Starting Prairie Seeds

In this workshop we will cover collecting prairie seed, what to consider when starting prairie seeds, where to purchase prairie seeds, how to start prairie seeds, and how to save and process prairie seeds.

- Collecting prairie seed
- Where to source prairie seeds
- Seed treatments
- How to start prairie transplants/seedlings
- How to grow out and plant prairie transplants
- How to save and process prairie seeds

Prairie Introduction

Today, less than 0.1% of Iowa's native prairies remain. Its demise is the result of many factors including agriculture conversion, urban sprawl, fire suppression, and ignorance.

Definitions

Remnant prairie: A pre-settlement native plant community (i.e. prairie or forest). A plant community that has survived on a site to the present day.
The biggest prairie remnant outside of the Loess Hills in Iowa is at Hayden Preserve in

Restoration: A native ecosystem that has been taken over to some degree by another plant community. Management is being used to restore pre-settlement vegetation. Restorations are often supplemented with seeds from plants that may have grown on the site. Restorations usually involve removing a plant community that has taken over the remnant.

Reconstruction: A planted prairie. Usually a planting of grasses and forbs (flowering plants) onto land that had the native vegetation removed (i.e. agricultural land). Reconstructions usually will not have the plant diversity of a Remnant or a Restoration. Insect and other organisms are missing too.

Types of Prairie
Mesic prairie: in-between wet and dry; most of tallgrass prairie was this type.

Wet prairie: wet prairies are a type of wetland with prairie plants that thrive in moist soils. Typically low-lying, poorly-drained areas and floodplains.

Dry prairie: many Loess Hills prairies, especially south- and west-facing slopes.

Oak savannas: typically have many prairie species but also include scattered trees. Bur oaks are relatively fire resistant, so bur oak savannas most common in this area.

Seed Collecting

Things to consider before hand collecting - Right time, right place, right plant
Right time: Is it the right time to collect? Only collect when the seed is mature and you won't disrupt the life cycle of the plant. Native prairie seeds are ready to collect in all seasons; late Spring, Summer, Fall and Winter.
Right place: Permission on public vs private lands
Right plant: You need to properly identify the plant and know its scientific name, Genus and species
Right amount: Only collect a small amount of seed from a stand of plants (⅓ is the recommendation) never take plants that are rare or growing in small quantities in any area. Take care to maintain the biodiversity of any area where you are collecting from.

A few examples of seed collecting times
Spring - Prairie violet (mid-June)
Summer - Koeleria macrantha, June Grass (mid-July)
Fall- Monarda fistulosa, Wild bergamot (mid-September into October)
Late Fall - Euthamia graminifolia, Grass-leaved goldenrod (late October)
Refer to Tallgrass Prairie Center Collecting Native Seed Brochure for a calendar

Steps for storing seeds properly
When storing seeds keep them dry, out of light, and in a cool place. Seeds are best stored in paper bags or envelopes and then inside dark containers. Glass jars can sometimes introduce moisture. Always keep seeds out of sunlight and this will decrease their viability.

Where to source seed

When restoring any prairie habitat or starting seedlings/transplants it is important to source your seed as close to your location in order to properly match the species that are most likely to grow there. When looking at seed companies and catalogues look for where they are sourcing their seed from. You may be surprised to find out that much of their seed doesn't even come from the Midwest or a prairie region anything like yours. Be careful and choosey with your seed sourcing looking for locally grown and harvested ecotype seed. This seed will be the most true to your location as well as the most resilient.

Some seed sources we have used //
Diversity Farms
Jon Judson 712-830-4143 diversityfarms@iowatelecom.net
Custom Seed Services
Roger Schwery 712-489-2430 customseed@iowatelecom.net
Prairie Moon Nursery
866-417-8156 info@prairiemoon.com www.prairiemoon.com
Ion Exchange
Howard Bright 563-419-0827 hbright@ionxchange.com www.ionxchange.com
Stock Seed Farm
Mike Fritz 402-867-3771 mike@stockseed.com www.stockseed.com

Full list of local seed dealers - https://tallgrassprairiecenter.org/pin-resources

Timing + Planting Times

Start early

November, December, January, February

There are multiple reasons and benefits to start early. First, we are mimicking nature. In nature seeds drop at the end of the season and go through natural stratification processes. Many prairie seeds need 90, 60, 45 or 30 days of a cold stratification process. Ideally seedlings should be ready for planting out as early as the soil can be worked. In our area that is mid-March through May. Prairie seedlings can be planted continuously into the summer as well, but the focus in year one whether you are direct seeding or planting transplants is getting the roots established before hard frost.

The second benefit of starting your prairie seeds early is that your plants will be larger and more established before you plant them out. Some prairie plants grow really, really slow. You will only have a stem 1-2 inches tall after months of growing it. This is because prairie plants are incredible at establishing roots and put their energy there, but don't we all like plants that bloom and/or fill in space during their first season?

Troubleshooting/common issues
If when stratifying seeds sprout, plant immediately
Trays dry out ... probably need to re-seed

Seed Preparations

Many prairie seeds need a type of seed preparation before they can be started indoors.
A - No treatment needed
B - Hot water treatment
C - Stratification
D - Surface sow
E - Warm moist followed by cold moist
F - Cold moist followed by warm moist followed by second cold moist
G - Cool soil (so in late Fall after frost or early Spring)
H - Scarification
I - Needs inoculum added at time of stratification
L - Refrigerate until planting

Cold/moist stratification - C
There are two ways to stratify your prairie seeds; using the refrigerator or setting seeds outside. Some seeds prefer one to the other so experiment with both. I've found that lead plant and white indigo germinated better using the refrigerator method.

Refrigerator method
Mix seed with an equal amount of moist sterile sand, sawdust, or vermiculite and place in a Ziploc bag or use a wet coffee filter covered by a dry paper towel and then place into a sealed ziploc bag. Avoid extra moisture; water should not be anywhere in the bag. Use vermiculite if working with species adapted to drier conditions. Place seeds in refrigerator 32 to 45 °F for the recommended period of stratification time. Check weekly.

Outdoor method
Place seeds sown into trays of moist soil outdoors in an area where they will stay moist and ideally will get snowed on. You also must take care that critters do not disturb the seeds so placing some kind of screen over the top is recommended if this is a concern.

Alternating warm/moist with cold/moist
A few species may require warm (68 to 94°F or 20 to 35°C), moist conditions, or warm moist followed by cold –moist stratification. This will be described on the seed packet.

Scarification
Species with a hard or waxy seed coat require scarification. Scarification is a technique that simulates the natural disintegration (such as weathering, abrasion, or partial digestion) of the seed coat to allow water uptake for timely germination. Species in the Sumac, Legume, Geranium, and Buckthorn families may require scarification. A simple scarification technique is to rub a single layer of seed between two sandpaper-covered boards for a minute or so until seed coat begins to appear dull.

Detailed list of seed treatments from Prairie Moon Nursery

A: Seed should germinate upon sowing in a warm location. No pretreatment is necessary other than cold, dry storage (also called dry cold stratification). Seed purchased from Prairie Moon has been stored under these conditions.

B: Hot water treatment
Bring water to a boil. Remove from heat, pour over seeds and soak in a warm place for 24 hours before planting.

C: (Number of stratifying days): Seeds germinate after a period of cold, moist stratification

Please note: *You do not need to stratify if you are fall planting or using a seed drill. Also, do not use this method if you are planting a seed mix and cannot keep the site moist.*

Mix seeds with equal amounts or more of damp sand, vermiculite, or other sterile media (moist—but not so wet that water will squeeze out of a handful). We use fine sand for small quantities. For large quantities we use medium or coarse grade vermiculite. Place mixture in a labeled, sealed plastic bag and store in a refrigerator (33–38°F). Stratify for the # days indicated in parentheses. If two months (C(60)) of this cold storage before planting is normally required to break the dormancy of these seeds, one month may work for many species if time is a constraint. Some seeds may sprout in the storage bag if moist stratified too long. If sprouting occurs, plant immediately. Another method of breaking dormancy for species requiring moist stratification is to sow seeds outdoors in the fall so they may overwinter.

D: Seeds are very small or need light to naturally break dormancy and germinate

Sow seeds in a container (pot or flat) and water from the bottom as necessary. Seed requiring this treatment should not be covered after sowing, although a light dusting of soil can be applied. If grown in outdoor beds, sow seeds on level soil. Cover with a single layer of burlap or cotton sheet. Do not let soil dry out until seedlings are established. Remove cover after germination. Shading with a window screen set 12" above the soil the first season will help prevent drying.

E: In order to germinate, seeds need a warm, moist period followed by a cold, moist period
Mix seeds with damp sand (not dripping wet), place in a labeled, sealed plastic bag and store in warm (about 80°F) place for 60–90 days. Then place in refrigerator (33–38°F) for 60–90 days before sowing. Or, sow outdoors and allow one full year for germination.

F: Seeds need a cold, moist period followed by a warm, moist period followed by a 2nd cold, moist period
Seeds germinate after alternating, cold moist, warm moist, cold moist stratification treatments. Start by following instructions for code C, then store in warm (70 to 80 degrees F) place followed by a 2nd cold period. Or sow outdoors and allow 2 year or longer to germinate.

G: Seeds germinate most successfully in cool soil
Sow seeds in late fall (after hard frost) or early spring.

H: Seeds need scarification
One way to accomplish this is by rubbing seed between two sheets of medium grit sandpaper. The object is to abrade seed coats—stop if seeds are being crushed. Scarification should be done before moist, cold stratification (Code C) if this treatment is also needed.

I: Legume, Rhizobium Inoculum
These species are legumes and although they will show satisfactory growth without inoculation we recommend using an inoculum if the proper type is available. The fixation of atmospheric nitrogen improves the long-term health of native plant communities and is especially important in low fertility soils. Prairie Moon Nursery supplies inoculum (when available) at no charge for legume seed purchased from us.

J: We remove the hulls from these legume seeds
This gives more seeds per pound and greatly improves germination. If you have unhulled seed from another source, treat as in Code H.

K: Hemiparasitic species which needs a host plant
Good hosts for many parasitic species include low-growing grasses and sedges: Hairy or Blue Grama, Little Bluestem, Common Oak Sedge, and June Grass. With a knife make a 2" deep cut at the base of the host plant. Sow seeds in the cut, making sure seed is not more than 1/8" deep. If host is transplanted at sowing time, the cut is not needed because damaged roots will

be available for attachment by the hemiparasite. You may also try sowing seeds of the host and parasitic species together. To add hemiparasitic species to existing sites, scatter seed on soil surface (rake in if seed is large) in late fall.

L: Plant fresh seed or keep moist
Refrigerate until planting or starting other treatment.

M: Best planted outdoors in the fall

N: Special seed treatment, indicated by the addition of blue or green dye (potassium nitrate), has been added to aid in germination. Best planted in spring when soil is warm.

O: Seed needs nicking
Nick seed coat with a knife, soak in water overnight. Plant.

S: Fern spore sowing
Sow fern spores on sterile peat under glass in indirect light. Water with distilled water. Refer to other reference material on growing ferns. Or, direct sow spores on soil surface.

?: Not sure
Your input would be of interest to us.

Basic steps for sowing seeds

When to start - Most native prairie seeds need to be started earlier than your average annual vegetables or herbs. Native prairie seeds should be started November through February for the best outcome. Many of the seeds that require cold stratification periods which work well if started in November through January. Begin by reading your seed packets to understand what seed preparations they may need and the suggested date for planting. Our last frost date for zone 5b is around May 20th. Use this date and count weeks backwards to determine the best time to start.

Native prairie seeds are tiny! When seeding some like to use tweezers or other tools. It is okay to sprinkle a few seeds per cell when sowing prairie seeds.

Start seeds in plug trays - recommended
Whatever you decide to start seeds in it is necessary that your containers have holes for proper drainage in the bottom. For the home gardener make sure you start your seeds in individual cells so that they are easy to up-pot. We recommend using plastic to start your seedlings (you can use it year after year as long as you do not leave it outdoors and store it properly). Egg cartons, styrofoam, paper cups, cardboard containers all deteriorate easily and dry out quicker than plastic. You do not want your seeds to dry out at any time. They need to be kept moist for proper germination. Seeds germinate better in moist soil and smaller spaces.

Choose a high quality organic germination mix
Germination mix is a little finer than the organic potting mix, both will probably work just fine for your home gardening ventures. You need soil that is loose & drains well. Look for soil mixes that have organic fertilizer/ compost in the mix - this will give your seedling some added nutrients & the boost they need to grow. If your mix does not have compost mixed in use your own (if you have good home compost that is finished) or purchase quality organic compost. Here are some mixes we love -

Always wet your soil mix before seeding
This is key - get your soil mix moist before sowing your seeds. You can do this by pouring the mix you need into a large bucket and getting it uniformly moist, or putting the soil mix in your tray/cells and then soaking it with water. Leave it for a while, then come back and sow your seeds. Make sure when you are filling your plugs or pots the you fill them completely. You do not want air pockets where there is no soil. Do this by gently packing the soil down a bit. You also do not want to pack the soil down otherwise this can compact the soil and deter root growth.

Seeding Technique
Most seeds do not need to be planted very deep at all! Make a small indent in the middle of the cell or pot with your index finger, place the seed into the indentation, push the seed down a little more if needed. Dust with more potting or germination mix when finished. One or two seeds per cell is good (this is impossible with those very, very tiny seeds).

After the seeds are covered it is good to add an organic fertilizer, look for the OMRI label. We use a granular mix of bone meal, kelp meal, and composted chicken manure. Gently broadcast this mix over the top of the seed tray. Water in.

Heat (if no seed treatment)
Place your trays in the warmest, sunniest spot you have indoors. A table against a south facing

window (where there is no draft) is ideal. We strongly recommend purchasing a grow/heat mat to place under your tray of seeds. Keep your tray on the heat until germination, then take it off and make sure they stay in a sunny window. At this time you can utilize additional overhead light but in general a sunny window will do just fine until you can set them outside. For grow lights we recommend at T5 light hung at least 6 to 10 inches above your trays. Seedlings need a lot of light to continue growing - at least 14 to 18 hours/day. Keep that in mind if you are using lights. Rotate your seedling trays or pots daily otherwise your seedlings will bend toward the light.

Another option - cold frames
When it is warm enough prairie seedlings can go outside under a homemade cold frame to acclimate them to the outdoors. A cold frame is usually made of glass and sits over a raised bed or garden area. Remember to open the cold frame on sunny days for proper airflow. The temperature can get quite warm inside!

Watering & Care
Water your seedlings gently whenever the soil feels dry to the touch or looks light brown. Make sure you water them thoroughly so the cells are soaked all the way to the bottom. Check this by gently lifting your tray to make sure.

Germination - when the seed sprouts
Expect germination and emergence to occur over a 2-6 week period. Some native prairie seeds take quite a while, so don't give up!

Caring for seedlings and potting up

True leaves + roots

When prairie seedlings have developed a decent root system and their first two true leaves they are ready to “pot up” or move to a bigger container before planting outdoors. Sometimes I’ve noticed that the true leaves have formed but the roots are not developed enough to move the plug, in which case it is important to wait. If the soil does not hold together and the seedling crumbles when you remove it from the plug it is not ready. The roots should hold the soil. Again, make sure your containers have proper holes and drain well before placing any plants in them. Seedlings should be taken outside slowly; this is called “hardening off” and should be planted when the soil is able to be worked and there is no danger of a hard frost (usually middle to end of May).

Site preparation for outdoor planting or seeding

There are two ways to plant the prairie - by transplants or by direct seeding. There are reasons and benefits to both approaches. When planting transplants take into consideration the natural ways the prairie grows. Taller plants should remain toward the North side rather than the South so as not to block out sunlight of established plants. Plants of varying heights should also be situated together. Your prairie seedlings can be planted 12-18 inches apart in a zigzag pattern. Make sure the entire root ball of your seedling is in the soil and is completely buried. Prairie seedlings are incredibly resilient and you can be a little rough with the roots. Make sure your soil is loosened adequately (we don’t recommend tillage) however prairie root systems grow well in just about any soil type! As the plants reseed and grow each year (remember they are perennials) you may want to dig some up by the roots and move them to areas that need more established.

Seed Saving from your prairie

Seeds need to be stored in a cool, dark, dry place.
Seeds should be stored in glass jars, paper bags, or paper envelopes.
Proper storage is crucial to maintaining viable seeds.
Use seed screens or the paper bag method (shake seed heads into a paper bag) to process the seeds.
Always include the common and scientific names on your seed packets or envelopes.

Germination test

Select 10 seeds and plant in individual pots or cells on a plug tray. Count how many germinate and determine what your average germination rate is for that batch of seeds. If 1 or 10 germinates you are at 10%. For commercial growers germination tests require many more seeds, but for gardeners and small growers you can start with 10.

Prairie Resources

Iowa Prairie Network - https://www.iowaprairienetwork.org/

Pottawattamie County
- Hitchcock Nature Center
- Vincent Bluff State Preserve
- Folsom Point Preserve

Douglas/Sarpy County
Glacier Creek Preserve
Fontenelle Forest
Neale Woods
Bluestem Prairie Preserve - 168th & Blondo

Harrison County, IA
Old Town Conservation Area
Loess Hills State Forest
Willow Lake Recreation Area

Fremont County, IA
Waubonsie State Park
Slusher Wildlife Area

Favorite Prairie Books //
- Wildflowers of the Tallgrass Prairie
- Wildflowers of the Iowa Woodlands
- Edible Wild Plants of the Prairie by Kelly Kindscher
- A Practical Guide to Prairie Reconstruction by Carl Kurtz
- Ecology and Management of Prairies in the Central United Statby Chris Helzer
- Restoring the Tallgrass Prairie: An Illustrated Manual for Iowa and the Upper Midwest by Shirley Shirley
- The Tallgrass Restoration Handbook by Stephen Packard & Cornelia Mutel
- The Tallgrass Prairie Center Guide to Prairie Restoration in the Upper Midwest by Smith, Williams, Houseal & Henderson
- The Prairie in Seed: Identifying Seed-Bearing Prairie Plants in the Upper Midwest by Dave Williams
- The Vascular Plants of Iowa by Roosa
- Iowa Prairie Plants by Paul Christiansen and Mark Mueller

Additional Resources + Links

Golden Hills RC&D - Our mission is to collaboratively develop and lead community, conservation, and cultural initiatives to improve our quality of life in rural western Iowa. A few of our projects include:

- Growing Natives - This class is part of Golden Hills' Growing Native Prairie Plant series in partnership with Iowa Western Community College.
- Prairie Seed Harvest - Golden Hills hosts prairie seed harvest events in summer and fall. Sign up for email updates.

Mullein Hill Farm - Class instructor Cait Caughey has a farm and consulting business specializing in native prairie plants.

Wild Ones - Seed Germination Codes and Instructions - the first three pages were included as a printed handout. The rest of this document includes seed germination codes for a large variety of native plant species.

Seed Germination Codes and Instructions - summary of codes from Prairie Moon Nursery.

Beautiful Land Products - Cait's recommended source for soil, based in Iowa.

Tallgrass Prairie Center - website includes many useful resources including a series of 10 Technical Guides for everything from seed harvest to propagation.

Natural Resource Conservation Service - The NRCS has offices in every county with conservation experts and resources. Many Iowa counties have a Farm Bill Biologist who are housed at NRCS offices. These biologists help landowners and farmers implement conservation practices.

Xerces Society - Their Midwest Senior Pollinator Conservation Specialist covering Iowa and Nebraska is Jennifer Hopwood.

Iowa Native Plant List Serv - Prairie nerds across Iowa and beyond use this email list to discuss native plant questions, research, and more.

Botany Beginners - Tallgrass Prairie Center's online course about plant identification basics.

Iowa Prairie Network Facebook group - good for sharing photos, discussion, etc.

Iowa Wildflower Report - good for sharing photos, discussion, etc.

Seed Cleaning Screens - If you're harvesting and processing your own seed, these are helpful for cleaning seed from chaff.

Germination Mats - Bottom heat helps seeds germinate quicker, especially if you don't have a greenhouse.

Water Wand - These are great for gently watering plants--if you use a hose it can be too powerful and wash the seeds out of the soil