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Using Native Prairie Species for Reclaiming Aggregate Mining Sites

What is Prairie?

Prairie, in the simplest of terms, is a community of native grasses and non-woody broadleaf plants, or forbs. Prairie plants, many of which have deep and fine roots that hold the soil in place, are specially adapted to extremes of climate and moisture, and a variety of soil conditions found in Nebraska, the Great Plains, and the Midwest. Before European settlement, prairie covered most of Nebraska. Extreme climatic conditions, frequent fires and large herds of grazing bison kept competing woody plants to a minimum.

There are several different types of prairie in Nebraska. Tallgrass prairie, where prairie grasses often grow over six feet high, grows in the eastern third of the state in areas with moderate to high soil moisture levels. The central and western parts of Nebraska receive less rainfall and generally have shallower and drier soils which do not support tall vegetation. Consequently these western grasslands are called mixed grass prairie – a mix of tall and shorter grasses – and short grass prairie. Since European settlement, tallgrass prairie was almost entirely lost due to conversion to cropland. There is still quite a large extent of Nebraska which is covered in mixed and short grass prairie.

Using Prairie Species for Reclamation

At depleted aggregate mining sites in central and eastern Nebraska, it is reasonable to consider revegetating with native prairie plants. Certain key characteristics of prairie plants make them a good choice for former mining sites. Because they are perennial, native prairie grasses, once established, can provide a long-term cover that is self-sustaining and requires little maintenance beyond possibly mowing in the first year or two, and prescribed burning every few years after planting.

Although a former aggregate site restored with native species offers many benefits, it does not restore the diversity of the original native prairie. Restoring more than a fraction of the species found in native prairie is often difficult because seed sources are not readily available in commercial quantities for all prairie species. However, there are nursery and seed businesses, and conservation organizations in Nebraska and Midwestern prairie states that do specialize in restoring diverse tallgrass prairies.

Native prairie plants are appropriate for reclamation projects in eastern and central Nebraska. Under the warm and prolonged moist soil conditions of spring and occasionally well into summer of wet years, seeds of native prairie plants germinate readily. Top growth of young plants is usually limited to small leaves that can be difficult to identify; most prairie plants establish an extensive root system during the first year. Full scale plants develop during the second year, often developing enough of a root sytem and top growth to form a flower and produce seed. To compensate for slow establishment of prairie plants, a cover crop of wheat or oats can be planted along with the native seeds. Cover crops grow quickly, providing protection for the slower establishing native species. In addition, cover crops tend to die off rapidly, within one or two years and therefore do not compete with more permanent native cover.

Although the initial costs may be higher, and site preparation as well as occasional weed control issues are sometimes challenging, the long term benefits of native plantings are great – especially high diversity

plantings with many grass and forb species. On some severe erosion-prone slopes the slow initial growth of native prairie plantings would seemingly make them less desirable in erosion-prone locations. However, in many situations, especially if a higher diversity mixture of select grasses and native forb species are sowed along with a fast-growing cover crop, or with a mulch cover, results can be far superior. Due to the increasing popularity of native prairie plantings, and a large pool of expertise by a number of people and institutions in Nebraska, including Prairie Plains Resource Institute, Pheasants Forever, Nebraska Game and Parks Commission, The Nature Conservancy and The Nebraska Department of Roads, most of these difficulties have been overcome. Provided below are basic guidelines for planting native species.

General Guidelines

Site preparation:

Native plantings respond best on a firm weed-free seed bed. Several herbicide applications followed by disking or mowing may be necessary on sites where vegetation is already established.

Seed source:

Seed harvested from as close to the project site as possible will preserve genetic characteristics and establish the vegetation types best adapted to the site.

Seed mixture and seeding rate:

The seed mixture and the seeding rate used for reclamation should be selected based on the site characteristics. Many sources advocate a diverse mix of grasses and forbs at a seeding rate in the range of 15 pls (pure live seed) lbs/acre to 30 lbs/acre. While high seed rates can rarely be seen as detrimental, they can add to expense. As an alternative, groups such as Prairie Plains Resource Institute and The Nature Conservancy have proven that with fairly high species numbers (50-100+), excellent results in diversity and stand density can be obtained with as little as 5 pls lbs/acre. If seed is harvested from a nearby site and used for reclamation, an analysis of the seed harvest should be conducted with the Nebraska Department of Agriculture's Seed Lab. Seed purchased from a variety of sources vendors can be blended to contain a diversity of species, taking care to be sure that any given species is appropriate to the site's soils and hydrology.

Seeding method:

Native seed can be planted using a specially adapted drill that accommodates the light fluffy native seed. The final seed drill planting depth should be ½ to 1 inch and maximum row spacing of about 8 inches, at right angles to surface drainage. An alternative to drilling is to till the site and broadcast the seed with either a mechanical seed sower, seed spreader or by hand. Planting depth can be from the surface to ½ inch in depth after the broadcasted area has been dragged with a rake or harrow. Packing is an option, which may help in very loose soil conditions. Hand seeding is a good method for small areas. Drill-seeded areas no doubt increase the likelihood that seeds will have deeper soil and moisture contact, an important factor in establishing a planting during a drought period. Broadcast areas may suffer a delay in a planting's development, i.e., more weeds in the early few years; however, in eastern Nebraska good timing with respect to spring rainfall can avoid many early development issues. Ironically, some very successful native plantings often occur under very weedy establishment conditions.

Cover crop:

A cover crop can be seeded with native seed mixtures. The type of cover crop depends on the season. Some possible cover crops are oats at a rate of 20 lbs/acre in the spring plantings, winter wheat at 20 lbs/acre for fall plantings, and annual rye grass at 10 lbs/acre for dormant seedings. Cover crops have recently been noted as somewhat ineffective at combating the species of weeds that cause long-term problems (perennials) and may actually slow the establishment of the restoration seed mixes.

Timing:

Native grasses can be planted from November to June 30. Prime timing for soil warm-up and moisture availability is probably April 1 to mid-May. Many species of wildflowers require a cold period to break

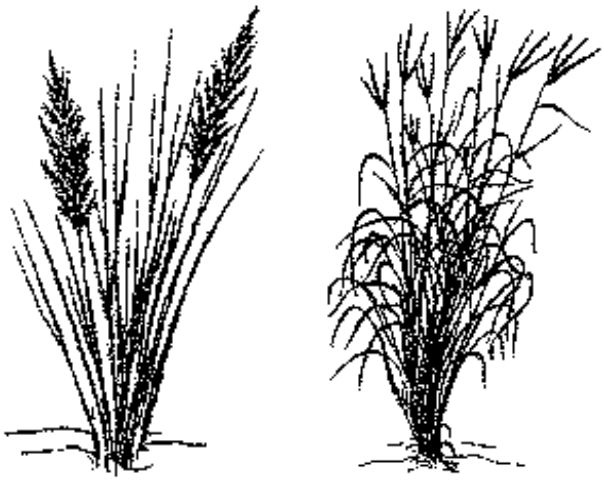
dormancy and are best seeded late in the fall. If seeded in the spring, they may not be seen until the second year after planting. Seedling plants can be used to add diversity to the plantings. Some desirable species are difficult to propagate from seed and are only available as seedlings.

Maintenance:

During the first growing season, if the cover crop or annual weeds reach 18 inches or more in height, the site can optionally be mowed to a height not less than 6 inches with a rotary mower. Mowing is mainly use don sites where soil organic matter and nitrogen levels are high. On nutrient-poor sandy mining reclamation sites, mowing is probably not absolutely necessary. Weed growth, which is comprised of non-noxious weeds, creates wildlife habitat and prevents erosion. As the grasses develop, prescribed burns can be implemented on a three to five year rotation usually starting the third or fourth year after planting. Fall haying is an alternative in areas where burning is not possible, and should be done on a rotational basis to allow full growth for habitat purposes somewhere on the site every year.

For more information on native grasses:

Contact the local Natural Resources District, the Nebraska Game and Parks Department, local Natural Resource Conservation Service Office, U.S. Fish and Wildlife Service, Prairie Plains Resource Institute, The Nature Conservancy, or Nebraska Department of Roads (NDOR).



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