

to one area and more forb seed in another, in an attempt to copy the mosaic pattern that apparently was present on the native prairie. In areas where I did not introduce any grass seed, the site remained weedier for a longer time. A heavy population of native grasses is effective in displacing many of the alien weed species.

Seed Treatment

There are various methods of seed treatment. One is to scarify the seed to produce breaks in the seed coat to enhance earlier germination. Especially on some legumes, such as leadplant, cream wild indigo, and white wild indigo, I used a vibrating hand-sander to scratch the seed coat immediately before planting.

Most legumes establish a symbiotic relationship with rhizobial bacteria in the soil. Through this relationship, atmospheric nitrogen is fixed into a form that can be used by the host plant and later by other species in the area. During early years of the project, immediately prior to seeding, I coated the seed of various legume species with rhizobium inoculants acquired from Nitragin Corporation. These were specific for each species. As these species became established, I stopped applying the inoculants on new plantings.

Damp stratification is another seed treatment. The seed may be mixed with sand or vermiculite and lightly moistened, then refrigerated for about 6 weeks before planting. This technique often enhances early germination,

but one possible disadvantage would be the occurrence of a prolonged dry period immediately after seeding: The germinating seed might not survive without supplemental watering. Most of my seed was stored dry over the winter in a cool basement or in an unheated building.

Genetic differences have been demonstrated between some species native to different regions. Thus, if there is to be an attempt to restore a site to some semblance of native prairie, insist on using regional ecotype seed, whether the seed is hand-collected or purchased from a seed nursery.

Fire

The plants that flourished on native prairie were adapted to periodic fires, which continue to be an important prairie-management tool. In the first year or two of a restoration project, the annual weed growth may consist of coarse stems and leaves that do not burn readily.

Once more grasses become established, burns may be conducted every year for several years. Prairie species, especially spring ephemerals, seem to thrive following fire. There have been indications that the seed-germination rate of certain species improves in the presence of one or more active compounds in smoke (see The Illinois Steward, Fall 2007). Researchers in South Africa and at the University of Western Australia identified one of these compounds to be butenolide. Its positive effect on the germination of several native prairie species has been demonstrated at the Chicago Botanic Garden.

After the first few years, the burns can be conducted every 2 or 3 years. Spacing the fires at longer intervals may permit tree seedlings to become established to the extent that fire alone is not effective in removing them. On my sites, I burn every year but rotate, leaving about one-fourth unburned each year. The unburned area provides a refuge for insects and other arthropods that overwinter aboveground in leaves and stems.

I burn from February to mid-March, which leaves cover for wildlife for a longer time and reduces the possibility of erosion on burned-over soil. Later burning dates may be inadvisable if early-spring-emerging species such as shooting star and wood betony are present. They often emerge in late March.

Burns are planned a year ahead, with the mowing of fire lanes in areas where fire might escape. If possible, the burn is started on a day with a light breeze in an appropriate direction for the site. When there is little or no wind, the fire may drift unpredictably from one direction to another. Backfires are started along the firebreaks. Once these are secured, the head fire is started with often dramatic but controlled results.

Management

One of the hopeful opinions held by prairie enthusiasts, including myself, was that once a diverse prairie was becoming established the only management required would be an occasional burning. Unfortunately, that is not the case. Plans should be made at the outset to anticipate management tasks that may occur over time.

Quite likely, the major necessary management effort will be in controlling or extirpating exotic species. As suggested earlier, a vigorous healthy prairie will displace many of these aliens, to a great extent. However, a few thrive on prairie conditions and present a long-term challenge if native prairie is to be approximated. Species that can be especially troublesome include reed canary grass, teasel, crown vetch, *Phragmites*, sweet clover, and day lilies.

On my sites, yellow and white sweet clover present a continuing problem. If the issue is not addressed, an alien clover field with some native prairie species could evolve. After several ineffective attempts at control, a labor-intensive method has been implemented requiring repeated sweeps across a field from late April until mid-July, carefully spot-spraying small sweet clover plants, while removing any larger, seed-bearing plants from the site.

Different problem species require different approaches. However, the best solution is to remain vigilant and aggressively address a problem when it appears, before it becomes well-established on a site.

Conclusions

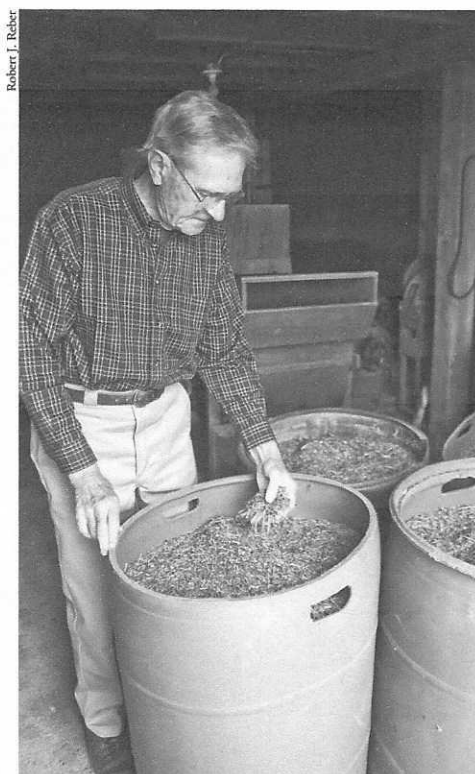
Given that various procedures in developing prairie can be successful, five factors are essential in my estimation.

1. **Become informed.** The first thing a person needs to do is learn about both native and non-native species—their identifying characteristics, their preferred habitats, their native ranges, and other species with which they grow. There should be an increasing awareness of interactions among plant species, as well as with soil organisms, insects, and other animal life.

Fortunately, there are many sources of information. These include Internet sites, published materials, and organizations. Becoming involved with one of the numerous organizations active in prairie work is an excellent method of learning about prairie from people who have extensive experience directly or indirectly associated with prairie.

Through becoming informed, a person can make a better judgment as to whether prairie restoration is an effort to undertake. The essence of native prairie was a sense of wildness. A goal of prairie restoration is to attempt

(continued on page 5)



FOLLOWING DRYING AND PARTIAL CLEANING, THE MATERIAL HARVESTED WITH THE COMBINE IS STORED IN BARRELS.

to recapture some of that wildness. In spring and early summer, a prairie may have a meadowlike appearance. Later in the summer, the tall grasses and many of the sunflowers, *Silphiums*, and goldenrods make their major growth. The prairie then takes on an aspect of ruggedness, with rich textures and colors that can be very appealing. However, we must realize that we live in a society that places high value on carefully manicured, monocultured, and alien species lawns and agricultural fields. For some people, it requires both a cultural and an aesthetic adjustment to accept and appreciate prairie.

2. Proceed slowly and carefully with the development of a prairie project. That approach gives more time to control persistent alien species and is important if a high-quality site is to be established. One of the basic characteristics of native prairie is a sense of expanse. Thus it is understandable that we want to proceed as rapidly as possible to recreate that vista. However, the Eastern Tallgrass Prairie evolved over a period of several thousand years until it was essentially destroyed by agriculture and other development. If we can restore prairie to some semblance of that presettlement state in 100 years, it will be a remarkable achievement. The time frame should in no way discourage the effort. There are many opportunities for great satisfaction in the incremental improvements that develop during the process of establishing a diverse mix of prairie species.

3. Make heavy applications of seed.

Establishing plantings progressively across a restoration site permits applying greater amounts of viable seed to any given area. The amount of seed produced and its viability can vary from year to year for the individual species. Using seed from multiple harvest years improves the chances of germinating and growing healthy native plants.

4. Introduce the greatest number of species suitable for the region in which the site is located. A further result of developing a restoration over an extended period is an increased opportunity to acquire more plant species. For instance, it will give time to permit establishment of a prairie nursery or garden, which can be used to start plants of species for which only small amounts of seed were available or that did not grow well when the seed was applied directly in the field. Also, over time a person becomes more familiar with the identity, growth characteristics, and requirements of additional native species that would be appropriate for the site.

5. Plan for long-term management. Early in the restoration project, clear plans and provisions should be made for management activities: such as establishing a schedule for periodic burning of the site; continuing vigilance for invading alien species and aggressive control efforts for those that become established; protection of the restoration from human encroachment, ranging from adjacent farming operations, to uncontrolled ATV use. Without management plans and their application, the results of the great effort involved in implementing the first four factors is likely to be placed in jeopardy.

So become informed, proceed slowly, make generous applications of seed, acquire the greatest number of regional ecotype species possible, and make firm plans for future management. By keeping in mind the limits of the sustainable effort and the resources that can be devoted to a project, there can be an emphasis on a methodical, incremental approach that has a much greater possibility of long-term success.

As Scott Weber states in a paper formulating a revised approach to prairie restoration, "...if we do not proceed slowly and try to do it right the first time, it is unlikely that many of these plantings will be adjusted later."

Prairie restoration can be characterized as being essentially a simple process. But sometimes, it is not easy. The most important characteristics necessary for successful prairie work are patience and persistence.

Don Gardner

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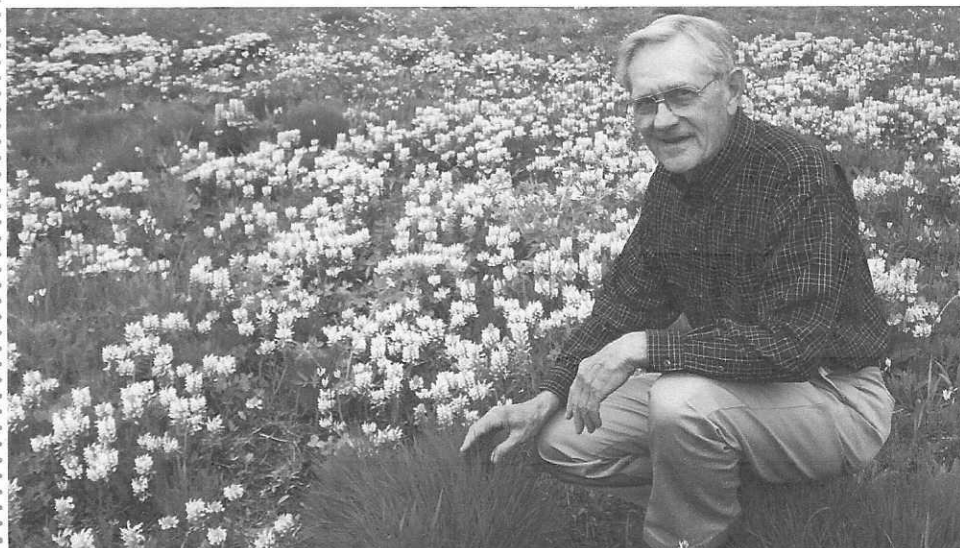
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RESTORATION OF NOW UNCOMMON PRAIRIE SPECIES, RANGING FROM PRAIRIE DROPSEED TO WOOD BETONY, PROVIDES A CONTINUING SOURCE OF WONDER AND SATISFACTION.