Management of Prairie Meadows

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Native prairie meadows are a low maintenance alternative to high maintenance lawns and traditional landscapes. They are not, however, no maintenance landscapes. Some simple, but essential, post-planting care is necessary for successful establishment and long-term performance.

The North American Prairie evolved under the influence of regular fires, caused either by lightning or set by people. Native Americans used fire to burn off the previous year's dead plant growth to make travel through the prairie easier, and to attract game to the burned areas, which greened up earlier in spring. Fires helped to keep invading trees, shrubs, and vines out of the prairie by burning them back to the ground, sometimes even killing them outright.

Prairie fires encourage the soil to warm up sooner in spring by exposing it to the warming rays of the sun. Most prairie flowers and grasses are "warm season" plants, and grow best under warm soil conditions. Burning the prairie in mid spring creates more optimal growing conditions for native prairie species, while discouraging non-native cool season grasses and weeds.

Today, we manage prairie meadows using five basic methods:

1) Mowing
2) Controlled Burning
3) Grazing and Haying
4) Digging and Pulling Weeds
5) Selective Herbicides for Spot Treatment of Problem Weeds

Most people do not have access to bison, elk, and antelope, so the focus will be on the other four management methods. Mowing and burning can be conducted on a large scale at relatively low cost. Herbicides can be used for local control of problem weeds with spot applications, or on large areas using selective herbicides that kill only broadleaf plants, only grasses, or certain groups of plants.

1. Mowing

Mowing is used for three purposes:

1) Control of annual and biennial weeds in the first two years after seeding
2) Controlling cool season grasses and weeds in the third year of establishment and beyond, similar in its effect to prescribed burning
3) Preventing invasion by trees and shrubs

Mowing can be accomplished using a heavy duty riding lawnmower, a wheeled brush mower, a string trimmer ("weed whacker"), or a tractor-mounted mower. String trimmers are the best, especially for small areas, since they can mow at a variety of heights, they lay down the cut material gently without clumping, and can be used in situations where mowers cannot be used (steep slopes and low wet areas).

The First Year

Mow the prairie seeding at six inches in height to keep back fast-growing annual weeds in the first growing season. Most prairie plants are slow-growing perennials, and are easily out-competed by annual weeds in the first year if not controlled. Mowing weeds before they set seed also helps reduce problems in following years. Do not allow weeds to get taller than 16 inches before mowing them down to six inches. When taller vegetation is cut down, the large amount of cut material can bury the young prairie seedlings. Expect to mow three times in the first year.

The Second Year

Mow annual and biennial weeds to a height of twelve inches in mid to late June, when most biennial weeds are in full bloom. This will prevent them from forming seed and re-infesting the area, and can kill some biennial weeds outright. Most prairie flowers and grasses will not be taller than twelve inches at this time, and remain unharmed by the mowing. It is important to time the June mowing to coincide with the bloom period of biennial weeds. This single mowing in the second year can be critical to long term success by controlling these often aggressive weeds before they can become firmly established.

Some biennial weeds will re-grow and flower a second time after the June mowing. They should then be either cut back to the ground using pruning shears or a string trimmer, or carefully pulled up by the roots when the soil is moist after a rain.

If biennial weeds, especially White or Yellow Sweetclover (Melilotus spp.) appear in the third growing season, they should again be cut down when in full bloom, or pulled up by the roots. If the plants have completed flowering and are forming seed, they should be cut or pulled and immediately removed from the prairie. Never allow biennial weeds to complete the seed formation process and re-infest the prairie, as they can become a long-term management problem.

SOME PROBLEM BIENNIAL WEEDS THAT MAY APPEAR:

Burdock	*Arctium minus*
Spotted Knapweed	*Centaurea maculosa*
Musk Thistle	*Carduus nutans*
Bull Thistle	*Cirsium vulgare*
Queen Anne's Lace	*Daucus carota*
White Sweet Clover	*Melilotus alba*
Yellow Sweet Clover	*Melilotus officinale*
Wild Parsnip	*Pastinaca sativa*

Warning: The sap of Wild Parsnip can cause a severe rash when it comes in contact with the skin and then is exposed to the sun. Wear protective clothing when working with this plant, including long sleeves, long pants, and pants. DO NOT rub the face, eyes, or other exposed areas of skin when handling this plant.

The Third Year and Beyond

Spring burning should be initiated at the beginning of the third growing season. If burning is not an option, mowing and raking the cut material can be substituted for burning to remove dead plant growth from the previous year. Raking off the cut material after mowing helps to expose the soil and encourage more rapid soil warming, favoring the heat-loving prairie flowers and grasses. Mow as close to the ground as possible, right down to the soil surface if possible. This closely mimics the effects of burning, and is nearly as effective in favoring the prairie plants over cool season weeds and grasses.

2. Controlled Burning (Prescribed Burning)

Burning a prairie meadow in mid-spring is not only an extremely effective management technique, it's also fun! Of course, great care must be taken when lighting things on fire. That's why it is referred to as "Controlled Burning."

Good firebreaks must be in place well in advance of the burn. Natural barriers such as roads, driveways, lakes, and rivers make excellent firebreaks. A closely mown lawn also serves as a good firebreak. However, dead thatch in the turf can burn, so close monitoring is recommended.

It is recommended that firebreaks be designed into the meadow planting at the outset. If you don't have natural firebreaks, create one with a ten to twenty foot wide strip of mowed grass. Keep the grass mowed regularly so thatch doesn't build up. If a mowed lawn border is not possible, firebreaks can be mowed in adjacent grassy fields, but they are less reliable due to the presence of more flammable material.

For a spring burn, mow your firebreaks and rake them in the fall, not the spring. When mown in the fall, any remaining flammable plant material will begin to decompose over the winter, rendering it less likely to burn. Spring mowing of firebreaks typically leaves combustible grass and other plant material in the firebreak. These can burns readily, and the fire can easily jump the break. Even spring-mowed firebreaks that have been raked free of plant debris remain flammable due to the presence of stubble that can carry a fire when dry.

Safe Burning Tips:

1) Burn in the evening when winds are down, temperatures lower, and relative humidity is higher. A prairie that might roar out of control when burned in the afternoon will be far more controllable in the evening.
2) Always burn into the wind, not with the wind. By burning against the wind, the fire will creep slowly and controllably. Burning with the wind can often result in more excitement than one might have bargained for!
3) Always burn downhill, not uphill. A fire burning uphill pre-heats the fuel ahead of it, so that it burns faster and hotter, making it harder to control.
4) To reduce the height of the flames, simply mow the area just prior to burning. This will knock down the dead grass, and the fire will move more slowly and at a lower level than in an un-mowed prairie.
5) Never burn on a windy day, or when winds are predicted.
6) Burn in mid-spring after cool season grasses and weeds have greened up. This helps kill back the new growth of unwanted weedy species, and the moisture in the green plants helps to slow down the fire. Burning in early spring before green-up does little or nothing to control cool season weeds and favor the warm season prairie plants, and the fire will move more rapidly through the all-brown dead vegetation.
7) Burn when soil moisture is high, such as just after a rain. The water in the soil will slow down the rate of spread of the fire, especially when burning into the wind.

Timing of Spring Burning and Mowing

The best time to burn or mow a prairie can vary from year to year. For controlling cool season grasses and weeds, mid-spring is best. This is usually between April 10 and May 10, but varies based upon latitude and the weather in any given year. Experience has shown that prairies should be burned or mowed when the buds of the sugar maple (Acer saccharum) are just beginning to open in spring. This corresponds to the time when most prairie plants are just beginning to emerge from winter dormancy. Since the prairie plants have grown very little at this point in the season, they remain unharmed under the soil during burning or mowing.

Some early blooming species typical of dry prairies can be harmed by mid-spring burns. The plants include Shootingstar (Dodecatheon meadia), Prairie Smoke (Geum triflorum), Pasque Flower (Pulsatilla patens), Hoary Puccoon (Lithospermum canescens), Birdsfoot Violet (Viola pedata), and Buttercups (Ranunculus spp.). If your prairie has numerous early spring-blooming flowers, it is best to burn in mid to late fall after the prairie plants have gone dormant, or in early spring prior to emergence of spring wildflowers.

If woody plants are a problem in the meadow, burning in late spring will do more damage to them than a mid-spring burn. Wait until the trees and shrubs have fully leafed out and then burn or mow. This is usually in mid to late May. Although the prairie plants will also be harmed, a late burn will severely damage most woody plants. The prairie flowers and grasses will grow back rapidly, as the woody plants recover more slowly.

3. Grazing and Haying

Two rarely used methods of prairie management are grazing and haying. Native ungulates such as bison, elk, and antelope can be stocked on a prairie and rotated as the season progresses. Prairie can also be cut in mid-summer for forage. These management options are feasible only on large prairies. Wild game will require high, sturdy fences in order to keep them from roaming onto the neighbor's property.

Prior to settlement by Europeans, bison and elk ranged across the Midwestern prairies. They primarily ate grasses, and avoided the flowers for the most part. This undoubtedly led to the vast fields of flowers that were described on the American Prairie by European explorers in the 18th and early 19th centuries. By preferentially consuming the prairie grasses, bison and elk would have tipped the balance of the plant community in favor of a higher dominance of flowers. This same tendency can be used today to alter the structure of restored prairies and prairie remnants to increase their flower to grass ratios.

To avoid damaging the prairie and to maintain plant diversity, animals should be allowed to graze a given area for only four to seven days at a time, and usually only once a year. They should then be moved to the next rotational pasture unit to allow the previously grazed unit to re-grow and recover. Constant, close grazing will eventually kill most prairie flowers and grasses, leaving only the most grazing-resistant species and encouraging invasion by weeds.

Grazing with cows, horses, sheep, and goats is not recommended, as these animals do not generally distinguish between flowers and grasses. The result is often a reduction in flower density, which most people do not want. Horses tend to be picky eaters, sheep rip plants out by the roots, and goats will consumer everything in sight.

Haying Prairies

Prairies can be cut once a year for hay. To maximize the yield of palatable forage and its protein content, cut just as the warm season grasses are sending up their flower stalks, usually late July or

early August. The cut grass is allowed to dry, wind-rowed, baled, and removed. The prairie plants will re-grow after cutting, and some may re-bloom before the end of the season.

Mid-summer haying tends to favor spring and early summer-blooming flowers, since the late summer and fall blooming species are cut before they can bloom and produce viable seeds. This tends to shift the balance of the plant community toward early season flowers and away from late season flowers. This can be addressed by haying the prairie meadow every other year, allowing later-flowering species an opportunity to mature and set seed in the off years.

4. Digging and Pulling Weeds

Problem weeds, especially those with taproots, can be carefully pulled or dug beginning in the second growing season. Pulling and digging is not recommended in the first year of establishment, as the small prairie seedlings are not yet well-rooted, and are easily disturbed and killed. By the second year, both biennial and perennial weeds that have become established will be evident. Biennial weeds can be carefully pulled, or cut at the base during flowering to kill them. Make sure to remove the plants prior to setting seed, to prevent re-infested in future years.

When pulling tap-rooted weeds, hold the weed firmly between the feet and pull straight up. This holds the soil in place around the roots, and minimizes the disturbance to adjacent young prairie plants. Stamp any loose soil firmly back into place around desirable plants that may have been disturbed. It is easiest to pull weeds just after a rain when the soil is moist. Pulling when the soil is dry is an exercise in futility that yields broken off roots that will re-grow and require future attention.

When digging out problem weeds, make sure any desirable plants are not damaged in the process. Carefully dig around the offending plant, and gently pull it out. Firm the soil around adjacent prairie plants that might have been uprooted in the process.

5. Selective Herbicides for Spot Treatment

Sometimes an aggressive perennial weed becomes a problem in a prairie meadow. Wind-blown seeds can enter from adjacent areas and become established. This usually occurs in the first three years of the planting, before the prairie has matured and developed the thick sod that helps to repel weeds. In such cases, it is sometimes necessary to utilize herbicides to eliminate unwanted aggressive plants.

Spraying Roundup (glyphosate herbicide) in a prairie is never recommended, as it is a broad spectrum herbicide that kills most plants on contact with their leaves. An alternative is to spot-treat specific plants with Roundup or a specific selective herbicide using an absorbent material that has been soaked in the appropriate herbicide. There are many different approaches, including the “Glove of the Death,” the “Tongs of Death,” and other variations.

First, protect your arms and hands with heavy duty, long, rubber herbicide application gloves. These are available at farm supply stores. To use the “Glove of Death” method place a larger size,

absorbent cotton glove over the herbicide glove on one hand. Using a small sprayer bottle, set on "stream" rather than "mist," soak the glove until saturated, but not dripping with the herbicide mixture. Then wipe the glove on the target plant, making sure that the liquid is applied uniformly to the leaves. If desirable vegetation is nearby, move it to the side with your feet or the hand without the herbicide glove, so that it is not touched by the glove or by the target weedy plant after it has been treated.

The "Tongs of Death" utilize a set of tongs whose ends have been wrapped in old cotton socks or other absorbent material. Herbicide can be applied to the tongs from a bucket, or by spraying from a bottle, as with the "Glove of Death" method. A spray bottle is recommended over the bucket, as an open container of herbicide could result in an unwanted spill if accidentally knocked over. The spray bottle keeps the herbicide contained, and the contents will not spill if tipped over.

Broadleaved Weeds

Broadleaved weeds can be treated using herbicides that kill only broadleaf weeds, leaving the prairie grasses unharmed. Beware that most broadleaf weed killers are also toxic to most prairie flowers. Therefore, it is not recommended to spray a prairie meadow with a broadleaf herbicide, as this will kill the flowers.

The exception to this rule is in plantings consisting of only prairie grasses and no flowers. The appropriate broadleaf herbicides can be sprayed across the entire field to kill unwanted non-grassy weeds. This is a cheap, effective method of controlling broadleaf weeds in prairie grass plantings.

Some weeds are resistant to Roundup. Those that cannot be controlled by burning, mowing, or dug out individually (due to rhizomatous root systems) may require treatment with broadleaf herbicides.

SOME OF THE MOST DIFFICULT TO CONTROL PERENNIAL WEEDS

Common Name	**Latin Name**	**Notes**
Canada Thistle	*Cirsium arvense*	Resistant to Roundup
Field Bindweed	*Convolvulus arvensis*	Resistant to Roundup
Hedge Bindweed	*Convolvulus sepium*	Resistant to Roundup
Crown Vetch	*Coronilla varia Plantago spp.*	Resistant to Roundup
Plantain species Horsenettle	*Solanum caroliniense*	
Canada Goldenrod	*Solidago canadensis*	Invasive native plant
Perennial Sow Thistle	*Sonchus arvensis*	
White Clover	*Trifolium repens*	

Specific weeds are more susceptible to some broadleaf herbicides than others. Always read the herbicide label to determine if it will successfully control the target weed, and follow all recommended safety measures.

A mixture that is usually extremely effective on problem weeds is a water-based mixture of Roundup, the appropriate broadleaf herbicide, and Ammonium Sulfate (AMS). AMS neutralizes minerals in the water so that the herbicides are more effective.

The following mixture will kill just about any weed known to humankind:

SUPER WEED KILLER MIX - PER GALLON WATER

- ¼ Cup Ammonium Sulfate, added to spray tank
- ½ Gallon water, mixed into tank to bring AMS into solution
- ½ Cup concentrated (40% active ingredient) Glyphosate herbicide (Roundup)
- ½ Pint of the appropriate broadleaf herbicide (2,4-D, Garlon, Trimec, etc), or the amount recommended on the label per gallon of water for the specific herbicide Add remaining ½ Gallon of water slowly to tank (to prevent foaming), for a total of one gallon of herbicide solution. Shake vigorously to homogenize all components.

BEWARE: *This mixture will kill all plants. Use with caution!* The mix can be sprayed directly onto the foliage of the target weed, or applied using the "Glove of Death: or "Tongs of Death." It is also effective for foliar spraying of Buckthorn (Rhamnus catharticus), Honeysuckle (Lonicera spp.), Multiflora Rose (Rosa multiflora), and most other invasive shrubs.

WARNING: *Most broadleaf herbicides are generally considered to be more hazardous than Roundup.* Many are implicated in or suspected of causing cancers, birth defects, and other health problems. Some people have strong physiological reactions to certain broadleaf herbicides. For this reason, the use of these chemicals should be minimized or avoided altogether. The information presented here is for those individuals who are comfortable using herbicides in their landscape. This is not intended to be a recommendation or justification for the use of these chemicals.

Plateau Herbicide

There is a specialty herbicide available called "Plateau" that is non-toxic to certain native prairie flowers and grasses when applied at specific levels. It can be applied either as a pre-emergent herbicide at the time of planting, or as a post-emergent herbicide after the seedlings have germinated and produced strong seedlings. Its effect can be highly variable from species to species and from genotype to genotype, so bewared that it may kill plants for which it is labeled as "safe." It controls many annual and perennial weedy grasses, as well as a number of broadleaved weeds. It does not kill most warm season prairie grasses, with the exception of Switchgrass and Prairie Cordgrass (Spartina pectinata). Plateau-resistant prairie species are listed below:

PLATEAU RESISTANT GRASSES

Common Name	**Latin Name**
Big Bluestem	*Andropogon gerardii*
Side Oats Grama	*Bouteloua curtipendula*
Needlegrass	*Heterostipa spartea*
Indiangrass	*Sorghastrum nutans*
Little Bluestem	*Schizachyrium scoparium*

PLATEAU RESISTANT FLOWERS

Common Name	**Latin Name**	
Leadplant	*Amorpha canescens*	Use max. rate of 4 oz/acre
Common Milkweed	*Asclepias syriaca*	
Smooth Aster	*Aster laevis*	Use max. rate of 2 oz/acre
New England Aster	*Aster novae angliae*	
White False Indigo	*Baptisia alba*	Use max. rate of 2 oz/acre
Blue False indigo	*Baptisia australis*	
Partridge Pea	*Cassia fasciculata*	
Coreopsis species	*Coreopsis spp.*	
White Prairie Clover	*Dalea candida*	
Purple Prairie Clover	*Dalea purpurea*	
Canada Ticktrefoil	*Desmodium canadense*	Use max. rate of 2 oz/acre
Purple Coneflowers	*Echinacea purpurea*	
Ox Eye Sunflower	*Heliopsis helianthoides*	Use max. rate of 2 oz/acre
Wild Lupine	*Lupinus perennis*	
Roundhead Bushclover	*Lespedeza capitata*	
Black Eyed Susans	*Rudbeckia spp.*	
Stiff Goldenrod	*Solidago rigida*	

WARNING: *Plateau can harm or kill a wide range of other prairie flowers, as well as Switchgrass, Prairie Cordgrass and many cool season prairie grasses such as the Wild Ryes (Elymus spp), Junegrass (Koeleria macrantha), Kalm's Bromegrass (Bromus kalmii), and Prairie Dropseed (Sporobolus heterolepis). Plateau should never be used in a diverse prairie containing many different types of flowers and cool season grasses.*

Perennial Grassy Weeds can also be treated using the Glove or Tongs of Death methods. On larger areas, undesirable cool season weeds such as Quackgrass, Kentucky Bluegrass, and Smooth Bromegrass can be treated by spraying with grass-selective herbicides such as Poast, Fusilade, and Select. Spray in mid to late fall after the warm season prairie grasses have all gone dormant for the year to avoid damaging them. Most cool season weedy grasses are still actively growing, and will be damaged with a fall application. Air temperatures must be above 60 degrees F. to ensure good results with late season herbicide applications.

A second follow-up application of grass selective herbicides is usually required to achieve control of cool season weedy grasses. This can be done in the following spring when cool season grasses are actively growing, but prior to the emergence of the warm season prairie grasses. A second application can also be done the next fall if desired.

Grass selective herbicides will kill actively growing native cool season grasses such as the Wild Ryes, Junegrass, Needlegrass, Kalm's Bromegrass, and Prairie Dropseed. These grasses green up around the same time as the non-native cool season species, and will be harmed or killed with a spring spraying of grass selective herbicide. However, most cool season native grasses will go dormant in

fall prior to many non-native cool season grasses. If cool season native grasses are an important component of the prairie, the use of grass selective herbicides should be restricted to late fall after all the prairie grasses have entered dormancy.

The species listed below account for most of the cool season weedy grass and nutsedge problems in restored prairies. Most can be controlled with mid to late spring burning. If burning is not an option, mid to late spring mowing and raking is a good alternative in most cases. If an infestation cannot be controlled using either burning or mowing, grass selective herbicides can be considered as an option.

GRASSES AND SEDGES

Common Name	**Latin Name**	**Notes**
Quackgrass	*Elytrigia repens*	Controllable with burning
Smooth Brome	Bromus inermis	Hard to control with burning
Yellow Nutsedge	*Cyperus esculentus*	Use “Manage” herbicide
Orchard Grass	*Dactylis glommerata*	Controllable with burning
Tall Fescue	*Festuca arundinacea*	Hard to control with burning
Reed Canary Grass	*Phalaris arundinacea*	Burn in late spring
Kentucky Bluegrass	*Poa pratensis*	Controllable with burning

Conclusion

Prairie meadows can be managed using a number of different techniques. By taking the time to properly prepare the site by killing all perennial weeds prior to seeding, long term problems can be minimized. Well-timed mowing and burning are the most commonly used management methods, due to their relative simplicity and low costs. Proper planning and execution is essential when using fire as a management tool. With good management, the prairie plants will choke out the majority of annual and biennial weeds without any extra effort.

Spot removal or herbicide treatment of problem perennial weeds may be necessary. Pulling or digging of tap-rooted weeds can be done successfully on smaller areas. On larger areas, selective herbicide treatment may be more cost effective.

Prairie meadows can be managed cheaply and efficiently by using the appropriate technique at the right stage of development. Properly timed and carried out, these management procedures will result in the establishment of perennial prairie meadows that return year after year. Significant cost savings are realized when the appropriate management methods are used, especially when compared to more traditional, high maintenance lawns and formal gardens.