first two years, annual and biennial weeds will grow much faster than the slow-growing perennial native plants. By the third year, the wildflowers and grasses should begin to win out over the weeds. Many flowers and grasses will mature in the third growing season.

FIRST YEAR

In the first year the slow-growing prairie seedlings will grow only a few inches tall.

Keep weeds mowed back to six inches tall. When weeds grow to 12 inches, mow back to six inches. Do not wait until weeds are taller than one foot tall, as the mowed material can smother the small prairie seedlings. Never mow when soils or plants are wet. Use a flail type mower if possible, as it shreds the vegetation and prevents clumping, as often occurs with rotary mowers. On small plantings, string trimmers are excellent for keeping weeds mowed back. Expect to mow three times in the first year, about once a month in summer (June, July, and August).

Beware of pulling weeds in the first year. The small prairie seedlings are easily disturbed, and are often pulled up along with the weeds. There goes your prairie! If you can tell the prairie seedlings from the weed seedlings, you can pull weeds when they are young. However, be careful not to disturb the young prairie plants during the critical first growing season. Annual weeds seldom present a problem to the long-term health of the prairie when kept under control using mowing in the first year. However, it can be worthwhile to carefully pull perennial weeds as they germinate, provided you can tell them apart from the native plant seedlings. On larger areas, this is not an efficient management technique!

SECOND YEAR

Annuals will continue to be abundant, and biennial weeds will likely appear as well. These may include such common biennials as Sweet Clover, Burdock, Wild Parsnip, and Queen Anne's Lace. The young prairie plants will grow taller in the second year than the first year, so the weeds should be mowed at a height of about one foot in the second growing season. Biennial weeds should be mowed when in full bloom, but before setting seed, usually around mid-June. This will "break the cycle" of biennial weeds, by preventing seed formation. Because biennials must produce seed to continue the next generation, preventing them from seeding helps prevent re-infestation of the area. Two mowings may be required at a height of 12 inches in the second year when biennials are in full flower, but not yet setting seed.

It is not uncommon for more biennial weeds to appear in the third and fourth year from dormant seeds in the soil. These plants will have to be pulled or cut back before setting seed, on a case by case basis.

If problem perennial weeds appear, they must be controlled immediately, before they have an opportunity to become established. Young perennial weeds can often be carefully pulled in the second growing season, now that the native plants are better established. Be careful not to disturb any adjacent prairie plants. Rhizomatous weeds such as Canada thistle and Canada goldenrod can be hand-treated with herbicide using a cotton glove placed on the outside of a protective rubber glove. Soak the cotton glove in herbicide (such as "Roundup") and apply to the leaves and stems of the weed without touching adjacent desirable plants. This is best done on a calm, cool day, so that the herbicide does not volatilize and drift onto nearby flowers.

Never spray weeds with herbicides in a prairie. The drift from the spray will kill large patches of desirable plants. Once the prairie plants are dead, weeds can move into these newly open areas. These areas must then be prepared for re-seeding by killing everything growing there, essentially starting completely over again.

The secret to success with prairie meadows is to establish the native plants across the entire area, so that they colonize the soil completely. Once the prairie sod is established, usually by the fourth or fifth year, weeds have no openings into which they can invade. Let the plants do the work for you!

THIRD YEAR

In the beginning of the third season, the young prairie meadow should be burned off in mid-spring. This is usually between April 15 and May 1 in the Upper Midwest and Northeast. At latitudes of 45 degrees North and above, and along the Great Lakes, spring comes later, and burning is often best done between May 1 and May 15. If burning is not possible, due to local restrictions or lack of dead grass to carry a fire, the planting can be mowed very closely to the ground instead. The mowed material should be removed from the site to expose the soil directly to the warming rays of the sun.

Exposing the soil surface by burning, or mowing and raking, helps encourage rapid soil warming in the spring. This favors the native "warm season" prairie plants over "cool season" weeds such as quackgrass. Rapid soil warming encourages the prairie plants over the weeds. The best time to burn or mow is when the buds of the sugar maple (Acer saccharum) tree are just breaking open in spring. Most prairie plants are still dormant or just beginning growth, and are unharmed by burning or mowing. Cool season weeds will be actively growing at this time, and will be significantly damaged. The advantage goes to the prairie plants.

Conclusion

Establishing a native prairie meadow is not a simple process. However, once established, a prairie lives on year after year, and serves as a living legacy of the person who plants it. The intrinsic natural beauty, ecological value, and significant maintenance cost savings make prairie meadows an attractive landscape option. By carefully following the five steps outlined in this article, anybody can attain excellent results!