

Living Landscapes in North Dakota:

A GUIDE TO NATIVE PLANTSCAPING

“Helping People Help the Land”



Why is Native Landscaping Important?

Native landscaping provides an attractive, environmentally friendly landscape while reducing water and maintenance requirements. Do you want a beautiful yard, garden, school, park, or parking area? Try a Xeriscape™ with native plants!

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The information in this publication will help you select and grow native plants that are naturally adapted and will thrive for years under extreme environmental conditions of North Dakota. This booklet provides an overview of native landscaping principles and practices. It integrates the principles of reduced water, energy, and chemical usage; wildlife habitat enhancement; and invasive weed management. Native plant, in the context of this booklet, means native to North Dakota, with a few exceptions.



“Fargo Xeriscape Gardens” is a popular urban demonstration of Xeriscape principles and landscapes incorporating native plants. Planting areas display “Moderate Water Use,” “Low Water Use,” and “Very Low Water Use” plants.

What is Xeriscape™?

Xeriscape (pronounced *zeer-i-scape*) is derived from the Greek word, *xeros*, meaning “dry.” Denver Water holds the trademark on the term. It is the wise use of water through water-efficient landscaping and the utilization of plants better adapted to local climatic and soil conditions. The word Xeriscape conjures up visions of a dry, desert-like landscape when, in fact, its focus is how to landscape appropriately in areas with seasonal water supply shortages. A Xeriscape design uses less water to sustain plant life and provides year-round beauty.

Steps to Success

1. Develop a plan and landscape design
2. Soil analysis
3. Select appropriate plants
4. Manageable lawn size
5. Efficient irrigation
6. Mulch plants and seedings
7. Practice regular maintenance



As one of five national Xeriscapes, the City of Fargo projects that up to 50 percent savings can be achieved in home water usage. Fargo studies support other study sites indicating potential savings of nearly 30 percent in maintenance and labor, 61 percent in fertilizers, 44 percent in fuel, and 22 percent in herbicides and pesticides.



Narrow grass strips (left) can result in poor water management. A water-efficient, low maintenance alternative landscape features hardier plants in “low water use” landscape zones.

Xeriscape and Native Plant Benefits

Economic

- Lower water and maintenance costs
- Enhanced real estate values
- Increased survival of plantings
- Edible and/or decorative products

Black chokeberry: berries used for making wine and jelly

Environmental

- Improved water and soil conservation
- Reduced use of petroleum products
- Improved air quality/carbon sequestration
- Enhanced urban wildlife habitat
- Reduced storm water runoff

Butterfly garden

Quality of Life

- Attractive year-round landscape
- Increased wildlife viewing
- Connect with nature
- Decreased mowing

Big bluestem: fall color



This colorful blazing star brings beauty to landscapes. It attracts butterflies and other wildlife species, and is significant to Native American culture.

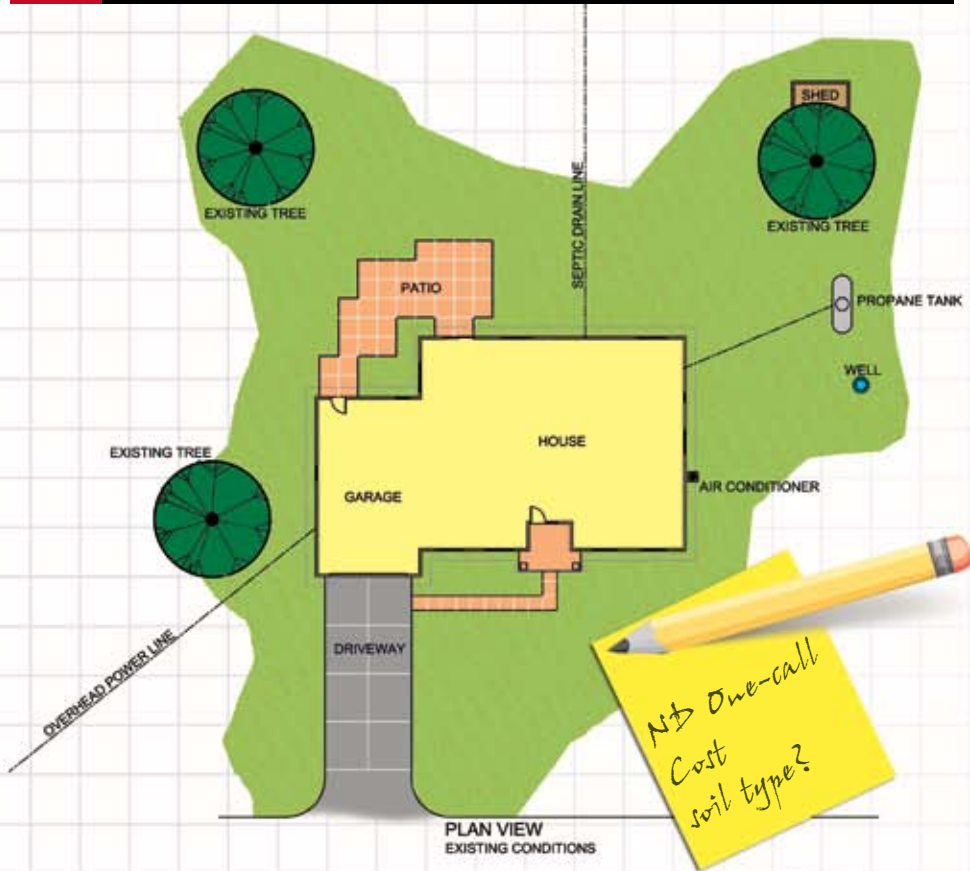
Native prairie wildflowers and grasses are excellent alternatives to traditional landscaping. They are less expensive to maintain than turf, require minimal rainfall, and are attractive all year long. Generally, only 50 percent of an existing lawn is actively used. Turf is the highest water-user and requires the most labor in a traditional landscape. Reducing the amount of turf will save time and money. Consider using a warm-season alternative turf grass, such as blue grama or buffalograss. These grasses are different from normal lawns. They are slower to green in the spring, quicker to go dormant in the fall, and require less mowing.

PLANNING

CAUTION

Before any digging, trenching, or post-driving, contact North Dakota One-call. North Dakota Century Code 49-23 requires anyone who engages in any type of excavation, with certain exemptions, anywhere in North Dakota, to provide notice of at least 48 hours in advance (excluding weekends and holidays) to North Dakota One-Call. This system is established to notify all North Dakota underground facility operators of intended excavation. Contact North Dakota One-call at 1-800-795-0555 or visit www.ndonecall.com.

North Dakota One-Call 1-800-795-0555



Steps to Planning

- 1 Consider family interests and needs**
List the outdoor activities and interests of family members, including pets.
- 2 Analyze the site**
Understand the resources: climate, soil characteristics (as determined by a soil test), slope and aspect, topsoil depth, and stability. Identify limitations such as potential flooding or inundation. Identify native plants/plant communities present on the site.
- 3 Develop and evaluate alternatives**
Visualize an initial landscape design that meets your objectives. Consider each of the following when formulating the conceptual plan:
Site. Is it wetland, riparian, or upland? Can topsoil be salvaged? Should the site be left alone due to potential flooding, bank erosion, or mass soil movement?
Plants. Are the plants adapted to the site? Consider managing to restore native plant vigor rather than removal and replanting. Identify desirable native plants and ensure they are not damaged during construction and site preparation. Evaluate how the landscape design, site preparation, and planting will affect future maintenance.
Function. Do the plants meet your objectives for aesthetics, conserving energy, and reducing maintenance time and expense?
- 4 Establish budget and timetable**
Will all the landscaping be put in place at one time or will it progress in phases over several years? How much will be spent and when?
- 5 Save or remove existing landscaping**
All desirable vegetation should complement future plantings. All unwanted vegetation should be entirely removed, either mechanically or chemically.
- 6 Solve problems identified in the site analysis**
Runoff from roof and driveway can be utilized in a rain garden. Are there existing rocks that could be used in the landscape design? Mulches can conserve water and protect soil surfaces from erosion.
- 7 Implement plan**
Order seed, nursery stock, and materials in a timely manner. Plan construction activities to avoid soil compaction and harm to desired vegetation. Use mulch or other suitable measures to prevent erosion during construction and establishment period.
- 8 Monitor and maintain landscape**
Check and protect plants from pest damage and weed competition. Ensure adequate soil moisture.

Site Inventory and Assessment

Planning and design begin with a thorough site inventory and assessment of the following factors:

Current and Historic Land Use

How has the property been used or altered in the past? Are there cultural resources buried or on the surface that should be saved? What level of cleanup will be necessary? These are important considerations before entering the next landscape phase: design, site preparation, plant selection, and planting.

Vegetative Inventory

Native species thrive in harmony with their environment. These relationships should be recreated as closely as possible for successful native landscaping. Look around and see what plants exist on the site or a similar site nearby. Do they grow there as part of a natural plant community or were they introduced? Identify the plants and determine if they are annual or perennial.

Identify and control weeds prior to planting activities. Chemical, biological, mechanical, or hand-weeding are all viable options.

Soil

Soil is the most important component of landscaping. Many well-designed landscapes have failed because of inadequate soil preparation before planting.

Compaction is a significant problem in new developments due to the activity of heavy equipment during construction. Compacted layers severely limit root growth and water movement. This problem should be corrected by ripping or deep tillage before the addition of topsoil or planting.

Topsoil. The growth rate and health of landscape plants are directly related to soil quality. Salvage topsoil prior to any excavation to secure a desirable material for plant growth. A minimum of 6 inches of good quality topsoil is recommended for turf; 12 inches for trees. This encourages deeper rooting and provides an organic rich environment for plant growth. Ideal soil textures are fine sandy loam, loam, or silt loam.



Ripping the compaction layer improves root growth and water movement.

Soil Tests. In landscape settings, soil testing is valuable to establish a baseline on soil pH, salt levels, and the need for nitrogen, phosphorus, and potassium fertilizer. The accuracy of a soil test is influenced by the laboratory analysis but may be influenced even more by the quality of the sample. Refer to NDSU Extension Bulletin SF-990 for sampling instructions.



Quality topsoil is the basis for quality landscapes.

Organic Soil Amendments. All soil textures may not be ideal for landscaping and garden beds. Two alternatives are available. One, plant site adapted vegetation which may limit species selection, or two, add organic soil amendments that will improve water-holding capacity (sandy soils) or improve aeration and drainage (clayey soils). Organic amendments include peat moss, compost, processed bark, and animal manures. Spread this material evenly over the surface and incorporate to a depth of 2 to 4 inches. The general rule is to incorporate no more than 3 cubic yards of organic material per 1,000 square feet per year. This equals about 1 to 2 inches of organic material.

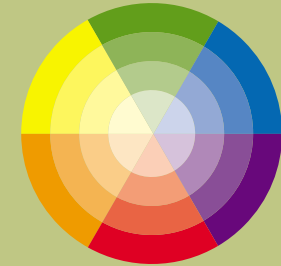
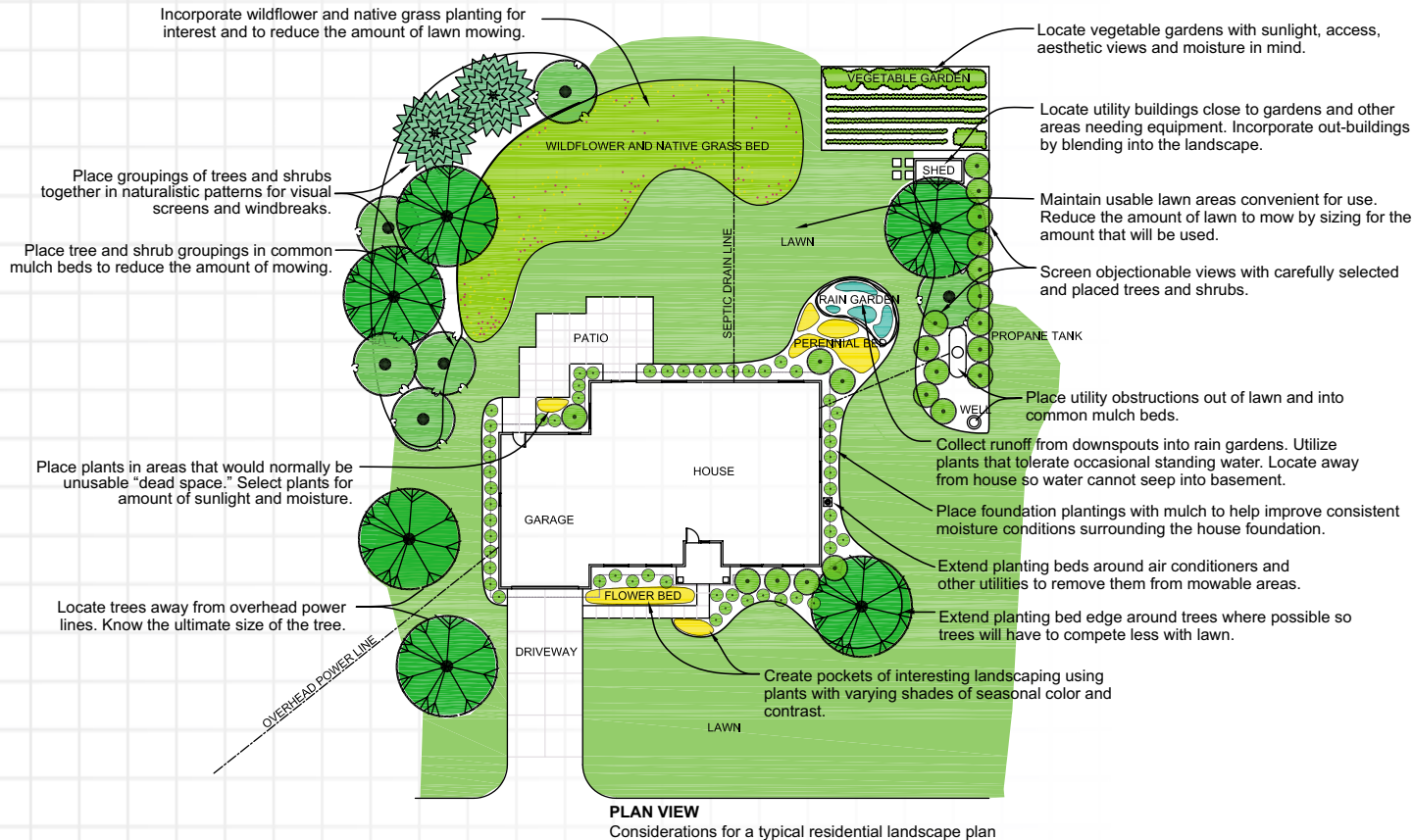


Climate

Climate of the Northern Great Plains is extremely variable and unpredictable. Native plant communities have adapted well to these extremes.

- **USDA Plant Hardiness Zones.** The Plant Hardiness Zone map divides the United States into zones based on average minimum temperature. It should be used to determine plant species adaptation to cold. (See page 6.)
- **Elevation/Topography/Aspect/Hydrologic Regime/Landform and Landscape Position.** These elements influence the length of the growing season, number of frost-free days, wind, sunlight, snow cover, soil depth, and other factors. Landscape position and microclimates around structures can modify growing conditions. Riparian areas, wetlands, and subirrigated sites offer unique opportunities for plant diversity.
- **Precipitation.** Timing of seasonal precipitation dictates water availability which is an important element when establishing and maintaining plants on a site.
- **Wind.** High wind speed exposes plants to moisture desiccation. Warm chinook winds can falsely lure trees and shrubs into breaking bud, making them vulnerable to winter kill. Winter-hardy plants must be selected to avoid damage.

DESIGN



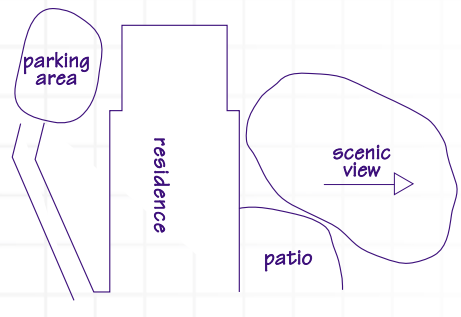
Flower and foliage color can vary greatly depending on the selected plant species/varieties. The color chart can be used as a general guide when selecting plants with colors that contrast or complement. Designs are a personal preference by the designing landscaper.

Information gathered in the site inventory is used to diagram existing conditions and identify functions of various spaces. To better visualize how things appear, drawings and/or design plans are developed to assure that each space gets specific attention and to determine relationships between spaces. The number of steps, or preliminary drawings, necessary to complete a landscape design is dependent on the size and scale of the project and the amount of detail incorporated at each stage of the process.

Landscape Design Sequence

Bubble Diagram

It is important to identify areas with different maintenance requirements. Use simple shapes to represent features or conditions such as a dog kennel, RV parking, turf area, perennial garden, sun exposure, or views.

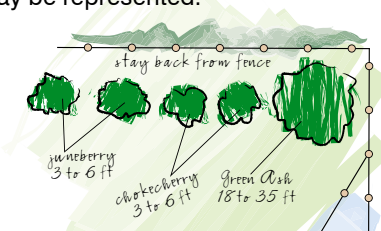


Concept Plan

Individual shapes begin to take on a greater level of detail, and relationships between spaces evolve. Large areas such as prairies, parking lots, lawns, and water features should be considered first. Smaller areas and shapes, such as planting beds, decks, and walkways should be integrated in and around the larger areas. The diagram at the top of this page is an example of a concept plan.

Completed Plan

The completed plan specifies the identity, location, and proper spacing of all plants. It contains all the information necessary to implement and install the landscape. Construction drawings may be necessary for building or installing other elements in the design.



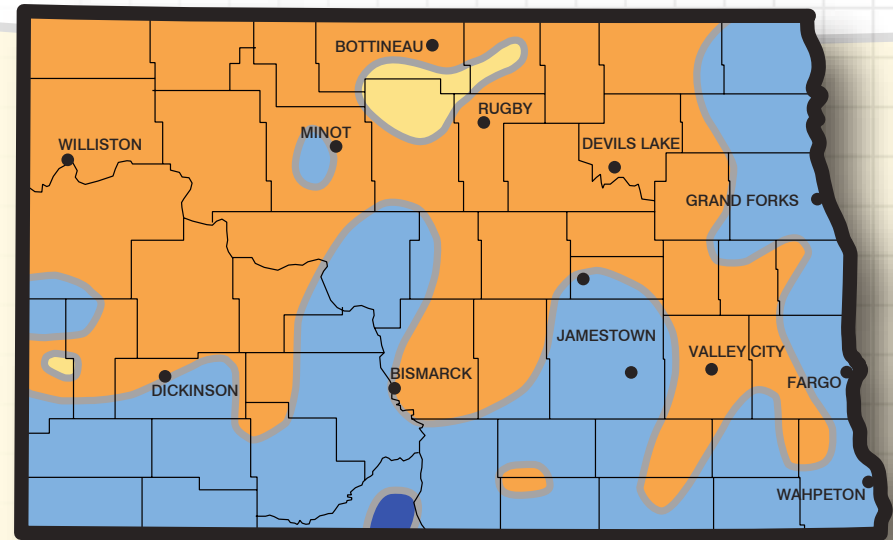
Rules of Thumb

To the casual observer, the prairie grass and wildflower landscape may be perceived as an unkempt lawn. Steps can be taken to promote the introduction of a prairie landscape into the traditional neighborhood.

- Provide one or two strips mowed lawn between the desired prairie landscape and sidewalks and your neighbor's lawn. This will lessen the abruptness of the taller grasses that observers may not be accustomed to seeing.
- Talk to your neighbors before installing the prairie landscape. Discuss the beauty, uniqueness, reduced maintenance and water needs, and other benefits of the prairie landscape.
- Provide naturalistic curves to the outside edge of the prairie landscape through the use of mowed strips or visible edging.
- Keep the selection of grasses and wildflowers simple. A short-statured mix of cool- and warm-season prairie grasses and a few selective species of wildflowers will keep the design simple and pleasing to the eye.
- Control weeds. The residential prairie landscape is not maintenance-free, but maintenance may be easier with fewer plant species.
- Consider other design elements such as a naturalistic stone outcropping, ornamental woody plants, a dry creek bed, or sculptures.
- Along borders, place short-statured plants in front and taller plants in the back.
- The width of a perennial border should be proportionally about one-third the height of the background.
- In island planting beds, place taller plants near the middle and decrease height toward the edge. The most pleasing effect is achieved if the bed is twice as wide as the tallest plant.
- Place plants according to their needs for sun, water, and soil condition.
- Arrange plants so they are visible and colorful throughout the year.
- Space plants based on mature size.
- Consider surroundings in design. Use plant screens or barriers as necessary for privacy.
- Recognize maintenance issues.
- Try different plant material as long as it is recommended for the site.
- Don't be afraid to experiment.



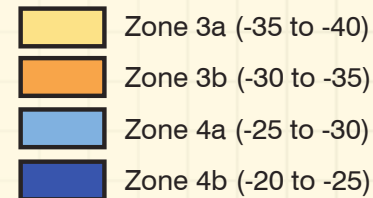
Water-loving aspens and dogwoods receive extra moisture because of their placement in the graveled runoff area.



USDA HARDINESS ZONES

Average Annual Minimum Temperature

Degrees Fahrenheit



Map source:
American Horticultural Society
Coordinated by Dr. H. Marc Cathey,
President Emeritus, and
USDA-ARS, Washington, D.C.

Eye Grabbers

Do

- Group 3, 5, or 7 plants together
 - **unifying**
- Match plant size to available space
 - **proper scale**
- Accent with fall color and leaf color
 - **cheery**
- Vary size, spacing, and diversity
 - **interesting**

Don't

- Scatter single plants here and there
 - **spotty and confusing**
- Incorporate many big trees on a small lot
 - **overpowering**
- Plant large plants too close to house
 - **structural damage**
- Plant if unable to maintain
 - **time-consuming**

SITE PREPARATION

Site preparation methods, sequence, and timing are important considerations to achieving landscaping goals. Site preparation includes (1) retaining desirable trees and vegetation, (2) maintaining or improving soil quality, (3) removing unwanted vegetation, (4) preparing seedbed, (5) transplanting, and (6) seeding grass and forbs.

1 Retaining Desirable Trees and Vegetation

Careful planning can prevent inadvertent loss of desirable vegetation. Stockpiled soil can suffocate vegetation within a few days. Stockpiled building materials may trap solar heat and destroy vegetation in a few hours. Herbicide drift, leaching, or translocation in soil can destroy existing trees and vegetation. Residual herbicides in the soil could negatively impact, or kill trees and vegetation for days or years after application.

Additional practices that are detrimental to tree health and development include:

- Trenching through tree roots
- Removing soil from over the root system of the tree
- Adding soil over the root system (As little as 1 inch of clay spread on top of the roots of a mature tree can cause it to decline.)
- Physical injury to tree trunks or limbs
- Traffic on root systems causing compaction
- Tilling deeper than 1 to 2 inches over the root area

Grasses and forbs can also be damaged through:

- Disturbance of topsoil
- Compaction

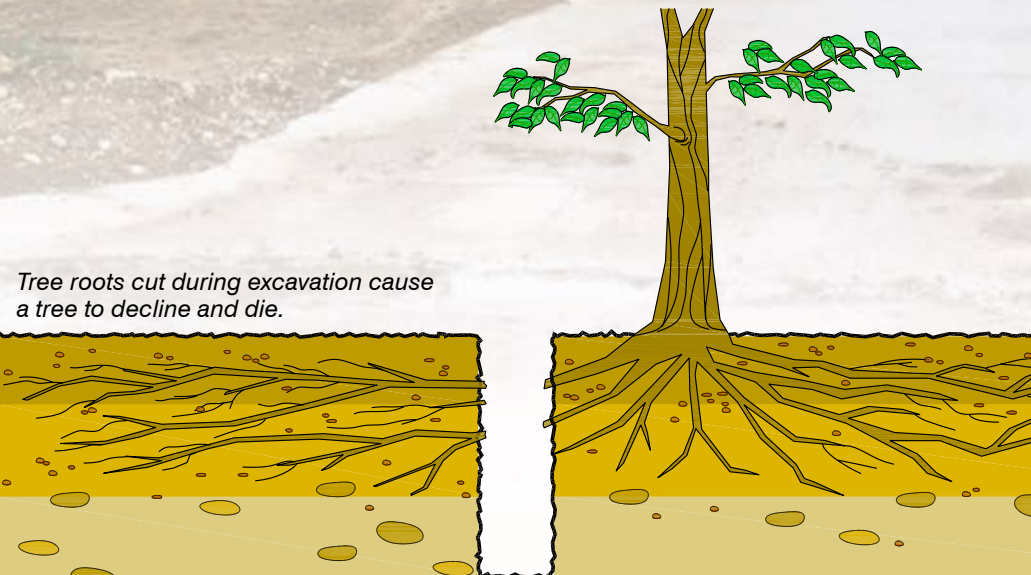
Reclamation of abandoned railroad right-of-way along urban bike path. Topsoil and site preparation are the most important parts of a successful Xeriscape planting.

Stockpiled soil or construction materials can kill sod – a very real loss if it is native.



TIP:

Remember, tree roots extend from the tree trunk for a distance equal to the height of the tree, up to as much as three times the height of the tree.



Tree roots cut during excavation cause a tree to decline and die.

2 Maintaining or Improving Soil Quality

Maintaining soil quality is important for sustaining healthy plants, reducing erosion, and improving nutrient and water use efficiencies. If topsoil is removed during construction, it should not be mixed with subsoil, and should be carefully stockpiled for resurfacing landscape planting areas. A minimum of 6 inches of topsoil is preferable for growing most plants. There may be a need for additional organic matter for some soils. Utilize soil sampling/soil test kits and the professional services of your local plant nursery, garden center, or NDSU Extension Service to assist with soil quality needs.

Construction and landscaping activity and other factors may result in soil compaction, and therefore, inhibit root growth and water absorption. To test for soil compaction, dig into the soil. A shovel should penetrate easily in undisturbed soil that has good structure and porosity. The soil should crumble and flake apart easily. Soil compaction may be alleviated by:

- Incorporating organic matter into the top 6 inches of the soil (well-rotted manure, straw, compost, grass clippings, leaves, peat moss, processed bark, etc.)
- Reducing traffic impact on the soil by limiting the number of trips and using lighter equipment
- Waiting for wet soils to dry before tillage

4 Preparing Seedbed

Before seeding disturbed sites, allow settling to occur. Watering may help settle the site, but too much or too fast will increase compaction or cause erosion.

Grass seeding requires a firm seedbed. Firming can be accomplished by an implement such as a harrow, roller-packer, ATV or vehicle tires, or foot traffic. When walking across a firm seedbed, an adult footprint should not sink over $\frac{1}{4}$ to $\frac{3}{8}$ inch.



Roller packing before seeding grass is a key to success.

3 Removing Unwanted Vegetation

Herbaceous vegetation can be effectively controlled with herbicides or repeated tillage. Note that repeated tillage may trigger water and wind erosion on many sites. Bare sites should be replanted or covered with mulch as soon as possible to control erosion and reduce weed infestations. When using herbicide control, select herbicides that:

- Are labeled for use in North Dakota.
- Effectively destroy the target vegetation, including the tougher invasive plants
- Have no carryover soil residual activity

Consult the NDSU Extension Service for site-specific herbicide application information.

Spraying herbicide



5 Transplanting

A wide variety of native shrubs, trees, and forbs are available through commercial sources. For a variety of reasons, avoid harvesting plant materials found in the "wild."

Transplanted roots should be kept moist at all times but not stored in water. The planting site should be moist but not wet. Place plants at the depth grown in the nursery. Fine lateral roots should be in the top 1 to 2 inches. Water as needed the first year to keep root zone moist to touch.

6 Seeding Grasses and Forbs

Plant grass seed $\frac{1}{4}$ to $\frac{1}{2}$ inch deep. Seeding can be accomplished by broadcasting or using a grass drill. Grass drills effectively control seeding depth and provide even seed distribution. However, they may leave visible drill rows.

Broadcast seeding is an effective seeding method, and will not leave visible drill rows. When broadcasting seed, spread half of the seed in one direction and the rest in another, to avoid gaps. When seeding is completed, rake, drag, or harrow to cover the seed with soil. To promote even germination, cover the seeded site with sterile mulch (clean straw, mulch, grass clippings, etc.). The soil surface should be kept moist (not wet) until seeds germinate. Water as needed to keep root zone moist.



A grass drill has depth bands to ensure that grass seed is placed at the correct depth.

CHOOSING THE RIGHT GRASSES AND WILDFLOWERS



Tag Tips:

- Scientific Latin name of one or two words, for example, *Linum lewisii*.
- "Zone" numbers, i.e., 3 means better adaptation to colder temperatures than 4.
- Sun, partial sun, or shade tell you the sunlight requirements and correct placement in the landscape.
- Water requirements in inches per year should fit natural, local precipitation amounts.

Plant Adaptation

Plants naturally adapted to survive in local environmental conditions should be selected.

- Choose reputable nurseries and garden centers. Many choose and grow native and introduced plant material that is adapted to the area. Consider their replacement policy. Guarantees usually vary from 6 months to 1 year from purchase.
- Select plants adapted to the correct USDA Plant Hardiness Zone. The "zone" will be listed on the tag or label. The lower the number, the more adapted it is to colder temperatures. In North Dakota, depending on your location, the zones range from 3a to 4a. Species, as well as varieties within the species, need to be adapted. Varieties or cultivars originating from milder southern climates often have different day length and length of growing season requirements, and lack of winter hardiness.
- Research a plant's adaptation using the two-word scientific Latin name for the species. It is more universal than a common name. Common names vary in time, place, and culture.
- Though plants from the wild are adapted, digging for home landscaping use is not recommended. Extensive root systems often make digging and transplanting unsuccessful. It is also illegal in many areas. When gathering seed, consider viability and propagation requirements. Seed quality is often poor in the wild. Many species require special conditions and treatments for germination. Knowing these needs is essential for successful establishment from seed.



Purple coneflower, a native wildflower, is grown and sold at many nurseries.



Mature purple coneflower

Plant Attributes and Features

When selecting plant species, consider contrast, harmony, and boldness to provide variety throughout the year. Allow ample room for growth as the plant matures.

Know the life-span of your plants.

Perennial - lives three or more years, resuming growth each growing season from overwintering buds above or below ground.

Biennial - requires two growing seasons to complete their life cycles; germinating and remaining vegetative the first year, then flowering, fruiting, and dying in the second year.

Annual - completes its life cycle within one growing season and must reproduce from seed each year.

Nature's Defenses

In nature's low-water environments, look for attributes considered natural defense mechanisms for conserving water.

- Hairy, sticky, or wavy leaf surfaces deflect wind and channel water droplets.
- Short, narrow, incised leaves have smaller surface area and lose less water to evaporation.
- White or silvery-colored leaves reflect the sun's rays and modify leaf temperatures.
- Spines, prickles, and aromatic foliage defend against loss of stem tissue and moisture from hungry, thirsty predators.
- Small, less showy flowers with little or no fragrance attract less attention from predaceous insects and grazing animals.

Plant Types

Grasses



Prairie dropseed is a bunchgrass



Buffalograss spreads by stolons



Little bluestem used as an accent plant

Grasses can be used in a landscape as an accent plant or a ground cover. Grasses can be compact and tufted, erect in bunches, creeping on the ground's surface, or spreading as sod. Height varies from ground-hugging to several feet tall. Depending on their time of growth, they are considered either warm- or cool-season species.

- **Cool-season** species green up early and actively grow during the cool, moist periods of the year such as from spring until mid-summer.
- **Warm-season** species begin growth in early summer and remain active until mid-autumn. In the fall, they often have attractive, colorful foliage.

Sweetgrass for cultural gardening



Monarch on blazing star bloom

Native Plant Attractions

- *Fragrance*
- *Herbal and medicinal qualities*
- *Color*
- *Bloom schedule*
- *Shape and texture*
- *Natural habitats recreated*
- *Winter landscape appeal*

Wildflowers

Wildflowers vary greatly in size, shape, color, bloom season, and duration of bloom. Knowledge of these characteristics will help to choose and coordinate plantings that provide interesting color throughout the entire growing season. Some wildflowers require direct sunlight for 6 to 8 hours per day. As sunlight decreases, plant height and bloom size decrease.



Black-eyed susan



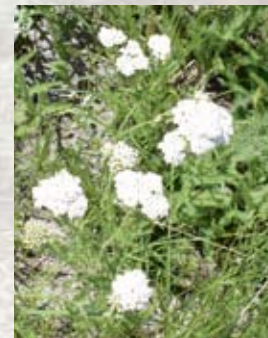
Purple coneflower



Blue flax



Blanketflower



Yarrow



Shell-leaf penstemon



Purple prairieclover

GRASSES

Grasses can bring texture and softness into a landscape design. A wide diversity of native grasses provides endless opportunities for adding color, an assortment of sizes and shapes, and offers relatively low maintenance. Favorable characteristics of most native grasses include low water and fertility requirements. They reach their ultimate size quickly, have a high resistance to insects and diseases, and generally can fend for themselves.

Native grasses in landscaping can include a broad range of uses, i.e., ground cover, monoculture manicured lawns, individual accent or specimen plants, and prairie or meadow restoration.



Sheep fescue is a long-lived bunchgrass.



Blue grama has "eyebrow" seed heads.



Winter color of little bluestem in new snow.



Buffalograss stolons cascade down a rock face.

Ground Cover

Grasses that spread by rhizomes, stolons (above-ground runners), or tillers are prime candidates for ground cover and site stabilization. Steep slope stabilization, however, may require structural stabilization prior to plant establishment. Initial weed control is critical until the cover plants are established well enough to shade out or crowd out any unwanted plants.

Lawns

The use of native grasses for a manicured lawn involves the same site preparation and establishment techniques as with a Kentucky bluegrass lawn. The seeding rates are increased [250 Pure Live Seeds (PLS) per square foot] to ensure a dense, solid stand. Depending on the amount of water applied to a site (natural or supplemental), the plant density will eventually adjust to that which the site can maintain. Mulching and early supplemental water will help ensure a good initial stand. Rhizomatous species will continue to fill in the open spaces, but bunchgrass stands may develop gaps if the initial establishment is sparse. Although the emphasis of this publication is on native species, there are some introduced grasses that, because of their drought tolerance and low maintenance, can be used for manicured lawns.

Prairie/Meadow

In some suburban areas and particularly in rural settings, a person may want to restore large areas to native prairie or meadows, blending a residence into a natural setting. To restore a natural plant community, there are several establishment options: 1) seed general mixtures of grasses and wildflowers, using most of the species you want in your end product; 2) seed simple mixtures and interplant to increase diversity; or 3) transplant all plants to spacing and composition desired. Once established, native prairies or meadows require minimal maintenance, spot weed control, and early spring residue management.

Suggested Native Grassland Seeding Mixtures

PLS lbs/acre*

Tallgrass Prairie (warm-season)

big bluestem 25%.....	1.9
<i>(Andropogon gerardii)</i>	
Indiangrass 25%	1.8
<i>(Sorghastrum nutans)</i>	
switchgrass 25%.....	1.1
<i>(Panicum virgatum)</i>	
sideoats grama 25%.....	1.9
<i>(Bouteloua curtipendula)</i>	

Mixed Prairie

western wheatgrass 10%	1.0
<i>(Pascopyrum smithii)</i>	
green needlegrass 20%	1.5
<i>(Nassella viridula)</i>	
little bluestem 40%.....	1.8
<i>(Schizachyrium scoparium)</i>	
sideoats grama 30%.....	2.3
<i>(Bouteloua curtipendula)</i>	

Shortgrass Prairie (warm-season)

blue grama 40%	1.0
<i>(Bouteloua gracilis)</i>	
sideoats grama 40%.....	3.0
<i>(Bouteloua curtipendula)</i>	
buffalograss 20%.....	5.2
<i>(Buchloe dactyloides)</i>	

Wet Meadow

switchgrass 40%.....	1.8
<i>(Panicum virgatum)</i>	
Canada wildrye 30%.....	2.3
<i>(Elymus canadensis)</i>	
western wheatgrass 20%	2.0
<i>(Pascopyrum smithii)</i>	
prairie cordgrass 10%	0.7
<i>(Spartina pectinata)</i>	

* drilled rate, double if broadcast

Grasses for Ground Cover and Lawns

Seeding Rates for Pure Stands

Species	Varieties	Life Form	Soil Preference			Lawns ¹	Prairie Planting ²	Drought ³ Tolerance	Trampling ³ Resistance	Mowing ³ Tolerance	Remarks
			Sandy	Loamy	Clayey	lbs. PLS per 1000 sq ft	lbs. PLS per acre				
COOL-SEASON (Native)											
western wheatgrass (<i>Pascopyrum smithii</i>)	Rodan Rosana	rhizomatous		X	X	2	10	Moderate	Good	Good	forms open sod, bluish in color
thickspike wheatgrass (<i>Elymus lanceolatus</i>)	Critana Bannock Schwendimar	rhizomatous	X	X	X	2	8.5	Good	Fair	Fair	finer leaved than western wheatgrass, good seedling vigor, western half ND only
streambank wheatgrass (<i>Elymus lanceolatus</i>)	Sodar	rhizomatous	X	X	X	2	8.5	Good	Fair	Fair	similar to thickspike, good seedling vigor, western half ND only
green needlegrass (<i>Nassella viridula</i>)	Lodorm AC Mallard	bunchgrass		X	X	1.5	7.5	Moderate	Fair	Fair	best in a mix with other cool-season grasses
COOL-SEASON (Introduced)											
crested wheatgrass (<i>Agropyron cristatum</i>)	Hycrest	bunchgrass	X	X	X	1.5	7	Excellent	Good	Good	good drought resistance
sheep fescue (<i>Festuca ovina</i>)	Covar Bighorn	bunchgrass	X	X		.5	2	Good	Fair	Good	fine-leaved, competitive with other plants and weeds
hard fescue (<i>Festuca trachyphylla</i>)	Durar	bunchgrass	X	X		.5	2	Good	Fair	Good	fine-leaved, short stature, difficult to mow
perennial ryegrass (<i>Lolium perenne</i>)	Adapted varieties	bunchgrass		X	X	1.5	7	Moderate	Good	Good	better soils, medium longevity
Canada bluegrass (<i>Poa compressa</i>)	Reubens Talon Foothills	rhizomatous	X	X	X	.5	1	Moderate	Good	Good	will form sod, but not as dense as Kentucky bluegrass
Russian wildrye (<i>Psathyrostachys juncea</i>)	Mankota Bozoisky-Select	bunchgrass	X	X	X	1.5	7.5	Excellent	Good	Fair	excellent drought resistance
WARM-SEASON (Native)											
blue grama (<i>Bouteloua gracilis</i>)	Bad River	bunchgrass	X	X	X	.5	2.5	Excellent	Excellent	Good	short stature, infrequent mowing, late green-up, easy to establish
buffalograss (<i>Buchloe dactyloides</i>)	Bowie Cody	stoloniferous		X	X	6	26	Good	Excellent	Good	short stature, infrequent mowing, late green-up, slow to germinate
sideoats grama (<i>Bouteloua curtipendula</i>)	Pierre Killdeer	bunchgrass	X	X	X	1.5	7.5	Moderate	Fair	Poor	tallest of grama grasses, good seedling vigor

¹ Seeding rates for lawn are figured at approximately 250 PLS per square foot; ² Seeding rates for a prairie grass stand are figured at approximately 40 PLS per square foot;

³ Rating scale: Excellent - Good - Moderate - Fair - Poor

GRASSES

Accent grasses in fall color

Buying Seed

Much of the grass utilized in native landscaping will be established from seed. The buyer must be aware of what he/she is buying, both in terms of quality and what undesirable material may be in the seed lot. All seed sold in North Dakota is required to meet certain standards; i.e., the seed lot can't have more than 1 percent weed seed and must be totally free of certain noxious weeds. By buying certified seed you are guaranteed that it is indeed the species and variety/cultivar as labeled, meets minimum purity and germination standards, and specific limits on the amount of weeds and other crops allowed. Purchase seed on PLS basis.

What Should A Seed Tag Tell You?

Seed tags vary in layout and design from state to state, but all have generally the same information.

Accent/Specimen Grasses

Accent or specimen grasses are individual plants or clusters that are space-planted, usually with weed barrier and bark, gravel, or decorative rock mulching. These types of plants are best established using containerized plant material transplanted in desired spacing and patterns. Many of the warm-season and tall statured grasses are used because of their fall colors and attractive seedheads, with secondary advantages of wildlife food and cover. Specimen plants may require some fall/winter or early spring maintenance to remove dead plant material and unwanted plant litter. The bunchgrass varieties of grasses are ideal for specimen plantings because they do not spread, retaining their individuality in a space-planted design.



'Badlands' little bluestem accents a butterfly garden

Common name of plant species → Kind: Big Bluestem

Cultivar or variety name → Variety: Bison

Number assigned to the production field by the state certification agency → Certification No.: A1330

Germination determined by a standard lab analysis → Germination: 80.00 %

Seed that didn't germinate but was determined to be alive with Tetrazolium (TZ) test → Dormancy (Hard Seed): 9.00 %

Total viability → Total Germination: 89.00 %

Percentage of bulk material that is actually seed of tagged species → Purity: 97.35 %

Percentage by weight of stems, dirt, insect parts, etc. → Inert Matter: 02.64 %

Percentage of other grass or agronomic crops → Other Crop Seed: 00.00 %

Percentage of weed seed → Total Weed Seed: 00.01 %

Restricted weeds expressed as number/pound (varies by state). If prohibited seeds are present, the seed can't be sold. → Res. Weed Seed: 0 per #

Date of the most current germination test → Date Tested: 02/09/05

State or foreign country where grown. If the origin is unknown, that fact must be stated. → ORIGIN: North Dakota

Pure Live Seed—PLS is determined by multiplying total germination by purity and dividing by 100

$$\left(\frac{97.35 \times 89}{100} = 86.64\right)$$

meaning that 86.64 percent of this bulk material is actually viable seed of the tagged species.

Net Wt. → 50 #

Grasses for Landscape Accents

Species	Variety (origin)	Soil Preference			Mature Height	Invasive ¹	Remarks
		Sandy	Loamy	Clayey			
WARM-SEASON (Native)							
big bluestem <i>(Andropogon gerardii)</i>	Bison (ND) Bonilla (SD) Sunnyview (SD)	X	X	X	5-7'		tall, vigorous plant; seed head resembles turkey foot; reddish fall/winter color; bunchgrass
sand bluestem <i>(Andropogon hallii)</i>	Garden (NE) Goldstrike (NE)	X	X		4-6'		same as above but more drought tolerant; bluish color; bunchgrass
switchgrass <i>(Panicum virgatum)</i>	Dacotah (ND) Forestburg (SD) Summer (NE)	X	X		3-5'	R	seed head is an open panicle; turns golden yellow in fall/winter; spreads by rhizomes; Dacotah is shorter; Summer is more upright
Indiangrass <i>(Sorghastrum nutans)</i>	Tomahawk (ND, SD)	X	X	X	4-6'		bronze-colored seed head; bunchgrass
prairie sandreed <i>(Calamovilfa longifolia)</i>	Bowman (ND) Goshen (WY)	X	X		4-7'	R	tall, attractive seed head; golden yellow in fall/winter; spreads by rhizomes; prefers dry sites to avoid leaf spotting
little bluestem <i>(Schizachyrium scoparium)</i>	Badlands (ND, SD) Itasca (ND, SD, MN) Camper (NE) Blaze (NE)	X	X	X	2-4'	S	good drought tolerance; fuzzy, white seed heads at maturity; reddish fall/winter color; bunchgrass
sideoats grama <i>(Bouteloua curtipendula)</i>	Killdeer (ND) Pierre (SD) Butte (NE)	X	X	X	1-2'		interesting seed head, oat-like spikelets hang from one side; brilliant orange anthers; good drought tolerance; Butte is taller
blue grama <i>(Bouteloua gracilis)</i>	Bad River (SD)	X	X	X	1-2'		eyebrow-shaped seed head; slender stalks; excellent drought tolerance; bunchgrass
prairie cordgrass <i>(Spartina pectinata)</i>	Red River (ND, SD, MN)		X	X	5-7'	R	prefers wetter sites; tall, robust plant; spreads aggressively by rhizome
COOL-SEASON (Native)							
Canada wildrye <i>(Elymus canadensis)</i>	Mandan (ND)	X	X	X	2-4'	S	nodding seed head with awns; excellent winter accent plant; bunchgrass
green needlegrass <i>(Nasella viridula)</i>	Lodorm (ND)		X	X	2-4'		black seed with awns; bunchgrass
Indian ricegrass <i>(Oryzopsis hymenoides)</i>	Rimrock (MT)	X	X		1-2'		delicate branching on seedheads; seeds resemble tiny pearls; prefers dry sites

¹May spread by: S = Seed, R = Rhizomes



Frost on 'Forestburg' switchgrass



'Bonilla' big bluestem in a formal landscape



'Mandan' Canada wildrye has a nodding seedhead

WILDFLOWERS

Perennial wildflowers live for more than two years. They offer something for everyone and are relatively easy to maintain.

- **Seeding.** Wildflower seeds are often very small, fluffy, or irregular-shaped, making it difficult to control the total amount dispersed. For example, aster and yarrow are better interplanted as small plugs of rooted plants. That way, there is less chance of overseeding and crowding out other species in the garden.
- **Potted Plants.** Containerized material should be healthy—leaf and stem colors appear normal with little or no yellowing or discoloration. Smaller containers are less expensive but greater numbers are required to fill an area. Larger material will be readily noticeable, but cost more to install.
- **Planting.** Prepare the soil well ahead of planting. Avoid planting during the hot, dry months of summer. For potted plants, follow spacing recommendations and keep watered prior to and after transplanting. Sow seed into a firm, moist seedbed, mulch lightly, and apply frequent, light sprinkler irrigation. Monitor and inspect for insect pests and control weeds as they appear.
- **Maintenance.** Extend the flowering period and promote re-bloom by “deadheading” the flower after it dies. Use sharp pruning shears to cut and remove the dead blossom. When plants reach maturity, divide the crown into smaller portions and transplant into another area, recycle to a like-minded gardener, or add to the compost pile. In late fall or early spring, cut back all dead plant parts. Remove debris to reduce pest and disease problems.

Landscape Uses

Wildflower use in the landscape is unlimited, as plants are available in many sizes, shapes, and colors. Plants that have similar water and light requirements should be grouped together. The development of a landscape plan is recommended and landscape design professionals can be consulted for assistance.

Specimens



Blazing star

Specimens are separate, individual plants that attract attention to their ornamental beauty. They are generally selected for large size and stature, or for unusual shape, color, or texture. Specimens function as solitary elements for viewing from all sides or as a dominant feature in a mass planting. They should be used sparingly to avoid attracting attention to many different points.

Borders



Maximilian sunflower

Border plants are used along the edge of a structure, hard surface, or lawn area. They function as hedges, screens, traffic guides, and foundation plantings. Open and semi-open space can be defined with the use of borders. Limit number of plant types to avoid visual chaos.

Mass Plantings



Lewis flax

Massing similar plants in a group mimics nature and creates a sense of unity in the design. Natural environments have clusters of vegetation that slowly shift in composition with altering conditions. Mass plantings act as an orderly connection among other planting groups.

Poisonous Plants

It's wise to inquire about a plant's potential toxicity before placing it in a landscape. The foliage of some plants is known to be poisonous to people, pets, and domestic livestock. A few of the more common ones include bleeding heart, buttercup, clematis, foxglove, goldenrod, horsechestnut, larkspur, locoweed, lupine, milkweed, monkshood, oak, poppy, and water hemlock. Visit your local bookstore or library, or the website provided in the reference section.

Ground Covers



Heath aster, when mowed short, provides late season color and ground cover.

Spreading and low-growing plants cover areas that are impractical to maintain as a lawn. They are used on slopes, along pathways, under shade or tree canopies, and between plants in flower beds. Consider converting lawn space to a ground cover for reduced water consumption.

Wildflowers for Native Landscapes

Common Name	Scientific Name*	Soil ¹	PHZ ²	Precip. inches	Longevity ³	Color ⁴	Invasive ⁵	Ht. feet	Bloom Season ⁶	Feature ⁷
common yarrow	<i>Achillea millefolium</i>	C, M, F	3a-5a	9	LP	W	R	1-2	S-Su	Dr, M
leadplant	<i>Amorpha canescens</i>	C, M	3a-5a	12	LP	Pu	–	1-4	LSu-EF	Bt, M
littleleaf pussytoes	<i>Antennaria microphylla</i>	C, M, F	3a-4b	12	SP	W	R	1	LS-Su	M
columbine	<i>Aquilegia canadensis</i>	C, M	3a-5a	16	LP	P	S	1-3	S-Su	Bt, Dr, M
plains coreopsis	<i>Coreopsis tinctoria</i>	C, M	3a-5a	12	A-SP	Y	S	1-2	Su-EF	Bt, Dr, M
white prairieclover	<i>Dalea candida</i>	C, M	3a-4b	12	LP	W	–	1-3	Su	Bt
purple prairieclover	<i>Dalea purpurea</i>	C, M	3a-4b	14	LP	Pu	–	1-2	Su	Bt
purple coneflower	<i>Echinacea angustifolia</i>	M, F	3a-4a	12	LP	P	S	2-3	Su	Bt, Dr, M
blanketflower	<i>Gaillardia aristata</i>	C, M, F	3a-4b	10	LP	Y	S	3	Su	Bt, Dr, M
prairie smoke	<i>Geum triflorum</i>	C, M, F	3a-5a	12	LP	P	–	1	S	Bt, Dr, M
Maximilian sunflower	<i>Helianthus maximiliani</i>	C, M, F	3b-5a	14	SP	Y	R-S	4-6	LSu-EF	Bt, Dr
dotted gayfeather	<i>Liatris punctata</i>	C, M	3b-4b	10	LP	P	–	1-2	LSu-EF	Bt, Dr, M
Lewis flax	<i>Linum lewisii</i>	C, M	3a-4b	10	SP	B	S	1-2	LS-Su	M, Dr
lupine	<i>Lupinus</i> sp.	C, M, F	3a-5a	14	LP	All	R	1-2	S-Su	Dr
bergamot beebalm	<i>Monarda fistulosa</i>	C, M, F	3a-4b	12	MP	Pu	S	2-4	Su	B, Bt, Dr, M
plains pricklypear	<i>Opuntia polyacantha</i>	C, M, F	3b-4b	8	LP	Y	–	–	LS-ESu	Dr, M
beardtongue	<i>Penstemon</i> sp.	C, M	3a-5a	10	A-SP	All	–	1-4	LS-EF	B, Bt, Dr
Hood's phlox	<i>Phlox hoodii</i>	C, M	3b-4b	10	LP	W	R	–	LS-Su	Dr
obedient plant	<i>Physotegia parvifolia</i>	C, M	3a-5a	20	LP	P	R	1-3	LSu-EF	Bt
prairie coneflower	<i>Ratibida columnifera</i>	C, M, F	3a-4b	10	SP	Y	S	1-3	Su	Bt, Dr, M
black-eyed susan	<i>Rudbeckia hirta</i>	C, M, F	3a-5a	12	SP	Y	S	1-2	Su	Bt
cup plant	<i>Silphium perfoliatum</i>	C, M	3a-5a	16	LP	Y	S	6	LSu-EF	B
scarlet globemallow	<i>Sphaeralcea coccinea</i>	M, C	3a-5a	8	P	O	R	1	Su	Dr, M
smooth blue aster	<i>Symphotrichum laeve</i>	C, M, F	3a-4b	12	MP	B	–	2-3	Su	Bt, Dr
prairie thermopsis	<i>Thermopsis rhombifolia</i>	M, F	3b-4b	8	LP	Y	–	1-2	LS-Su	Dr
Culver's root	<i>Veronicastrum virginicum</i>	C, M	3a-5a	16	LP	W	–	2-5	Su-EF	Bt, M
soapweed yucca	<i>Yucca glauca</i>	C	3a-4b	8	LP	W	–	1-2	LS-Su	M

* Taxonomy from USDA NRCS PLANTS Database; ¹ C Coarse (sands to gravels), M Medium (intermediate combinations), F Fine (silts to clays); ² USDA Plant Hardiness Zone; ³ A Annual, SP Short-lived Perennial, MP Moderate-lived Perennial, LP Long-lived Perennial; ⁴ W White, Y Yellow, R Red, B Blue, P Pink, Pu Purple, O Orange; ⁵ S Seed, R Rhizome; ⁶ S Spring, Su Summer, F Fall, E Early, M Mid, L Late; ⁷ B Birds, Bt Butterflies, Dr Deer resistant, M Medicinal

CHOOSING THE RIGHT TREES AND SHRUBS

Selecting the Best Type of Nursery Stock

Types of Nursery Stock

Bareroot

These plants are dug and shipped as dormant 1- to 4-year-old stock without any soil surrounding their roots. For most situations, bareroot stock should not show leaf emergence at the time of purchase. Late planting season purchases may show slight leaf emergence but will require more stringent planting and maintenance the first year to ensure survival. Conservation grade conifers are also produced as bareroot stock.

Container

These plants are grown in a pot for at least one growing season. Stock grown in a pot, especially stock carried over from one season to the next, may develop girdling roots that need to be gently loosened from the root ball and spread radially from the trunk at planting. If this is not possible, make one or two vertical slashes 1 to 2 inches deep through the root ball to sever girdling roots.

Potted

Bareroot stock is planted in pots just weeks prior to spring sales. Generally, by the time of purchase, little root growth will have occurred. Though not grown in the pot, these plants can be used successfully if proper depth and root orientation are achieved. Potted stock extends the planting season compared to bareroot stock.

Balled and Burlapped (B&B)

These are hand or mechanically dug field-grown plants that have their roots and surrounding soil wrapped in burlap fabric and secured with twine or pins. Used primarily for large, field-grown stock. Once the plant has been placed at the proper depth in the planting hole, all twine and burlap should be removed. It is permissible to leave small inaccessible amounts directly beneath the bottom of the ball.

Wire Baskets

This is a form of B&B that utilizes a wire basket to secure the root ball in lieu of twine. All wire and burlap should be removed after the plant has been placed in the planting hole. It is permissible to leave small inaccessible amounts directly beneath the bottom of the ball.

TIP:
Avoid purchasing plants with abnormally small leaves, leaves that are unusually yellow or with brown scorched margins.

ADVANTAGES

Bareroot

- inexpensive
- ease of planting
- field grown hardiness
- easy to replant
- adapts to planting site soils

Container

- long planting season window
- reduced transplant shock
- trees may be leafed at purchase
- adaptation to onsite soils may be delayed

Potted

- cheaper than balled and burlapped
- can be planted after bud break
- easier to determine healthy stock

B&B

- reduced transplant shock on smaller stock (better survival)
- "instant" tree

DISADVANTAGES

- proper storage and transport is critical
- roots easily desiccated (1 to 2 minutes air exposure)
- shorter planting time frame

- more expensive than bareroot
- may have more girdling roots
- heavier to handle than bareroot

- heavier to handle than bareroot
- have to treat as bareroot to ensure proper root alignment
- soil often falls off root ball

- expensive
- heavy
- difficult and expensive to replant
- proper depth placement more difficult
- generally fewer species available
- excessively large stock may not grow for years

Tree and Shrub Health

The outward appearance of a plant can provide insight into its overall health. Examine nursery stock closely before purchasing it.

Healthy Roots

- Actively growing stock should have white root tips.
- Healthy plants should have enough fibrous root mass to retain the shape of the root ball once the container or burlap is removed.
- Bareroot material should have a shoot to root ratio of 1:1 or 1:2 with extensive, fibrous roots.

Healthy Trunk and Branches

- A healthy tree trunk should be straight, slightly tapered, and capable of remaining upright on its own. It should be uniformly branched along its length with half the leaf area in the lower two-thirds of the canopy.
- The trunks of large trees should be firmly connected to the root ball (i.e., not move independently).
- Branches should be free from signs of mechanical injury, sunburn, sunscald, insect, disease, or other forms of stress.
- The branches and tops of trees should not be severely pruned.
- Stems should have no insect borer holes, and any injuries should be less than ½ inch in size.

Healthy Foliage

- Adequate and uniform foliage
- Leaves appropriately sized and uniformly colored for the species
- No signs of bud swell or growth should appear on dormant stock.

Geographic Suitability

Generally, plants perform better if they are planted within 300 miles of where they originated. Origin means where they grew and developed naturally, not the location of the wholesale nursery.

TIP:

Determine proper planting depth for potted, B&B, and wire basketed trees by gently probing with a finger or trowel through the top of the soil immediately adjacent to the stem. Avoid damage to bark or roots. Measure from the trunk flare to the bottom of the pot or root ball. Dig the hole no deeper than that. Trunk flare is that part of the trunk with a noticeable diameter increase at the juncture with the roots.



Bareroot

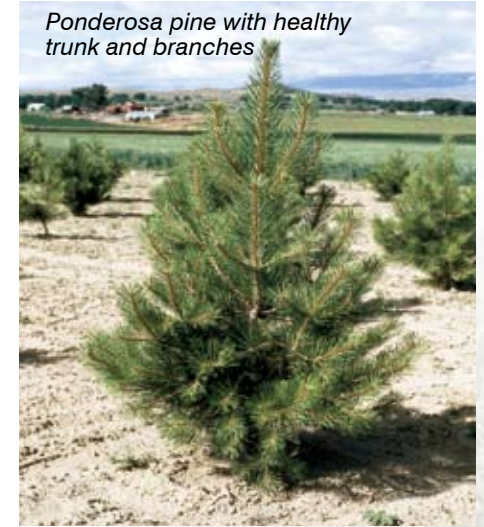


Container



Balled and burlapped

Ponderosa pine with healthy trunk and branches



TIP:

On healthy trunk or limb tissue, a shallow scratch with a fingernail reveals a light green cambium layer between the bark and the wood. No green means tree is dead.



Healthy bur oak foliage

TREES AND SHRUBS

Intermediate Care, Storage, and Handling of Trees and Shrubs

Transport all stock in a covered vehicle to prevent dessication of the tops and drying of the roots. Bareroot stock should have the roots covered with saturated (soaked in water for several hours) shingle tow, wood shavings, sphagnum moss, or shredded paper. The root coverings should be moist for the entire trip, but the roots should not be immersed in containers of water.

Bareroot plants are shipped dormant and should be planted as soon as possible, usually within 72 hours of leaving the nursery. For short storage intervals (less than 3 days), bareroot plants can be kept in cool, shaded locations outdoors or in a cool basement. Cover the roots as was done for transport from the nursery. Inspect daily to ensure root covering remains moist. Make sure all the root covering is thoroughly saturated. It works best to soak the root coverings in a bucket of water before covering the roots. The root covering material should always be wet enough that a bit of water can be squeezed from a handful. Keep seedlings out of direct sun, and protect from wind dessication and heat build-up. Never let the roots dry out during the planting process, even for a few seconds. For time periods of less than an hour, bareroot trees can be transported in buckets of water during the planting process. Do not damage roots during storage or planting by bending, breaking, scraping bark, etc.

Container/potted plants offer more flexibility in planting, handling, and storage than bareroot stock. The soil in the pot provides a limited amount of water storage permitting active growth when weather conditions permit. Check daily and water as needed to wet the entire pot. Ensure that pots have drainage holes to allow excess water to drain. Container plants may have been potted just before purchase or they may have been grown in the pot for several seasons. Store container stock in a wind-protected area out of direct light. When planting, container stock should be removed from the pot.

Balled and Burlapped (B&B) material often requires special handling given the size and weight of the plant, roots, and soil. Do not move B&B plants by the trunk alone. Support the trunk and root ball simultaneously to assure the roots are not broken at the trunk surface. Never drop a B&B plant abruptly on the ground, even from a slight elevation. Gently slide or roll large B&B plants into the planting hole. Never attempt to move an excessively wet root ball. Store B&B material as you would container plants. Media such as a sand/peat mix may be used to cover the root ball during long-term storage. Special provisions may be needed to secure the plants during storage in high wind locations.

Trees and Shrubs for Native Landscapes

Common Name	Scientific Name	Mature Height	Mature Crown	Growth Rate	Shade Tolerance	Wildlife Food	Wildlife Cover	Fall Leaf Color	Minimum Precip (in.)	Human Food
Trees										
Ash, Black	<i>Fraxinus nigra</i>	30-50	15-30	Medium	I	S	N, L	Yellow	H	
Ash, Green	<i>Fraxinus pennsylvanica</i>	35-65	30-40	Medium	I	S	N, L	Yellow	10	
Aspen, Quaking	<i>Populus tremuloides</i>	25-60	20-30	Medium	N	W	N, L, E	Yellow	14	
Birch, Paper	<i>Betula papyrifera</i>	8-15	6-12	Medium	N	W	N, L	Yellow	H	
Boxelder	<i>Acer negundo</i>	30-60	30-60	Fast	N	S	N, L, W, B	Yellow/Brown	14	Yes
Cottonwood sp.	<i>Populus</i> sp.	50-99	40-75	Fast	N	W	N, L, W	Yellow	H	
Crabapple*	<i>Malus</i> sp.	10-25	15-25	Medium	N	W	N, L	Brown/Yellow	14	Yes
Hackberry, Common	<i>Celtis occidentalis</i>	40-60	25-45	Medium	I	W	N, L, B	Yellow	18	
Hawthorn, Downy	<i>Crataegus mollis</i>	15-20	15-20	Slow	N	S	N, L, E, W, B	Yellow/Brown	14	
Juniper, Rocky Mountain	<i>Juniperus scopulorum</i>	12-30	12-20	Slow	I	W	N, L, E, W	None	10	
Linden, American	<i>Tilia americana</i>	50-70	30-50	Medium	T	S	N, L	Brown/Yellow	H	
Oak, Bur	<i>Quercus macrocarpa</i>	40-70	35-60	Slow	N	W	N, L, B	Yellow/Brown	14	
Pine, Limber	<i>Pinus flexilis</i>	20-50	15-25	Slow	N	W	N, L, E, W	Green	10	
Pine, Ponderosa	<i>Pinus ponderosa</i>	50-70	15-30	Medium	N	W	N, L, E, W	None	10	
Spruce, Colorado Blue*	<i>Picea glauca</i> var. <i>pungens</i>	30-65	15-25	Medium	N	W	N, L, E, W	Green	14	
Shrubs										
Buffaloberry, Silver	<i>Shepherdia argentea</i>	6-14	8-14	Medium	N	W	N, L, E, W	None	10	Yes
Chokeberry	<i>Aronia melanocarpa</i>	5-6	5-6	Medium	I	S	N, L, E, W, B	Yellow/Red	18	Yes
Chokecherry, Common	<i>Prunus virginiana</i>	12-25	10-20	Medium	I	S	N, L, E, W	Yellow	14	
Cranberry, Highbush	<i>Viburnum trilobum</i>	8-12	8-12	Medium	T	W	N, L, W	Purple/Red	18	Yes
Currant, Golden	<i>Ribes aureum</i>	3-6	3-6	Medium	I	S	N, L	Yellow	14	Yes
Dogwood, Redosier	<i>Cornus sericea</i>	7-10	10-15	Fast	T	S	N, L, E, W, B	Purple	H	
Hazel, American	<i>Corylus americana</i>	6-8	6-8	Medium	T	S	N, L, E	Yellow	18	Yes
Indigo, False	<i>Amorpha fruticosa</i>	8-12	6-10	Medium	N	W	L, B	Yellow	18	
Ironwood	<i>Ostrya virginiana</i>	15-30	10-20	Slow	T	N	N, L	Yellow	18	
Juneberry	<i>Amelanchier alnifolia</i>	6-15	5-12	Slow	I	S	N, L, E, W	Yellow	14	Yes
Juniper, Common	<i>Juniperus communis</i>	3-6	3-8	Slow	I	S	N, L, E, W	Blue/Green	10	
Plum, American	<i>Prunus americana</i>	8-10	8-10	Medium	I	W	N, L, E, W, B	Yellow/Orange	14	Yes
Raspberry	<i>Rubus idaeus</i>	3-6	3-6	Fast	I	S	L, B	Yellow	18	Yes
Rose, Prairie	<i>Rosa arkansana</i>	1-2	1-3	Slow	N	W	L, B	Yellow	10	
Rose, Woods	<i>Rosa woodsii</i>	2-4	3-4	Medium	I	W	L, B	Purple	14	
Saltbush, Four-winged	<i>Atriplex canescens</i>	4-5	3-4	Slow	I	W	L	Grey/Green	10	
Sandcherry, Western	<i>Prunus pumilla</i> var. <i>besseyi</i>	3-6	3-6	Medium	N	S	N, L, B	Yellow	14	Yes
Silverberry	<i>Elaeagnus commutata</i>	6-9	3-6	Medium	N	W	N, L, E, W	None	14	
Sumac, Skunkbush	<i>Rhus trilobata</i>	5-8	4-10	Medium	I	S	N, L, E, W	Red/Yellow	10	
Sumac, Smooth	<i>Rhus glabra</i>	5-15	10-15	Slow	I	W	N, L, E, W	Red	14	
Viburnum, Nannyberry	<i>Viburnum lentago</i>	10-14	8-12	Slow	I	W	L, E, W	Yellow/Red	18	
Willow, Bebb's	<i>Salix bebbiana</i>	8-12	4-8	Fast	N	S	N, L, E, W	None	H	
Willow, Sandbar	<i>Salix interior</i>	6-10	5-10	Fast	N	S	N, L, E, W	None	18	
Yucca	<i>Yucca glauca</i>	2-5	1-3	Slow	N	N	L	Grey/Green	10	
Groundcovers										
Juniper, Spreading	<i>Juniperus horizontalis</i>	<1	1-3	Slow	N	W	E	Blue/Green	10	
Snowberry	<i>Symphoricarpos albus</i>	1-5	1-3	Slow	I	W	N, L, E, W, B	Brown	14	
Vine										
Grape, Riverbank	<i>Vitis riparia</i>	40-45	1	Medium	I	S	L	Orange/Red	14	Yes
Woodbine	<i>Parthenocissus quinquefolia</i>	45-50	1	Fast	T	S	L	Orange/Red	14	

Growth Rate: Slow = <1' per year; Medium = 1-2' per year; Fast = >2' per year. **Shade Tolerance:** N = Not Tolerant; I = Intermediate; T = Tolerant. **Wildlife Food:** W = Winter food and growing season food; S = Growing season food; N = Not a food source. **Wildlife Cover:** N = nesting; L = loafing; E = escape; W = winter; B = Beneficial to butterflies. **Fall Leaf Color:** Note that colors may vary between seasons and due to soil chemistry for the same species. **Minimum Precipitation:** H = needs water in addition to precipitation. * = **Introduced Species** - Though introduced, Colorado Blue Spruce and crabapple can be used to provide many aesthetic and wildlife benefits. Except for very rare site conditions, these species will not establish offsite from roots or seeds.

TREES AND SHRUBS

Anatomy of a Properly Planted Tree

1-800-795-0555

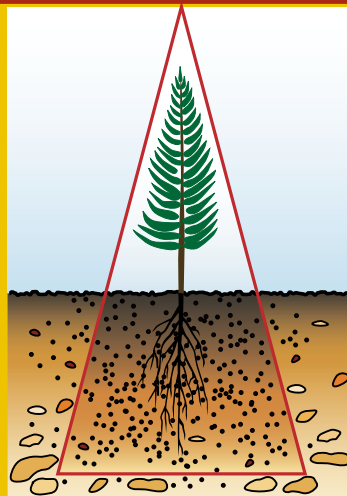
Always call
ND One-Call
before
digging.



TIPS: TREE PLANTING

Do not leave roots exposed to the air for even brief periods. Keep bare-root plants covered with wet burlap, sheets, or blankets during the planting process. Make sure roots are fully extended and spread radially from the trunk in planting hole. Follow the B&B steps 1, 2, 4 to 8 as appropriate.

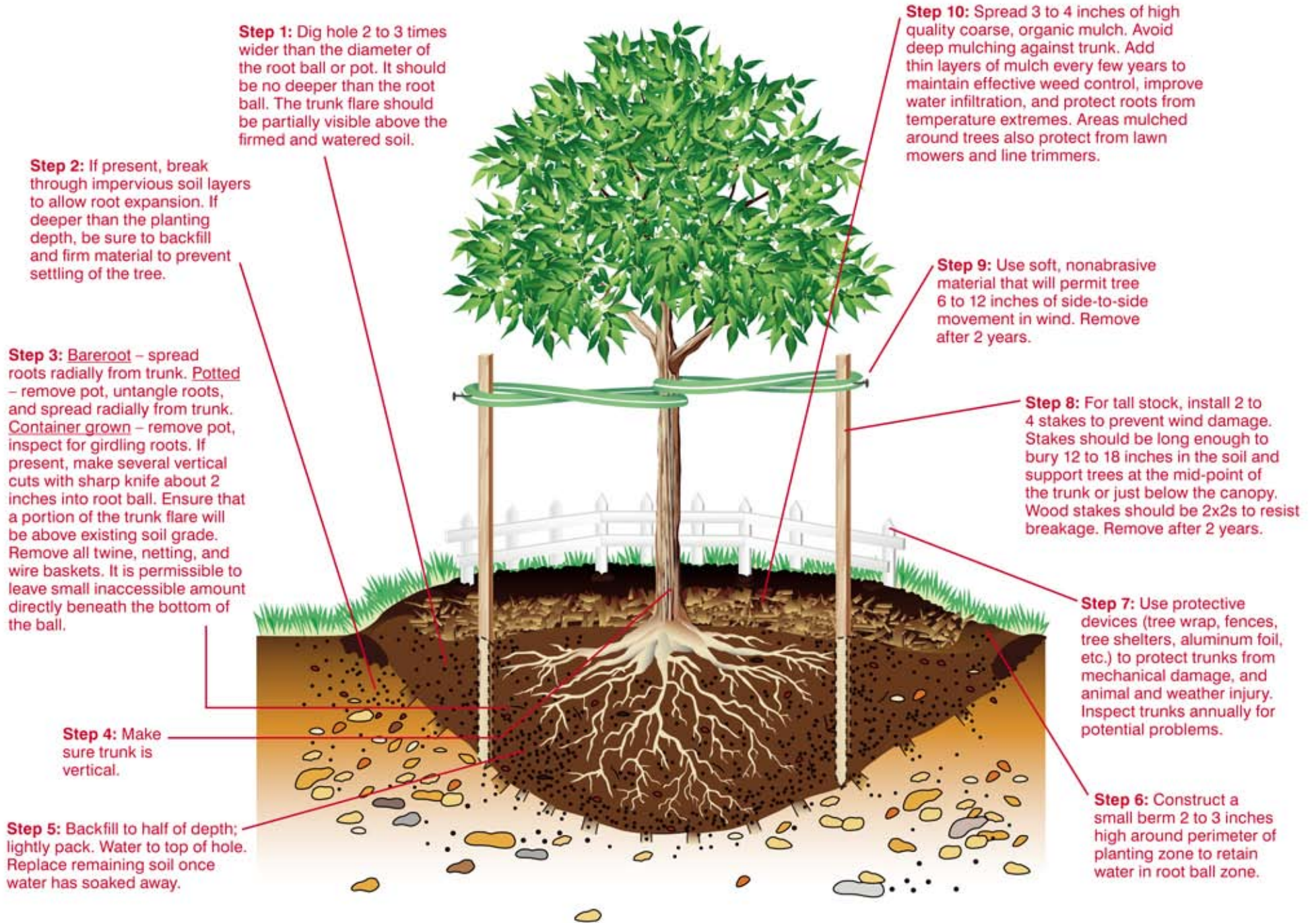
Adapted from Windbreaks for Montana A Landowner's Guide, Cooperative Extension Service, Montana State University Bulletin 366, July 1986.



Always remove the plant from the pot prior to planting.

All burlap, ties, synthetic wraps, and wire baskets should be removed once the tree is positioned in the hole. A small inaccessible amount, directly beneath the root ball, may be left.

Steps to Tree Planting



WATER CONSERVATION

In the development and maintenance of a native landscape, water conservation is the driving force behind efficient and aesthetic designs. Plants should be grouped in separate water-use zones according to their water needs and function within a landscape. Monitoring soil moisture to determine when to irrigate is better than using a pre-set schedule. The soil water-holding capacity will vary with soil type, amount of organic matter, and climatic conditions.

Supplemental Water Requirements

Seedings: A moist soil profile, at time of planting, will increase seeding success. Watering should be done in frequent, light applications during the first 4 to 6 weeks to ensure good seed germination, emergence, and root development. The use of an organic mulch can reduce the potential fluctuations in surface soil moisture and soil temperature during this critical establishment period. New seedings without mulch may require light watering 2 to 3 times per day to maintain soil surface and seed moisture.

Transplants: Young transplants require frequent and regular watering until root development can provide the proper shoot to root ratio. Some woody species (oak in particular) spend several years developing an extensive root system before a corresponding increase in above-ground development is realized.

Established Plantings: There are two times during the year when it is critical that the rooting zone of a plant be at or near field capacity – fall and early spring. Fall moisture is essential for the health and vigor of plants for winter survival. Evergreens, in particular, should be deep watered in late fall to prepare for possible warm periods during the winter months. As temperatures rise in the spring, water is needed to support rapid early growth.



Water is wasted when applied too heavily or rapidly. Excessive slope and poor location for turf area contribute to runoff.



Low pressure sprinkler systems conserve water by delivering small amounts exactly where needed.

Other Considerations

- South and west exposures require more frequent watering than north or east exposures.
- Sloping landscapes require water to be applied more slowly than flat surfaces to allow adequate infiltration and prevent runoff.
- Berms or terraces hold water and stabilize severe slopes.
- Avoid using sprinklers that throw a fine mist high in the air.
- Avoid watering during hot, windy, or rainy weather.
- Design plantings and structures to capture snow for additional moisture.

Water Conservation Strategies

Zoning

Plants should be established in zones to maximize water use efficiency. These zones dictate the best irrigation system to be used, e.g., underground sprinkler (high watering zones), drip/trickle (moderate watering zones), or conventional hose (low watering zones).

High Watering Zones	Moderate Watering Zones	Low Watering Zones
20 gals. added per sq. ft. per growing season	10 gals. added per sq. ft. per growing season	2 to 3 gals. added per sq. ft. per growing season
½ inch 3 times/week	¾ inch once/week	½ inch every two weeks
Approx. 30 inches added/season	Approx. 16 inches added/season	Approx. 5 inches added/season

Shading/Shielding

Plants that have high moisture requirements or prefer shade can be located beneath or on the shady side of larger plants, fences, or buildings. Afternoon sunlight is more intense, so plants to be shaded should be put on the easterly side of large plants or structures.

Mulching/Landscape Fabric

Mulches are used to minimize evaporation, and reduce weed growth and erosion. Apply mulch directly to the soil surface or over landscape fabric. Don't use black plastic unless it's been perforated; it prevents air and water from reaching plant roots and reduces beneficial soil organisms.

Organic mulches such as wood chips, peat moss, sphagnum moss, or grass clippings decompose and improve soil texture, but must be replenished periodically. Apply in a layer 2 to 3 inches deep between plants.

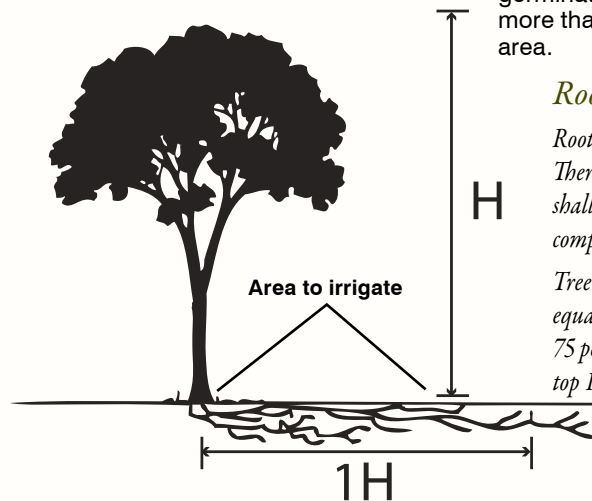
Inorganic mulches such as rocks or gravel rarely need replacement and are good in windy areas. Apply in a layer 2 to 4 inches deep between plants. This usually works best if installed on top of landscape fabric.

Newly seeded areas can be mulched with weed-free hay, straw, or composted grass clippings. This will help retain soil moisture, increase site stability (reduce soil and water erosion), and provide more uniform heat at the time of seed germination. Apply mulch in a layer no more than 1/2 inch deep over the seeded area.

Root Lengths Vary

Root depth is proportional to top growth. There are exceptions: grass roots can be shallow or very deep; bulb roots are short compared to their top growth.

Tree roots spread from the trunk for a distance equal to or greater than the height of the tree. 75 percent or more of the roots are within the top 12 inches of soil.



How Much/How Often

The amount of supplemental water applied and the duration of each application depends on several factors:

- amount and type of plant cover
- amount of organic matter
- type of soil (infiltration rate)
- water application method
- soil compaction (bulk density)
- time of day
- weather (evapo-transpiration)
- slope (runoff potential)



Mulches such as rock or bark can be placed on top of the landscape fabric to attain a particular aesthetic appearance.

Caution: Rock mulch can serve as a heat sink and also reflect heat to surrounding plants and buildings.

Infiltration Rates and Available Soil Water by Soil Texture

Soil texture	Infiltration rate (inches per hour)		Available water per foot of soil
	Vegetated	Bare	
Sandy	2.5	1.2	0.50
Silty	2.0	1.0	1.00
Loamy	1.0	0.5	1.25
Clayey	0.2	0.1	2.00

The frequency of irrigation is dependent primarily on the moisture requirements of the plants and the water-holding capacity of the soil. Plants should be carefully monitored for signs of moisture stress, i.e., loss of leaf turgidity (drooping), curling of leaf edges, and leaf discoloration.

Drip Emitters

The most efficient use of water is the slow, deliberate metering of water directly to individual plants. Drip systems can be installed underground or laid across the soil surface. Most drip systems work with low pressure and often require a filtration system to prevent the clogging of emitters. Drip systems must be monitored to avoid over saturation below the soil surface.



Soaker hoses deliver water slowly and with very little loss to evaporation.

MAINTENANCE



Prescribed burning can be an effective tool for maintaining native landscapes. **Always check local regulations and work with experienced personnel.**



To avoid clipping basal leaves of wildflowers, mowing height for weed control in established plantings should be 8 inches or more.

Pruning/Trimming

Pruning is usually done on woody plants, but can also refer to the removal of seedheads and other mature plant parts from herbaceous plants.

Herbaceous Plants

Maturing seedheads can be pruned to stimulate secondary flowering or prolong vegetative growth later in the growing season. Herbaceous material should be trimmed and removed in late fall or early winter. Mature specimen plants can be left to add winter color or aid in trapping snow. Herbaceous specimen plants left standing over winter should be trimmed in early spring to remove dead plant material and unwanted plant litter.

Woody Plants

Woody plants should be pruned at an early age to conform with the intended use and landscape design. Trim to a single stem or leave as multi-stem plant.

- Prune lower branches to provide lower stem sanitation or alleviate shading of adjacent groundcover plants.
- Prune disease and insect-affected plant parts to minimize spread.
- Remove rubbing, deformed, or dead branches at any time.
- Prune interior limbs to reduce wind resistance.
- Conifers should be pruned in spring or early summer. They are usually pruned to correct deformities.
- Deciduous trees and shrubs should be dormant-pruned in late fall or winter.



Use sharp, high-quality pruners. **Note:** sterilize pruners with 10 percent bleach solution after cutting diseased branches.



Avoid leaving a stub. Remove the entire limb, cutting close to the branch collar of the trunk or branch from which it is removed. Do not cut into the branch collar (flush cut).



Using Chemicals

TIP:

Using Chemicals: Follow the label for proper pesticide application rates and target species. For insect and disease damage it is important to properly identify the insect or pathogen before attempting any control measures.

Mowing

When mowing, leave at least a 3-inch stubble height. With taller-statured grasses, an even higher stubble height should remain. Various grass species respond differently to mowing. Rhizomatous species are stimulated by frequent clipping while bunchgrasses are often stressed or even eliminated by frequent cutting.

Mowing frequency and intensity will vary according to the species and intended use of a particular stand of grass.

• Manicured Lawn

Maintain at uniform height. Most sod-forming species are naturally short-statured.

• Biomass Removal

Consider removal of dormant or dead stems and leaves at the end of a growing season for fire prevention and reduction of potential snow drifting.

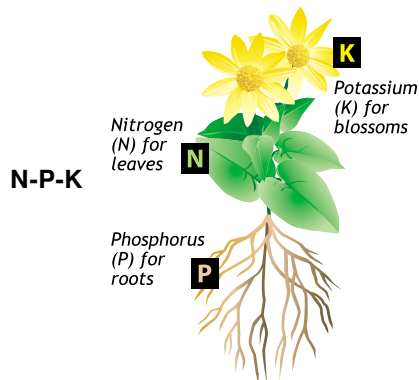
• Weed Control

Mowing, especially during the establishment year, can help with weed control by not allowing annual weeds to set seed.

Fire can be used as a substitute for mowing to reduce biomass when the grasses are dormant, i.e., late fall or early spring. Mature warm-season grasses, in particular, benefit from the removal of biomass, which stimulates the next year's growth. Avoid property damage and annoyance to neighbors. Burning permits may be required — inquire locally.

Fertilizer

Most arid and semiarid native plants do not need supplemental fertilization if established on natural soil conditions. If subsoil is exposed or the soil is extremely sandy, fertilization may be warranted. Excess fertilization will increase biomass production, thus increasing soil moisture requirements for the plants.



New Seedlings

Unless you are planting into a very raw mineral soil, fertilizers (particularly nitrogen) should not be applied the seeding year—as you would only be feeding the weeds rather than the seeded plant material. Incorporation of supplemental phosphorus when preparing the seedbed helps promote root development.

Established Plant Material

Grasses. Apply in the fall (early to mid-September) to promote winter survival and early spring growth.

Wildflowers. Use very low rates, if any at all. High fertility levels will stimulate spindly and weak stem growth.

Trees and Shrubs. Apply macronutrients (N-P-K) early in the growing season. Late summer application could delay proper “hardening off.” Micronutrients are available in foliar spray. Since safe limits for application rates of trace elements are narrow, they are best applied with caution. High and low soil pH can limit essential micronutrient availability to plants.

Pest Control

Adopt an Integrated Pest Management (IPM) approach to controlling weeds, insects, and disease. This approach incorporates monitoring to determine the level of infestation with a combination of control measures, i.e., cultural practices, pesticides, biological control, choosing plants with pest and disease resistance, maintaining good plant health (vigor), practicing good sanitation, and properly timed control methods. Cultural practices include tillage, hand-pulling of weeds or hand-plucking of insects, and mowing.

Insects

Native vegetation often attracts desirable insects rather than pests. Butterflies and other pollinators will be attracted by flowering forbs and shrubs. Conscientious use of pesticides, use of less toxic compounds (insecticidal soap, dormant oil spray, diatomaceous earth), and strategic placement of insect-detering plants should control most insect pest problems. Monitor insect populations closely and apply control measures in the early stages of infestation.



Noxious weeds such as leafy spurge can take over an entire landscape if allowed to spread.

Caution: Overuse of fertilizers may result in the contamination of surface and ground water, and the unwise use of natural resources. Utilize a soil analysis to identify soil nutrient deficiencies and fertilize accordingly.



Diseases

Sanitation is key to disease control and prevention. Most diseases can be avoided by carefully monitoring the plants. Native plants have a natural immunity to many diseases. Selective pruning, excess litter removal, and in some cases, by using fire, diseases in a natural landscape will be minimal. Avoid late afternoon or evening watering.

Animals

Native landscaping, especially in rural and suburban areas, will attract potentially damaging animals (deer, rabbits, rodents, beavers). Until plants are large enough to withstand browsing, some form of plant protection may be necessary (see **Plant Protection** section). The planting of less palatable shrubs and trees is a feasible alternative.

Weeds

Perennial weeds should be addressed prior to implementation of a landscape plan. Annual weeds can be reduced by keeping them from going to seed. The first two establishment years require the most maintenance, but once landscape plants are established, maintenance becomes easier and more routine. Caution should be used when using any herbicides within the rooting zone of woody plants.

PLANT PROTECTION

Protection is the preventative maintenance of plant care. Although it is often thought of in terms of avoiding damage from animals or people, protection includes any proactive steps to minimize plant stress and maintain health. An important step in this process is selecting well-adapted species and maintaining them in a vigorous condition.

Protecting Plants from Desiccation

Desiccation occurs when water loss from the plant (transpiration) exceeds its ability to extract water from the soil. Numerous factors contribute to desiccation including temperature, wind speed, sun exposure, soil texture, available soil moisture, and stage of plant growth.

- Cease weed control in and around trees and shrubs in mid to late August, letting the herbaceous weeds grow tall to trap snow and increase available water to the plant. Deep snow pack protects young trees and shrubs from drying winds and animal browse.
- Water in anticipation of high plant demands throughout the growing season.
- If the soil is dry in late August to the first week of September, saturate the top foot of soil to reduce winter desiccation.
- Use anti-desiccant spray on green foliage to reduce water loss from leaves immediately after transplanting. This is also beneficial to conifers when applied just before freeze-up.
- Install wood mulch or weed control fabric to conserve soil moisture.
- Use shingles or screens on the west and south sides of newly planted seedlings to reduce wind desiccation and sun exposure.
- Install manufactured tree shelters to protect from sun and wind, and to encourage rapid growth and establishment.

Protecting Plants from People

People often injure landscape plants through neglect, carelessness, or misguided effort. Protection from people includes proper landscape design, appropriate species selection, proper planting location, installation of physical barriers, the use of warning signs, and proper education.



A sun shade protects a ponderosa pine seedling



Line trimmer damage

Tree shelter protecting cherry tree.

Strategies for Protection from People

Common People Problems	Protective Measures
Mower and weed trimmer injury to trees and shrubs	<ul style="list-style-type: none"> • install synthetic wrap around base of trunk • install weed barrier or mulch around base of tree • install ornamental fence • plant flowers or ground cover around base of tree
Heavy traffic	<ul style="list-style-type: none"> • install physical barrier, (man-made or plants) to reduce traffic • construct a sidewalk or path • construct a fence or wall • install warning signs (commercial)
Misapplied chemicals and fertilizers	<ul style="list-style-type: none"> • apply pesticides only when absolutely necessary • always follow label instructions • base fertilizer applications on soil test results (if some is good, more is <u>not</u> necessarily better) • consult with a professional
Improper mowing	<ul style="list-style-type: none"> • mowing too low is often a problem; raise mowing height to 3 inches • keep blades sharp to prevent tearing
Improper pruning	<ul style="list-style-type: none"> • learn proper pruning techniques • use sharp, high-quality pruners • if unsure, hire a professional



Sidewalks help protect plants in heavy traffic areas.

Protecting Plants from Animals

Ornamental landscapes attract and provide habitat for numerous animals including deer, rabbits, gophers, mice, and other wildlife. Although some designs intentionally incorporate features to attract wildlife, damage to landscape plants can be serious and may warrant the need for protection. The type and cost of protection varies with the value of the plants and the potential for damage.

Repellents. Repellents are products that, when applied to the plant or soil, discourage animals from feeding on or otherwise damaging the plant. They are:

- Usually low-cost products
- Well suited for use in gardens, orchards, nurseries, and ornamental landscapes
- Generally, only effective for a short period of time and require multiple applications in order to continue providing protection
- Increasingly ineffective as browse and forage become limited

Exclusion. In general, exclusion systems provide more absolute protection than other techniques. These barriers may be physical and/or electrical in mode of action. Physical barriers include wire cylinders and cages, ventilated plastic tubing, netting, wraps, fences, screens, and hardware cloth.



A wire cylinder excludes browsing animals.



Livestock damage

Cultural. Cultural practices such as weed control, brush management, pruning, and mowing can be used to reduce cover in the vicinity of the target plant. Remove tall, dense herbaceous vegetation from around trees and shrubs to discourage rodents.

Plant Selection. Browsing damage can sometimes be reduced by selecting plants that are not preferred by wildlife and livestock. Keep in mind that starving animals will utilize nearly all edible vegetation.

Using Domestic Animals for Plant Protection. Secured dogs and other domestic animals are sometimes effective in scaring away unwanted wildlife. New designs that incorporate wireless fences have proven effective in the nursery industry.

Animal Removal. In some cases, it may be necessary to relocate damaging animals. Contact your county animal control department.

Sacrificial Crops. Highly palatable, low-cost crops can sometimes be used to lure wildlife away from landscape plants. Caution should be used when designing such systems to avoid attracting additional animals into the area. This is best suited to farm or ranch situations.

PLANNING FOR WILDLIFE



Yellow warbler nesting in shrub

Properly planned native landscapes can provide wildlife with various habitat needs. Selecting plants that provide food, cover, and water to landscapes can provide the needed habitat elements for many species that will visit your backyard.



Swallowtail on echinacea

During the planning process wildlife habitat requirements need to be considered. Wildlife needs vary from year-round habitat for resident species to seasonal habitat for migratory species. Various types of wildlife species will visit if their habitat requirements are provided.

The types of plants used to provide food and cover will determine the wildlife species that are attracted. Select native species that flower and bear fruit or seed at different times during the short Northern Plains growing season. Plant a variety of species including grasses,

flowering forbs, shrubs, and trees. Shrubs that hold their fruit into fall and winter can provide food well into the winter season. Native forbs will attract butterflies.

A variety of herbaceous and woody plant materials will provide a diversity of structure for wildlife cover. Depending on the species selected, these same plants can provide cover and a food source into fall and winter. Plant in groups or clusters. Single plants of native grass, forbs, or shrubs will not provide the habitat needed for wildlife. Larger groups of shrubs, grass, or flowering forbs provide

increased diversity, cover, and food in close proximity and structural heights attractive to wildlife.



Water features are aesthetically pleasing.



Sphinx caterpillar on chokecherry

All photos on pages 29 and 30 courtesy of ND Game and Fish Department unless noted.

Considerations

Food

Learn the food needs of the species you wish to attract and plant accordingly. Provide plant species that will yield a variety of foods during the year. If you wish to attract birds, plant species that retain fruit into the winter season, such as junipers, highbush cranberry, native rose species, or species that will retain seeds into the winter such as Maximilian sunflower. Native grasses also provide seeds for birds. A variety of flowering forbs attract insects and will attract birds that feed on those insects. Hummingbirds can be attracted by planting flowers with high nectar levels. Butterflies seem more attracted to purple and white flowers than yellow.



Maximilian sunflower

Cover

Wildlife species need multiple cover types located close to food to avoid predation and exposure to harsh winter elements. The type of wildlife you wish to attract will dictate the required type of covers planted. Planting native grasses and forbs will attract birds that nest on the ground and feed on small seeds and insects. Planting a variety of trees and shrubs will attract bird species that nest in woody vegetation and use fruits or nuts as food sources. Cover must be close enough to food to provide safe access for wildlife. Cover types that provide an array of vertical structure will attract a wider variety of wildlife species.

Management of cover is a key component to attract wildlife. If native grasses and forbs are mowed during the primary nesting season, nesting cover is destroyed. Leave residual cover into winter to provide adequate nesting cover in spring. To provide nesting cover, native grasses should not be mowed during the nesting season from mid-April to late July and should only be mowed periodically (once every 3 to 5 years) to provide the residual cover needed for ground or grass nesting birds.



Rosehips make an excellent food source.

Water

Wildlife needs may vary. However, they all need water to survive. Some species utilize dew on plants while other species need open water. Plan for water in your backyard. If natural water is available, protect it from sedimentation and nutrient loading with grass buffers. Artificial water can be added by use of bird baths, lined ponds, or construction of a clay-lined created wetland. Year-round water is important. A heated water source can attract birds to backyards. Keep water fresh, and provide logs or rocks as escape areas around deep water sources for birds and maybe even a basking turtle. Small depressions in rocks can collect water and attract butterflies.



Photo: USDA-NRCS

For more information on backyard landscaping for wildlife consult these two publications:

Backyard Conservation

Natural Resources Conservation Service

Attracting Wildlife to Your Backyard

North Dakota Game and Fish Department,
100 East Expressway, Bismarck, ND

References:

Backyard Conservation
Natural Resources Conservation Service

Attracting Wildlife to Your Backyard
North Dakota Game and Fish Department

Landscaping for Wildlife
Carrol L. Henderson
Minnesota Department of Natural Resources
1987

RAIN GARDENS



Blazing star
Liatris ligulistylis
Ht: 3'
Flower: Purple
Bloom: July-Aug.
Habitat: Full to partial sun.
Wet to dry soils.



Big bluestem
Andropogon gerardii
Ht: 3-5'
Flower: Reddish purple
Bloom: July-Sept.
Habitat: Full sun.
Moist to somewhat dry soils.



Blue grama
Bouteloua gracilis
Ht: 1-2'
Flower: Purple/Tan
Bloom: July-Sept.
Habitat: Full sun.
Dry soils.



Purple coneflower
Echinacea purpureum
Ht: 2-3'
Flower: Purple/Pink
Bloom: Aug.-Sept.
Habitat: Full sun. Moist to somewhat dry soils.



Indiangrass
Sorghastrum nutans
Ht: 3-5'
Flower: Reddish/Bronze
Bloom: July-Sept.
Habitat: Full sun.
Moist soils.



Prairie smoke
Geum triflorum
Ht: .5-1'
Flower: Pink
Bloom: April-June
Habitat: Full sun.
Moist to dry soils.



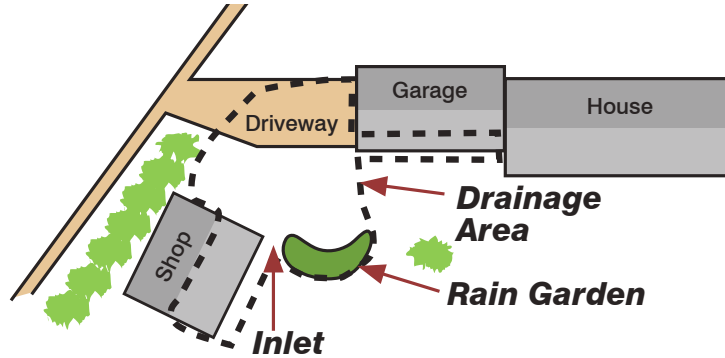
Canada anemone
Anemone canadensis
Ht: 2'
Flower: White
Bloom: May-June
Habitat: Full to part sun.
Wet to moist soils.



Red columbine
Aquilegia canadensis
Ht: 1.5-2.5'
Flower: Red/purple
Bloom: May-July
Habitat: Full to part sun.
Moist soils.

Rain Gardens – Utilizing the best quality (free) water available to the Great Plains

Rain gardens are shallow depressions that collect storm water from impervious surfaces (roofs and driveways) and infiltrate, filter, evaporate, and transpire the runoff. Rain gardens are typically planted with a diverse mix of native wildflowers, grasses, shrubs, and trees, and are an attractive low-maintenance addition to a home landscape. For much of North Dakota, water captured by a rain garden is much better quality than water that comes from a typical well, and considerably cheaper than water available from urban or rural water systems.



Plan Map with Prominent Features Shown

Purpose

- Provide runoff storage
- Enhance water infiltration/recharge
- Trap sediments, nutrients, and pollutants
- Provide soil/biological water treatment
- Provide wildlife habitat
- Provide landscape amenities
- Capture and utilize high quality precipitation

Rain gardens should have standing water for no longer than 24 to 48 hours. Mosquitoes generally take 7 to 10 days to complete their breeding cycle, so rain gardens should not increase mosquito populations.

Planning

- Map the property. Note topography, buildings, existing vegetation, underground utilities, and other features. Determine where existing runoff flows.
- Calculate the area of all runoff surfaces that will collect in the rain garden.
- Locate garden in an area that captures the most runoff and requires the least amount of digging and diking to get level. Stay at least 15 feet away from structures and poured slabs and 50 feet away from septic leach fields.
- Make the rain garden about 10 percent the size of the area contributing water and 6 to 9 inches deep. (6-inch depth will capture 0.6 inches of runoff and 9-inch depth will capture 0.9 inches runoff.)
- Direct runoff to the rain garden with drain tile or a constructed swale, if needed.
- Plan for a controlled overflow to prevent erosion from large runoff events, especially during the first year or two before berms are fully sodded and vegetation is well established.
- Choose a variety of native perennials adapted to the soil and light conditions. Include at least 40 percent grasses and sedges to provide dense root masses, interesting textures and support for flower stems.



Sideoats grama
Bouteloua curtipendula
Ht: 1-2'
Flower: Purplish/Tan
Bloom: July-Sept.
Habitat: Full sun. Dry soils.



Spiderwort
Tradescatia sp.
Ht: 1-2'
Flower: Pink/Purple
Bloom: May-July
Habitat: Full to part sun.
Moist soils.

Construction

- Remove existing vegetation by tillage, covering with black plastic for several months, or using a herbicide such as glyphosate.
- Dig a shallow bowl (6 to 9 inches deep at the center) with gently sloping sides.
- If clay or heavy soils are present, over excavate the site by 1 foot and backfill with a mixture of 70 percent washed sand and 30 percent compost blended together.
- Place excavated soil on the downhill side to create a berm that ensures water will be a uniform depth within the basin. Part of the berm should be slightly lower than the inlet to allow for controlled overflow from extreme runoff events.
- Ensure that the top of the berm is perfectly level to reduce the chances of erosion damage.
- After seeding and planting the berm, cover with biodegradable erosion control blanket to hold soil in place while plants become established.
- Spread 2 to 4 inches of shredded wood mulch over the entire planting area. Ordinary wood chips tend to float and should be avoided.

Planting

- Rooted stock and seeds can be planted from early May until the end of June.
- Plant seedlings 12 inches apart, with more flood tolerant species toward the bottom and drought tolerant species toward the top.
- Plant species in large clusters to provide more visual impact.

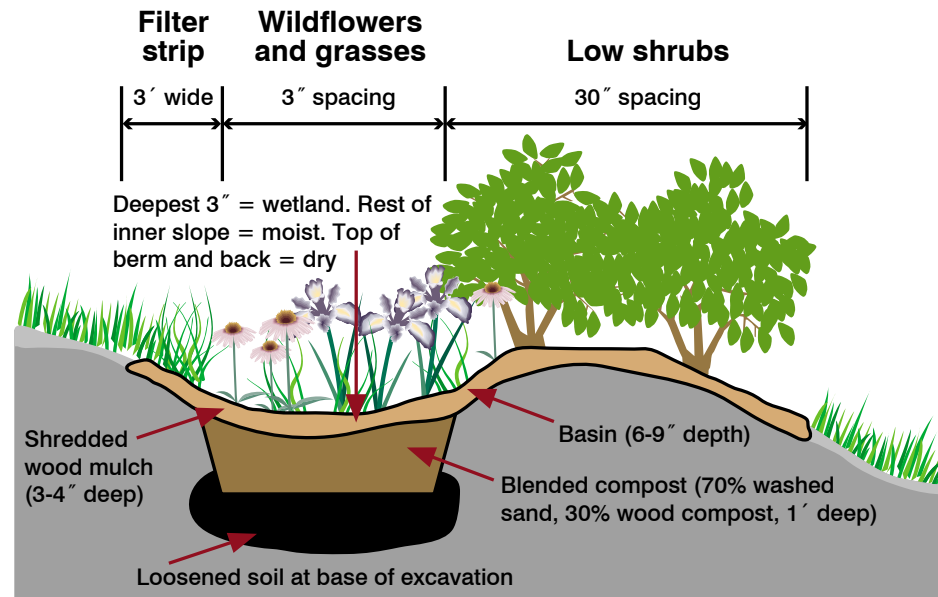
Maintenance

- Rain gardens will require maintenance each year, a bit more the first two years.
- Ensure the rain garden receives at least 1 inch of water per week for the first 2 months from irrigation or rain.
- Control weeds. Placing plant tags near each plant or using a plant ID book will aid in determining which are weeds.
- Many native species have strong stems and will stay standing even after a snowfall. Allow the year's growth to stand over winter, providing visual interest, wildlife habitat, and good quality water harvested from snow.

Other Information Sources:

<http://www.pca.state.mn.us/publications/manuals/stormwaterplants.html>

<http://clean-water.uwex.edu/pubs/raingarden/rgmanual.pdf>



Redtwig dogwood
Cornus sericea
Ht: 7-10'
Flower: Yellow/White
Bloom: May-June
Habitat: Full to part sun.
Moist to wet soils.



Purple prairieclover
Dalea purpurea
Ht: 1-2'
Flower: Purple
Bloom: June-August
Habitat: Full to part sun.
Moist soils.



Golden alexander
Zizia aurea
Ht: 1-2'
Flower: Yellow
Bloom: June-July
Habitat: Full to part sun.
Moist soils.



Prairie coneflower
Ratibida columnifera
Ht: 2-3'
Flower: Yellow
Bloom: June-Aug.
Habitat: Full sun.
Moist to dry soils.



Black-eyed susan
Rudbeckia hirta
Ht: 1-2'
Flower: Yellow
Bloom: June-August
Habitat: Full to part sun.
Moist to dry soils.



Little bluestem
Schizachyrium scoparium
Ht: 2-3'
Flower: Reddish/White
Bloom: July-September
Habitat: Full sun.
Moist to dry soils.



Mint
Monarda fistulosa
Ht: 1-2'
Flower: White to Pink
Bloom: July-August
Habitat: Full to part sun.
Moist to wet soils.



New England aster
Symphyotrichum novae
Ht: 3-5'
Flower: Purple
Bloom: September
Habitat: Full sun.
Moist soils.



Potentilla
Dasiphora floribunda
Ht: 2-4'
Flower: Yellow to White
Bloom: July-September
Habitat: Full to part sun.
Moist to dry soils.



Prairie dropseed
Sporobolus heterolepis
Ht: 1-3'
Flower: Grey
Bloom: July-September
Habitat: Full sun.
Moist soils.

ENERGY CONSERVATION

Landscaping to Save Energy

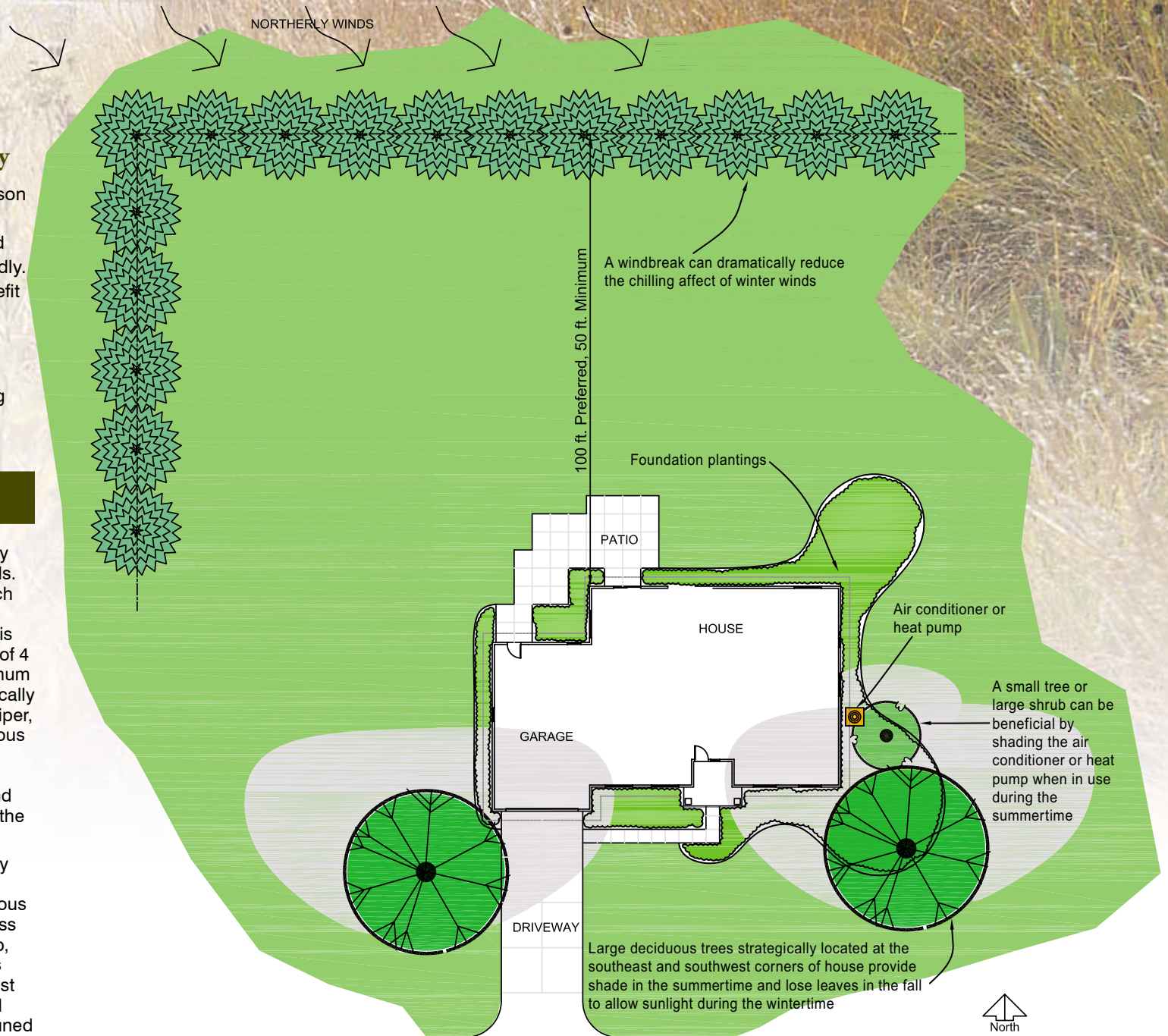
Saving money is an obvious reason for landscaping choices that reduce fossil fuel use. Reduced fossil fuel use is environmentally friendly. Landscaping to save energy can benefit wildlife and conserve water. Beauty can be maintained or improved with landscaping that saves energy.

Goals for energy-efficient landscaping are reduce heat, air conditioning, and maintenance requirements.

Landscape for Heating Efficiency

Tree/shrub windbreaks can dramatically reduce the chilling effect of winter winds. Home heating costs can be cut as much as 30 percent with properly designed windbreaks. Optimum wind protection is downwind from the trees at a distance of 4 to 7 times the height of the trees. Optimum windbreak density of 60 percent is typically achieved with one row of spruce or juniper, two rows of pine, or six rows of deciduous trees. A site-specific windbreak design is essential to ensure that the location, species selection and arrangement, and maintenance plan are compatible with the soil and the landowner's preferences.

Trees for shade and scenery are usually planted closer to houses and other buildings than are windbreaks. Deciduous trees close to the house let sunlight pass through the crown after the leaves drop, assisting with winter solar gain. Shrubs planted 3 to 5 feet from the north or west side of a house can reduce radiant and convective heat loss. They must be pruned regularly to prevent branches from rubbing and damaging the siding or roof.



PLAN VIEW
TREE/SHRUB PLACEMENT TO SAVE ENERGY

Landscape for Cooling Efficiency

Trees and shrubs can provide valuable shade to a house, reducing energy consumed for air conditioning. A shaded roof reduces house temperature as much as 10 degrees F. Tall, deciduous trees are preferred for roof shade. Their structure provides shade in summer but lets sunlight through in winter. Optimum distance from tall shade trees to a building is 15 to 20 feet. Sturdy species such as bur oak, hackberry, or green ash are preferred to reduce the risk of broken limbs damaging the building. Proper pruning as the trees grow is crucial for strong limbs and trunks, and prevents rubbing damage to the siding or roof. Instructions are found in the NDSU Extension Service Bulletin "Pruning Trees and Shrubs" at <http://www.ext.nodak.edu/extpubs/plantsci/trees/h1036w.htm>.

Tall trees planted on the east side and southeast corner intercept the morning sun, significantly slowing the warm-up process in the summer. Tall trees on the south side block valuable sunlight in winter. Tall trees on the west side and southwest corner provide valuable shade from the summer sun on hot afternoons and evenings.

Shrubs planted close to the house on the west and east sides can intercept or deflect solar heat, reducing interior temperature. Choose species that are adapted for the space and size of the wall to be screened. Where rubbing damage could occur, plant shrubs far enough away from the house or prune them as needed.

Vines can also be grown near or on buildings to intercept solar heat. Selecting a species with desired traits is important. Not all vine species are capable of climbing bare walls. Riverbank grape is a native vine that will produce edible fruit if pruned annually. It is not adapted to climb a bare wall but is suited to a trellis. Woodbine is another native vine that is well suited to intercept solar heat. If you find vines visually appealing, they may have a niche in your landscape. Information about different vine species is available from the NDSU Extension Service, <http://www.ext.nodak.edu/county/cass/horticulture/treeshrub/vines.htm>.

Air conditioners and heat pumps will consume less energy if they are shaded. A tall shrub or vine-covered arbor can provide shade and attractively screen such equipment. Leave at least 5 feet of clear space around air conditioners and heat pumps for air circulation and maintenance. Place the plant so that at maturity it will shade the air conditioner or heat pump when the appliance is running.

Landscape to Minimize Maintenance

Lawn mowing burns 800 million gallons of gasoline annually in the USA. About 90 million pounds of pesticides are put on lawns and gardens annually. Irrigating a 75 x 100 square-foot lawn with ¾ inch of water twice a week for eight weeks demands pumping and paying for 56,000 gallons of water. Substantial amounts of chemicals and energy are used to treat and pump municipal and rural water applied to lawns. Landscaping with native plants minimizes mowing, watering, fertilizing, and pesticide inputs.

Most lawns in North Dakota are Kentucky bluegrass. They are mowed frequently from May through September. They are regularly irrigated in western North Dakota, and commonly irrigated elsewhere in the State. Fertilizer and herbicides are often applied to this introduced species.

Blue grama and buffalograss are short, native perennial grasses, that are alternatives to Kentucky bluegrass for lawns. They are drought-tolerant, warm-season species that grow very little before June or after August. These short species require only 3 to 4 mowings per year and no fertilizer. Irrigation may be required for establishment. Established stands do not require irrigation. Spring or fall watering encourages weed growth. During drought and periods of dormancy, these species turn a tan color.



Blue grama and buffalograss lawns require far less energy, time, and money to maintain than Kentucky bluegrass.

Buffalograss prefers clay to loamy soil, while blue grama is adapted to soils ranging from sand to clay. They look alike and can be grown alone or together. Planted as a mixture, blue grama and buffalograss have a uniform appearance.

One plan would be to plant Kentucky bluegrass next to the house and native species on the remainder. A strip of native flowers can attractively separate the Kentucky bluegrass from the low-maintenance blue grama/buffalograss area.

Irrigation costs can be reduced by piping or channeling roof runoff toward trees, a rain garden, or native flowerbeds. The runoff from some driveways can likewise be diverted to enhance plant growth and vigor.

Mulch can be used for saving water, labor, and energy. Wood chips, leaves, grass clippings, or other organic matter around trees, shrubs, and flowers lower soil temperature and reduce evaporation. A layer of mulch 2 to 3 inches thick will usually control weeds. Mulch materials can often be obtained free from a city maintenance department, neighbors, or utility company. More information about mulching is available at <http://www.nrcs.usda.gov/feature/backyard/Mulching.html>.

Snow is an important consideration in landscaping. Windbreaks, yard trees, and shrubs will reduce snowblower work and fuel consumption if correctly placed. Spruce and juniper trees with low-level branches intact provide maximum density and trap snow in the shortest, deepest drifts. Deciduous trees with the lower branches removed yield the longest drifts. Multiple tree rows increase density and shorten snow drifts.

WEEDS AND INVASIVE PLANTS

Weeds sprout early and seize bare ground. Direct sun, wind, and rain do not discourage them. They thrive in gravel beside railroad tracks, and in niches between slabs of concrete. They grow fast, seed early, and retaliate to injury with awesome power. They will even take root in the cracks of an old shoe: not much hope there, but perhaps the shoe will be thrown into the midden out back, and then they can burgeon and swallow the whole yard.

ALFRED W. CROSBY

Ecological Imperialism

The Biological Expansion of Europe, 900-1900

Weeds are often defined as “plants out of place.” An attractive wildflower to one individual may be an aggressive, spreading weed threatening to take over flowerbeds to another individual. Noxious weeds are designated by state government and control is required in any setting by county, state or federal law. Distribution of these weeds by any means is not allowed. The uncontrolled spread of noxious weeds can have dramatic impact on local agriculture. Leafy spurge and Canada thistle each infest approximately 1 million acres in North Dakota. The economic impact to the state from leafy spurge is estimated at \$86 million annually.

Invasive plants can be native or introduced species: 1) that are non-native (or alien) to the ecosystem under consideration and, 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health. The State of North Dakota has no legal authority regarding invasive plants. Legal parameters and policies regarding invasive plants vary widely among units of government.

It is up to the landowner/homeowner to be aware of plants that may cause potential problems. The extent of the invasiveness, especially for native species, may be subjective and vary widely depending on site and associated species in the plant community.

Common forage and turf grass species such as smooth brome grass and Kentucky bluegrass become invasive on many sites managed for native plant communities. There are many important conservation tree and shrub species that can easily move offsite and become invasive. Russian olive is a good example and should not be planted in wet sites, riparian areas, or saline lowlands where it may move offsite and cause environmental or economic problems.

Species currently listed by the North Dakota Department of Agriculture (<http://www.agdepartment.com/noxiousweeds/searchweeds.asp>) as “**Invasive Plants to Ecological Locations**” include: crested wheatgrass, smooth brome grass, caragana, Russian olive, yellow sweetclover, reed canarygrass, Kentucky bluegrass, and Siberian elm.

Photo: Mike Haddock, KSU



Showy milkweed

Photo: Nature Conservancy



Canada thistle

Noxious weeds currently listed by the North Dakota Department of Agriculture include Russian knapweed, wormwood sage, musk thistle, diffuse and spotted knapweed, yellow star thistle, Canada thistle, field bindweed, leafy spurge, dalmation toadflax, purple loosestrife, and saltcedar. Check out the website for scientific names, pictures, and specific control information (<http://www.agdepartment.com/noxiousweeds/searchweeds.asp>).

Noxious weed infestations should be reported to county weed boards.



Reedgrass, left, and sweetgrass, right, have high ornamental value and cultural significance, but spread aggressively from underground rootstalks (rhizomes) and can be invasive in small areas.

Why Do Species Invade?

- Opportunity (disturbance, bare ground, climatic cycles, etc.)
- Lack of control mechanisms
- Reproductive adaptation that allows them to spread
- Tolerance and adaptation to specific environmental conditions

Management Considerations

- Use native species of known origin
- Establish vegetation quickly
- Maintain healthy ecosystems
- Early detection and awareness of invasive plants by the public
- Develop a plan for managing noxious weeds and invasive species

Methods of Prevention and Control

- Cultural – modification of human behavior (example: inspected hay for trail rides).
- Biological – natural plant-eating enemies (example: flea beetles that feed on leafy spurge).
- Mechanical – burning, mowing, cutting, etc. (example: pulling out seedlings of Siberian elm).
- Chemical – herbicides, generally best in early detection (example: spraying saltcedar when the first few plants are discovered).
- Barriers – the bottom cut out of a 5-gallon pail and dug into the ground works well to keep rhizomatous species from spreading.

Choosing the best prevention and control depends on species present, surrounding environmental conditions, nature of the invasion, and management.



Buckthorn understory



Buckthorn leaves

“In a human dominated environment, natural areas are biological islands under constant invasion by exotic, translocated, and opportunistic species.”

(Wisconsin Manual of Control Recommendations for Ecologically Invasive Plants, 1997)

“To Do” LIST



Spring...

- 1 **Tree Care:** Prune trees and non-flowering shrubs in late winter/early spring before they break dormancy. If needed, apply repellents and barriers (horticultural oils, “tanglefoot”) according to the label. Mulch out to the drip line.
- 2 **Manicured Lawn Care:** Apply pre-emergent herbicides in early spring, before weeds begin growth. Aerate, power rake, and fertilize lawns in May. Mow to no less than 2 ½ to 3-inch height to stimulate good root development. De-thatch if thatch accumulation exceeds ½ inch.
- 3 **Warm-Season Grass Ground Cover:** Mow to a 3-inch height and remove residue if necessary. Controlled burning may be an option if site, conditions, and ordinances allow. You may spot treat cool-season grasses and weeds with glyphosate herbicide, only if warm-season grasses are still dormant (not green, generally done in April). Ground covers are generally not fertilized.
- 4 **Cool-Season Grass Ground Cover:** Mow to 3-inch height. Consider appropriate herbicides, or hand dig troublesome weeds. Ground covers are generally not fertilized.
- 5 **Prairie Planting:** Before grasses have significant growth (April), cut to a 3 to 4-inch height and remove residue. Controlled burning may be an option if site, conditions, and ordinances allow. This would be a good time to add additional seed or plants to target areas, and to spot spray or remove perennial weeds, if desired.
- 6 **Gardening:** Start transplants indoors in late winter/early spring. Plant/transplant frost-tolerant plants, seeds, and seedlings in April-May; all others when the danger of frost is past (May-June). Divide and transplant fall-flowering perennials.
- 7 **Compost vegetative trash** to reduce volume and recycle nutrients back into the soil. Do not compost grass clippings that contain herbicide residues!
- 8 **Pressurize and inspect all zones** of an automatic watering system.



Summer...

- 1 **Watering:** Water plants in early morning, according to plant needs. Water deeply, uniformly, and infrequently, at a slow rate to reduce runoff potential. Do not over-water! Mulch where appropriate to reduce water consumption.
- 2 **Tree Care:** Prune spring-flowering shrubs just after blooms are finished.
- 3 **Harmful Insects:** Control aphids and mites with insecticidal soaps to spare beneficial insects and provide long-term pest control. Do not use pesticides unless insect threshold levels warrant it.
- 4 **Weed Control:** Keep ahead of weeds by mowing and hand-pulling if possible. Use herbicides sparingly and according to label recommendations.
- 5 **Mulching:** Reduces water consumption, improves the soil structure and fertility, prevents weed growth, and protects against temperature extremes.
- 6 **Manicured Lawn Care:** Mow frequently. Remove no more than 1/3 of the leaf at one time. Set mower to 2 ½ to 3 inch height, and keep blades sharp! Mow higher during hot, dry spells to induce deeper rooting. Follow watering instructions above!
- 7 **Warm-Season or Cool-Season Grass Ground Cover:** Generally no watering is needed unless you want to extend the green period due to drought or species seasonality. Mow to suit your taste, generally once or twice on the warm season, and 3 or 4 times on the cool season, or forget mowing and enjoy the attractive seed stalks. The birds and butterflies will appreciate it.
- 8 **Prairie Planting:** Observe the natural beauty of species diversity; no mowing, or fertilizing, or watering to spoil the day! Consider keeping a notebook to record individual plant information such as: flowering dates, colors, number of blooms or seed stalks, pollinators attracted, favorite plants, seed or fruit ripening, and color changes. Occasional hand-weeding of unwanted plants is always timely. Take lots of pictures!



Fall...

- 1 **Manicured Lawn Care:** Fertilize around Labor Day. Sod or seed new lawns before September 10. If starting from seed, use hydro-mulch or a germination blanket to reduce weed competition and ensure good germination. Do not use straw.
- 2 **Prairie Planting:** Enjoy the fall colors which seem to change daily. Collect seed for future plantings. Leave the residue standing over winter and watch birds feeding on the seed, and the frost and snow adding their accents.
- 3 **Divide and transplant spring-flowering perennials.** Dig bulbs for winter storage.
- 4 **Watering:** Water landscape plants deeply before freeze-up for good establishment and winter survival. Mulch wherever possible to reduce water loss.
- 5 **Trees and shrubs:** Prune any damaged branches. Transplant new trees. Apply repellents and barriers to reduce animal damage. Mulch out to drip line.
- 6 **Weed control:** September is one of the best months to apply herbicides for controlling most persistent perennial weeds. Be careful to follow the label.
- 7 **Drain and blow out irrigation systems.**
- 8 **Provide snow fencing on windward side of landscape plantings for winter protection.**



Additional information on the above topics is also available from: Natural Resources Conservation Service, North Dakota Association of Soil Conservation Districts, North Dakota State University Extension Service, and the North Dakota Forest Service.

About this Publication

Contributors:

USDA Natural Resources
Conservation Service:

Mark Anderson
Resource Conservationist

Rachel Bergsagel
Biological Science Technician

Arlene Deutscher
Public Affairs Specialist

David Dewald
Biologist

Wayne Duckwitz
PMC Manager

Nancy Jensen
Agronomist

Lynette Lennick
Editor

Susan Samson-Liebig
Soil Data Quality Specialist

Jay Mar
RC&D Coordinator

Wayne Markegard
RC&D Coordinator

Steve Sieler
State Soil Liaison

Craig Stange
Forester

Dwight Tober
Plant Materials Specialist

Developed in Cooperation with:

Dakota Prairies RC&D

Lake Agassiz RC&D

North Dakota RC&D Association

North Dakota Association of Soil
Conservation Districts

North Dakota State Soil
Conservation Committee

USDA Natural Resources
Conservation Service

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Conservation Service

North Dakota Association of Soil
Conservation Districts

Design and Illustration:

Illustrations on pages 3, 5, 7, and
33 by Jim Hanson, Landscape
Architect, Hanson Design
Associates

Illustration on page 22 modified
from original by Mary Myers, USDA-
NRCS, Montana

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from other publications are noted
with illustrations.

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Northern Great Plains and Rocky
Mountains*, USDA Natural Resources
Conservation Service, Montana

Photography:

Nature Conservancy

North Dakota Game & Fish
Department

Larry Allain, USDA-NRCS PLANTS
Database

Lyndon Anderson, *Prairie Journal*

Mark Brand, University of
Connecticut Plant Database

Mike Haddock, Kansas State
University

Eleanor Saulys, Connecticut
Botanical Society

Joan Sieler, Bismarck, ND

Gregg Thompson, Association of
Metro Soil & Water Conservation
Districts, Minnesota

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Natural Resources Conservation
Service unless otherwise noted.

References:

City of Fargo, Forestry Department

At Home with Xeriscape, Xeriscape
Colorado, Denver Water, Denver, CO

Natural Resources Conservation
Service, Field Office Technical
Guide Sections 1, 2, and 4

2005 Minnesota Stormwater
Manual, Version 1.0

North Dakota Tree Handbook, 1996

*Rain Gardens – A How-to Manual
for Homeowners*, University of
Wisconsin

USDA-NRCS PLANTS Database

Other Sources of Information:

Conservation districts

Extension Service

Garden clubs

Landscapers

Local garden centers

Native plant societies

Additional information may be
obtained from your local USDA Natural
Resources Conservation Service
office listed in the phone book under
US Government, Department of
Agriculture, Service Center.

For additional copies of this
publication, or permission to
reproduce all or part of it, contact:

USDA Natural Resources
Conservation Service
PO Box 1458
220 East Rosser Avenue
Bismarck, ND 58501
701-530-2000



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