
Chapter One:

# Reconstructing a Tallgrass Prairie

## A Seeding Guide for Missouri

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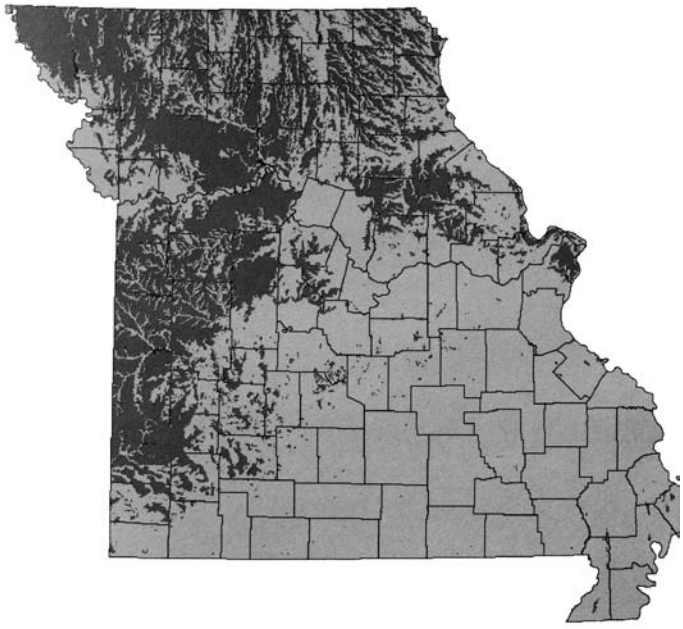
## Introduction

This reconstruction method is designed for early winter seeding in Missouri. It will take two to three years for most seedlings to flower and at least three years for plants to overcome initial weeds. Timing and patience are important to achieve success. With careful attention to maintenance during the first year or two, you can create a beautiful and low-maintenance restoration on a small budget. With yearly burning or mowing, your restoration will survive for generations to enjoy. This method is simple and has been used at Shaw Nature Reserve in Gray Summit, Missouri, over many years.

## Determine Goals



### Presettlement Prairie

The range of the original tallgrass prairie is shown in the dark areas on the map above. While it dominated northern and western Missouri, its range also extended throughout southeastern Missouri in patches between rocky glades, open woodlands, and forested river bottoms. In Missouri, about 4 percent of the original prairie exists today, mostly in the western part of the state. Prairie landscapes are being reconstructed on state and private lands throughout the Midwest. They are used to reduce mowing on small farms, highway right-of-ways, college and corporate campuses, and golf courses.

Before beginning prairie reconstruction you should evaluate your site and determine what you hope to achieve. Ask yourself why you are reconstructing the site and what goals you have for it. The answers will help you decide on the site location, layout, size and seed mixture, all of which are described in this boooklet. There are four basic reasons to reconstruct a tallgrass prairie:

### Maintenance

It is becoming more common for homeowners and owners of large properties to reduce mowing by replacing turf with prairie plants that need mowing only once a year.

### Beautification

Tallgrass prairies with a diversity of grasses and wildflowers bloom from April through November and attract a host of colorful birds, butterflies and insects. Homeowners, landowners and city parks use prairies for beautification.

### Education

A tallgrass prairie reconstruction is a good opportunity to teach local cultural and natural history, while providing opportunities to develop math, reading, writing, art and science skills.

### Ecological Reconstruction

Prairie reconstruction provides needed habitat for wildlife. Over 95 percent of the original tallgrass prairie is gone in Missouri, replaced by agriculture and urban development. A prairie reconstruction project with a diversity of native plants attracts a diversity of insects, birds, amphibians and mammals and provides opportunities to observe nature up close.

## Site Evaluation

| Labor Comparison | |
|---|---|
| Lawn<br>• Weekly mowing | Field<br>• Mowing three times per year |
| Highway Right-of-way<br>• Mowing six times per year | Tallgrass Prairie<br>• Mowing once per year |

### A. Map the area.

Note existing structures, utilities, traffic use, slope, north-south aspect, soil type, vegetation, patterns of shade and light, soil moisture and drainage, erosion, size and shape of the site. Maps will help you decide where to locate a prairie and may be useful in explaining the project to neighbors, city officials or maintenance crews.

### B. Survey vegetation.

A plant survey of the site and surrounding area may reveal clues to the plant community that existed and helps you decide what needs to be done first. For example, if native prairie grasses and forbs grow in a nearby fence row or roadside, seeds of these plants could be collected and used in the project, or at least guide plant selection. You may find that the site is covered with shrubs, vines or weedy vegetation. If possible, avoid areas that are infested with crown vetch, bird's foot trefoil, Johnsongrass, sericea lespedeza; they are difficult to control. This will help prioritize the reconstruction steps.

### C. Research land-use history.

Has the land recently been in row-crop production? If so, has the herbicide Atrazine been used? Atrazine may prevent germination of prairie seeds up to a year after its application. Herbicide-resistant row crops can be an advantage by keeping the field weed-free until seed-sowing time in late November and early December. We recommend Roundup-Ready crops be used in the season immediately preceding prairie seeding.

### D. Is the site suitable for a tallgrass prairie?

Look for evidence that a prairie existed on the site. Are there stories about prairies in the area? Do prairie plants exist in the area? If there are trees, the site may have been prairie anyway. Much of the tallgrass prairie south of the Missouri River has been replaced with forest over the past 200 years. If you have attractive specimen trees, consider seeding the site with savanna species. They are more tolerant of shade and drought.

See sample seed list for savannas on page 13.

## Tips for Species Selection



### Prairie Borders

Left to right: Small backyard prairie landscape with prairie dropseed grass edge and split-rail fence. Corporate prairie landscape with buffalo grass edge. Large front-yard prairie landscape with mowed fescue edge along driveway. Each has well-defined borders that create a gentle visual transition from walkway to taller prairie. Fencing also prevents prairie plants from flopping at the edges.

E. Create a schedule.

Before going further, it is important to plan step-by-step in advance so each step is done in sequence.

See sample schedule below.

| Prairie Reconstruction Schedule | |
|---|---|
| **Year 1** | |
| Summer | First herbicide application. Collect, clean, dry and store seed. |
| Fall | Second herbicide application. Collect, clean, dry and store seed. |
| Late Fall | Third herbicide application. Collect, clean, dry and store seed. |
| Early winter | Mix and sow seed. Late November or early December is ideal. |
| Winter | Seeding can occur in January but no later. |
| Spring | Seed germinates March to May. Survey seedlings to determine germination success. Begin mowing weeds. Spot spray herbicide if needed. |
| **Year 2** | |
| Summer | Continue mowing weeds if needed. Collect, clean, dry and store seed. Spot spray herbicide if needed. |
| Fall | Continue mowing weeds if needed. Collect, clean, dry and store seed. Spot spray herbicide if needed. |
| Winter | Over seed in late November or early December as needed. |
| **Year 3** | |
| | Should not need to mow at all. Spot spray herbicide if needed. Collect, clean, dry and store seed for next prairie plots. |

### Diversity

The more diverse the plant life, the greater the diversity of wildlife that use it for food and shelter. A diversity of native plants also tends to provide blooms from early spring through early winter. Typical commercial prairie seed mixes include about 25 species.

### Soil moisture determines proper species selection.

Dry: Well-drained soil, on south- or west-facing slopes with shallow or rocky soils. Soil surface dries quickly.

Mesic: Medium soil moisture, often gently sloped land. Soil surface retains moisture several days.

Wet: Poorly drained soil, usually in flat, low ground. Soil surface remains inundated with water after rain.

The species selection guide in this document lists species for dry, mesic and wet sites.

## Tips for Site Preparation

| Prairie Plants to Avoid or Use Sparingly in Seed Mixes | |
|---|---|
| Sunflowers<br>Helianthus spp. | Most sunflower species are aggressive and should not be included in seed mixes. They can, however, be seeded over an established prairie at a later date. |
| Illinois bundleflower<br>Desmanthus illinoensis | Illinois bundleflower produces seed eaten by wildlife; however, use seed sparingly since it can take over in dry areas. |
| Partridge pea<br>Chamaecrista fasciculata | Partridge pea is the larval food plant for sulphur butterflies and produces seed eaten by wildlife; however, use seed sparingly since it can take over in dry areas. |
| Tall goldenrod<br>Solidago altissima | This native species of goldenrod spreads rapidly by seed and rhizomes. It is considered a weed and should never be included in seed mixes.<br>Note: None of the goldenrod species cause hay fever. Hay fever is caused by ragweed, which blooms at the same time as goldenrod. |
| Tall prairie grasses<br>Indian grass<br>Switch grass<br>Eastern Gama<br>Cord grass | These grass species are aggressive and should be used appropriately in seed mixes. They can be seeded over an established prairie at a later date. |

### Existing vegetation must be removed.

This process is more important than any other step, so be sure it is done thoroughly before seeding prairie. It may take more than one season to control difficult weed species.

If starting with a turf lawn, use clear plastic, tin or organic mulch to kill turf in small areas. Apply in spring/summer and remove just before early winter seed sowing. Secure plastic and tin so they don't blow away. For areas larger than 5,000 square feet, use an herbicide such as Roundup (glyphosate) (or Rodeo, near water,) to kill existing turf. Apply once or twice in late summer and fall for early winter seed sowing. When using herbi-cides, always wear eye and skin protection.

If you are starting with an old field or highway right-of-way, it is impractical to use mechanical means to remove weeds. You can use hand tools to cut down or dig out small numbers of trees and shrubs.

The preferred method is to use glyphosate (or Rodeo near water) to kill grasses and broadleaf weeds. Use Roundup Pro or Garlon to kill undesired tree saplings, shrubs and vines (if woody plants are too big, they must be cut down and removed from the site). Apply in mid-summer, late-summer and fall for early-winter seed sowing. Old fields typically have a diversity of grasses, broadleaf weeds and brush and may require more herbicide applications than a lawn. The table on Page 8 lists difficult weeds and suggestions for their control.

Tree saplings and shrubs such as oaks, hickories, hackberry, blackberry, sumac, sassafras, autumn olive or woody vines can be a problem if not killed before sowing seed. A stronger herbicide may be needed.

See table on Page 8 for treatment instructions.

## Soil Preparation


Top: Various size herbicide sprayers. Bottom: Fifty-gallon spray rig with a 15-foot boom is practical for sites larger than a half acre.

After existing vegetation is killed, the ground

| Difficult to Kill Weeds Must be Controlled Before Seed Sowing Occurs | |
|---|---|
| **Non-native Weeds** | |
| Crown vetch<br>Coronilla varia | Spray 2% solution of Roundup® over several-year period. Seeds are long-lived in the soil. Prescribed burning can stimulate spread. |
| Sweet clover<br>Melilotus spp. | Mow over several-year period or spray with a 2% solution of 2,4-D amine and surfactant. Do not let sweet clover make seeds as it is difficult to control. |
| Curly dock<br>Rumex crispus | Spray 2% solution of Roundup in spring or early summer before plants flower. |
| Red clover<br>Trifolium pratense | Spray 2% solution of Roundup in spring or early summer before plants flower. |
| Thistle<br>Cirsium arvense, C. vulgare | Spray 2% solution of Roundup in spring or early summer before plants flower. |
| Sericea lespedeza<br>L. cuneata | Spray 2% solution of Garlon 4® over several-year period. Seeds are long-lived in the soil. Prescribed burning can stimulate spread. |
| **Native Weeds** | |
| Johnsongrass<br>Sorghum halepense | Spray Outrider® before plants flower. Roundup is not 100 percent effective. |
| Tall goldenrod<br>Solidago altissima | Spray 2% solution of Roundup in spring or early summer before plants flower. |
| Yellow nut grass<br>Cyperus esculentus | Spray Manage (1 gram per gallon of water) during the growing season. |
| Tree saplings, shrubs and vines | Apply a solution of Garlon 4 mixed in commercially available basal oil, diesel fuel, or kerosene to bark of uncut stems. Or apply 20% solution of Roundup Pro mixed in water with a surfactant to cut stumps. These applications can take place in any season but are most easily applied in winter. |

should not be tilled, disked or plowed. Disturbing soil brings up weed seed. Dead vegetation should be cut to a few inches high, using a mower or weed whip. Having some dead vegetation helps hold seed in place and prevent erosion during winter months. Seeding can be done directly in the mowed, dead vegetation in early winter.

Slopes with a grade above 1:2 may need to be stabilized. Several materials are available to keep seeds and soil in place while plants establish themselves.

## Seed Collection

### Slope-Stabilization Mats Control Erosion

| Type | Brand name | Description |
|---|---|---|
| Fiber mat | Geojute® | Open mesh construction allows plants to grow with ample light to pass through. Absorbs almost five times its weight. Decomposes in two years or less. |
| Wood shavings mat | Curlex® No.1 | Expands when wet, causing the material to adhere to the surface, and releases moisture to germinating seeds. Product is entirely biodegradable in two months. |
| Straw mat | North American Green, S75 Single Net Straw Blanket | The interwoven strands move independently of each other providing better moisture absorption, flexibility and conformance with the soil surface. Decomposes in one year. |

Small quantities of seeds can be collected by hand or with pruners. Good containers are apple-picking bags, paper or plastic grocery bags, and buckets.

### Local Ecotype Seed

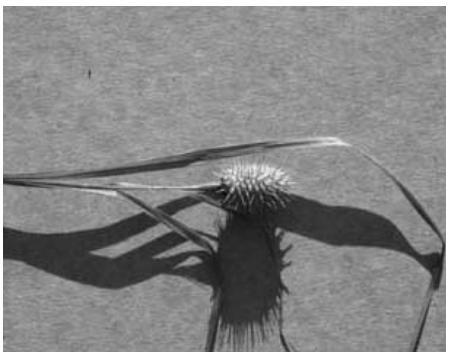
This seed originates naturally near your prairie project. The closer the seed originates to the project site, the more likely the plants will succeed because they are genetically adapted to the environment and are more disease-resistant. When purchasing seed, ask for seed that comes from as close to the project site as possible. For more details, visit http://www.forwild.org/download/LocalEcotypeBrochure.pdf

Collecting grass seed using pruners and apple picking bag. Hand stripping seed into a 5-gallon bucket. It is easy to cut a hand while using pruners A bag tied around your waist lets you use both hands.

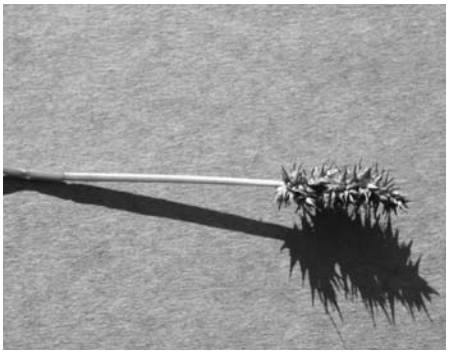
## Seed Drying, Cleaning and Storage

### Drying

Dry seed in cardboard trays, open paper bags



Unripe seed heads are green or still have color in their flower petals. Wait until petals turn tan or brown. From left, Sedge, Black-eyed Susan, and White wild indigo.



Ripe seed heads are tan, brown or black. From left, Sedge, Black-eyed Susan, and White wild indigo.

or other open containers. Spread out large quantities of seed in a large, dry space. Seed dries in about two weeks, more quickly in air-conditioned environment. Be sure to include plant name, date collected and collection location with the seed.

## Cleaning

Seeds may be cleaned in kitchen colanders, sieves, window screens and other household items. Large wooden screens may be made of variously sized metal screening purchased from a hardware store.

Seed heads are cleaned in different sized screens.

Once seed is dried and cleaned, it may be stored in Ziploc® or paper bags. These can be stored in a refrigerator or in a garage or basement as long as they are dry, mouse-free and out of direct sunlight.



Labeled seed being dried in cardboard trays, paper bags, and on a sheet of plastic.



Seeds can be stored in Ziploc® or paper bags.

## Seed Mixing

### Getting Started

Mix 50 percent native grass seed with 50 percent forbs by weight (forbs are non-grass, broad-leaved flowering plants like Black-eyed Susan). Pre-mixed prairie seed can be purchased from local native plant nurseries (see nursery source list). Try to acquire seed from these sources since it will be hardier and more disease-resistant in our climate.

You need 10 pounds pure live seed (PLS*) per acre (15 pounds if seed is chaffy or not pure live seed). If you collect seed yourself, use the 15 pound-per-acre weight. For example, if you have a four-acre prairie you need either 40 pounds of PLS or 60 pounds of chaffy seed. (For smaller sites, sow 1 ounce mixed seed per 200-300 square feet.)

Sample Seed Mix: One-Acre Mesic to Dry Prairie

| Scientific Name | Common Name | Weight Per Acre |
|---|---|---|
| Grasses | | |
| Andropogon gerardii | Big bluestem | 1.25 lb. |
| Elymus canadensis | Canada wild rye | .5 lb. |
| Panicum virgatum | Switch grass | .25 lb. |
| Sorghastrum nutans | Indian grass | .5 lb. |
| Schizachyrium scoparium | Little bluestem | 1.5 lb. |
| Carex species | Mixed prairie sedges | 1 lb. |
| Total Grasses: | | 5 lb. |
| Forbs | | |
| Asclepias tuberosa | Butterfly milkweed | 5 oz. |
| Aster novae-angliae | New England aster | 3 oz. |
| Baptisia alba | White false indigo | 8 oz. |
| Coreopsis lanceolata | Lance-leaved coreopsis | 5 oz. |
| Coreopsis tripteris | Tall coreopsis | 5 oz. |
| Echinacea pallida | Pale purple coneflower | 5 oz. |
| Eryngium yuccifolium | Rattlesnake master | 5 oz. |
| Heliopsis helianthoides | False sunflower | 3 oz. |
| Helianthus occidentalis | Western sunflower | 2 oz. |
| Lespedeza capitata | Round-head bushclover | 5 oz. |
| Liatris pycnostachya | Prairie blazing star | 5 oz. |
| Monarda fistulosa | Wild bergamot | 3 oz. |
| Ratibida pinnata | Gray-headed coneflower | 3 oz. |
| Rudbeckia hirta | Black-eyed-Susan | 3 oz. |
| Solidago rigida | Stiff goldenrod | 5 oz. |
| Rudbeckia subtomentosa | Sweet coneflower | 5 oz. |
| Vernonia arkansana | Arkansas ironweed | 5 oz. |
| Tradescantia ohiensis | Ohio spiderwort | 5 oz. |
| Total Forbs : | | 80 oz. or 5 lb. |
| Grand Total : | | 10 lb. PLS per acre |

| Sample Seed Mix: One-Acre Mesic to Dry Savanna or Open Woodland | | |
|---|---|---|
| Scientific Name | Common Name | Weight Per Acre |
| Grasses | | |
| Andropogon gerardii | Big bluestem | 1 lb. |
| Carex annectens, C. vulpinoidea, C. molesta, C. gravida, C. muehlenbergii, C. complanata, C. shortiana | Mixed upland sedges | 1.5 lb. |
| Chasmanthium latifolium | Creek oats | .25 lb. |
| Bromus pubescens | Woodland brome | .25 lb. |
| Elymus hystrix | Bottlebrush grass | .25 lb. |
| Elymus virginicus var. glabriflorus | Woodland rye | .25 lb. |
| Panicum virgatum | Switch grass | .25 lbs. |
| Schizachyrium scoparium | Little bluestem | 1 lb. |
| Sorghastrum nutans | Indian grass | .25 lb. |
| Total Grasses & Sedges: | | 5 lb. |
| Forbs | | |
| Aster oblongifolius | Mixed asters | 3 oz. |
| Blephilia ciliata | Ohio horse mint | 3 oz. |
| Dodecatheon meadia | Shooting star | 1 oz. |
| Echinacea purpurea | Purple coneflower | 8 oz. |
| Helianthus divaricatus or H. hirsutus | Woodland sunflowers | 3 oz. |
| Heliopsis helianthoides | False sunflower | 3 oz. |
| Liatris scariosa | Savanna blazing star | 5 oz. |
| Monarda bradburiana | Bradbury beebalm | 3 oz. |
| Phlox pilosa | Downy phlox | 2 oz. |
| Pycnanthemum pilosum | Hairy mountain mint | 4 oz. |
| Rudbeckia triloba | Brown-eyed Susan | 6 oz. |
| Scutellaria incana | Hoary skullcap | 6 oz. |
| Senna marilandica | Wild senna | 8 oz. |
| Solidago ulmifolia or S. rugosa | Elm-leaved goldenrod or Rough-leaved g. | 3 oz. |
| Tradescantia ohiensis or T. virginiana | Ohio spiderwort or Virginia spiderwort | 7 oz. |
| Verbesina helianthoides | Yellow wingstem | 6 oz. |
| Veronicastrum virginicum | Culver's root | 1 oz. |
| Zizia aurea | Golden Alexanders | 8 oz. |
| Total Forbs: | | 80 oz. or 5 lbs. |

*PLS means pure live seed, which is seed that has been tested for purity and viability.
This is done by most seed nurseries and should be included in your seed order.

## Sowing Seed by Hand

### When to Sow Seeds

Early winter is the optimum time to sow seed because most native wildflower seeds germinate better after exposure to cold temperature. This process, called stratification, happens naturally each winter. Without stratification, seed germinates at the wrong time and does not survive winter. Sow seed in November or December, if possible (early January at the latest).

### Sowing Seed on Slopes

When sowing seed on slopes, incorporate a nurse crop such as oats or annual rye. Nurse crops are planted with your seed mix to prevent erosion and reduce weed growth during the first growing season and ideally are sown in November. Nurse crops typically disappear by the second growing season.
Do not use winter wheat or winter rye as a nurse crop. Studies have shown they produce chemicals that prevent germination of prairie seedlings.

| Seeding Rates for Nurse Crops of Oats or Annual Rye | |
|---|---|
| Oats | 60-90 lb. per acre |
| Annual Rye | 15 lb. per acre |

For this seeding, a large volume of seed was mixed with moist sawdust. White fluffy seed on top is showy goldenrod.

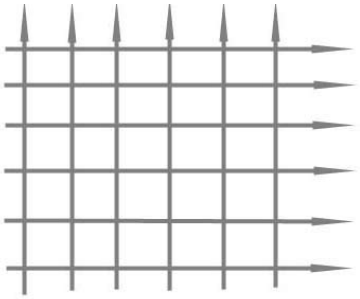
### Mixing Seeds

Mix seed with a larger volume of slightly moist sand, sawdust or similar inexpensive material to improve seed distribution. Four parts sawdust to one part seed is a good percentage.

### Sowing Seeds

Sow using a grid-shaped pattern by spreading half the seed mixture over the entire area as you move in one direction. Then spread the other half of the seed mixture over the same area as graph indicates.

Here are some tips for hand seeding:
A. Line up helpers, evenly spaced at the edge of the plot. As they walk forward, they should remain the same distance apart. It helps to walk toward a landmark, a trick that helps workers stay on course.



B. Fan out seed as it is thrown. Avoid throwing clumps of seed mixture in one small area.

C. Sowing seed on snow is acceptable, but some seed may be eaten by birds. Sowing seed on a steep slope may result in seed washing away in a heavy rain. You may need to use erosion mats on steep slopes. Gentle slopes are fine.

D. Sow seed on undisturbed ground. Tilling, disking or plowing brings unwanted weed seeds to the surface. During winter freezes and thawing, seeds sown on the surface work their way into the soil to the proper depth. Therefore, there is no need to cover the seed or rake it in when sowing.

## Sowing Seed with a No-till Drill

This method is used for plots larger than an acre. No-till seed drills plant the seed in rows by cutting slits in the soil and planting seed at the proper distance, and depth. No-till drills cause minimal soil disturbance which results in less weed seed germination. Seed drills may be borrowed from various state agencies or hired through a landscape contractor who specializes in prairie seeding. To learn how to borrow and use a no-till seed drill, contact the Missouri Department of Conservation private lands conservationist in your county. He or she will be listed at http://www.mdc.mo.gov/landown/contacts.html.

Sowing seed can be done by hand if the site is less than five acres. Use a commercial seed drill for larger plots. Ten people can sow seed over five acres in a morning.

### How to Calculate an Acre of Land

An acre contains 4,840 square yards or 43,560 square feet. If your plot is about 200 feet by 200 feet then you have 40,000 square feet or just under one acre.

## Spring Germination

Commercial seed drill

Prairie seed begins to germinate in April and continues through June. Some germination even occurs the next spring. Seedlings may be

difficult to see because of their small size and the annual weed competition.

You can learn to identify prairie seedlings by sowing seed of each species indoors. Seed should be kept in moist sand in a Ziploc® bag in the refrigerator for 2-3 months and then sown in pots to germinate. As seedlings germinate, you will notice differences in each prairie species.

Six-week-old prairie seedlings: Wild Bergamot, left, and Prairie blazing star.

Top left: Compass plant. Top right: Switch grass. Bottom: Wild bergamot .

## Maintenance

### What to do in year one

Vigorous annual and biennial weeds can shade out prairie seedlings during the first summer because prairie wildflowers and grasses grow more slowly than these weeds. Control weeds by keeping them mowed to a height of 6-12 inches throughout the first growing season. Most prairie seedlings are less than six-inches tall in their first growing season and seldom are damaged by mowing. Always cut weeds before they are 12-inches high to avoid shading out prairie seedlings. When weeds are cut at taller heights, the long clippings may smother seedlings. Controlling weeds also prevents production of weed seeds that produce problems in the future. Mowing weeds on a regular basis in year one is a key step for a successful prairie seeding.

#### Best equipment to use

String trimmers work well on projects less than an acre. Tractor-driven mowers are needed for larger areas. Adjust mower to cut higher than six inches.

#### Common weeds

Common biennial weeds include Queen Anne's lace, bull and Canada thistle and curly dock. Common annuals include moth mullein, fleabane, mare's tail, foxtail grass, chicory, ragweed, lambs quarter, mustard and smartweed, to name a few.

## Weed with care

Weeding in year one is difficult because prairie seedlings are small and easily pulled along with weeds. If you can identify young weeds, it is safe to pull them as long as you do not disturb the desirable seedlings. Keep in mind that pulling weeds disturbs soil and can expose new weed seeds. To remove large weeds, cut them off at the base and remove seed heads from the site.

## What to do in year two

If weeds are a problem mow them at a height of 12 inches since prairie seedlings will be taller the second year. If biennials are a problem, mow them at 12 inches when they are in full bloom. This should kill them or set them back severely.

## Long-term maintenance

If burning your prairie is not an option, mowing will work once your reconstructed prairie is established. A late winter or early spring mowing is recommended once every year or two to control trees and shrubs. Standing prairie plants are full of over-wintering insects and provide food and cover for winter birds.

Top: First year prairie receiving mowing. Bottom: Established prairie receiving annual late winter mowing.

## Grasses

| | |
|---|---|
| Andropogon gerardii<br>Sun/Dry to Wet | Big bluestem<br>5-8 ft. Clump-forming |
| Bouteloua curtipendula<br>Sun/Dry to Mesic | Sideoats grama<br>2-3 ft. Clump-forming; |
| | drought tolerant |
| Elymus canadensis<br>Sun to Part Shade | Canada wild rye<br>3 ft. Clump-forming |

## Species Selection Guide

### Grasses, Sedges and Rushes

| Scientific Name | Common Name | Light & Moisture Requirement | Notes |
|---|---|---|---|
| | Mesic to Dry | | |
| Hystrix patula | Bottlebrush grass | Shade/Mesic to Dry | 3 ft. Clump-forming; drought tolerant |
| Koeleria pyramidata | June grass | Sun/Dry | 1-2 ft. Clump-forming |
| Panicum virgatum | Switch grass | Sun to Part Shade/ Dry to Mesic | 3-5 ft. Clump-forming |
| Sorghastrum nutans | Indian grass | Sun/Dry to Mesic | 3-5 ft. Clump-forming |
| Spartina pectinata | Prairie cord grass | Sun/Wet to Mesic | Quickly spreads by rhizomes |
| Sporobolus heterolepis | Prairie dropseed | Sun/Dry to Mesic | 1-2 ft. Clump-forming |
| Schizachyrium scoparium | Little bluestem | Sun/Dry to Mesic | 2-3 ft. Clump-forming; drought tolerant |
| Sedges and Rushes | | | |
| Carex annectans | Yellow-fruited sedge | Sun/Wet to Mesic | 2-3 Ft. Clump-forming |
| Carex bicknellii | Prairie sedge | Sun/Wet to Mesic | 1-2 Ft. Clump-forming |
| Carex brevior | Short-beaked sedge | Sun/Mesic to Dry | 2-3 Ft. Clump-forming |
| Carex bushii | Bush's sedge | Sun/Mesic to Dry | 2 Ft. Clump-forming |
| Carex buxbaumii | Brown bog sedge | Sun/Wet to Mesic | 1-2 Ft. Quickly spreads by rhizomes |
| Carex crinita | Fringed sedge | Sun/Wet to Mesic | 2-3 Ft. Clump-forming |
| Carex cristatella | Crested sedge | Sun/Wet to Mesic | 2-3 Ft. Clump-forming |
| Carex crus-corvi | Raven's foot sedge | Sun to Part Shade/ | Clump-forming initially, |

| Scientific Name | Common Name | Light & Moisture Requirement | Notes |
|---|---|---|---|
| | | Wet | then spreads by rhizomes |
| Carex davisii | Davis's sedge | Sun to Shade/ Wet to Mesic | 1-2 Ft. Clump-forming |
| Carex emoryi | Emory's sedge | Sun to Part Shade/ Wet to Mesic | Quickly spreads by rhizomes |
| Carex festucasea | Fescue sedge | Sun to Part Shade/ Wet to Mesic | 1-2 Ft. Clump-forming |
| Carex frankii | Frank's sedge | Sun to Part Shade/ Wet to Mesic | 2 Ft. Clump-forming |
| Carex granularis | Meadow sedge | Sun to Part Shade/ Wet to Mesic | 2 Ft. Clump-forming |
| Carex gravida | Heavy sedge | Sun/Wet to Mesic | 2-3 Ft. Clump-forming |
| Carex grayii | Bur sedge | Sun to Part Shade/ Wet to Mesic | 2 Ft. Clump-forming |
| Carex grisea | Wood gray sedge | Shade to Sun/ Wet to Mesic | 2 Ft. Clump-forming |
| Carex hirsutella | Hairy green sedge | Shade to Sun/ Dry to Mesic | 1-2 Ft. Clump-forming |
| Carex hyalinolepis | Shoreline sedge | Sun/Wet | Quickly spreads by rhizomes |
| Carex lanuginosa | Wooly sedge | Sun/Wet | Quickly spreads by rhizomes |
| Carex louisianica | Louisiana sedge | Sun to Part Shade/ Wet | 2-3 Ft. Clump-forming |
| Carex lupulina | Hop sedge | Sun to Part Shade/ Wet | 2-3 Ft. Clump-forming |
| Carex lurida | Shallow sedge | Sun to Part Shade/ Wet | 2 Ft. Clump-forming |
| Carex muskingumensis | Swamp sedge | Sun to Part Shade/ | 2-3 Ft. Clump-forming |

| Scientific Name | Common Name | Light & Moisture Requirement | Notes |
|---|---|---|---|
| | | Wet to Mesic | |
| Carex normalis | Straw sedge | Sun to Part Shade/ Wet | 1-2 Ft. Clump-forming |
| Carex prasina | | Sun to PShade/ Mesic | 1-2 Ft. Clump-forming |
| Carex retroflexa | Reflexed sedge | Shade to Part Sun/ Dry to Mesic | 1-2 Ft. Clump-forming |
| Carex shortiana | Short's sedge | Sun to Part Shade/ Wet to Mesic | 2-3 Ft. Clump-forming |
| Carex squarrosa | Squarrose sedge | Sun/Wet to Mesic | 2-3 Ft. Clump-forming |
| Carex tribuloides | Blunt Broom sedge | Sun/Wet | 2 Ft. Quickly spreads by rhizomes |
| Carex vulpinoidea | Fox sedge | Sun to Part Shade/ Wet to Mesic | 2-3 Ft. Clump-forming |
| Juncus dudleyi | Dudley's rush | Sun/Wet | 2 Ft. Calcareous fens |
| Juncus effusus | Soft rush | Sun/Wet to Mesic | 2-3 Ft. Clump-forming initially, then spreads by rhizomes |
| Juncus torreyi | Torrey's rush | Sun/Wet | 2-3 Ft. Quickly spreads by rhizomes |
| Scirpus atrovirens | Dark green rush | Sun/Wet | 3-4 Ft. Clump-forming |
| Scirpus cyperinus | Wool grass | Sun/Wet | 3-4 Ft. Clump-forming |
| Scirpus pendulus | Nodding bulrush | Sun/Wet | 2-3 Ft. Clump-forming |
| Scirpus vallidus | Great bulrush | Sun/Wet | 3-4 Ft. Quickly spreads by rhizomes |
| Amsonia illustris | Shining bluestar | Sun to Part Shade/ Wet to Mesic | 3 ft. Blue flowers May-June |
| Artemisia ludoviciana | White sage, wormwood | Sun/Dry to Mesic | Quickly spreads by rhizomes; Sandy soils |
| Asclepias incarnata | Swamp milkweed | Sun/Wet to Mesic | Good nectar source for |

## Forbs (the non-grass plants often referred to as prairie wildflowers)

| Scientific Name | Common Name | Light & Moisture Requirement | Notes |
|---|---|---|---|
| | | | butterflies |
| Asclepias syriaca | Common milkweed | Sun to Part Shade/ Dry to Mesic | Spreads by rhizomes; flowers pink, fragrant |
| Asclepias tuberosa | Butterfly weed | Sun/Dry to Mesic | 2 ft. Orange flowers June-July |
| Aster anomalus | Woodland aster | Sun to Shade/ Dry to Mesic | Blue flowers September; drought tolerant |
| Aster novae-angliae<br>for butterflies | New England aster<br>Wet to Mesic | Sun to Part Shade/ good nectar source | Purple flowers September; |
| Aster oblongifolius | Aromatic aster<br>Dry | Sun to Part Shade/ October | 1-2 Ft. Lavender flowers |
| Aster oolentangiensis | Sky blue aster | Sun to Part Shade/ Dry to Mesic | 3 Ft. Blue flowers September |
| Aster patens | Spreading aster | Sun to Part Shade/ Dry to Mesic | 2-3 Ft. Blue flowers September |
| Aster turbinellus | Prairie aster<br>Dry to Mesic | Sun to Part Shade/ September | 3 Ft. Blue flowers |
| Astragalus canadensis | Canada milk vetch | Sun to Part Shade/ Dry to Mesic | 3 Ft. Creamy yellow flowers, May-June |
| Baptisia alba | White wild indigo | Sun/Dry to Mesic | 3-6 ft. White flowers July-August |
| Baptisia australis | Blue wild indigo | Sun/Dry to Mesic | 2-3 Ft. Blue flowers May-June |
| Baptisia bracteata | Cream wild indigo | Sun to Part Shade/ Dry to Mesic | 2 Ft. Light yellow flowers, April-May |
| Blephilia ciliata | Ohio horse mint | Sun or Shade/ Dry to Mesic | 2-3 Ft. Pink flowers May-June |

| Scientific Name | Common Name | Light & Moisture Requirement | Notes |
|---|---|---|---|
| Castilleja coccinea | Indian paintbrush | Sun/Dry | 1 Ft. Orange flowers April-May; annual |
| Chelone obliqua | Rose turtlehead | Sun or Shade/ Wet to Mesic | 3 Ft. Rose pink flowers August-September |
| Coreopsis grandiflora | Large-flowered coreopsis | Sun/Dry to Mesic | 2 Ft. Yellow flowers April-May |
| Coreopsis lanceolata | Lanceleaf coreopsis | Sun/Dry to Mesic | 2 Ft. Yellow flowers April-May |
| Coreopsis palmata | Prairie coreopsis | Sun/Dry to Mesic | 2 Ft. Yellow flowers May-June |
| Coreopsis tinctoria | Plains coreopsis | Sun/Dry to Mesic | 2-3 Ft. Yellow and red flowers, July |
| Dalea candida | White prairie clover | Sun/Dry to Mesic | 1-2 Ft. White flowers June-July |
| Dalea purpurea | Purple prairie clover | Sun/Dry to Mesic | 1-2 Ft. Purple flowers June-July |
| Delphinium carolinianum | Prairie larkspur | Sun/Dry to Mesic April-May | 2-3 Ft. Light blue flowers |
| Dodecatheon meadia | Shooting star | Sun to Part Shade/ Dry to Mesic | 1-2 Ft. Pink and white flowers, April-May |
| Echinacea pallida | Pale-purple coneflower | Sun/Dry to Mesic | 2-3 Ft. Pink flowers, June |
| Echinacea paradoxa | Yellow coneflower | Sun/Dry | 2-3 Ft. Yellow flowers June |
| Echinacea purpurea | Purple coneflower | Sun/Dry | 2-3 Ft. Pink flowers July-August |
| Echinacea simulata | Glade coneflower | Sun/Dry | 2-3 Ft. Pink flowers, June |
| Eryngium yuccifolium | Rattlesnake master | Sun/Dry to Mesic | 2-3 Ft. White flowers July-Aug |

| Scientific Name | Common Name | Light & Moisture Requirement | Notes |
|---|---|---|---|
| Eupatorium coelestinum | Mist flower | Sun/Wet to Mesic | 1 Ft. Purple flowers August- September |
| Eupatorium purpureum | Joe-Pye weed | Sun/Wet to Mesic | 5-7 Ft. Pink flowers June-July |
| Filipendula rubra | Queen of the prairie | Sun/Wet to Mesic June | 3-4 Ft. Rose pink flowers |
| Gentiana andrewsii | Bottle gentian | Sun to Part Shade/ Dry to Mesic | 1-2 Ft. Blue flowers September-October |
| Gentiana puberulenta | Downy gentian | Sun/Dry to Mesic | 1-2 Ft. Blue flowers September-October |
| Gillenia stipulata | Indian physic | Sun to Part Shade/ Dry to Mesic | 2-3 Ft. White flowers, July |
| Helenium autumnale | Sneezeweed | Sun to Part Shade/ Wet to Mesic | 2-3 Ft. Yellow flowers September |
| Helianthus occidentalis | Western sunflower | Sun/Dry to Mesic | 2-3 Ft. Yellow flowers July-August |
| Heliopsis helianthoides | Ox-eye sunflower | Sun to Shade/ Dry to Mesic | 3 Ft. Yellow flowers August-September |
| Heuchera Richardsonii | Alum root | Sun to Part Shade/ Dry to Mesic | 1-2 Ft. White flowers May-June |
| Hibiscus lasiocarpos | Rose mallow | Sun to Part Shade/ Wet to Mesic | 4-5 Ft. White and pink flowers, August-September |
| Iris virginica | Southern blue flag | Sun/Wet to Mesic May-June | 2-3 Ft. Lavender flowers |
| Lespedeza capitata | Roundheaded bushclover | Sun/Dry to Mesic July-August | 3-4 Ft. Cream flowers |
| Liatris aspera | Rough blazing star | Sun/Dry to Mesic August-September | 3 Ft. pink flowers |

| Scientific Name | Common Name | Light & Moisture Requirement | Notes |
|---|---|---|---|
| Liatris pycnostachya | Prairie blazing star | Sun/Dry to Mesic | 3 Ft. Pink flowers July-August |
| Liatris scariosa | Eastern blazing star | Sun to Part Shade/ Dry to Mesic | 3 Ft. Pink flowers July-August |
| Liatris squarrosa | Scaly blazing star | Sun to Part Shade/ Dry | 1 Ft. Cream flowers July-August |
| Lobelia cardinalis | Cardinal flower | Sun or Shade/ Wet to Mesic | 2-3 Ft. Red flowers July-August |
| Lobelia siphilitica | Blue lobelia | Sun or Shade/ Wet to Mesic | 2-3 Ft. Blue flowers August-September |
| Manfreda virginica | American aloe | Sun/Dry to Mesic | 1 Ft. in leaf, 3-4 Ft. tall flowers, July; stalks fragrant |
| Mimosa quadrivalvis | Sensitive briar | Sun/Dry | 1-2 Ft. Pink flowers July-August; thorny stems |
| Mimulus ringens | Monkey flower | Sun/Wet to Mesic June-August | 1-2 Ft. Light pink flowers |
| Monarda bradburiana | Bee balm, horsemint | Sun to Shade/Dry | 1-2 Ft. Pink flowers, May |
| Monarda fistulosa | Wild bergamot | Sun to Part Shade/ Wet to Mesic | 3-5 Ft. Pink flowers June-August |
| Oenothera pilosella | Prairie sundrops | Sun/Wet to Mesic | 1-2 Ft. Yellow flowers June |
| Oenothera speciosa | Pink primrose | Sun to Part Shade/ Dry to Mesic | 1-2 Ft. Lt. pink flowers June-July |
| Opuntia humifusa | Prickly pear cactus | Sun to Part Shade/ Dry | 1 Ft. Yellow/orange flowers, June; thorns |
| Palafoxia callosa | Spanish needles | Sun/Dry | 2-3 Ft. Pink flowers September-October |

| Scientific Name | Common Name | Light & Moisture Requirement | Notes |
|---|---|---|---|
| Parthenium integrifolium | Wild quinine | Sun/Dry to Mesic | 2-3 Ft. White flowers June-July |
| Penstemon digitalis | Foxglove beard-tongue | Sun to Part Shade/ Wet to Mesic | 2-3 Ft. White flowers June-July |
| Penstemon pallidus | Pale beard-tongue | Sun to Part Shade/ Dry | 2 Ft. White flowers May-June |
| Penstemon tubaeflorus | Prairie beard-tongue | Sun/Dry | 3 Ft. White flowers June-July |
| Phlox glaberrima | Smooth phlox | Sun/Wet to Mesic | 1-2 Ft. Pink flowers July-August |
| Phlox maculata | Meadow phlox | Sun to Shade/ Wet to Mesic | 3-4 Ft. Pink flowers June-July |
| Phlox paniculata | Garden phlox | Sun to Shade/ Wet to Mesic | 3-4 Ft. Pink flowers June-July |
| Phlox pilosa | Downy phlox | Sun/Dry | 1-2 Ft. Pink flowers May-June |
| Physostegia angustifolia | Obedient plant | Sun/Dry to Mesic | 3 Ft. Pink flowers August-September |
| Pycnanthemum tenuifolium | Slender mountain mint | Sun/Dry to Mesic | 2 Ft. White flowers July-August |
| Ratibida pinnata | Gray-headed coneflower | Sun to Part Shade/ Dry to Mesic | 3-4 Ft. Yellow flowers July-August |
| Rudbeckia fulgida | Orange coneflower | Sun or Part Shade/ Wet to Mesic | 2-3 Ft. Yellow flowers August-September |
| Rudbeckia hirta | Black-eyed Susan | Sun/Dry to Mesic | 2-3 Ft. Yellow flowers June-August |
| Rudbeckia subtomentosa | Sweet coneflower | Sun to Part Shade/ Wet to Mesic | 3-4 Ft. Yellow flowers June-August |

| Scientific Name | Common Name | Light & Moisture Requirement | Notes |
|---|---|---|---|
| Rudbeckia triloba | Brown-eyed Susan | Sun or Shade/ Dry to Mesic | 4-5 Ft. Yellow flowers July-September |
| Ruellia humilis | Wild petunia | Sun/Dry to Mesic | 1-2 Ft. Pink flowers June-August |
| Salvia azurea | Blue sage | Sun/Dry | 4-5 Ft. Blue flowers August-September |
| Scutellaria incana | Downy skullcap | Sun or Shade/ Dry to Mesic | 2-3 Ft. Lavender flowers July-August |
| Senna marilandica | Wild senna | Sun to Part Shade/ Dry to Mesic | 3-5 Ft. Yellow flowers July-August |
| Silene regia | Royal catchfly | Sun to Part Shade/ Dry to Mesic | 3 Ft. Red flowers July-August |
| Silphium laciniatum | Compass plant | Sun/Dry to Mesic | 4-6 Ft. Yellow flowers June-August |
| Silphium perfoliatum | Cup plant | Sun/Wet to Mesic | 5-12 Ft. Yellow flowers July-August |
| Silphium terebinthinaceum | Prairie dock | Sun/Dry to Mesic | Leaves 1-2 Ft., stems 4-6 Ft.; yellow flowers June-August |
| Solidago nemoralis | Gray goldenrod | Sun/Dry | 1-2 Ft. Yellow flowers August-September |
| Solidago riddellii | Riddell's goldenrod | Sun/Wet | 3 Ft. Yellow flowers September |
| Solidago rigida | Rigid goldenrod | Sun/Dry to Mesic | 2-3 Ft. Yellow flowers September |
| Solidago speciosa | Showy goldenrod | Sun/Dry to Mesic | 3-4 Ft. Yellow flowers September |
| Tephrosia virginiana | Goat's rue | Sun to Part Shade/ Dry | 1-2 Ft. Pink & yellow flowers, June-July |
| Tradescantia ohiensis | Ohio spiderwort | Sun to Part Shade/ | 3-4 Ft. Lavender/blue |

| Scientific Name | Common Name | Light & Moisture | Notes |
|---|---|---|---|
| | | Dry to Mesic | flowers, June |
| Verbesina helianthoides | Yellow wing stem | Sun to Part Shade/ Dry to Mesic | 3 Ft. yellow flowers June-July |
| Vernonia arkansana | Arkansas ironweed | Sun to Part Shade/ Dry to Mesic | 3-4 Ft. Purple flowers July-August |
| Vernonia baldwinii | Ironweed | Sun/Dry to Mesic | 3-4 Ft. Purple flowers July-August |
| Veronicastrum virginicum | Culver's-root | Sun to Part Shade/ Dry to Mesic | 3-4 Ft. white flowers June-July |
| Zizia aurea | Golden Alexanders | Sun to Part Shade/ Dry to Mesic | 2-3 Ft. yellow flowers April-May |

## Resources

Hamilton Seeds and Wildflowers
HC Rt. 9, Box 138
Elk Creek, MO 65464
417-967-2190
www.hamiltonseed.com/

Missouri Wildflowers Nursery
9814 Pleasant Hill Rd.
Jefferson City, MO 65109
573-496-3492
www.mowildflowers.net/

Pure Air Native Seed Co.
Rt. 1 Box 27
Novinger, MO 63559
660-488-6849
www.frankoberle.com/intro_store.html

Prairie Hill Farm
877 Country Rd. 263
Auxvasse, MO 65231
573-387-4680

Bluestem Prairie Nursery
Rt. 2, Box 106-A
Hillsboro, IL 62049
217-532-6344

DJM Ecological Services
Eastern Missouri
Jon Wingo
101 Pratt Pl.
Florissant, MO 63031
314-974-4282

Missouri Wildflowers Nursery
Central Missouri
Mervin Wallace
9814 Pleasant Hill Rd.
Jefferson City, MO 65109
573-496-3492
www.mowildflowers.net/

Little Creek Ranch
Central Missouri
Dennis P. McDevitt
146 Foxberry Rd.
Eldon, MO 65026-4054
573-392-7600
mcdevd@dam.net

Total Resourse Management
Western Missouri
382 NW Hwy. 18
Clinton, MO 64735
660-492-2052

Applied Ecological Services
1904 Elm St.
Eudora, KS 66025
785-542-3090

## Examples of Reconstructed Prairies (prairies created from agricultural fields, lawns, roadsides and construction sites)

### St. Louis Area

Shaw Nature Reserve
www.shawnature.org/

Missouri Botanical Garden
www.mobot.org/hort/gardens/kemper/prairie/index.shtml

Powder Valley Nature Center
www.conservation.state.mo.us/areas/cnc/powder/

The Green Center
www.thegreencenter.org/home/

Forest Park, Kennedy Woods Prairie-Savanna
levee.wustl.edu/~rlk/wgnss/savanna/

Weldon Spring Site, Howell Prairie
www.wssrap.com/howellprairie.htm

Missouri Department of Transportation
Interstate 44 and I-270 intersection

### Columbia Area

Prairie Garden Trust
www.prairiegardentrust.org/

### Jefferson City Area

Missouri Wildflower Nursery
Brazito, Mo. www.mowildflowers.net/

Runge Conservation Area
mdc.mo.gov/areas/cnc/ranger

### Springfield Area

Ozark Regional Land Trust's Woods Prairie
www.orlt.org/

### Kansas City Area

Burr Oak Woods Conservation Nature Center
www.mdc.mo.gov/areas/cnc/burroak/

Powell Gardens
www.powellgardens.org/default.asp?page=NatureTrail

Flat Rock Creek
Lenexa, Kan. www.jocomuseum.org/overland-Trails/trail_6.htm

Burroughs Audubon Library
816-795-8177 www.burroughs.org

### Miscellaneous

Hamilton Seeds and Wildflowers
Elk Creek, Mo.
www.hamiltonseed.com/

Helton Prairie Conservation Area
Bethany, Mo.
mdc.mo.gov/cgi-bin/atlas/search.cgi?cgistate=1&area=6902

Cuivre River State Park
Troy, Mo.
www.mostateparks.com/cuivre.htm

Missouri Prairie Foundation Sites
Western Missouri www.moprairie.org/visit.html

The Nature Conservancy's Wah' Kon-Ta Prairie
Eldorado Springs, Mo. nature.org/wherewework/northamerica/states/missouri/preserves/art472.html

### Web Site Resources

Shaw Nature Reserve
www.shawnature.org

Grow Native!
www.grownative.org

Missouri Dept. of Conservation
www.mdc.mo.gov/landown/

Wild Ones Natural Landscapers
www.for-wild.org

The Missouri Prairie Foundation
www.moprairie.org

Local Ecotype Seed
www.for-wild.org/download/LocalEcotypeBrochure.pdf

American Prairie Foundation
www.americanprairie.org

The Tallgrass Prairie in Illinois
www.inhs.uiuc.edu/~kenr/tallgrass.html

Ecological Restoration
www.ecologicalrestoration.info/

Prairie Crossing Housing Development
www.prairiecrossing.com/pc/site/about-us.html

Diary of a Prairie Restoration
www.illinoisraptorcenter.org/diarydirectory.html

Prairies for Children
www.dnr.state.wi.us/org/caer/ce/eek/nature/habitat/whatprai.htm

Missouri Native Grasses
www.conservation.state.mo.us/conmag/1996/03/70.html

## Bibliography

The Tallgrass Restoration Handbook: For Prairies, Savannas, and Woodlands, by Stephen Packard and Cornelia F. Mutel, editors. 1997. Society for Ecological Restoration by Island Press, 1718 Connecticut Avenue NW, Suite 300, Washington, D.C. 2009-1148. xxxii + 463 pages.

Restoring the Tallgrass Prairie: An Illustrated Manual for Iowa and the Upper Midwest by Shirley Shirley. 1994. University of Iowa Press, Iowa City. xiii + 330 pages.

Prairies, Forests, and Wetlands: The Restoration of Natural Landscape Communities in Iowa by Janette R. Thompson. 1992. University of Iowa Press, Iowa City. viii + 139 pages.

Ecological Restoration
edited by Dave Egan, the University of Wisconsin-Madison Arboretum, University of Wisconsin Press. Subscriptions available on the web: www.wisc.edu/wisconsinpress/journals/journals/er.html

Prairie Establishment and Landscaping
by William E. McClain. 1997. Division of Natural Heritage, Illinois Department of Natural Resources, Springfield, IL
Natural Heritage Technical Publication #2.
Available on the web: www.dnr.state.il.us/conservation/naturalheritage/prairie/table.htm

Prairie Plants and Their Use in the Landscape
by Neil Diboll. Article available on the web: www.prairienursery.com/NeilsPage/AchWriting/PrairiePlantsUse.htm

Notes

Notes

The Seeding Guide is a collaborative effort between Shaw Nature Reserve and the Missouri Department of Conservation's Grow Native! Program.

SHAW
NATURE RESERVE

GROW native!
Missouri Department of Conservation
Missouri Department of Agriculture