Landscaping with NATIVE PLANTS of MINNESOTA

2nd Edition

Lynn M. Steiner

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Lynn M. Steiner

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Dedication

This book is dedicated to the entire native-plant community of Minnesota, including the advocates and organizations; designers, nurseries, and garden centers; and home gardeners, who gave me their full support in writing this book. Thank you for your help and for all you do to preserve and promote the state's native treasures.

Acknowledgments

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Introduction

Landscaping with Native Plants of Minnesota

Why a book on landscaping with native plants of Minnesota? Mainly because it hasn't been done and there is a definite need$ There are many good field guides and reference books for identifying and learning about native plants. There are also several good books about gardening in Minnesota. This book combines these two approaches—identifying Minnesota's native plants and plant communities and demonstrating how to use them effectively in a typical home landscape.

I hope to dispel the many misconceptions people have about native plants, such as their being weedy, hard to grow, difficult to purchase, and generally inappropriate for landscape situations. I also hope to show you the many possibilities available in our native flora so you can choose plants that are both appealing and well adapted to the climate and soils of your landscape and well suited to your lifestyle.

My first task was determining which plants are "native." I followed the distinction used by many experts and based my selection on what was growing here naturally before European settlement. For this information, I turned to *Vascular Plants of Minnesota* by Gerald B. Ownbey and Thomas Morley, and to the Minnesota Department of Natural Resources website on state vascular plants prepared by Welby R. Smith. I have not included plants that have become naturalized—often labeled "wildflowers"—and aren't indigenous to any part of the state.

My initial list of native plants was far too long, so I had to make difficult choices about which plants to leave out. I based my decision on each plant's ability to adapt to cultivation, suitability for various landscape situations, and availability at local nurseries or through mail-order

sources. One of the true joys of working with native plants is observing how they match the rhythms of the seasons, so I looked for plants that provide a succession of interest year round. I also tried to include a variety of sun and shade plants and a cross section of plants native to the state's three major biomes. To the many wonderful plants that didn't make the cut, I apologize. I eliminated plants that are difficult to bring into the garden because of demanding soil or cultural requirements or are difficult to find.

Space limitations also prevented me from including detailed propagation information for each species. There are many good references out there on native-plant propagation—especially for wildflowers. If you are interested in this fascinating aspect of gardening with native plants, I encourage you to read *Restoring the Tallgrass Prairie: An Illustrated Manual for Iowa and the Upper Midwest* by Shirley Shirley; *The New England Wild Flower Society Guide to Growing and Propagating Wildflowers of the United States and Canada* by William Cullina; or *Native Trees, Shrubs, and Vines: A Guide to Using, Growing, and Propagating North American Woody Plants* by William Cullina.

What else is included in this book? You'll find an overview of Minnesota's natural heritage, an understanding of which is crucial before attempting any type of native landscaping. Still, nothing you read here will be more informative than what you can learn from nature itself: be sure to take lots of walks in Minnesota's many parks and nature areas for inspiration.

In this book you'll also find basic gardening information tailored to native plants. You'll learn what level of native-plant landscaping is right for you and get valuable information on the process of designing a natural garden that fits your lifestyle. You'll also find lots of plant lists for specific styles of gardens.

In the Gallery of Gardens section, you'll be inspired by what your fellow Minnesota gardeners have done with native plants in their own landscapes, including a prairie restoration, a suburban woodland garden, and a garden for wildlife.

The Native Plant Profiles section includes comprehensive descriptions of some 350 species of flowers and groundcovers, trees, shrubs, vines, evergreens, grasses, and ferns native to Minnesota, as well as information on planting, maintenance, and landscape uses for each plant.

Late July color comes from *Heliopsis helianthoides* (oxeye), *Monarda fistulosa* (wild bergamot), *Verbena stricta* (hoary vervain), and *Artemisia ludoviciana* (prairie sage).

Facing Page: Native plants replace customary nonnative shrubs in this foundation planting.

Chapter 1

Understanding Native Plants

What They Are and How to Use Them

Just what defines a native plant has been debated for many years by many people. A widely accepted definition—and the one used in this book—classifies native plants as those species that grew in an area before European settlement—about the mid-1800s in the Midwest. By and large, Native Americans lived in harmony with the plants and animals of an area without endangering the natural ecosystems. European settlers, on the other hand, had a major impact on the landscape as they cut down large stands of trees, plowed up acres of prairies, suppressed natural fires, and introduced plants from their homelands and other parts of this "new" continent.

Unlike most introduced plants, a native plant fully integrates itself into a biotic community, establishing complex relationships with other local plants and animals. Not only does a native plant depend on the organisms with which it has evolved, but the other organisms also depend on it, creating a true web of life. This natural system of checks and balances ensures that native plants seldom grow out of control in their natural habitats.

"Wildflower" is a commonly used term, but it does not necessarily mean a native plant, since not all wildflowers are native to an area. Wildflowers include introduced plants that have escaped cultivation and grow wild in areas. Examples are Queen Anne's lace (*Daucus carota*) and chicory (*Chicorium intybus*), two common roadside plants, neither of which is native to any area of the United States.

Introducing new plants is not always a bad thing. Where would we be without tomatoes, potatoes, and wheat? And, it's hard to find fault with introduced plants as charming and well behaved as lilacs and hostas. However, experience has taught us that the introduction of nonnative plants into an ecosystem is a delicate operation that should be undertaken with care. More and more, we are finding that plants that evolved in other countries, or even other areas of this country, can become too comfortable in landscape situations and threaten native flora. A prime example is purple loosestrife, a European native propagated by nurseries and grown in gardens for years before it was realized that it aggressively invades natural wetlands, crowding out native plants. Buckthorn is another European native that has been widely used as a hedge. Today, it is the bane of any homeowner with a wooded plot and it is running rampant through native woodlands.

Classifying Native Plants

Before you can know and effectively use native plants, you must have a simple knowledge of plant taxonomy. The fundamental category in this book is the species, a group of genetically similar plants within a genus, a larger botanical division. Genus and species names are commonly Latin and italicized, with the genus name coming first in capital letters followed by the species in lower case. Learning Latin names can be frustrating, but it is important. Too many plants share the same or similar common names, and it's easy to end up with the wrong plant—one that may not even be native to your area. Latin names also offer clues on how to identify a plant. For example, knowing that *tomentosus* means "downy" and *laevis* means "smooth" will help you identify and remember what a plant looks like.

Within a species, there are also subspecies (abbreviated as "ssp.") and varieties ("var."). A subspecies has a characteristic that isn't quite different enough to make it a separate species. This characteristic may occur over a wide range or in a geographically isolated area.

Varieties have minor recognizable variations from the species, such as flower size or leaf color, but are not distinct enough to be labeled subspecies. An example is found in *Cypripedium calceolus* (yellow lady's slipper), which is further differentiated into var. *pubescens* (large yellow lady's slipper) and var. *parviflorum* (small yellow lady's slipper). The latter plant is shorter and has a slightly different flower shape and color, but without seeing the two side by side, it can be difficult to tell which one you are looking at.

As native plants become more popular, many horticulturally selected cultivated varieties are being introduced. These "cultivars" are usually chosen for certain characteristics such as larger or double flowers, leaf color, compact growth, or flower color, and are propagated by nurseries to maintain the trait. In most cases, these cultivars retain most of the characteristics of the native species and are fine choices for most landscape use. However, if you are doing restoration work, you will want to stick with the species or even the subspecies or variety native to your area to maintain the true genetic diversity you'll only get from the native species.

For most plants, species is the final classification. However, some plants are divided further into varieties. When you see them side by side, you can see that the *Cypripedium calceolus* var. *pubescens* (large yellow lady's slipper) at left and var. *parviflorum* (small yellow lady's-slipper) at right have minor size and color differences, thus the further differentiation into varieties. Some botanists feel that the differences are distinct enough to classify *C. pubescens* as a separate species.

While the native pink-flowered *Physostegia virginiana* (obedient plant) is a beautiful flower suitable for naturalizing and prairie plantings, it can be too aggressive for many landscapes. 'Miss Manners', a white cultivar, is less aggressive and better suited to garden use.

The Bad Guys: Invasive and Weedy Introduced Plants

While many introduced plants are well-behaved, beautiful additions to gardens, some become harmful invaders of local habitats. You may be surprised by how many common landscape plants have the potential to become invasive and weedy when grown in conditions that promote rampant growth, such as tended garden beds or abandoned and neglected sites where native plants are no longer prevalent. Here are some of the many plants that have been turning up on invasive-plant lists in recent years:

Acer ginnala (Amur maple)
Acer platanoides (Norway maple)
Aegopodium podagraria (goutweed)
Ailanthus altissima (tree of heaven)
Ampelopsis brevipedunculata (porcelain berry)
Berberis thunbergii (Japanese barberry)
Berberis vulgaris (common barberry)
Butomus umbellatus (flowering rush)
Campanula rapunculoides (creeping bellflower)
Caragana arborescens (Siberian peashrub)
Celastrus orbiculatus (Oriental bittersweet)
Coronilla varia (crown vetch)
Daucus carota (Queen Anne's lace)
Elaeagnus angustifolia (Russian olive)
Euonymus alatus (winged euonymus)
Euonymus europaeus (European euonymus)
Euonymus fortunei (winter creeper euonymus)
Euphorbia esula (leafy spurge)
Glechoma hederacea (creeping Charlie)
Hesperis matronalis (dame's rocket)
Hieracium aurantiacum [*Pilosella aurantiaca*] (orange hawkweed)
Iris pseudacorus (yellow flag)
Leucanthemum vulgare (oxeye daisy)
Ligustrum vulgare (common privet)
Lonicera japonica (Japanese honeysuckle)
Lonicera tatarica (Tatarian honeysuckle)
Lotus corniculatus (bird's foot trefoil)
Lythrum salicaria (purple loosestrife)
Miscanthus sinensis (maiden grass)
Phalaris arundinacea (reed canary grass)
Polygonum japonicum [*P. cuspidatum*] (Japanese knotweed)
Rhamnus cathartica (common buckthorn)
Robinia pseudoacacia (black locust)
Rosa multiflora (multiflora rose)
Saponaria officinalis (soapwort, bouncing bet)
Sorbus aucuparia (European mountain ash)
Tanacetum vulgare (common tansy)
Ulmus pumila (Siberian elm)
Vinca minor (common periwinkle)

Source: Plant Conservation Alliance's Alien Plant Working Group: http://www.nps.gov/plants/alien

The term "wildflower" can be a misnomer when referring to native plants as not all plants that grow well in a region are native there. If you see a proliferation of one species—such as the oxeye daisy (*Leucanthemum vulgare*), a European native—taking over lawns and roadsides, chances are it's an introduced plant displacing native species.

Many aggressive nonnative plants are introduced as garden plants because they are showy and easy to grow. *Campanula rapunculoides* (creeping bellflower) is an example of a European native that has become a prolific garden weed. Its thick, tuberlike rhizome makes it difficult to eradicate once it becomes established.

Benefits of Native Plants

There are many reasons to use native plants, some more tangible than others. For many gardeners, the initial attraction comes from native plants' reputation of being lower maintenance than a manicured lawn and exotic shrubs. For the most part this is true—provided native plants are given landscape situations that match their cultural requirements. Because they have evolved and adapted to their surroundings, native plants tend to be tolerant of tough conditions such as drought and poor soil. Native plants are better adapted to local climatic conditions and better able to resist the effects of native insects and diseases. Their reduced maintenance results in less dependence on fossil fuels and reduced noise pollution from lawn mowers and other types of equipment.

The less tangible—but possibly more important—side of using native plants is the connection you make with nature. Gardening with natives instills an understanding of our natural world—its cycles, changes, and history. Communing with nature has a positive, healing effect on human beings. Learning how to work with instead of against nature will do wonders for your spiritual health. By observing native plants throughout the year, a gardener gains insight into seasonal rhythms and life cycles. You will experience intellectual rewards that are somehow missing if you only grow petunias or marigolds.

Gardening with native plants will help you create a sense of place rather than just a cookie-cutter landscape. Your yard will be unique among the long line of mown grass and clipped shrubs in your neighborhood. A native-plant landscape will blend into the natural surroundings better that those planted with introduced species, and you will get an enormous sense of satisfaction from helping reestablish what once grew naturally in your area. You will see an increase in wildlife, including birds, butterflies, and pollinating insects, making your garden a livelier place.

On a broader scale, using native plants helps preserve the natural heritage of an area. Genetic diversity promotes the mixing of genes to form new combinations, the key to adaptability and survival of all life. Once a species becomes extinct, it is gone forever, as are its genes and any future contribution that it might have made.

Misconceptions about Native Plants

Despite the increased interest and promotion of native plants, many people still hesitate to use them for one reason or another. Here are some of the common misconceptions about using native plants.

Native plants are colorless and dull

The belief that native plants are drab or uninteresting is based in ignorance. Once you learn about the wide variety of natives and how to use them properly, you will discover that they have much to offer, not only colorful flowers but also interesting textures, colorful fruits, and year-round interest. They may not all be as bright and showy as a lot of introduced plants, but their subtle beauty can be just as effective in landscaping.

Native plants cause allergies

The truth is, most native plants are insect pollinated rather than wind pollinated. Kentucky blue grass has the potential to produce more allergens than any native plant.

Native plants are invasive

Most aggressively invasive plants are imported from other countries or another part of the United States. Keep in mind that any plant can become invasive if it is given the right conditions—a site more conducive to rampant growth than its preferred habitat.

Native plants are hard to grow

The misconception that native plants are hard to grow comes from the fact that many of them have evolved in a rather specific habitat. Once you learn about the different plant communities and their soil and sunlight requirements and determine which plants are best for your conditions, you will find that most native plants are easier to grow than their cultivated counterparts.

Native plants are messy

Nature is "messy." It's full of fallen logs, recycling plant parts, and plants that weave together rather than lay out in straight lines. Once you understand and appreciate this, native plants will no longer appear unattractive. When given proper conditions and room to grow, most native plants produce larger and better flowers than their wild counterparts. There are many things you can do to make a native landscape look neater, such as incorporating small patches of lawn grasses, creating paths and neat edges, and cutting back certain plants when they are done blooming.

Native plants are hard to find

Once you learn which plants are native, you will be surprised how many are available at local nurseries. In every part of the country, you will find nurseries that specialize in native plants, and many of them offer mail order.

Native Plants in the Landscape

Basically there are three ways to use native plants in a landscape: restoration, integration, and habitat gardening.

On the extreme side, you can grow only plants that were found in your area before European settlement. This is a wonderful way to preserve and enjoy the beauty of individual plants, and also to preserve entire ecosystems or plant communities. Restoring a tall-grass prairie or creating an authentic deciduous woodland habitat are wonderful ways to create pure stands of native plants.

For most people, however, using only native plants is not practical. Because our landscapes have been altered so much by human activity, it is difficult to go back to the point where you can successfully grow only native plants without investing quite a bit of time and effort in plant eradication and site preparation. If you truly want to establish a pure stand of plants that once grew naturally in your area, you should get help from a professional specializing in native-plant restorations.

For most gardeners, a more practical way to use native plants is to integrate natives with nonnative, more traditional landscape plants that have proven to be nonaggressive and adaptable to your area. You may already be doing this without realizing it. If your mixed border includes liatris, butterfly weed, and black-eyed Susans, or if your shade garden is home to wild ginger, pagoda dogwood, and maidenhair ferns, you are already well on your way to using native plants. You don't have to give up some of the well-behaved nonnative plants you love, such as spring bulbs, hostas, and rhododendrons. Most natives are adaptable and willing to coexist with nonnatives. Be warned, however: once you have discovered the subtle beauty that natives bring to your landscape, you may well become one of the many gardeners choosing to grow more and more of these fascinating plants.

People who have a strong interest in growing native plants will get immense pleasure from the creation of habitat gardens within their landscape. The goal here is to re-create a natural habitat that would have once been found in or around your area. Start by assessing the specific site conditions in an area of your landscape and determining which native habitat would be best suited to the conditions. If you have a shady area under large deciduous trees, look to the plants of the southern forests; an area in full sun would be an ideal area for a grassland habitat garden. By establishing large areas of native-plant communities, you will help preserve natural ecosystems that once flourished in your area and end up with an attractive, easy-to-tend garden filled with plants with similar cultural requirements. You will also get to experience first hand the intricacies of a natural plant community.

The bottom line is, there is really no right or wrong way to use native plants, as long as it brings you pleasure. As with any type of gardening, your landscape should reflect your own preferences for color, style, and plants. If you have a colonial-style house in the suburbs and prefer a formal entryway with clipped hedges, there are native plants that will fit the bill. If you're a plant lover who can't resist the hodgepodge of a collector's garden, that's fine too. No matter how many natives you use or in which way you use them, you will be helping to counteract the tragedy of habitat destruction and reduction in native-plant populations occurring around the world. And, on a more personal note, you won't have to leave home to enjoy nature. It will be right at your doorstep.

No single gardener can solve all the environmental problems of the world, but by growing native plants, you can help preserve and promote the natural ecosystem of your small part of the globe. Like many native plants, *Geranium maculatum* (wild geranium) may not be as ostentatious as its cultivated cousins, but its subtle beauty, adaptability, and low maintenance make it easy to use in many landscape situations.

Although it takes several years to establish, if you have the space and resources, a prairie restoration is a wonderful way to experience the wonders of a natural plant community.

A complete habitat restoration is not practical for most homeowners. Luckily, many native plants adapt readily to traditional landscape use. Here *Echinacea purpurea* (purple coneflower), *Ratibida pinnata* (gray-headed coneflower), *Eupatorium purpureum* (Joe-pye weed), *Liatris pycnostachya* (great blazing star), and native grasses help make the transition from the water's edge to a more formal part of this landscape.

Native Plant Conservation

Once you've been convinced of the benefits of growing native plants, it's time to temper that recommendation by saying it's important to use them properly and responsibly.

Native plant gardeners face moral and ethical considerations that most gardeners do not. You must be sure that the native plants you buy are propagated by a nursery and not collected in the wild. You want to purchase plants that were "nursery propagated," not just "nursery grown." Reputable nurseries will readily volunteer information on the origin of their plants, so evasiveness or ambiguous answers from nursery owners should trigger caution.

Plants growing in their native habitats should never be dug up for garden use unless the plants are facing imminent destruction from development. It is always preferable to try to preserve or restore a natural habitat rather than destroy it, but sometimes this just isn't possible. If you have permission to collect seeds from a stand of native plants, take only what you need. Collect only a few seeds from several plants in the stand; never take all of the seeds from one plant. Do not collect underground plant parts. Collecting must never endanger a plant population.

The rapid destruction of native habitats in the last century means many native plants and animals are threatened with extinction. You should become aware of these plants, since in many states it is illegal to gather, take, buy, or sell plants listed as endangered or threatened. A safeguard for endangered native species is the Federal Endangered Species Act of 1973. This law applies only to federal lands, however. Protection of endangered plants on other public and private lands is left up to individual states, and each state has its own list of endangered, threatened, and special-concern plants.

How to Select Propagated Over Collected Native Plants

For the conservation of native plant species, it's important the native plants you purchase at a nursery are propagated rather than collected from the wild. Despite assurances from nursery owners, you should trust your own eyes as well. Here are some signs that plants may be collected instead of propagated legitimately by a nursery:

- Poor or abnormal color
- Sparse foliage
- Weak stems or wilted leaves
- Legginess
- Large size or obvious maturity, especially in slow-growing plants
- Off-centered potting
- More than one species in the same pot
- Large stones in the soil
- Different soil types in the same pot
- Compacted clay rather than uniformly textured potting soil

Hydrastis canadensis (golden seal) is a fascinating native plant with interesting leaves and showy flowers and fruits. Unfortunately, its reputed medicinal qualities have lead to over-collecting in the wild, and it is now classified as a threatened or endangered species in several states. Be sure to only purchase nursery-propagated plants if you want to include this gem in your landscape.

Plant collecting can be devastating to native plant communities. Always ask the nursery or supplier where they got their plants. If they are hesitant or evasive about their sources, take your business elsewhere.

Minnesota's Natural Plant Life

Learning from the Natural World

The key to creating a successful home landscape using native plants is to understand the natural plant comunities in your area. Nature is truly the best garden designer, and you will never go wrong if you attempt to imitate it.

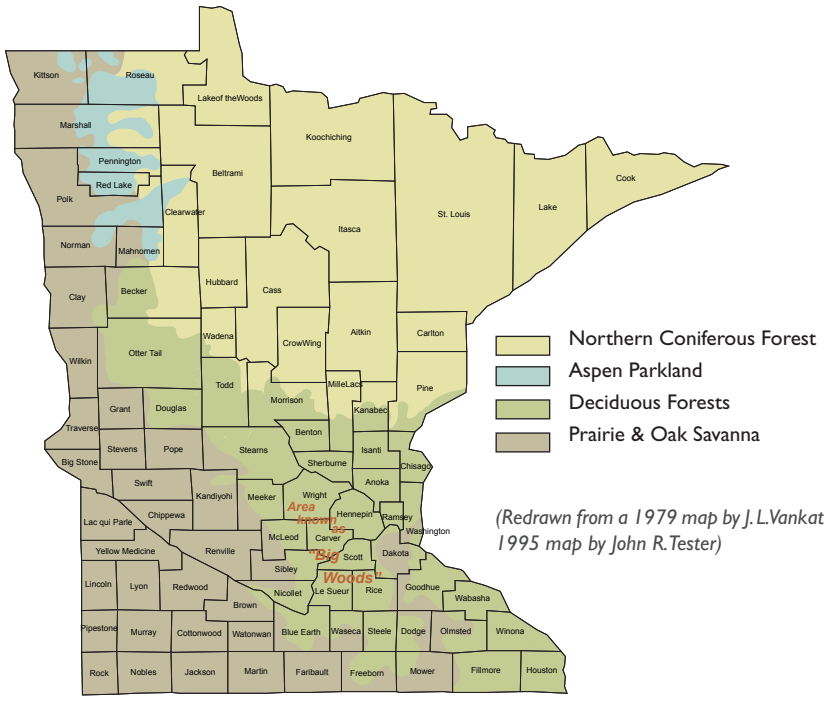
For gardeners in Minnesota, the natural world has provided many options. Minnesota is the meeting point for three North American biomes, a rare occurrence in most states. Minnesota flora represents the western limits of the vast eastern forest flora and the northern and eastern limits of the flora of the prairies and plains in the continental United States. As a result, the state's natural vegetation shows up on the map in roughly three parallel bands that cross the state diagonally.

The first band, covering the southern and western parts of the state, is the tall-grass prairie, with its rolling waves of grasses and myriad flowers. In the southeast and extending in a narrow corridor northwestward nearly to the Canadian border are deciduous forests composed mainly of sugar maples, basswoods, and elms. This ecosystem includes the area known to early settlers as the Big Woods. (Between the prairie and the Big Woods lies a band of oak savanna, an ecosystem often set apart as a separate biome, but here it is included as a subhabitat within the prairie.) The northeastern third of the state is a mosaic of stands of white and red pines interspersed with spruces, firs, aspens, and birches making up the northern coniferous forest. Minnesota is also home to many different water features, ranging from large lakes to bogs, each of which takes on different characteristics depending on which plant zone it is located in.

Some of Minnesota's native plants evolved in only one or two of the three general plant communities described above, and some are native throughout the state. Obviously, plants do not recognize political boundaries such as state lines, and these plant communities spill over into neighboring states and provinces. As a result, the plant communities of southeastern Minnesota are more like the plant communities of southwestern Wisconsin and northeastern Iowa than the plant communities of northwestern Minnesota.

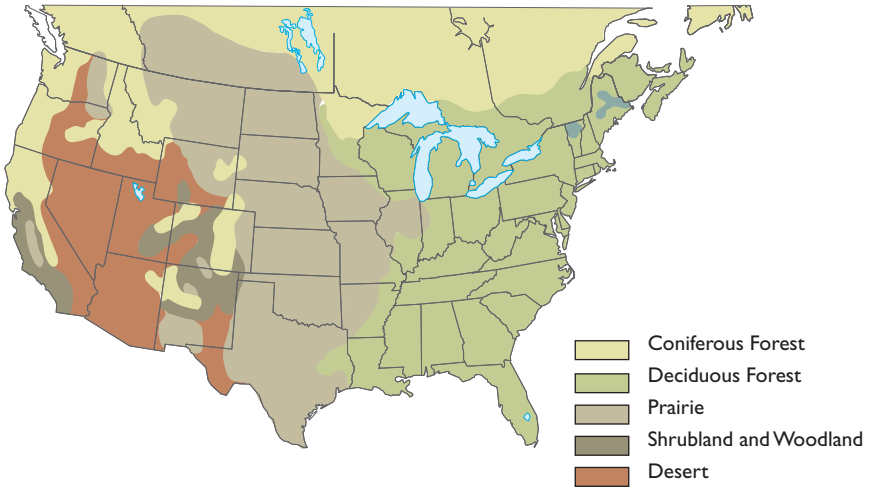
There is one plant, however, endemic to Minnesota. This is the dwarf, or Minnesota, trout lily (*Erythronium propullans*), which grows in mature maple-basswood forests and adjoining floodplains in Rice and Goodhue Counties and nowhere else in the world. Because it is so rare, the federal government classified it as an endangered species in 1986.

Major Vegetative Regions of Minnesota



(Redrawn from a 1979 map by J. L. Vankat and 1995 map by John R. Tester)

Major Ecological Regions of the United States



Facing page: A successful native landscape starts with a good understanding of your area's ecosystems and the plants that grow in them. Sharon and Fred Remund of Marine, Minnesota, have successfully interpreted the natural plant community found several miles north of them in William O'Brien State Park. They've allowed *Caltha palustris* (marsh marigold) and *Symplocarpus foetidus* (skunk cabbage) to grow along their stream, and the rustic wooden bridge mimics the natural fallen log.

Minnesota's Geography and Climate

Minnesota's area is 86,943 square miles; 7,326 square miles are covered by water if you include the state's portion of Lake Superior. Most of the state is characterized by gently rolling hills. The northwestern corner contains broad expanses of flat land, and the northeast contains rugged hills that drop to the shoreline of Lake Superior, Minnesota's coastline.

The mean elevation of Minnesota is 1,200 feet above sea level. The state's highest and lowest elevations are found in the Arrowhead Region. Lake Superior's shore is the lowest elevation at 602 feet above sea level; Eagle Mountain is the highest point at 2,301 feet.

Average temperatures are about 2 to 3 degrees Fahrenheit cooler for every 100 miles of northward travel. The average January temperature is about 0 degrees in the northwest and about 14 degrees in the south. The average temperature in July is about 74 degrees in the south and as low as 60 degrees in the far northeast. There are bog areas in northern Minnesota that have reported freezing temperatures every month of the year.

The frost-free growing season generally ranges from about the second week of May in the south and ends during the first week of October. The growing season starts about June 1 in the north and ends about mid-September.

Annual precipitation varies from 18 to 20 inches in the northwest to 32 inches or more in the southeast. A little more than two-thirds of the annual precipitation falls from May through September (the growing season). The average annual snowfall in Minnesota varies from 36 inches in the southwest to more than 70 inches along Lake Superior.

Source: State Climatology Working Group: http://www.climate.umn.edu

Tall-Grass Prairie

Of the three major biomes found in Minnesota, the tall-grass prairie has been most devastated by humankind. Prior to European settlement, more than 18 million acres of tall-grass prairie stretched across Minnesota. Today less than 1 percent of Minnesota native prairie remains, and most of the prairie wetlands have been drained. About 150,000 acres of native prairie remain, with about 48,000 acres protected by the DNR, the Nature Conservancy, and other agencies.

The main reason for this mass destruction of habitat is that Minnesota's native prairies contain some of the most fertile soils on Earth. Once early settlers discovered this soil, they set about plowing up acres and acres without a thought to the native flora and fauna. It's not surprising that the prairie biome is home to a greater number of endangered, threatened, or special-concern animal and plant species than either of the forest biomes. Unfortunately, once the prairie sod has been broken and the soil farmed for several years, it can take a century or more for a tall-grass prairie to reestablish itself.

The boundary between the tall-grass prairie and its neighboring ecosystem, the deciduous forest, was constantly in flux, creating the savanna, an area with scattered trees and large open areas of prairie vegetation. Rainfall amounts and the occurrence of fires prevented woody species from encroaching onto the prairie. The climate of the northeastern parts of the tall-grass prairie was moist enough that trees and shrubs could encroach into grasslands were it not for the periodic fires that destroyed most woody plants.

Rainfall amounts not only kept woody species out, but also determined what prairie species grew in an area. Root systems of prairie plants are variable, ranging from deep tap roots with fine rootlets that can tap deep subsoil reserves in times of drought to shallow, dense root systems that rely on light rains that only penetrate a few inches into the soil. These variations in soil moisture and the plant species adapted to them have led to the classification of prairies into three main types: mesic, dry, and wet. Mesic prairies, having moderate moisture, are the most common native grassland ecosystem in Minnesota.

Most prairie plants evolved to grow from their base or just below the soil surface, a trait that allowed them to not only survive repeated fires but to actually benefit from them. Aboveground plant parts were killed by fire, recycling nutrients back into the soil and allowing new shoots to grow readily from the plant's crown. With the litter layer burned off by fire, plants could grow quickly in the ample sunlight and fertile soil. This method of growing also allowed prairie plants to withstand repeated trampling and grazing by prairie animals, along with the high winds common on the prairie.

Minnesota's tall-grass prairies were home to a mix of forbs and grasses, with grasses and sedges comprising 75 to 80 percent of the biomass.

Prairie in the Landscape

Of Minnesota's three main plant biomes, the plants of the tall-grass prairie are probably the most adaptable to general landscape use. Many have showy flowers and have evolved to withstand the hot, sunny conditions typical of many perennial gardens. The earliest species generally start blooming in late spring, with later species continuing their show right up to frost. Many flowers have persistent seed heads offering winter interest, and prairie grasses remain showy until late winter.

It is possible to create the look of a prairie without doing a full-fledged restoration. Select a sunny part of your landscape with few or no large trees. An occasional oak or maple will a give savanna look. Select a mixture of prairie forbs and grasses based on your soil type: mesic plants for average soil; dry-prairie plants for well-drained, sandy soil (page 20); and wet-prairie plants for heavier soil (page 53).

For a natural look, be sure to use plenty of native grasses. Their deep roots aerate soil, improve drainage, and contribute substantial amounts of humus when they die back. Grasses also support stems of wildflowers and make your prairie or savanna look more natural.

Embellish your prairie landscape with paths, ornaments, and furniture that match its informal style. Incorporate broad and winding gravel, wood-chip, or mown paths, and place casual benches made of wood, rusted metal, or sawn logs along the paths. For ornament in prairie landscapes, have fun using "junk" salvaged from farmyards, which is so popular at garden centers and gift shops. Bird and butterfly houses will provide shelter for all the fluttering friends who'll be visiting, and a birdbath or other source of water will also be appreciated.

Savannas were found along the border of the tall-grass prairie and the deciduous forests. In contrast to prairies, savannas were home to widely spaced, fire-resistant trees and occasional shrubs such as *Rhus glabra* (smooth sumac) and *Amorpha canescens* (leadplant).

Include several benches in your landscape where you can stop and enjoy what you have created. This rustic wooden bench is well suited to the informality of this large prairie garden.

Native Plants of the Tall-Grass Prairie

The tall-grass prairie was once home to more than 900 native species. Here are some common plants of Minnesota's tall-grass prairies and savannas that adapt well to cultivation.

Grasses

Andropogon gerardii (big bluestem)
Bouteloua curtipendula (side-oats grama)
Elymus canadensis (nodding wild rye)
Panicum virgatum (switch grass)
Schizachyrium scoparium (little bluestem)
Sorghastrum nutans (Indian grass)
Sporobolus heterolepis (prairie dropseed)

Forbs

Allium cernuum (nodding wild onion)
Antennaria species (pussytoes)
Asclepias tuberosa (butterfly weed)
Asclepias verticillata (whorled milkweed)
Asclepias viridiflora (green milkweed)
Aster cordifolius (heart-leaved aster)
Aster ericoides (heath aster)
Aster laevis (smooth aster)
Aster novae-angliae (New England aster)
Aster oolentangiensis (sky-blue aster)
Baptisia lactea (white wild indigo)
Campanula rotundifolia (harebell)
Coreopsis palmata (stiff tickseed)
Dalea candida (white prairie clover)
Dalea purpurea (purple prairie clover)
Desmodium canadense (showy tick trefoil)
Dodecatheon media (prairie shooting star)
Echinacea angustifolia (narrow-leaved purple coneflower)
Eryngium yuccifolium (rattlesnake master)
Eupatorium purpureum (sweet Joe-pye weed)
Euphorbia corollata (flowering spurge)
Gentiana andrewsii (bottle gentian)
Geranium maculatum (wild geranium)
Geum triflorum (prairie smoke)
Heliopsis helianthoides (oxeye)
Heuchera richardsonii (alumroot)
Liatris aspera (rough blazing star)
Liatris pycnostachya (great blazing star)
Lilium michiganense (Michigan lily)
Lobelia siphilitica (great lobelia)

Forbs (continued)

Lupinus perennis (wild lupine)
Monarda fistulosa (wild bergamot)
Phlox pilosa (prairie phlox)
Physostegia virginiana (obedient plant)
Pulsatilla patens (pasque flower)
Pycnanthemum virginianum (Virginia mountain mint)
Rudbeckia hirta (black-eyed Susan)
Silphium laciniatum (compass plant)
Sisyrinchium angustifolium (blue-eyed grass)
Solidago flexicaulis (zigzag goldenrod)
Solidago nemoralis (gray goldenrod)
Solidago rigida (stiff goldenrod)
Solidago speciosa (showy goldenrod)
Thalictrum dasycarpum (tall meadow rue)
Tradescantia ohiensis (Ohio spiderwort)
Verbena stricta (hoary vervain)
Vernonia fasciculata (bunched ironweed)
Veronicastrum virginicum (Culver's root)
Zizia aurea (golden alexanders)

Woody Plants

Amelanchier arborea (downy serviceberry)
Amorpha canescens (leadplant)
Betula papyrifera (paper birch)
Ceanothus americanus (New jersey tea)
Cornus racemosa (gray dogwood)
Cornus stolonifera (red-osier dogwood)
Corylus americana (American hazelnut)
Juniperus virginiana (eastern red cedar)
Prunus americana (wild plum)
Prunus pumila (sand cherry)
Prunus virginiana (chokecherry)
Quercus alba (white oak)
Quercus ellipsoidalis (northern pin oak)
Quercus macrocarpa (bur oak)
Rhus glabra (smooth sumac)
Rosa arkansana (prairie rose)
Symphoricarpos albus (snowberry)
Viburnum lentago (nannyberry)
Viburnum rafinesquianum (downy arrow wood)