

Creating Native Landscapes



in the
Northern Great Plains
and
Rocky
Mountains



photo courtesy of Linda Iverson



Photo courtesy of Linda Iverson

Why is Native Landscaping Important to You and the Semiarid West?

Are you interested in creating an attractive environmentally friendly landscape while reducing your water and maintenance requirements? Do you want a beautiful yard, garden, school, park, or parking area? Try a Xeriscape™ with native plants!

In this photo: Urban Xeriscape with native plants in summer foliage: staghorn sumac, horizontal and common juniper, western mountain ash, aspen, skunkbush sumac, rose, shrubby cinquefoil, ponderosa pine.

Whether you're a newcomer to the northern Great Plains and Rocky Mountains or you just want fresh, new landscaping ideas, this booklet will help you select and grow native plants that are naturally adapted and will thrive for years under our extreme environmental conditions. The goal of this booklet is to provide an overview of native landscaping principles and practices. It integrates the principles of several conservation initiatives such as reduced water, energy, and chemical usage; wildlife habitat enhancement; and invasive weed management. Native plant, in the context of this booklet, means native to the United States.

What is Xeriscape™?

Xeriscape (pronounced *zeer-i-scape*) is derived from the Greek word, *xeros*, meaning "dry." It's the wise use of water through water-efficient landscaping. The word Xeriscape conjures up visions of a dry,

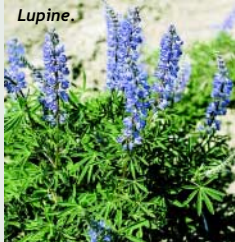
desert-like landscape when, in fact, its focus is how to landscape appropriately in areas with seasonal water supply shortages. Denver Water holds the trademark on the term and has developed 7 Xeriscape Principles.

7 Principles of Xeriscape

1. Plan and Design Comprehensively
2. Improve Soil with Amendments
3. Reduce Lawn Areas
4. Use Appropriate Plants and Group According to Water/Environmental Needs
5. Irrigate Efficiently
6. Use Mulches
7. Maintain Your Landscape

Comparisons of traditional landscapes and Xeriscapes have shown that up to 50 percent savings can be achieved in water usage alone. Other studies indicate 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 (At Home with Xeriscape®, Xeriscape Colorado, Inc).

Lupine.



Narrow grass strips (left) too often result in watering pavement as well as grass. A water-efficient, low maintenance alternative treatment (right) features juniper and western mountain ash.



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In many parts of the West, where rainfall is scarce, landscaping accounts for half of all residential water consumption. Outdoor landscaping offers the single biggest opportunity for water savings to a typical American family. That's because most people pour a lot more water on their greenery than it really needs. In fact, it is estimated that 85 percent of all landscape problems are caused by over watering (A Consumers Guide to Water Conservation®, 1993 American Water Works Association).

Xeriscape and Native Plant Benefits

Economic

- Lower Water and Maintenance Costs
- Enhanced Real Estate Values
- Increased Survivability of Plantings
- Edible and/or Decorative Products

Golden currant: berries used for jelly making.

Environmental

- Improved Water and Soil Conservation
- Reduced Use of Petroleum Products
- Improved Air Quality/Carbon Sequestration
- Enhanced Urban Wildlife Habitat
- Reduced Water Contamination

Cottontail rabbit.

Aesthetic

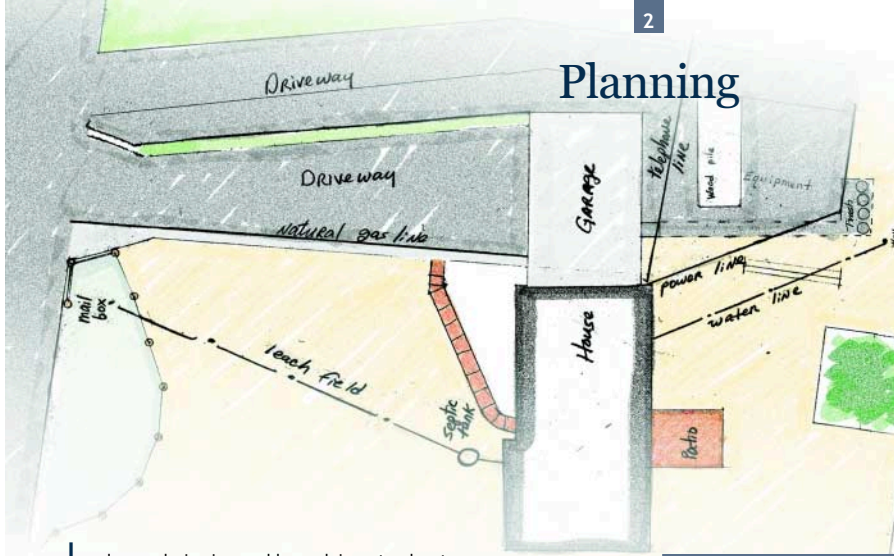
- Increased Year-Round Visual Interest
- Increased Urban Wildlife Viewing
- Encouraged Link with Nature
- Enhanced Quality of Life

Big bluestem: fall color.



Yucca: this evergreen plant brings a bold, dramatic touch to a dry landscape. American Indians used the leaves to make baskets and the roots to produce soap.

Planning



Walk over the proposed planting site to determine the location of power, gas or phone lines, septic leach fields, sidewalks, structures, etc. These features should be noted so that plants do not conflict with utilities, structures or other land uses. Some of these features may not be apparent from walking over the site. A few will have to be researched by talking to neighbors, checking city and county records, etc. To locate underground utilities contact the National Line Locator at 888-258-0808.

Landscape design is a problem solving, step-by-step process that includes, but is not limited to, project research and analysis, development of plans and diagrams for functional and aesthetic use of plant materials, design implementation and construction, and landscape maintenance. Any landscaping project must first start with a plan; one that takes into consideration your needs, the limitations and obstacles of the site, and the resources that you have available. Site conditions need to be evaluated and matched with the planned landscape goals and desired plant characteristics.

Steps to Planning

1. Consider family interests and needs

List the outdoor activities and interests of your family members, including pets.

2. Analyze site

Understand the resources, especially soil texture, depth, pH, and stability.

3. Develop and evaluate alternatives

Visualize an initial landscape design that meets your objectives. Consider each of the following when formulating your conceptual plan:

Site. What's the soil type?

How much water exists?

Plants. Are the plants you've visualized adapted to the site?

Function. Do the plants meet your objectives for shade, as a screen or as an accent?

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. Implement plan

Prepare site, add amendments, purchase plants and seed, and plan for their timely planting. Protect the soil from erosion during construction activities.

6. Solve problems identified in the site analysis

For example, adding amendments such as compost can improve soil drainage and lower the pH. Mulches can conserve water and protect soil surfaces from erosion.

7. Save or remove existing landscaping

All desirable vegetation should complement future plantings. All unwanted vegetation should be entirely removed, either mechanically or chemically. If it looks like a weed, it probably is a weed. Prior to reestablishment of plant cover, weeds should be identified and controlled.

8. Monitor and maintain landscape

Check plants for pest damage, weed competition, soil moisture, etc.

Site Inventory & Assessment

Planning and design begins 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? Is it forested hills, an irrigated valley bottom, dryland pasture, native rangeland, or along a stream or permanent wetland? Are there other signs of former tillage activity? What level of clean up

will be necessary? These are important considerations before entering the next landscape phases: design, site preparation, plant selection.

Vegetative Inventory

Native species evolved to perpetuate themselves in harmony with their environment. Furthermore, plants have established niches within diverse plant communities. These time-tested relationships should be re-created as closely as possible for successful native landscaping. Look around and see what plants are already growing on the site or a similar site nearby. Consider why a particular plant might be located there. Does it grow there as part of a natural plant community? Was it planted, or introduced by humans? Was it planted by nature, i.e. wind, water, animals? Try to identify the plants and determine if they are annual or perennial.

A weed is any unwanted plant growing on the site. Weeds should be properly identified and controlled prior to planting. Chemical, biological, mechanical, or hand-weeding are all viable options.



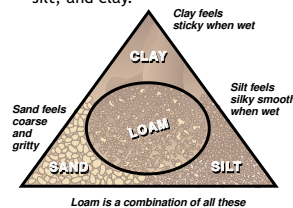
Native forbs found growing on a sandstone outcrop.

Soil

Soil plays an extremely important role in a plant's ability to adapt and survive on a site. Plan to salvage topsoil prior to any construction disturbance to secure a desirable plant growth media.

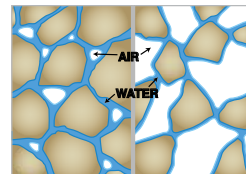
Soil testing is advisable to determine the following soil attributes.

- Texture.** Soil texture is the relative percentage of sand, silt, and clay particles. A loam soil is ideal for plant growth. It is made up of equal parts of sand, silt, and clay.



Adapted from *Tips on Land and Water Management for Small Farms and Ranches in Montana*, Montana Department of Natural Resources and Conservation, 1996.

- Physical/Chemical.** Physically, an ideal garden soil consists of 50 percent solids, 25 percent water, and 25 percent air by volume. The solid portion includes soil, rock and organic matter. The soil organic matter serves as a valuable nutrient source, assists with water retention and infiltration, and promotes root growth through aeration. Chemically, the pH measures the acidity or alkalinity of the soil. Plants have preferences for certain pH levels. In the northern Great Plains and Rocky Mountains most soils are alkaline. Soil salinity and sodicity is a measure of the amount of calcium, magnesium, and sodium salts. High salinity or sodicity is not conducive to healthy plant growth. Salts desiccate plants and can become toxic to many plant species.



Adapted from "Seedbed Preparation—the Forgotten Step in Range Seeding" by William J. McGinnies; *Vegetative Rehabilitation and Equipment Workshop 38th Annual Report*; USDA/USDI Equipment Development Center, Missoula, MT, Feb. 1984.

- Erodibility.** Highly erodible soils, particularly those on steep slopes, need to be protected from wind and water erosion during site preparation and plant establishment. Moisture levels are difficult to maintain on slopes, as water runs off, rather than into the soil. This problem can be reduced with mulch. In windy areas, blowing soil is a problem that is reduced with strategically placed plant material.

Climate

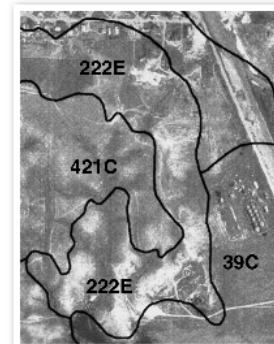
Across the northern Great Plains and Rocky Mountains regions, extreme variability and unpredictability in climate is normal. Native plant community adaptation depends primarily on the extremes of temperature and precipitation.

- USDA Winter Hardiness Zones.** This map categorizes areas by average annual minimum temperature and should be used to determine plant species adaptation. (See WHZ map on following page.)

- Elevation/Topography/Aspect/Hydrologic regime/Landform & 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. Local effects of landscape position and microclimates around structures can modify growing conditions.

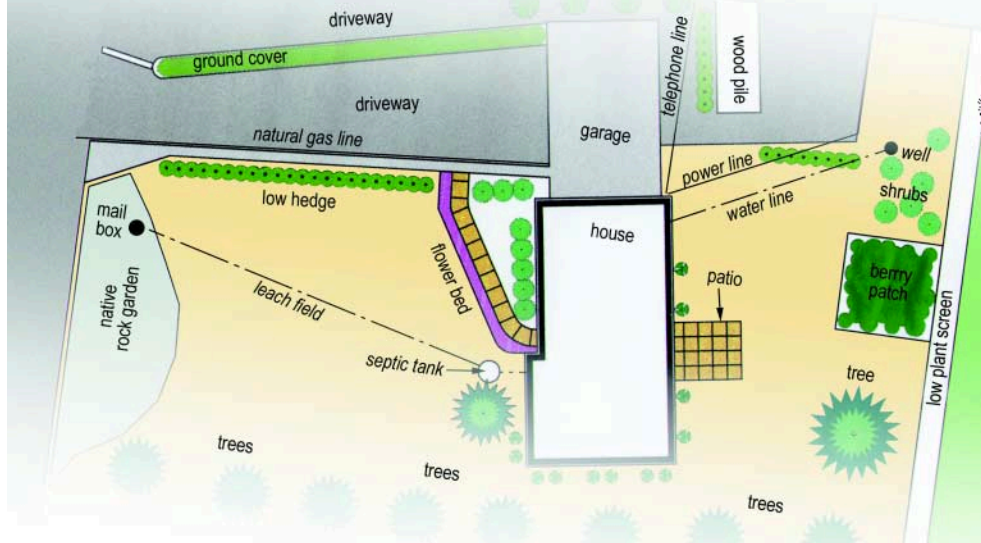
Riparian areas, wetlands, and subirrigated sites offer unique opportunities for plant diversity.

- Precipitation.** Seasonal precipitation and timing dictate water availability—a meaningful element when establishing plants and maintaining them during the active growing season.
- 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 winterkill. Winter-hardy plants must be selected to avoid damage.



Soil maps, available from your local USDA Natural Resources Conservation Service office, can be useful for determining soil attributes. In the photo above, map unit 222E is a silty, well-drained gravelly soil, whereas map unit 421C is a saline/sodic clayey soil. Both these soils would limit the type of plants that could be grown, and require additional management for plant establishment. However, map unit 39C is a silty clay loam soil that has few limitations and is a good soil for growing most plants.

Design



The use of color principles, based on the distinction between warm and cool, is a good guide when designing floral displays.

Red, orange and yellow are warm colors that attract attention and seem to advance toward the viewer.

Blue and green are cool colors that tend to recede from the viewer.

Color combinations can be contrasting (yellow and blue) or complimentary (red and orange).

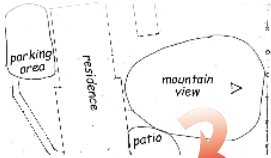
CAD graphic by Miguel Camacho Serna, University of Arizona

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

Identify site attributes that affect landscape function. Use simple shapes to represent features or conditions such as a dog kennel, RV parking, turf area, perennial garden, sun exposure, or views. It is important to include areas with different maintenance requirements.



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.

Preliminary Designs

Plant material is assigned to a space by specific characteristics or function. Important and large-sized plants or groups of plants are located first. Trees, mass plantings, and stand-alone gardens are examples. Actual dimensions of patios, sidewalks and other hard surfaces may be represented.



Completed Plan

A bird's-eye view of the final design. 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

- Along borders, short-statured plants should ideally be placed in the front and taller-statured plants toward the back. In small areas, borders are best maintained if no wider than 4 to 8 feet.
- Borders and edges that curve are more natural looking than those with rigid, straight lines. The width of a perennial

border should be proportionally about one-third the height of the background.

- In stand-alone, 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.
- Group plants into zones according to their needs for sun, water, and soil.
- Utilize plants so they are visible and colorful throughout the year.
- Know a plant's stature and size at maturity.
- Design with your surroundings in mind; consider using plant screens or barriers as necessary for privacy.

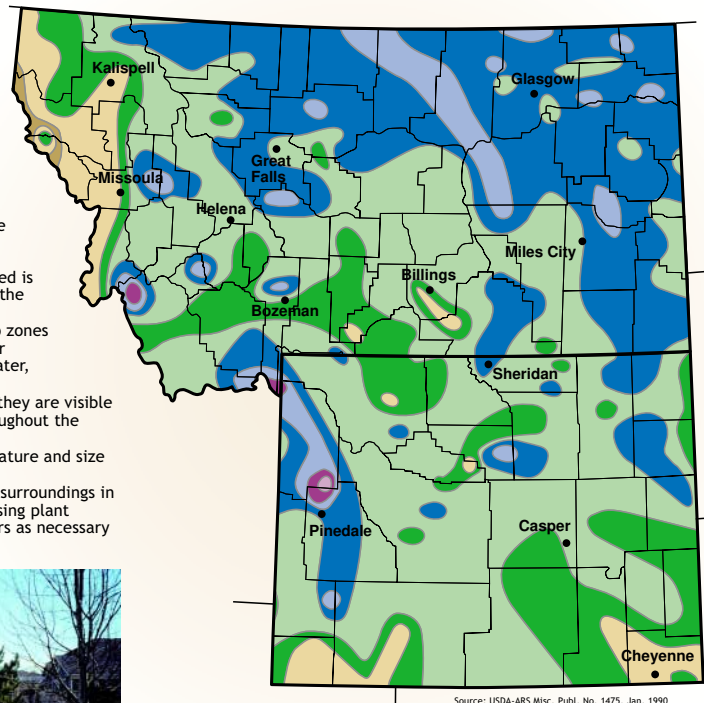


Water-loving aspens and dogwoods receive extra moisture because of their placement in the gravelled runoff area.

USDA Winter Hardiness Zones

Degrees Fahrenheit

- Zone 2a (-45 to -50)
- Zone 2b (-40 to -45)
- Zone 3a (-35 to -40)
- Zone 3b (-30 to -35)
- Zone 4a (-25 to -30)
- Zone 4b (-20 to -25)
- Zone 5a (-15 to -20)
- Zone 5b (-10 to -15)



Source: USDA-ARS Misc. Publ. No. 1475, Jan. 1990

Eye Grabbers

Do	Don't
Group 3, 5 or 7 plants together	Scatter single plants here and there
• unifying	• spotty and confusing
Match size of plant to scale of site	Incorporate many big trees on small lot
• human feeling	• overpowering
Accent with bright, warm colors	Apply many variations of color
• cheery	• disorganized
Vary size and spacing	Repeat similar shapes
• interesting	• boring

Site Preparation



Existing Sod

If you have existing areas of unwanted turf, pasture, or undesirable native vegetation, it must be physically or chemically removed. In larger windbreak or shelter-belt plantings it is recommended that the site be chemically and mechanically followed for one growing season to control vegetation and store moisture.

Bare Soil

Construction activities may completely disturb the soil profile and eradicate all existing vegetation. The necessary site treatment is determined by the extent of disturbance.



Sod Removal

Completely remove sod and discard or utilize elsewhere.



Chemical Control

Apply a non-selective herbicide such as glyphosate to green growth that has 3-4 inches of height. Spraying during active early growth may require multiple applications. Glyphosate is most effective when applied in September.



Intact Soil Profile

If there is minimal impact to the topsoil, or if at least 2-4 inches of topsoil remain, there is adequate growing media.



No Topsoil or Mixed with Subsoil

Re-surface with salvaged topsoil or weed-free introduced topsoil. Rough up the surface of the subsoil so that the subsoil-topsoil interface is not smooth.



To build a more favorable topsoil, organic matter and fertility must be added. Amendments such as composted manure, straw, and lawn clippings can be used. Incorporate organic material into the top 4-6 inches of soil.



Incorporate Organic Matter

Deep roto-till or disk to incorporate dead sod following chemical treatment, or remaining roots after sod removal, into the top 6 inches of soil.



Weed Control

Control perennial weeds or unwanted plants well in advance of landscaping. Do not use any chemicals having a harmful residual effect on planned landscaping plant material.



Caution: Apply all chemicals according to label directions.

Seedbed Preparation

If compaction has resulted from heavy traffic during construction, the site should be ripped and tilled to improve soil tilth and moisture percolation. Site preparation will have significant impact on the ultimate success of any planting. Following tillage, the seedbed should be firmed, but not compacted. A firm seedbed helps control planting depth and facilitates good seed-soil contact. If possible, the site should be irrigated well in advance of seeding or planting to allow settling of manipulated soils. Reshape or contour as needed after soil dries and prior to planting.



Seeding



Broadcast seeding.

Seed should be planted at a depth of 1/4 to 1/2 inch, with some of the very small-seeded species planted just below the soil surface. Planting with a double-disk drill assures proper seed placement, but may result in undesirable rows in a landscaping situation. A Brillion™-type drill will uniformly dribble and cover the seed. Broadcast seeding requires light roughening of the soil surface prior to scattering seed and raking or dragging to cover seed.

Transplanting

Many accent or specimen plants must be transplanted as containerized material into beds, rock gardens or borders. Containerized plants are usually started from seed and are well established before planting. Successful plant salvage from native sites is generally limited. Rhizomatous and stoloniferous plants can be easily transplanted. However, only young or smaller bunchgrasses and taprooted plants are moved successfully. Any transplanting of wildland material should be done while plants are dormant.



Many native grasses and flowers are available from commercial nurseries.

Choosing the Right Grasses and Wildflowers



Tag Tips:

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

Plant Adaptation

Select plants that are naturally adapted to survive in local environmental conditions.

- Reputable nurseries and garden centers choose native and introduced plant material that is adapted to the area. A plant's adaptation to a certain environment can be researched. However, the only way to ensure a plant's true identity is by the scientific name, which provides positive identification of the species. Common names vary in time, place, and culture.
- When purchasing plants and seed, be on the lookout for information on winter hardiness. The best indicator is a designated USDA Winter Hardiness Zone listed on the tag or label. Ask questions about local adaptation and the plant's origin. Plants or seed from a milder climate or a more southern location may not be hardy.
- Replacement guarantees may be available and will vary from within six months up to one year from purchase. Guarantees are limited by the fact that proper plant care after purchase is beyond the control of the seller.
- Digging and transplanting plants from the wild into a home landscape is usually unsuccessful. Wildland plants have extensive root systems and often have special needs that cannot be retained. In many places, it is illegal to dig plants in the wild.



Blacksampon echinacea, a native wildflower, is grown and sold at many nurseries.

Plant Attributes and Features

When choosing plants, strive for contrast, harmony and boldness to provide interesting variety throughout the year. It will take time for plants to mature, so allow plenty of room for growth. Perennials are plants that live longer than two years and life spans range from just a few years, up to many years. Longevity is often referred to as short- or long-lived.

Nature's Defenses

- 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.

- Herbaceous perennials** grow and die back to the soil surface every year.
- Woody perennials** are trees and shrubs that persist above ground year after year.
- Annual and biennial** life spans require replanting every one or two years.

Some plants have developed strategies to cope with low-water environments. These are defense mechanisms designed to gather and preserve precious water. Look for plants with leaves that are fuzzy, light-colored, seem blue-tinged, or have spines.



Northern oriole in cottonwood trees.



Tortoiseshell butterfly feeding on senecio blossom.

Garden Attractions

- Fragrance
- Wildlife enhancements
- Herbs or medicinal
- Color schemes or seasonal bloom schedules
- Recreation of natural habitats

Plant Types

Grasses



Bluebunch wheatgrass.



Sheep fescue.



Little bluestem used as ornamental.

Grasses are common components in a landscape. They reproduce by seed and above- or below-ground stems. 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.

- Cool-season species green up early and actively grow from spring until mid-summer.
- Warm-season species begin growth in early summer and remain active until mid-autumn. In fall they have attractive foliage and are generally the most attractive grasses of the season.

Wildflowers



Blacksampon echinacea.



Purple prairieclover.



Aster.



Two varieties of penstemon.



Arnica.



Phacelia.



Lupine.

Some wildflowers require direct sunlight for 6 to 8 hours per day. As sunlight decreases, plant height and bloom size decrease. Bloom season and duration of bloom vary, so coordinate the extension and overlap to ensure interesting color throughout the entire growing season.

Choosing the Right Trees and Shrubs



Selecting the Best Type of Nursery Stock For Your Budget and Construction Needs

Bareroot

Plants that are dug and shipped as dormant 1- to 3-year-old stock without any soil surrounding their roots. Deciduous plants are primarily produced this way, although some evergreens can be grown using this method.

Container

Plants that are grown in a pot. Avoid plants grown in the field and then transplanted to a pot just prior to sale.

B&B

(Balled and Burlapped). Hand or mechanically dug field-grown plants that have their roots and surrounding soil wrapped in burlap fabric secured with twine. Used primarily for large, field-grown stock.

Wire Baskets

A form of B&B that utilizes a wire basket to secure the rootball in lieu of twine. The baskets are untied from the trunk but remain in place during planting.

	ADVANTAGES	DISADVANTAGES
Bareroot	• inexpensive • ease of planting • field grown hardiness	• special handling and storage • long time period until maturity • decreased root area • easily desiccated • timing of planting is critical • poorer survival
Container	• moderate cost • flexibility in handling, storage, planting • intact root system • better survival	• limited water/nutrient reservoir • more expensive than bareroot • potentially girdling roots • potentially root bound
B&B	• mature size/instant effect • better survival	• handling, storage, planting labor • expensive



Bareroot.



Container.



Balled and burlapped.

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 rootball once the container or burlap is removed.
- Bareroot material should have a shoot:root ratio of 1:1 or 1:2 with extensive, fibrous roots.

TIP: Avoid plants with signs of dead, discolored, shriveled, or water-soaked roots. Remove unhealthy or deformed roots with a sharp pruner prior to planting.



Healthy 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.



Ponderosa pine with healthy trunk and branches.

- The trunks of large trees should be firmly connected to the rootball (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 back (headed).
- Stems should be firm and smooth without a wrinkled appearance or soft texture.

TIP: On healthy tissue, a shallow cut of the stem reveals a light green cambium layer between the bark and the wood.

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

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.



Healthy bur oak foliage.

Grasses

Grasses can bring texture and softness into a landscape design. The wide variety of native grasses provides endless opportunities for adding color, providing a diversity of sizes and shapes, and offering relatively low maintenance. Favorable characteristics of most 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.

The use of native grasses for low maintenance 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.



Newly transplanted buffalograss plugs (1-foot spacing).



Crested wheatgrass.



'Covar' sheep fescue.



'Critana' thickspike wheatgrass.

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 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 [500 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; e.g., 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 are virtually maintenance-free and, in most cases, perpetuate themselves forever.

Suggested Native Grassland Seeding Mixtures

■ Mountain/Foothills

bluebunch wheatgrass (*Pseudoroegneria spicata*)
Idaho fescue (*Festuca idahoensis*)
big bluegrass (*Poa ampla*)
mountain brome (*Bromus marginatus*)

■ Tallgrass Prairie

big bluestem (*Andropogon gerardii*)
little bluestem (*Schizachyrium scoparium*)
switchgrass (*Panicum virgatum*)
Indiangrass (*Sorghastrum nutans*)

■ Mixed Prairie (upland)

bluebunch wheatgrass (*Pseudoroegneria spicata*)
prairie junegrass (*Koeleria macrantha*)
needle & thread (*Stipa comata*)
Indian ricegrass (*Achnatherum hymenoides*)

■ Mixed Prairie (lowland)

western wheatgrass (*Pascopyrum smithii*)
green needlegrass (*Nassella viridula*)

thickspike wheatgrass (*Elymus lanceolatus*)
blue grama (*Bouteloua gracilis*)

Grasses for Ground Cover and Lawns

Species	Cultivars	Life Form	Soil Preference			Seeding Rates for Pure Stands					Remarks
			Sandy	Loamy	Clayey	Lawns ¹ lbs.PLS per 1000 sq ft	Prairie Planting ² lbs.PLS per acre	Drought ³ Tolerance	Trampling ³ Resistance	Mowing ³ Tolerance	
COOL-SEASON											
Native											
western wheatgrass (<i>Pascopyrum smithii</i>)	Rosana Rodan	rhizomatous		X	X	4	8	Moderate	Good	Good	forms open sod, bluish in color
thickspike wheatgrass (<i>Elymus lanceolatus</i>)	Critana Bannock Schwendimar	rhizomatous	X	X	X	3.5	6	Good	Fair	Fair	finer leaved than western wheatgrass, good seedling vigor
streambank wheatgrass (<i>Elymus lanceolatus</i>)	Sodar	rhizomatous	X	X	X	3.5	6	Good	Fair	Fair	similar to thickspike, good seedling vigor
green needlegrass (<i>Nassella viridula</i>)	Lodorm	bunchgrass		X	X	3	5	Moderate	Fair	Fair	best in a mix with other cool-season grasses
Introduced											
crested wheatgrass (<i>Agropyron cristatum</i>)	Ephraim Roadcrest	rhizomatous	X	X	X	3	7	Excellent	Good	Good	good drought resistance
sheep fescue (<i>Festuca ovina</i>)	Covar Bighorn	bunchgrass	X	X		1	2	Good	Fair	Good	fine-leaved, competitive with other plants & weeds
hard fescue (<i>Festuca trachyphylla</i>)	Durar	bunchgrass	X	X		1	2	Good	Fair	Good	fine-leaved, short stature
tall fescue (<i>Festuca arundinacea</i>)	Alta Fawn	bunchgrass		X	X	2.5	6	Moderate	Good	Good	coarse leaves, high tolerance of trampling
Canada bluegrass (<i>Poa compressa</i>)	Reubens Talon Foothills	rhizomatous	X	X	X	1	1	Moderate	Good	Good	will form sod, but not as tight as Kentucky bluegrass
Russian wildrye (<i>Psathyrostachys juncea</i>)	Bozoisky-Select Mankota	bunchgrass	X	X	X	3	7	Excellent	Good	Fair	excellent drought resistance
WARM-SEASON (Native)											
blue grama (<i>Bouteloua gracilis</i>)	Bad River Willis Alma	bunchgrass	X	X	X	1	2	Excellent	Excellent	Good	short stature, infrequent mowing, late green-up
buffalograss (<i>Buchloe dactyloides</i>)	Bismarck Topgun Plains	stoloniferous		X	X	9	15	Good	Excellent	Good	short stature, infrequent mowing, late green-up, best results with plugs
sideoats grama (<i>Bouteloua curtipendula</i>)	Killdeer Pierre	bunchgrass	X	X	X	3	5	Moderate	Fair	Poor	tallest of grama grasses

¹ Seeding rates for sod are figured at approximately 500 PLS seeds per square foot.; ² Seeding rates for a prairie grass stand are figured at approximately 25 PLS seeds per square foot;

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

Grasses

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.



Blue grama.

Buying Seed

Much of the grass utilized in native landscaping will be established from seed. The buyer must be aware of what they are buying, both in terms of quality and what undesirable material may be in the seed lot. All seed sold in Montana and Wyoming is required to meet certain standards; i.e., the seed lot can't have more than 2 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, has minimum purity and germination levels, and meets specific limits on the amount of weeds and other crops allowed.

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.

Common name of plant species

Cultivar or variety name

Percentage of bulk material that is actually seed of tagged species

Percentage by weight of stems, dirt, insect parts, etc.

Percentage of other grass or agronomic crops

Percentage of weed seed

Restricted weeds expressed as number/pound (varies by state). If prohibited seeds are present, the seed can't be sold.

Number assigned to the production field by the state certification agency

Germination determined by a standard lab analysis

Seed that didn't germinate but was determined to be alive with Tetrazolium (TZ) test

Total viability

Date of the most current germination test

Origin of the cultivar, not necessarily where it was grown

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.



'Trailhead' basin wildrye.



Bluebunch wheatgrass.



'Rimrock' Indian ricegrass.

Grasses for Landscape Accents

Species	Cultivars	Life-form	Mature Height	Fall Color	Soil Preference			Remarks
					Sandy	Loamy	Clayey	
COOL-SEASON (Native)								
Indian ricegrass <i>Achnatherum hymenoides</i>	Rimrock Nezpar Paloma	bunchgrass	1-2'	pale yellow	X	X		attractive spreading seed head, seeds utilized by birds & mammals
basin wildrye <i>Leymus cinereus</i>	Trailhead Magnar	bunchgrass	5-8'	yellow/tan		X	X	tall stature, good background plant
bluebunch wheatgrass <i>Pseudoroegneria spicata</i>	Goldar	bunchgrass	1-2'	pale yellow	X	X	X	state grass of Montana, attractive plant at maturity
prairie junegrass <i>Koeleria macrantha</i>	No releases	bunchgrass	6-18"	pale yellow	X	X	X	small stature, delicate blue-green leaves with compact seed head
WARM-SEASON (Native)								
big bluestem <i>Andropogon gerardii</i>	Bison Bonilla Sunnyview	bunchgrass	5-7'	reddish/purple	X	X	X	tall stature, turkey-foot shaped seed head, good border or background plant
little bluestem <i>Schizachyrium scoparium</i>	Badlands selection Camper Blaze	bunchgrass	2-3'	reddish	X	X	X	shorter robust bunches with attractive red fall colors
switchgrass <i>Panicum virgatum</i>	Dacotah Forestburg	bunchgrass	3-5'	golden yellow		X	X	seed head is an open panicle, seeds readily used by birds and small mammals
Indiangrass <i>Sorghastrum nutans</i>	Tomahawk	bunchgrass	4-6'	yellow/bronze	X	X	X	tall stature, good border or background plant
sideoats grama <i>Bouteloua curtipendula</i>	Killdeer Pierre	bunchgrass	1-2'	yellow	X	X	X	unique seed head with oat-like spikelets along one side of spike
blue grama <i>Bouteloua gracilis</i>	Bad River selection Willis Alma	bunchgrass	6-12"	pale yellow	X	X	X	eyebrow-shaped seed head, excellent drought tolerance, good for rock garden
prairie sandreed <i>Calamovilfa longifolia</i>	Goshen Pronghorn	rhizomatous	5-7'	pale yellow	X	X		prefers sandy soil, good for sandy soil stabilization

Wildflowers

Perennial wildflowers live for more than 2 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, 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. Follow spacing recommendations. Keep potted plants 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.** To extend the flowering period and promote rebloom, “deadhead” 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. By removing debris, pest and disease problems are reduced and interference with new growth is minimized.

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.

Landscape Uses

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

Specimens



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 piece in a mass planting. They should be used sparingly to avoid attracting attention to many different points.

Borders



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. Avoid creating visual chaos by limiting the number of plant types.

Mass Plantings



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.

Ground Covers



Spreading and low-growing plants work well to 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	WHZ ²	Precip. inches	Longevity ³	Color ⁴	Light ⁵	Ht. feet	Bloom Season ⁶	Feature ⁷
common yarrow	<i>Achillea millefolium</i>	C, M, F	2b-5a	9	LP	W	PSh-FS	1-2	S-Su	Dr, M
western pearly everlasting	<i>Anaphalis margaritacea</i>	C, M	3a-4b	10	SP	W	PSh-FS	1-2	Su	M
littleleaf pussytoes	<i>Antennaria microphylla</i>	C, M, F	2b-4b	12	SP	W	FS	1	LS-Su	M
smooth aster	<i>Aster laevis</i>	C, M, F	3a-4b	12	MP	B	PSh-FS	2-3	Su	Bt, Dr
white prairieclover	<i>Dalea candida</i>	C, M	3a-4b	12	LP	W	FS	1-3	Su	Bt
purple prairieclover	<i>Dalea purpurea</i>	C, M	3a-4b	14	LP	Pu	PSh-FS	1-2	Su	Bt
blacksampson echinacea	<i>Echinacea angustifolia</i>	M, F	3a-4a	12	LP	P	FS	2-3	Su	Bt, M, Dr
sulphur-flower buckwheat	<i>Eriogonum umbellatum</i>	C, M	3a-4b	10	LP	W-Y	FS	1	Su	Bt, M
blanket flower	<i>Gaillardia aristata</i>	C, M, F	3a-4b	10	LP	Y	FS	3	Su	Bt, Dr, M
sticky geranium	<i>Geranium viscosissimum</i>	C, M	3a-4b	14	LP	P	PSh-FS	2-3	LS-LSu	M
boreale sweetvetch	<i>Hedysarum boreale</i>	C, M, F	3a-4b	12	LP	P	FS	1-2	Su	
Maximilian sunflower	<i>Helianthus maximiliani</i>	C, M, F	3b-5a	14	SP	Y	FS	4-6	LSu-EF	Bt, Dr
showy goldeneye	<i>Heliomeris multiflora</i>	C, M	3b-4b	14	SP	Y	FS	3	MSu-EF	Bt, Dr
dotted gayfeather	<i>Liatris punctata</i>	C, M	3b-4b	10	LP	P	FS	1-2	LSu-EF	Bt, Dr, M
Lewis flax	<i>Linum lewisii</i>	C, M	3a-4b	10	SP	B	PSh-FS	1-2	LS-Su	M
lupine	<i>Lupinus</i>	C, M, F	2b-5a	14	LP	All	Sh-FS	1-2	S-Su	
wildbergamot beebalm	<i>Monarda fistulosa</i>	C, M, F	3a-4b	12	MP	Pu	PSh-FS	2-4	Su	B, Bt, Dr, M
plains pricklypear	<i>Opuntia polyacantha</i>	C, M, F	3b-4b	8	LP	Y	FS	—	LS-ESu	D, Mr
beardtongue	<i>Penstemon</i>	C, M	3a-5a	10	A-SP	All	Sh-FS	1-4	LS-EF	B, Bt
silverleaf phacelia	<i>Phacelia hastata</i>	C, M, F	3b-4b	10	LP	W	FS	1-2	LS-Su	
spiny phlox	<i>Phlox hoodii</i>	C, M	3b-4b	10	LP	W	FS	—	LS-Su	Dr
woolly cinquefoil	<i>Potentilla hippiana</i>	C, M	3b-4b	14	SP	Y	FS	1-2	ESu	
prairie coneflower	<i>Ratibida columnifera</i>	C, M, F	3a-4b	10	SP	Y	FS	1-3	Su	Bt, Dr, M
scarlet globemallow	<i>Sphaeralcea coccinea</i>	M, C	3a-5a	8	P	O	FS	1	Su	Dr, M
prairie thermopsis	<i>Thermopsis rhombifolia</i>	M, F	3b-4b	8	LP	Y	FS	1-2	LS-Su	Dr
American vetch	<i>Vicia americana</i>	C, M, F	3b-5a	10	LP	B	FS	1	LS-Su	
soapweed yucca	<i>Yucca glauca</i>	C	4a-4b	8	LP	W	FS	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 Winter 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 Sh Shade, PSh Partial Shade, FS Full Sun; ⁶ S Spring, Su Summer, F Fall, E Early, M Mid, L Late; ⁷ B Birds, Bt Butterflies, Dr Deer-resistance, M Medicinal.

Trees and Shrubs

Trees and Shrubs for Native Landscapes									
Common Name	Scientific Name	Rate of Growth ¹	Minimum Precip. (in.) ²	USDA Winter Hardiness Zone	Saline Soil Tolerance ³	Sun ⁴	Overall Landscape Aesthetic ⁵	20-Year Height (feet)	Mature Width (feet)
Trees									
bur oak	<i>Quercus macrocarpa</i>	s-m	12	2	mt	f	m-h	18 to 25	20 to 35
green ash	<i>Fraxinus pennsylvanica</i>	m	10	3	mt	p-f	m	20 to 30	30 to 40
honeylocust	<i>Gleditsia triacanthos</i>	m	12	3	mt	f	m	15 to 20	30 to 40
ponderosa pine	<i>Pinus ponderosa</i>	m	12	3	mt	f	m	16 to 20	25 to 30
Douglas fir	<i>Pseudotsuga menziesii</i>	s-m	14	3	nt-mt	p-f	m	12 to 18	20 to 30
limber pine	<i>Pinus flexilis</i>	s-m	10	3	nt-mt	f	m-h	12 to 20	15 to 30
Colorado spruce	<i>Picea pungens</i>	m	12	2	nt-mt	p-f	m	16 to 20	15 to 25
common hackberry	<i>Celtis occidentalis</i>	m	12	3	mt	p-f	l-m	15 to 20	10 to 20
western mountain ash	<i>Sorbus sitchensis</i>	m	15	3	nt	p-f	m-h	10 to 15	10 to 12
paper birch	<i>Betula papyrifera</i>	m-r	H	2	nt	f	m	25 to 35	20 to 30
quaking aspen	<i>Populus tremuloides</i>	r	H	1	nt-mt	f	m	15 to 20	15 to 20
black cottonwood	<i>P. balsamifera</i> ssp. <i>trichocarpa</i>	r	H	2	nt-mt	f	m	40 to 50	35 to 40
narrowleaf cottonwood	<i>Populus angustifolia</i>	r	H	2	nt-mt	f	m	30 to 40	25 to 35
plains cottonwood	<i>P. deltoides</i> ssp. <i>monilifera</i>	r	H	2	nt-mt	f	m	40 to 50	35 to 40
Shrubs									
Rocky Mountain juniper	<i>Juniperus scopulorum</i>	s-m	10	3	mt	f	m	10 to 12	12 to 20
common juniper	<i>Juniperus communis</i>	s-m	12	2	mt	f	l-m	3 to 5	4 to 8
silverberry	<i>Elaeagnus commutata</i>	m	12	2	mt-t	p-f	l-m	4 to 8	3 to 6
American plum	<i>Prunus americana</i>	m	14	3	mt	p-f	m	8 to 10	8 to 10
common snowberry	<i>Symphoricarpos albus</i>	m	14	3	nt-mt	p-f	l-m	1 to 3	1 to 3
mallow ninebark	<i>Physocarpus malvaceus</i>	m	15	3	nt	p-f	l-m	2 to 3	3 to 4
Lewis' mockorange	<i>Philadelphus lewisii</i>	s-m	15	3	nt	p-f	m	3 to 6	3 to 6
golden currant	<i>Ribes aureum</i>	m	12	2	mt	p-f	m	3 to 5	3 to 6
silver buffaloberry	<i>Shepherdia argentea</i>	m	10	2	t	f	l-m	6 to 12	8 to 14
Canada buffaloberry	<i>Shepherdia canadensis</i>	s	14	3	nt	p-f	m	3 to 5	6 to 8
chokecherry	<i>Prunus virginiana</i>	m	12	2	mt	p-f	m	10 to 12	10 to 20
western sandcherry	<i>Prunus pumila</i> var. <i>besseyi</i>	m	12	3	mt	f	m	3 to 5	3 to 5
skunkbush sumac	<i>Rhus trilobata</i>	s-m	10	3	mt	p-f	l-m	3 to 6	4 to 8
Woods' rose	<i>Rosa woodsii</i>	m	12	2	nt-mt	p-f	m	4 to 5	4 to 6
staghorn sumac	<i>Rhus typhina</i>	m	10	3	nt-mt	p-f	m	8 to 10	8 to 15
shrubby cinquefoil	<i>Pentaphyllloides floribunda</i>	m	14	2	mt	p-f	m	1 to 3	1 to 3
serviceberry	<i>Amelanchier alnifolia</i>	m	12	4	nt-mt	p-f	m	6 to 8	10 to 15
fourwing saltbush	<i>Atriplex X aptera</i>	s-m	10	2	mt-t	f	l	1 to 3	2 to 5
winterfat	<i>Krascheninnikovia lanata</i>	m	10	3	mt	f	l	1 to 3	1 to 3
curlleaf mt. mahogany	<i>Cercocarpus ledifolius</i>	s	10	3	mt	p-f	m	4 to 8	2 to 6
big sagebrush	<i>Artemisia tridentata</i>	s-m	8	3	mt	f	l-m	3 to 6	4 to 8
redosier dogwood	<i>Cornus sericea</i>	m-r	H	2	nt	p-f	m	6 to 8	10 to 15
Groundcovers									
bearberry	<i>Arctostaphylos uva-ursi</i>	s	14	2	nt-mt	s-p-f	m-h	0.25 to 0.5	2 to 3
Oregon grape	<i>Mahonia repens</i>	s	14	3	nt-mt	p-f	m	0.5 to 1	4 to 6
horizontal juniper	<i>Juniperus horizontalis</i>	s	12	3	mt	f	m	0.5 to 1.5	5 to 8
Vine									
Virginia creeper	<i>Parthenocissus quinquefolia</i>	m	14	3	nt-mt	p-f	m-h	0.5 to 0.75	25+

¹s-slow, m-moderate, r-rapid; ²H-hydric (needs moisture advantage); ³t-tolerant, mt-moderately tolerant, nt-not tolerant; ⁴f-full sun, p-partial, s-shade; ⁵l-low, m-medium, h-high

Intermediate Care, Storage, and Handling of Trees And Shrubs

After purchase, the care and handling of plant material from the time it is delivered until the time it is installed is the responsibility of the customer.

Bareroot plants are shipped dormant and should be planted as soon as possible, usually within 72 hours of receipt. Optimum storage is 34° to 37°F in refrigerated cooling at a relative humidity of 80 to 90 percent. For short storage intervals (less than 3 days), bareroot plants can be kept in cool, shaded locations outdoors. Keep the roots covered with sterile, moistened media. The media should be just moist enough that only a few drops of water can be squeezed from a single handful of material. Keep seedlings out of direct sun, protected from wind desiccation and heat build-up, and keep the roots moist. Never allow the roots to dry out, even briefly, prior to planting. Keep bareroot plants in cold storage until they are needed for outplanting. Bareroot plants should show no signs of active growth, even bud swell, prior to planting.

Container plants offer more flexibility in planting, handling, and storage than bareroot stock. Potted plants have a limited reservoir of water and may require daily watering during active growth. Container stock can be planted as either dormant or active-growing plants. Store

potted plants in a wind-protected area under filtered light. Water until drainage occurs from the bottom of the pot.

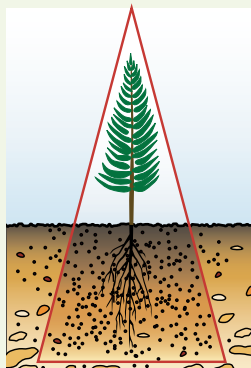
Balled and Burlapped (B&B) material often requires special handling given the size and weight of the plant, roots, and soil. Do not move B&B plants by the trunk alone. Support the trunk and rootball simultaneously to assure the roots are not broken at the trunk surface. Never drop a B&B plant abruptly 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 rootball. Store B&B material as you would container plants. Media such as a sand:peat mix may be needed to cover the rootball during long-term storage. Special provisions may be needed to secure the plants during storage in high wind locations.

Trees and Shrubs

Anatomy of a Properly Planted Tree

Always call your local utility company before digging.

Bareroot



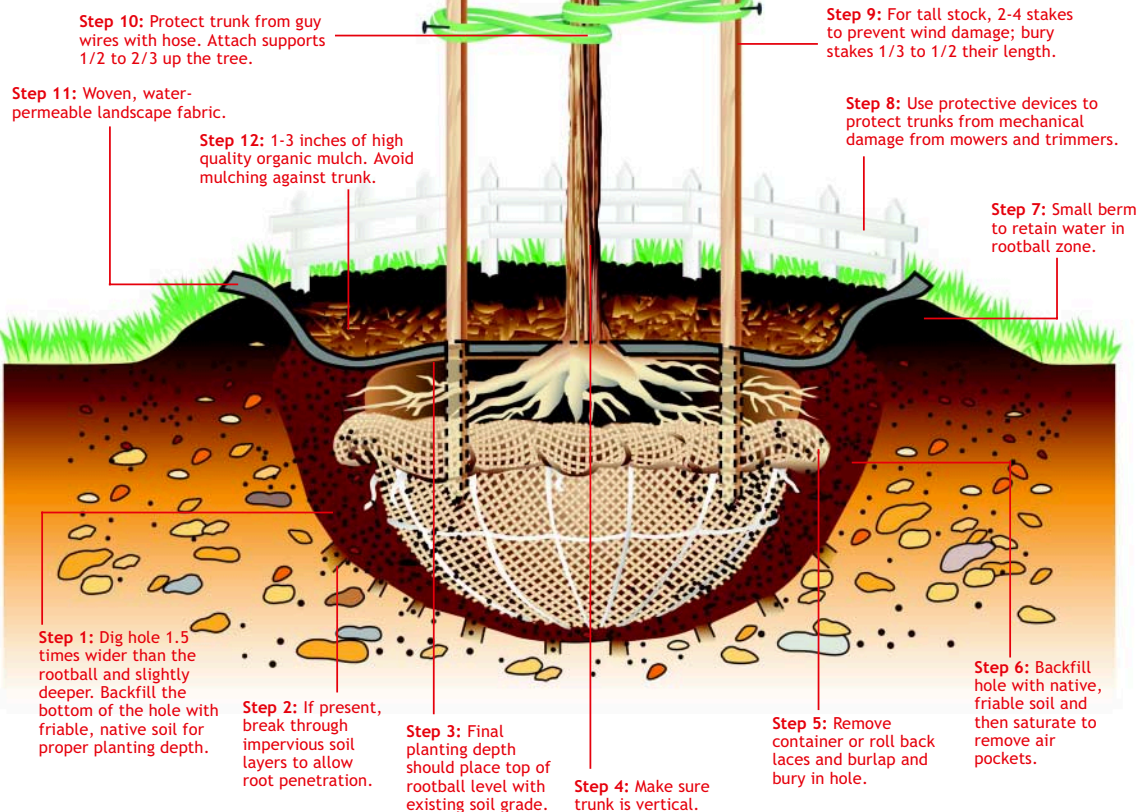
Adapted from Windbreaks for Montana A Landowner's Guide, Cooperative Extension Service, Montana State University Bulletin 366, July 1986.

TIP: Do not leave roots exposed to the air for even brief periods. Keep bareroot plants covered with moist burlap during the planting process. Make sure roots are fully extended and vertical in planting hole. Follow the B&B steps as appropriate.

Containers and Balled and Burlapped

TIP: Always remove the plant from the pot prior to planting.

TIP: The removal of burlap is unnecessary although it should be untied from the trunk of the tree and rolled back into the planting hole and covered with soil to prevent wicking. Synthetic wraps must be totally removed to prevent girdling.



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

- **Seedlings:** A moist soil profile, prior to planting, will increase seeding success. Watering should be done in frequent, light applications during the first 4-6 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.
- **Transplants:** Young transplants require frequent and regular watering until root development can provide the proper shoot: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 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 the plant as it prepares itself for the winter months. Trees, in particular, should be deep watered in the fall to prepare for possible warm periods during the winter months. As temperatures warm up in the spring there is an urgent need for water to support rapid early growth.



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

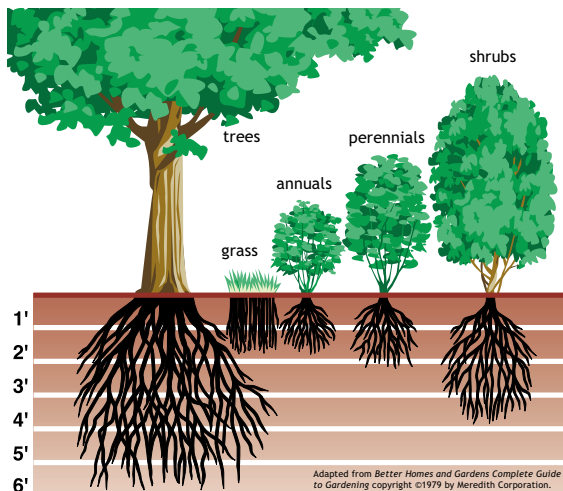


Low pressure sprinkler systems conserve water by delivering small amounts exactly where needed.

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.
- With severe slopes, establish berms or terraces to hold water and stabilize the slope.
- Avoid using sprinklers that throw a fine mist high in the air.
- Avoid watering during hot, windy, or rainy weather.

Root Lengths Vary



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

Water Conservation Strategies

Zoning

Plants should be established in zones to maximize water use efficiency. These zones will also 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	2-3 gals. added per sq. ft. per growing season
1/2" 3 times/wk	3/4" once/wk	1/2" bi-monthly
Approx. 30" added/season	Approx. 16" added/season	Approx. 5" added/season

Shading/Shielding

Plants that require more moisture 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 to reduce weed growth and erosion. Apply mulch directly to the soil surface or over a landscape fabric. Don't use black plastic unless it's been perforated; it prevents air and water from reaching plant roots and it reduces beneficial soil organisms.

Organic mulches such as wood chips or grass clippings decompose and improve soil texture, but must be replenished periodically. Apply in a layer 1-3 inches deep between plants.

Inorganic mulches such as rocks or gravel rarely need replacement and are good in windy areas. Apply in a layer 2-4 inches deep between plants.

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.



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.

How Much/How Often

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

- amount & 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)

Infiltration Rates and 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 under ground 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 oversaturation below the soil surface.



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

Maintenance



photo courtesy of Tracy McCreath

Mowing

When mowing, it is recommended that a 3-inch stubble height be left. With taller-statured grasses an even higher stubble height should remain. Various grass species respond differently to mowing. Rhizomatous species are stimulated by frequent cropping while bunchgrasses are often stressed or even eliminated by frequent cutting.

The mowing frequency and intensity will vary according to the species and intended use of a particular stand of grass:

- **Manicured Lawn.** Maintained at uniform height. Most sod-forming species are naturally short-statured.
- **Biomass Removal.** The purpose of mowing is to reduce the amount of dormant or dead stems and leaves for such purposes as fire prevention, reduction of potential snow drifting or just removal of mature plant material at the end of a growing season.

- **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. Extreme caution must be taken to avoid property damage and annoyance to neighbors. Burning permits may be required—inquire locally.



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.

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. Mature specimen plants can be left to add winter color or aid in trapping snow. Otherwise, herbaceous material should be trimmed and removed in late fall or early winter. Herbaceous specimen plants left standing over winter should be trimmed in early spring to remove dead plant material and unwanted plant litter.

Woody Plants

- At an early age woody plants should be pruned to conform with the intended use and landscape design. Trim to single stem or leave as multi-stem plant.
- Prune lower branches to provide lower stem sanitation or alleviate shading of adjacent ground cover plants.
- Prune disease or insect-affected plant parts to minimize spread.
- Remove rubbing, deformed, and dead branches.
- Prune interior limbs to reduce wind resistance.
- Conifers should be pruned in spring or early summer.
- Deciduous trees and shrubs should be dormant-pruned in late fall or winter.



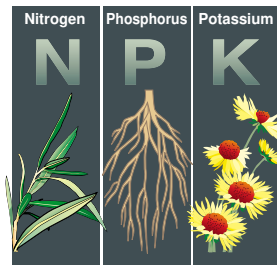
Use sharp, high-quality pruners. **Note:** Sterilize pruners after cutting a diseased branch.



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

Fertilizer

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



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Seedlings

Unless you are planting into a very raw, mineral soil, fertilizers (particularly nitrogen) should not be applied the seedling year—as you would only be feeding the weeds rather than the seeded plant material. However, the 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. Very low rates, if any at all. High fertility levels will stimulate spindly and weak stem growth.

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

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.

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

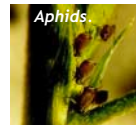


Pest Control

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 will probably attract more desirable insects 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 deterring plants should solve most insect pest problems. Monitor insect populations closely so that control measures can be implemented in the early stages of infestation.



Diseases

Sanitation is the key to disease control and prevention. With careful monitoring and early detection, most diseases can be avoided. As with insects, native plants have evolved a natural immunity to many diseases. With selective pruning, excess litter removal, and in some cases, by using fire, diseases in a natural landscape will be minimal. Also avoid late afternoon or evening watering of foliage.

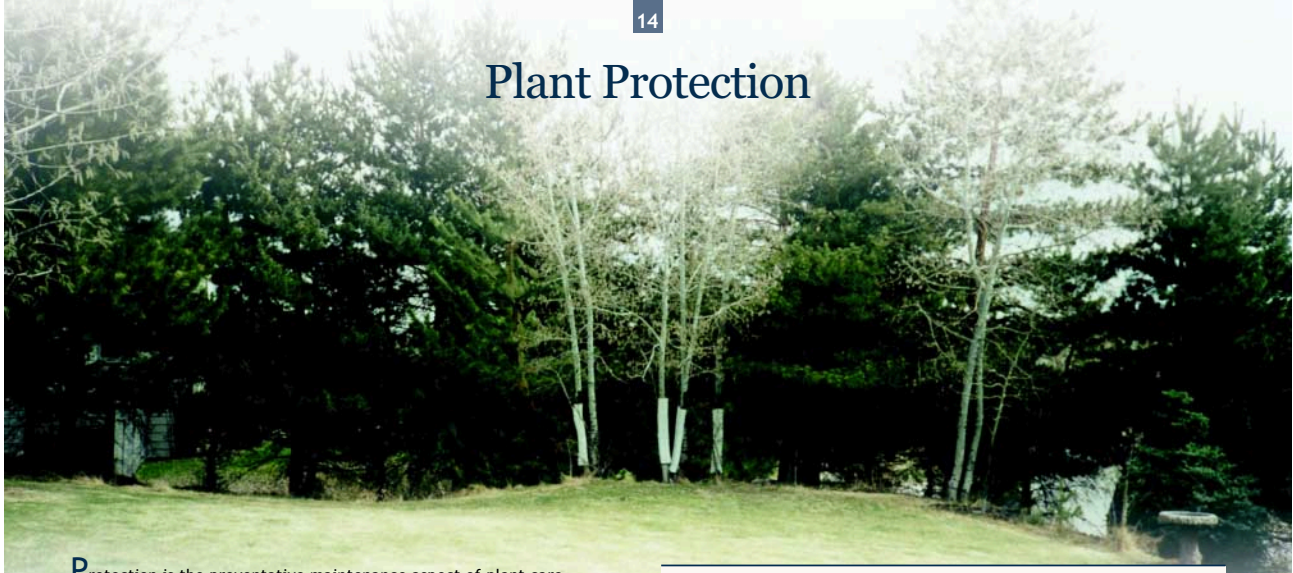
Animals

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 dealt with prior to implementation of a landscape plan. Annual weeds can be reduced by not allowing them to go to seed. The first two establishment years require the most maintenance, but once your 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 aspect of plant care. Although we often think of protection in terms of avoiding damage from animals or people, protection includes any proactive steps to minimize plant stress and maintain health. An important first step in this process is to select well-adapted species and then maintain them in a vigorous condition.

Protecting Plants from Desiccation

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

- Water in anticipation of high plant demands.
- Saturate the soil in the fall and early winter in order to reduce winter desiccation.
- Use anti-desiccant spray when planting seedlings, transplanting nursery stock, or in the fall to protect exposed plants. Install landscape fabric and mulch to conserve soil moisture.
- Use shingles or screens on the south and west sides of newly planted seedlings to reduce wind desiccation and sun exposure.
- If possible, do not locate plants in exceptionally windy areas unless temporary protection is provided.



A sunshade protects a ponderosa pine seedling.



A wire cylinder excludes browsing animals.

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.

Culture. 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.



Beaver damage to a cottonwood tree.



Livestock damage.

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 probably best suited to farm or ranch situations.

Always consider public safety, especially that of children, when developing a protection plan.

Protecting Plants from People

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

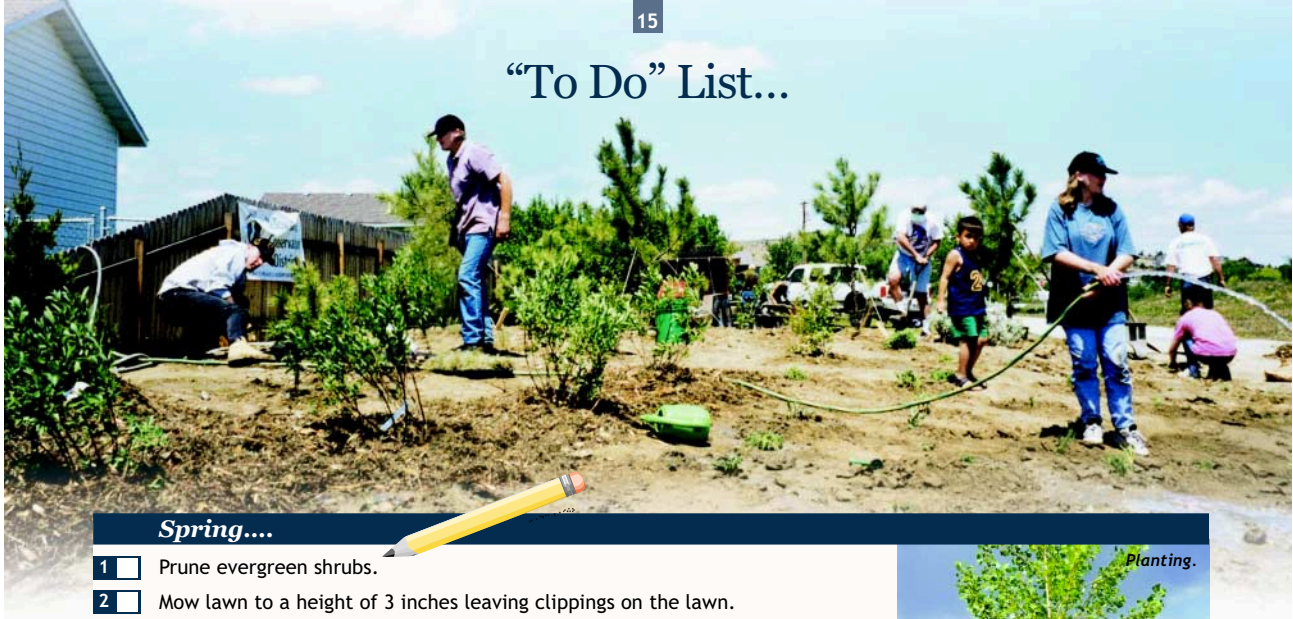
Strategies for Protection from People

Common People Problems	Protective Measures
Mower and weed trimmer injury to trees and shrubs	• install plastic wrap around base of trunk • install weed barrier and mulch around base of tree • install ornamental fence • plant flowers or ground cover around base of tree
Heavy traffic	• install physical barrier, even plants, to reduce traffic • construct a sidewalk or path • construct a fence or wall • install warning signs (commercial)
Misapplied chemicals and fertilizers	• 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	• mowing too low is often a problem; • raise mowing height to 3 inches • keep blades sharp to prevent tearing
Improper pruning	• become educated on proper pruning techniques • use sharp, high-quality pruners • if unsure, hire a professional



Sidewalks help protect plants in heavy traffic areas.

"To Do" List...



Spring....

- 1 ☐ Prune evergreen shrubs.
- 2 ☐ Mow lawn to a height of 3 inches leaving clippings on the lawn.
- 3 ☐ Check lawn to determine if it needs aeration.
- 4 ☐ Compost garden prunings to reduce trash volume and recycle nutrients back into the garden.
- 5 ☐ Plant trees, shrubs, and most plants now.
- 6 ☐ Pressurize and check all zones of automatic sprinkler system to make sure there are no leaks. Set the system for shorter and/or less frequent cycles during the cool spring months.



Planting.

Summer....

- 1 ☐ Water plants in early morning, according to plant needs, to maintain healthy root and top growth and to reduce water loss by evaporation.
- 2 ☐ Control aphids and mites with insecticidal soaps to spare beneficial insects and provide long-term pest control.
- 3 ☐ Prune spring-flowering shrubs just after blooms are finished. Leave the branch collar instead of making flush cuts.
- 4 ☐ Keep ahead of the weeds by mowing and hand-pulling. Use herbicides sparingly and apply according to label recommendations.



Controlling weeds with landscape fabric.

Fall....

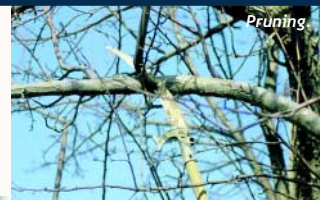
- 1 ☐ Compost equal parts of dry leaves and green plant materials for next year's soil amendment.
- 2 ☐ Prepare the soil for next year's landscape plantings and vegetable garden.
- 3 ☐ Water landscape plants for good establishment and winter survival.
- 4 ☐ Drain and blow out irrigation system.
- 5 ☐ Apply repellents and barriers to reduce animal damage.
- 6 ☐ Install snow fence on the windward side of landscape plantings to trap additional moisture and protect sensitive plants from winter desiccation.
- 7 ☐ Fertilize lawn.



Composting.

Winter....

- 1 ☐ Prune deciduous trees and late summer-blooming deciduous shrubs.
- 2 ☐ Soak root zone on a monthly basis if there has been no winter precipitation and if soil is not frozen. Especially watch the evergreens.
- 3 ☐ Watch south-facing slopes and windy areas for winter drying and water as needed.



Pruning.

Relax and enjoy your landscape!



About this Publication

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Design by Mary Myers, USDA Natural Resources Conservation Service

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Other Sources of Information:

Conservation Districts
Extension Service
Garden clubs
Landscapers
Local garden centers
Native plant societies

Web Sites:

www.plants.usda.gov

www.xeriscape.org

www.pprr.usu.edu
(poisonous plants)

www.firewise.org
(Living With Wildfires/Firewise Landscaping)

www.nifc.gov
(National Interagency Fire Center)

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Photo this page:
*Alpine wildflowers at Logan Pass,
Glacier National Park, Montana.*

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