

PLANTING & MAINTENANCE OF NATIVE PRAIRIE GRASSES

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Native prairie grasses provide numerous benefits in any landscape, and offer some particularly desirable attributes for golf courses. Prairie grasses offer a low maintenance alternative in out of play areas or even in secondary rough areas. These grasses are highly adaptable to a range of soil conditions, thrive with no fertility even in relatively sterile soils, and require no irrigation. Once established, maintenance practices are minimal.

Native prairie plantings on a golf course also accomplish a variety of positive environmental impacts including:

water conservation

soil stabilization

increased diversity of plant material

wildlife habitat in the form of food, cover and nest sites

an opportunity for a golf course to function as a preserve and conservation area for this unique natural landscape.

Native prairie grasses can be used dramatically from a design standpoint in setting off the maintained turf areas, helping with proper course routing, creating focus and framework for landing areas, indicating trouble areas or simply providing general aesthetic appeal.

All of these benefits, when combined, offer tremendous public relations with golfers. Additionally, use of native prairie grasses can have a positive impact with non-golfers including many environmental groups and wildlife conservation groups that may perceive golf courses as a detriment to their issues.

Removing the perception that a golf course is a high input, artificially green space from fence line to fence line will benefit all of us in the turf industry. Creating instead a functional recreational area interspersed within a collection of ecologically sound natural habitats is a far better view point. Golf courses then can be promoted as areas of conservation and preservation as well as recreation.

Defining Native

The term "native" is often used inappropriately and is sometimes confusing and even controversial. There is, however, a commonly accepted definition of a native plant defined as: *A species of plant that occurred in Michigan prior to European settlement.* Often you hear this referred to as presettlement vegetation. Botanists in Michigan have done a good job of identifying and compiling presettlement vegetation for our state. While there are some plants that still are in question, most can be positively identified as native or non-native (exotic).

Native is different than naturalized. Naturalized refers to non-native species that survive and reproduce on their own. Many of our turfgrasses have naturalized in Michigan, but this is far different from being native to Michigan.

Even though a plant species may be native to Michigan, if seed is purchased out of state from plants that genetically are not native to Michigan, then those plant's genetics are going to be different than the native genetics. This is considered important by botanists because introducing plants (even though the species may be native to Michigan) with non-native genetics dilutes the genetics of our native population. Of more practical concern, a plant from a different part of the country may not be as genetically well-adapted to Michigan growing conditions as a plant from local genetic sources.

In turf we seldom worry or even know where the plant originated genetically. When we begin to work with native plants and create native habitats like prairie, this becomes important and may even influence the success of our establishment. Of added concern is the botanical issue of genetic purity and the potential impact we may have on natural areas if we use plants with non-native genetics. In the middle of Wayne County this may

not be an important consideration. In Newago County where we are surrounded by native prairie plants, it may create controversy.

The best option to ensure success and positive public relations is to always use local genotypes where available. If not available and you must go out of state for your prairie grass seed, select sources from as close to Michigan and on the same latitude as your location. These seed sources will be more expensive than seed from Texas or other states that produce large quantities of prairie grass seed.

Prairies in Michigan

By definition, a prairie is a grassland. These vast treeless expanses were influenced by seasonal climate fluctuations typical of the temperate Midwest. That alone would not maintain prairie. Two other major influences in a prairie ecosystem were periodic fires and brief but intense grazing by large herbivores like bison and elk (Hamilton 1994). Both of these influences discouraged woody vegetation from becoming established. Prairie habitats stayed relatively stable for thousands of years due to these factors. At one time, prairie covered 1/3 of North America. Today it is one of our rarest natural landscapes.

Many of us think of prairies as a landscape far removed from Michigan. Historically, true mesic prairie was not extensive in Michigan (Voss 1972). Prairie grasses were found in other ecosystems such as dry prairies, sand barrens, wet prairies and forest or oak openings, and were therefore present in extensive areas of Michigan including the upper peninsula.

While prairies were composed of many species of grasses and forbs, certain grasses tended to predominate depending on the type of prairie and geographical location. In Michigan, there are four predominate prairie grasses that are usually included in a prairie planting. These four are: little bluestem (*Schizachyrium scoparium*); big bluestem (*Andropogon gerardii*); Indiangrass (*Sorghastrum nutans*); and switch grass (*Panicum virgatum*).

Native populations of these four prairie grasses occur in the following numbers of Michigan counties (out of 83 counties total):

Little bluestem	45 counties
Big bluestem	50 counties
Indiangrass	33 counties
Switch grass	36 counties

(Voss 1972)

Prairie Grass Facts

Prairie grasses are quite different from our turfgrasses. The four predominant prairie grasses are warm season grasses. They thrive during the heat of the summer and are dormant during the spring and fall when temperatures are cold. Seedhead production is in late summer and remains ornamental on the plant through the winter. These grasses are bunch type with the exception of switch grass which is rhizomatous.

Unlike the fine leaf fescues which have often been used in unmowed grass areas on golf courses as a low maintenance grass, the prairie grasses become very ornamental in the fall and winter with seedheads and fall color. The fescues tend to become thick and matted, especially late in the season. Our native prairie grasses will remain upright, even with heavy snow or ice storms. Often times the prairie grasses stay very segregated in bunches so it becomes much easier to find a stray golf ball between the clumps.

While we struggle to maintain deep root systems on our cool season grasses, especially during the summer, the native prairie grasses flourish. Kentucky bluegrass and bentgrass roots maintained at a 2 inch cutting height seldom exceed 1.5-2 feet (Beard 1973), and are much less during the summer months. Our native prairie grasses typically root to depths of 5-8 feet and rooting has been measured to over 20 feet (Weaver 1968).

Switch grass is planted extensively in Michigan for pheasant food and habitat. This provides an opportunity to cooperate with conservation groups like Pheasants Forever.

Established prairie has been shown to absorb up to 15" of rainfall per hour sustained. Even 5 year old prairie absorbed 7.5" per hour of sustained rainfall (Bharati).

Prairie Grasses on the Golf Course

Little bluestem is likely the best prairie grass for golf course use because of its smaller size (2-3'). Little bluestem is suited to very dry to moderately moist soil conditions.

Big bluestem is the tallest prairie grass discussed here, often reaching 7-8' in fertile soils. Big bluestem can tolerate wetter soil conditions than little bluestem. On the golf course, big bluestem can be used as vertical accents within a little bluestem planting. Plant in colonies for best effect.

Indiangrass and switch grass are intermediate in height, often reaching 3-6' depending on soil conditions. These would make good transitional grasses to taller vegetation and can be used in colonies to break up a more expansive little bluestem planting.

Prairie grasses, would also make nice design features around or in bunkers, near greens and tees, and as waste areas isolated in the rough. Prairie grasses used to buffer wetlands would filter nutrients and help discourage geese because of their height.

While there are many more native prairie grasses than the four discussed above, these four are the most common and available. It is best advised to begin with this limited number of grasses and begin to incorporate them on a manageable scale, especially if this is your first experience with prairie grasses. Unlike cool season turfgrasses that rapidly germinate, prairie grasses are slow to establish. A three to five year establishment period is not unusual so prepare yourself and your members or golfing public for this time frame.

Another option in using these grasses is to establish a more complete prairie habitat. This can be done by adding some of the native prairie forbs (wildflowers) to your seed mix. Some good wildflower species to add to your prairie grass planting suitable for a wide range of soil and site conditions are:

<i>Aquilegia canadensis</i>	Columbine
<i>Asclepias tuberosa</i>	Butterfly weed
<i>Aster azureus</i>	Azure aster
<i>Coreopsis lanceolata</i>	Lance-leaved tickseed
<i>Liatris aspera</i>	Rough blazing star
<i>Lupinus perennis</i>	Wild lupine
<i>Monarda fistulosa</i>	Bergamot
<i>Monarda punctata</i>	Horsemint
<i>Penstemon hirsutus</i>	Hairy penstemon
<i>Rudbeckia hirta</i>	Black-eyed Susan
<i>Solidago rigida</i>	Stiff goldenrod

Most of these species are relatively low growing (1-3') and are quite showy in bloom.

Prairie grass and wildflower establishment

The following steps should be followed to establish prairie grasses on a golf course:

Select the area you wish to grow prairie grasses and wildflowers. The selection may be based on the types of prairie grasses and wildflowers that interest you, future maintenance considerations, or some design intent you wish to accomplish with the site.

Survey the area to determine if desirable prairie grasses and wildflower species are already present. You may wish to protect these plants during the establishment process.

Soil test through your County Cooperative Extension Service. There is no listing for prairie grasses and wildflowers so do not indicate the crop. Soil testing will determine soil pH and the levels of important nutrients like phosphorus and potassium.

Select the seed sources or live plants best adapted to your site and soil conditions. You will need to do some research to determine this. If you want a long term planting, it is best to use native Michigan prairie grasses and wildflowers preferably from local seed sources.

Control weeds. Weed competition is the major reason for prairie grass and wildflower establishment failure and the major source of future maintenance work. It is best to plan far in advance so weeds are well controlled at the time of establishment. For late spring plantings start your weed control strategies early the previous fall. Use a combination of hand weeding, tillage and non-selective herbicides like Roundup. Continue through the fall and into next spring but do not use tillage within one month of planting to prevent new weed seeds from being brought to the surface where they may germinate.

It is seldom recommended to amend, modify or fertilize soils for prairie grasses and wildflower plantings. What is most important is to select appropriate plants for your site. In some cases where soil conditions are extremely poor, it may be beneficial to add organic matter, a natural organic fertilizer, adjust soil pH, or supplement phosphorus or potassium. This should be evaluated on a case by case basis. Like most plants, prairie grasses and wildflowers will respond to fertile soils. A problem arises when soils are too rich or fertile and weed competition becomes excessive.

Time most prairie grass and wildflower seedlings for late spring (mid-May to mid-June). Lightly scarify the soil surface to ensure good seed/soil contact. Do not till or disc the soil deeply. Use a light disc, power rake, hand or York rake or light drag to accomplish the soil scarification.

Spread seed with a hand cranked whirlwind seeder or by hand. Seeds vary considerably in size, shape, weight, and often have feathery attachments that aid in natural dispersal. Seeds can be planted as a homogeneous mix but seeding uniformity can be a problem. A better way to plant is to buy seed as separate species, set aside a portion (less than 50%) of each species, mix the remainder of each species having similar seed size and weight together and apply this over the site. You may end up with three or four different passes based on seed size. Then take the seed set aside as separate species and seed these individually as drifts or groupings. This better duplicates what occurs in nature as many native plants tend to form colonies. Because some seed is small or may be light and feathery, these species are difficult to spread. Mixing these species with sand or some other additive often aids in seeding. Seed perennial forbs at 5-10# per acre; annuals at 5# per acre; and warm season grasses at 10-15# per acre.

For larger areas, a Brillion seeder with brushes can work or a drill seeder specifically designed for native grasses can be used.

Very lightly rake to incorporate the seed in the soil. Do not bury. Many species prefer little or no soil cover.

Roll to ensure good seed soil contact.

It is seldom recommended to mulch prairie grasses and wildflower plantings. Most prairie species do poorly with mulch. If the site is erosive, consider a light seeding of oats as a quick cover stabilizer or possibly a thin mulching blanket.

Watering is not necessary but it will speed germination and establishment. If started, watering must be continued through the first year. On larger sites, watering is seldom practical.

Some additional thoughts on establishment

A prairie contains both grasses and forbs. It is often desirable to add prairie grasses as a component of your wildflower planting. Prairie grasses are usually clump or bunch type growers. They can add a great deal of interest in fall and through the winter with their attractive beige, bronze, reddish or purplish seed heads and dried foliage.

Since weed control is the greatest challenge on any site, rapid establishment is important. Many perennials take a long time to germinate and establish. The use of annuals is beneficial as they provide a quick cover which competes with less desirable weeds. Most annuals that you would add as a component of a planting are not native to Michigan. Select non-persistent species of flowers that will compete with weeds but still allow the desirable perennial wildflowers and grasses to germinate. Annuals also provide good color and interest the first season. Some may reseed in future years but most tend to disappear as the perennial flowers and grasses establish.

Management of a native Michigan prairie grass and wildflower planting

During the 3-5 years of establishment certain maintenance practices should be conducted. The types, timing and frequency of maintenance procedures will vary from site to site and year to year, sometimes depending on weather conditions. The following practices are needed to maintain a prairie grass and wildflower planting:

Weed control - hand weeding (be careful not to disrupt the soil too much as young wildflower plants may be damaged in the process), treating with Roundup and/or cutting out weed species needs to be done on a regular basis. More is usually needed in the first and second years following seeding. Do not let this get out of hand and try to remove weeds before they go to seed. It is easier to spend an hour or two each week hand weeding or spot spraying with a wildflower planting than it is to wait a month and end up with a nightmare of weed problems. Learn the good guys from the bad because young plants are hard to tell apart from weeds when they are not in bloom. Some sources recommend mowing in the fall to control weeds and tidy up the planting. To me, the dried plants provide winter interest, overwintering sites for animals and some shading that may actually reduce weed competition. In most cases I do not recommend annual mowing unless there are woody plants starting to encroach.

Reseeding may be needed if an area is thin or damage occurs on the site.

Burn the area as soon as there is enough fuel to carry a fire, usually two to three years after seeding. Burn each year thereafter for three to five more years then burn about every three years as a maintenance practice. Burning in mid-March to late April will help control some exotic weed species especially cool season grasses, will help keep out woody plants, will provide nutrients to the site, will accelerate the heat buildup of the soil which will start plant growth earlier, and will actually aid the germination of some prairie grass and wildflower seeds (Henderson, et al 1982) (Peterson 1982). Do not burn the entire area at once but keep an area unburned so butterfly and moth cocoon's can be preserved. Burn in low wind (usually morning or evening), obtain a burn permit where required, and be prepared with a water source and other safety precautions. Time the burn just as cool season grasses are starting to green up. Where possible, time a burn just prior to a rain. The fire should be hot and move fast. If it slowly smolders than conditions were not correct.

Live plants can be added at any time. The addition of live plants can be used to speed establishment, add more diverse species, and increase future seed sources.

Conclusion

This provides an introduction to using native prairie grasses and perhaps some related native wildflowers on a golf course. By no means is this intended to be considered a thorough explanation of creating prairie habitats on a golf course. Ultimately, creating native prairie, woodland and wetland habitats and preserving existing native landscapes on our golf courses should be our goal. In doing so, our golf courses become an environmental and ecological preserve in addition to a recreational site. Learning about and learning to appreciate our native habitats is a necessary first step before we can fully incorporate them as part of golf course design, construction and management.

Literature cited:

- Beard, J. B. 1972. Turfgrass: science and culture. Prentice Hall.
- Bharati, L. Infiltration studies on vegetation along riparian strips. Iowa State University masters thesis.
- Hamilton, R. 1994. Native prairie management guide. The Iowa Prairie Network.
- Henderson, R. A., Lovell, D. L., and Howell, E. A. 1982. The flowering responses of seven grasses to seasonal timing of prescribed burns in remnant Wisconsin prairie. Proceedings of the Eighth North American Prairie Conference. p. 7-10.
- Peterson, N. J. 1982. The effects of fire, litter, and ash on flowering in *Andropogon gerardii*. Proceedings of the Eighth North American Prairie Conference. p 21-24.
- Voss, E. G. 1972. Michigan flora: part I gymnosperms and monocots. Cranbrook Press.
- Weaver, J. E. 1968. Prairie plants and their environment - a fifty year study in the Midwest. University of Nebraska Press.

Appendix I

Important definitions:

NATIVE - Present prior to European settlement.

EXOTIC - Introduced after European settlement.

ECOSYSTEM - An association of plants and animals adapted to particular soils, light, moisture, and climate.

HERBACEOUS - Plants that do not have woody branches. Herbaceous plants have green, leafy tissue that is subject to winter dieback.

ANNUALS - A plant that completes its life cycle in one year. Annuals germinate, grow, flower and produce seeds then die in one year.

PERENNIAL - A plant that persists from year to year. The top growth of perennial wildflowers often dies back in winter but the crown, root system and/or underground storage parts like tubers remain alive to regrow the next year.

WARM SEASON GRASSES - Grasses often associated with prairies that are dormant (slow down or cease growth) during the colder parts of the year. These grasses are most active in the heat of the summer and as fall approaches they produce seedheads.

FORBS - Herbaceous broadleaf plants (not grasses) often used in association with prairies. Forbs are commonly called wildflowers.

PRAIRIE - An ecosystem made up predominantly of grasses and wildflowers with few woody plants present. There are five types of prairies referred to as: wet prairies, wet mesic prairies, mesic, dry mesic, dry prairies. Prairies are also sometimes referred to by the predominant grasses - tallgrass or shortgrass.

SAVANNA - A woodland ecosystem made up of scattered trees or tree colonies interspersed with prairie plants. Oak savannas are the most common savanna in the Midwest.

WETLAND - Any ecosystem in which the water table is close to the surface or visible for a certain defined

period of time during a year. Wetlands need not have standing water all or even part of the year to fit the definition, but only need some level of saturated soils. Many different types of wetlands exist including: swamps (mature trees are the predominate plant); bogs (sphagnum moss and associated plants); fens (similar to a bog but with a high pH); wet prairie, sedge meadow, marsh.

WOODLAND - Any ecosystem in which trees predominate. Many different woodland communities exist including: Beech-Sugar maple, Oak-Hickory, Oak-Savanna, Deciduous Swamp, Pine, River Floodplain and Bottomland, Spruce-Fir.

Appendix II

Suggested sources for native plants and seeds

Arrowhead Alpines P.O. Box 857 Fowlerville, MI 48836 223-3581	native plants
Cold Stream Farm 2030 Free Soil Road Free Soil, MI 49411 (616) 464-5809	native trees and shrubs
Grass Roots, Inc. P.O. Box 4001 Lansing, MI 48826 (517) 337-2405	native plants from plant rescue
Grimes Gardens 14650 Center Bath, MI 48808 (517) 641-4053	native plants
Huria Nursery 4687 Grenadier SW Wyoming, MI 49509 538-4359	native trees and shrubs
Michigan Wildflower Farm 11770 Cutler Road Portland, MI 48875 647-6010	native wildflower and prairie grass seed
Oikos Tree Crops P.O. Box 19425 Kalamazoo, MI 49019-0425 624-6233	native trees and shrubs
Perennial Presence 1030 Lieback Road Chelsea, MI 48118 475-2177 open by appointment only	native plants

The plants at Perennial Presence are received from a grower in Minnesota, you may wish to contact this grower directly:

Prairie Moon Nursery Route 3 Box 163	native plants and grasses
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Winona, MN 55987
(507)452-1362

Ask for Michigan natives

Von Bochove's
1019 Miller Road
Kalamazoo, MI 49001
(616) 343-1669

native plants and
grasses

Wetlands Nursery
P.O. Box 14553
Saginaw, MI 48601
(517) 752-3492

native wetland plants
and seeds

Wild Types
East Lansing, MI 48823

native trees and shrubs

Check also with nature centers in your area. At times they may offer plants or seeds for sale. Always ask any supplier of live plants if the plants have been nursery propagated, not just nursery grown. The exception would be plants from a plant rescue operation.

Appendix III General references

Wildflower and Prairie Books

Prairie Primer - University of Wisconsin-Extension
Prairie Propagation Handbook - Milwaukee County Department
of Parks, Recreation and Culture
Winter Wildflowers - Michigan Botanical Club
Orchids of the Western Great Lakes Region - Cranbrook Institute of Science
A Garden of Wildflowers - Garden Way Publishing

Native Plant Books

Ferns, Wild Things Make a Comeback in the Garden - Brooklyn Botanic Garden
Going Native, Biodiversity in Our Own Backyards - Brooklyn Botanic Garden
Landscape Restoration Handbook - New York Audubon Society
Michigan Flora: Part I Gymnosperms and Monocots - Cranbrook Institute of Science
Michigan Flora: Part II Dicots - Cranbrook Institute of Science
Michigan Trees - The University of Michigan Press
Shrubs of Michigan - Cranbrook Institute of Science
The Trees of North American - Facts On File Publications

Attracting Wildlife Books

Homes for Wildlife - Cranbrook Institute of Science
Landscaping for Wildlife - Minnesota Department of Natural Resources
Managing Michigan Ponds - Michigan State University Extension Bulletin E- 1554
Michigan Frogs, Toads, and Salamanders - Michigan State University Extension
Michigan Turtles and Lizards - Michigan State University Extension
Michigan Snakes - Michigan State University Extension
Woodworking for Wildlife - Minnesota Department of Natural Resources

Associations

Wildflower Association of Michigan
60 Cumberland
Lowell, MI 49331