



## *The Landscape Environment - Climatic Factors*

Town	Elev.(ft)	Record Low (°F)	Annual Snow (in)	Frost Free Days	USDA Hardiness Zones*
Bear Lake	6000	-25	41	109	---
Coalville	5552	-33	73	78	5, 3
Flaming Gorge	6270	-38	61	100	5, 3
Heber City	5630	-36	68	90	5, 3
Kamas	6475	-31	87	82	5, 3
Laketown	5980	-37	42	85	5, 3
Morgan	5060	-33	72	96	5, 3
Park City	7140	-30	140	105	---
Randolph	6268	-43	34	50	3, 2

\*The hardiness zones listed for each location are based on the mean minimum temperatures recorded from 1961 to 1990 (mean over 30 years of each year's lowest temperature) and the absolute lowest temperature recorded during that time. Moroni, for example, has a zone 5 based on its mean minimum temperatures and a 4 based on its all-time low between 1961 and 1990. The advantage of the zones in this table is they are based on local weather station data rather than interpolating from a large-scale map. See various gardening books or go to [extension.usu.edu/forestry/HomeTown/Select\\_HardinessZoneTable.htm](http://extension.usu.edu/forestry/HomeTown/Select_HardinessZoneTable.htm) or [www.usna.usda.gov/Hardzone/](http://www.usna.usda.gov/Hardzone/) for more information on USDA hardiness zones.

The USDA map can give misleading information in Utah because of rapid changes in elevation. It is also possible to have occasional years with extreme winter cold that may cause plant damage beyond what would be expected based on the hardiness map. The data in Table 1 provide more detailed climate characteristics for communities and locations in the high valleys. There can be even more local effects (called microclimates) that are the result of topography, canyons, walls, buildings, and courtyards. Cold hardiness **must** be a major consideration in choosing any landscape plant.

Climatic records also tell us how much moisture enters the landscape as precipitation, and how much water is lost from the landscape. Because of rain shadow effects and elevation, precipitation in higher elevations can vary. Water lost from a landscape through transpiration by plants or evaporation from the soil surface is called evapotranspiration or ET. Climatic data for the month of July estimates that a turf area in a cool spot, such as Brighton, would use about 0.13 inches of water per day (3.8 inches per month), while warmer spots, such as Kamas, may use up to 0.15 inches per day (4.4 inches per month). These values are estimates only, and are influenced by local climatic conditions. Cool summer temperatures at high elevations mean that less water is needed for irrigation. However, this does not mean water must not be conserved. Many of the communities within this classification are restricted in the amount of water available to them, so water must be used wisely.

## **THE LANDSCAPE ENVIRONMENT - SOIL FACTORS**

Soils within this region fall within the broad classification of being cold to moderate in temperature, and generally dry. Soil textures include loam, clay loam, fine sand, fine sandy loam, and others. Some soils in this area may contain excess salt, which creates problems in many landscape situations. It is important to remember that even excellent native soils are usually reduced in quality during construction. Construction often results in the mixing of subsoils with topsoil, compaction, and contamination of the soil with debris and chemicals. Compaction is a very common problem and is serious because it restricts root growth, reduces water infiltration, and limits aeration.

Plant growth and ease of maintenance are improved immensely by high quality soils. Landscape soil quality can be improved by keeping it clean during construction, tillage to reduce compaction, and amending with fertilizers and organic matter. To amend soils correctly requires an understanding of the following characteristics.

**Soil texture:** This refers to the percentages of sand, silt, and clay in a soil. Sandy soils drain quickly and retain little water or nutrients. Clay soils consist of much smaller particles and have less drainage, but better nutrient retention than sandy soils. Soils with appropriate balances of sand, silt, and clay are described as loamy. Loam soils, or close relatives such as clay loams or silt loams, are the best soils for plant growth.

**Soil structure:** Structure refers to the degree to which small soil particles clump together, forming both large and small pores throughout the soil. This clumping aids water and air movement in the soil because water and air can move freely through the large pores. At the same time, the smaller pores within the aggregates hold water for plant use.

**Soil organic matter:** Organic matter is beneficial in soil because it decomposes to provide plant nutrients. Organic matter also improves water infiltration, drainage and retention in the soil, largely due to its ability to improve soil structure. Manure, compost, leaves, and grass clippings are sources of soil organic matter.

**Nutrient status:** The nutrient status of the soil refers to the amount of nutrients such as nitrogen, phosphorus, and potassium in the soil. These nutrients and several others are essential for proper plant growth. If nutrients are limited then plant growth suffers because of deficiencies. On the other hand, excessive levels of nutrients or other compounds such as sodium chloride can result in salty soils. Saline soils are difficult for plants to grow in because high levels of salts make it hard for plant roots to absorb water.

**Soil pH:** This refers to the acidity or alkalinity of the soil. It is important because the pH of the soil affects the availability of mineral nutrients to plants. For example, Utah soils have high levels of iron, an essential mineral. However, due to the high pH of these soils, the iron present is not readily available for plant growth.

The most effective way to determine a soil's characteristics is to have a soil test done. Soil testing is done by commercial laboratories, or through agencies such as the Soil Testing Laboratory at Utah State University (435-797-2217). Instructions and sampling kits for soil tests are available at county Cooperative Extension offices.

## **MANAGING THE LANDSCAPE ENVIRONMENT - WATER MANAGEMENT**

Summer landscape irrigation requirements are primarily met through irrigation. A problem common to arid regions is the tendency for over-irrigation, which wastes water and can damage many plants. Water supplies in Utah are limited, and will become more so as demand for water continues to increase. Conservation of water is important from both environmental and proper plant management perspectives. Remember though, limited water does not mean that landscaping must be limited. It is possible to retain beautiful and functional landscapes while conserving water. There are several things that can be done to conserve water in the landscape.

**1. Planning:** Planning for water conservation can provide many ways to save water within a highly functional and desirable landscape. Factors that should be planned for in the design include selecting appropriate plants, installing a well-designed irrigation system, proper preparation of the soil before planting, landscape weed control, and efficient maintenance. Information on plant materials and designs for water conservation can be obtained from this publication and the many references listed in the bibliography. Visits to

local parks, gardens, golf courses and other landscaped areas can also provide a wealth of information.

**2. Irrigation systems:** Proper design and use of irrigation systems can provide substantial water savings in the landscape. Proper design insures that irrigation water is applied uniformly to the landscape. Uniform application prevents over-watering of large portions of the landscape when the system is left on long enough to get that one stubborn dry spot green. Design can also specify the use of water saving systems such as drip irrigation.

Even the most perfectly designed system will waste water if not managed correctly. Fortunately, there are a number of techniques which can be used singly, or together, to conserve water while irrigating.

- Know how much water you are applying. Irrigation should be applied based on *quantity* of water, not the length of application time. Sprinkler system application rates can be determined by placing several straight sided containers (soup cans) in the landscape and measuring the water applied in a given time period. This information also gives some idea of how uniformly water is being applied.
- The landscape should be designed so that plants are grouped according to irrigation requirements. With such a design, each control station can be set to provide the appropriate amount of water for the plants within that station. For example, a station covering the north side of a home will require less water (per square foot) than one on the south side.
- The amount of water applied at any one time should be sufficient to moisten the entire root zone. Sandy soils will require less water to do this than clay soils. Shallow soils will also require less than deep soils. The best way to determine depth of irrigation is to use a soil probe (moisture probe, long screwdriver or soil corer) to determine how far the water has penetrated the soil. More information on this technique can be found in the Utah State University Fact Sheet entitled: Water Wise Landscaping: Monitoring Soil Moisture with Probes (<http://extension.usu.edu/publica/gardpub2.htm>). It may be necessary to apply water in a series of frequent, short applications to prevent surface runoff while thoroughly moistening the soil profile.
- Irrigate when plants need it, not on a predetermined day of the week. There are a number of observational techniques that can be used to determine when to irrigate. The easiest is to observe the landscapes and watch for signs of water stress in plants. Water stress usually shows up first in turf, and is characterized by a change in color from a bright green, to a dull blue-green. Dry turf will also show foot prints after it is walked on. There may be other plants in the landscape that show water stress before anything else, and they too can be used to schedule irrigation. If water is applied soon after stress appears, there is usually no harmful effect to the landscape. Irrigation scheduling can also be based on ET.

**3. Plant hydrozones:** Grouping plants together according to similar water requirements avoids wasteful over-watering and encourages proper growth. For many water efficient plants, there is such a thing as too *much* water. This guide provides recommended levels of watering as a general guide to “zone” planting. It is important to realize that there are not any magic numbers available which say exactly how much water should be applied to the landscape for any given plant. Water needs are dependent on the soil type, weather conditions, plant material, and the amount of competition with weeds or other desirable plants. The ratings given in any publication are simply guidelines.

**4. Use mulches:** One of the best things that can be done with any landscape is to use mulches of organic matter. It is hard to go wrong when adding such material to the soil,

especially in the desert soils of Utah where organic matter is often very low. Mulches keep soil temperatures lower and reduce surface evaporation, thus holding the water near roots longer. Mulches suppress weed growth, reducing competition with desirable plants. They also decompose over time and provide needed organic matter to the soil.

**5. Proper use of turf:** There is a constant debate on how much water turf uses compared to other plants. Currently, researchers are looking for turfgrasses that can do well in low irrigation situations. Since turfgrasses are actively growing all summer long, they tend to use more water than other plants. For many types of activities, there is no good substitute for turf, so eliminating turf from the American landscape is usually not an option. However, reducing the amount of turf can save water. For instance, if the only time a turf area is walked on is when it is mowed, then it may be prudent to consider an alternative. Perennials can be more water efficient and offer the benefit of color. Shrub beds installed with weed barriers can be very attractive and very low maintenance. There are also nontraditional turfgrasses, such as buffalograss, which can survive with little supplemental water. However, such grasses do not function the same as bluegrass in the landscape.

**6. Control weeds:** The ideal water conserving landscape loses no water through evaporation from the soil or use by weeds. Evaporation can be controlled by mulches. Weeds can also be controlled by mulches, and by cultivation and herbicides. Remember, label directions must be followed when using herbicides in landscapes. A good reference is the Utah Horticultural Weed Control Handbook available through Cooperative Extension.

## **MANAGING THE LANDSCAPE ENVIRONMENT - SOIL MANAGEMENT**

One of the main causes of landscape problems is inadequate soil preparation. Landscape soils are often compacted or contaminated by construction practices. If these problems are not corrected, plant growth will suffer for years. There are many simple practices that can dramatically improve soils damaged by construction.

When preparing a soil for planting, the first step is to reduce compaction by deep tillage or ripping of soil. This insures appropriate drainage and aeration. This cultivation should be done to the subsoil following construction and before the addition of top soil. The depth of cultivation should be 12-18 inches, and only needs to be enough to break up compacted soil layers. Finer tillage and grading can be done after topsoil is added.

Organic matter can also improve soil characteristics. Addition of organic matter is beneficial because it may temporarily reduce the pH (if acidic materials are used), improve nutrient and water retention, and insure good structure and aeration. Organic matter is best when used to modify an entire area rather than just a planting hole. When amending with organic matter, the best method is to spread a layer on the surface of the topsoil and then cultivate it into the soil. It is usually not appropriate to amend a soil with sand or clay. Such practices may damage the soil more than they improve it.

Two common problems in these areas are alkaline soils (high pH) and salinity. Lowering soil pH is difficult for large areas, and is very expensive for an entire landscape. The best solution is to choose plants adapted to the existing pH, rather than trying to change the pH to support non-adapted plants. Irrigation with high quality water (low salts) in soils with adequate drainage controls most soil salinity since salts move freely with soil water. Improve drainage by reducing compaction and adding organic matter to the soil, or by the installation of drain tiles in areas with severe problems. Salinity problems can be reduced by applying an extra 10% of water to help flush salts down past the root zone. It is also possible to select plants that are salt tolerant.

## MANAGING THE LANDSCAPE ENVIRONMENT - LANDSCAPE PLANT SELECTION

The answer to many landscape problems is as simple as selecting appropriate plants. Plants that are native or adapted to the local environment can thrive under minimum maintenance, while non-adapted plants often will not survive the soil and climatic conditions. Cold tolerance is the first criterion in selecting landscape plants. Plant irrigation requirements and other factors are less critical because we can economically provide water, fertilizers, and pesticides. However, providing supplemental heat for landscape plants is too expensive to be an option. For some reason, people tend to choose plants that are at the very limit of their hardiness capability. The result of such selections is that many of these plants are injured or killed outright during periodic cold spells. To avoid the discouragement of seeing a carefully nurtured 10-year-old tree die, it is much better to select plants that are hardy for the zone they are grown in. Most plant material publications and catalogs are good sources of hardiness information.

While hardiness is the most critical aspect of plant selection, other factors are also very important. In a water conserving landscape, plants should be selected that tolerate minimum irrigation and extended dry periods. In areas with high pH soils, plants should be chosen that are not susceptible to iron chlorosis. Plants should also be chosen based on their resistance to local disease and insect problems. For example, plants such as European weeping birch, silver maple, rhododendrons, and others are not recommended because of serious problems that occur with them in the landscape.

Some think that only native plants should be used in drought tolerant landscapes. While many native plants function extremely well as landscape plants, it is important to realize that some natives may not be adapted to the site in question. Just because a plant is native to Utah does not mean it is native to all of the habitats in Utah. In addition, there are many introduced plants that function as well as, or better than, some natives in low maintenance landscapes.

The following tables are lists of plants that are suitable for much of the high mountain valleys. Plants are classified as trees, shrubs, herbaceous perennials, and grasses. Each plant is listed with common and botanical names, and a host of characteristics. While not comprehensive, these lists are a good place to start when choosing plants for a landscape, or when sitting down with a landscape architect. In these lists, 'zone' refers to the plant hardiness zone, and water refers to relative water requirements for acceptable growth. Water requirements are based on a scale of 0-3, with the definitions as follows:

- 0** No supplemental water is required after plants are established.
- 1** At least 1-inch of supplemental water per month may be required after plants are established.
- 2** At least 1-inch of supplemental water every two weeks may be required after plants are established.
- 3** At least 1-inch of supplemental water each week may be required after plants are established.

## TREES

### ***Abies lasiocarpa* - Subalpine Fir**

zone 1-5      water 3

Native, evergreen tree occurring at elevations of 6500-10,000 feet. This tree is narrowly pyramidal and grows to 60'-80' tall. Only for cool, moist environments.

### ***Abies concolor* - White Fir**

zone 3-7      water 2-3

Native, evergreen tree occurring at elevations of 6000-8000 feet. Broadly pyramidal, to 80'. The needles have a white or frosty appearance. Currently available in the nursery trade. One of the best firs for landscaping.

***Acer ginnala* - Amur or ginnala maple** zone 2-8 water 2  
Native to central and northern China, Manchuria, and Japan. Moderately shade tolerant. Many varieties are available commercially that vary from small shrubs to small trees. The main problem with this species in Utah is occasional chlorosis on high pH soils. Fall color can be excellent.

***Acer glabrum* - Rocky Mountain Maple** zone 3 water 1  
Native, deciduous, small tree growing rapidly to 20' x 15'. Green leaf color changing to yellow to orange in fall; does well in sun or shade. Grown easily from seed, but hard to transplant. Stays shrub-like on poor sites.

***Acer grandidentatum* - Big Tooth Maple** zone 3 water 1-2  
Native, small, deciduous tree with bright fall colors of yellow to orange and red. Slow growth to 30' x 20'; requires well-drained soils and full sun. Easily grown from seed, transplants well if container-grown. Thought to be a close relative of the sugar maple.

***Acer negundo* - Boxelder** zone 2-9 water 1  
A large, native, deciduous tree common to riparian areas throughout Utah. Rapidly growing and weak-wooded. Female trees are susceptible to the boxelder bug. Not the best choice, but in wet sites selected cultivars may be a good option.

***Acer platanoides* - Norway Maple** zone 3-7 water 3  
Deciduous; green to purple leaves depending on cultivar; very dense shade; moderate growth rate to 50' x 40'; full sun; tolerant as to soil type if well-drained; pH of 6-8. Tolerant of air pollution. Problems with aphids, *verticillium* wilt, and leaf scorch, somewhat weedy.

***Acer tataricum* - Tatarian Maple** zone 3-8 water 2  
Deciduous; small tree (20' x 20'); slow-moderate growth rate; often multi-stemmed; wide range of fall colors; adaptable to a wide range of conditions and somewhat drought tolerant when established. Few disease or insect problems.

***Aesculus hippocastanum* - Horsechestnut** zone 3-8 water 2  
Deciduous tree, growing to 50'-70'. Very showy flowers. It has a slow growth rate and is susceptible to leaf scorch. *Aesculus x carnea* (Red Horsechestnut) may be more scorch tolerant. Has large, inedible seeds.

***Alnus glutinosa* - European Alder** zone 3-7 water 3  
Deciduous tree growing to 40'-60'. Attractive dark, green leaves. Best used as an alternative for moist, poorly drained soils. Has the ability to fix nitrogen.

***Alnus incana* - Mountain Alder** zone 1-6 water 3  
A native, deciduous tree or shrub. Occurs in riparian areas in mountainous regions throughout the state. Selected varieties are available. An excellent choice for cold, wet environments.

***Betula occidentalis* - Western River Birch** zone 3 water 3  
Deciduous, multi-stemmed small tree which grows rapidly to 35' x 15'. Occurs naturally as a riparian plant. Multiple stems and copper-colored bark provide nice winter appearance. Transplants easily. Should not be confused with *Betula nigra* a non-native River Birch.

***Celtis occidentalis* - Common Hackberry** zone 2-9 water 1  
Deciduous; coarse, green leaves with yellow fall color; ridged, corky bark; moderate grower to 40' x 40'; full sun; tolerates a wide range of soils with pH of 6-8. Largely pest free except for leaf nippule gall, a cosmetic insect problem on leaves.

- Cercis canadensis* - Eastern Redbud** zone 3-9 water 2  
A small, flowering, deciduous tree growing to 20'-30'. The flowers are a distinct magenta and open before the leaves. Widely adaptable, though does require well drained soil. A member of the legume family.
- Crataegus douglasii* – Black or Douglas Hawthorn** zone 2-8  
Native, small (25'), deciduous tree occurring in riparian areas at elevations of 4000-8400 feet. It has small, white flowers and 1/2-inch black fruit. Like most other hawthorns, it is quite thorny.
- Crataegus crusgalli* - Cockspur Hawthorn** zone 3-8 water 1  
A small, flowering, deciduous tree that grows to 20'-30'. Small white flowers followed by persistent red fruit. A slow growing tree. Large thorns are a significant concern in some situations, but a thornless variety exists (var. *inermis*).
- Crataegus phaenopyrum* - Washington Hawthorn** zone 3-8 water 2  
A 25'-30' tall flowering tree. Broadly rounded form with dense, thorny branches. White flowers followed by 1/4-inch diameter persistent fruit.
- Elaeagnus angustifolia* - Russian-Olive** zone 2-7 water 1  
Deciduous; silvery-grey foliage; fast growth to 20' x 20'; full sun; tolerant of most soil conditions including high pH and salts. Susceptible to *verticillium* wilt. *Useful in extremely difficult situations*, but invasive. Check local weed ordinances.
- Ginkgo biloba* - Ginkgo/Maidenhair tree** zone 3-8 water 2  
Deciduous; green leaf with yellow fall color; slow to establish with moderate growth rate to 50' x 30'; full sun; adaptable to soil conditions, air pollution, heat and salts. Does well in urban conditions. Avoid extremely high pH conditions. No insect or disease problems. Use male cultivars (no fruit).
- Gleditsia triacanthos* var. *inermis* - Thornless Honeylocust** zone 3-9 water 1  
Deciduous; green compound leaf with small leaflets; fast growth to 40' x 40'; full sun; tolerant to high pH and salt. Provides light shade, no heavy leaf litter. Susceptible to midge pod gall and *thronectria* canker.
- Gymnocladus dioica* - Kentucky Coffeetree** zone 3-8 water 1  
Deciduous; large green doubly pinnate leaves; slow to establish and grow to 60' x 40'; full sun; adaptable to soil conditions, but prefers deep loam. Tolerates urban conditions, no serious diseases or insects. Female trees will produce seed pods. Good tough tree.
- Juniperus scopulorum* - Rocky Mtn. Juniper** zone 2-7 water 0  
Evergreen native; bluish-green foliage; slow growing to 30' x 3-10'; size dependent on variety; full sun; tolerant to wide range of soil conditions if well drained. Good screen for harsh sites. May suffer root rot if over irrigated. Many cultivars.
- Juniperus virginiana* - Eastern Redcedar** zone 2-9 water 0  
Evergreen; moderate growth to 40' x 10'; full sun; soil and pH adaptable if well-drained; salt tolerant. Tough plant for screening and naturalizing. No serious disease or insect problems. Many cultivars.
- Larix decidua* - European larch** zone 2-6 water 3  
Native to the mountains of northern and central Europe; does well in Utah with a moderate growth rate and is quite cold-tolerant; prefers moist soils; shade intolerant. This is a beautiful tree with great, golden fall color. Deciduous character is interesting but not everyone likes its winter appearance.
- Malus species* - Crabapple** zone 2-8 water 2  
Deciduous; green to red leaves; a wide variety of forms, sizes, flower color; and fruit size and color. Truly one of the hardiest flowering trees available. Adaptable as to soil type if well-drained; full sun. Over 200 cultivars in the trade.

- Picea abies* - Norway Spruce** zone 2-7 water 2  
 This spruce is distinguished from the more common Colorado spruce by its drooping branchlets, though there are many cultivars with many different forms. Medium to fast growth rate to 40'-60'. Readily transplanted. Spruce ips bark beetles can be serious pests on water-stressed plants.
- Picea engelmannii* - Engelmann Spruce** zone 2-5 water 1  
 A native conifer occurring at elevations of 8000-10400 feet. Only use on cool-moist sites. Spruce ips bark beetles can be serious pests on water-stressed plants.
- Picea glauca* - White or Blackhills Spruce** zone 2-6 water 2  
 Native in Black Hills, northern Lake States, northeastern U.S., and throughout Canada and Alaska; but not in Utah. Slow growing. Prefers moist sites with good soil, but fairly adaptable. Shade tolerant. Seldom planted in Utah (except for dwarf Alberta spruce), but a very desirable landscape tree. Narrow-crown and short needles make it interesting. Dwarf Alberta spruce (*P. glauca* 'Conica') is a commonly available cultivar that is overused in many landscapes.
- Picea pungens* - Blue Spruce** zone 2-7 water 3  
 Evergreen native; green to blue foliage; slow growing to 40' x 15'; full sun. Must account for eventual size of this tree when planting in landscape. Spruce gall adelgid is mainly a cosmetic problem. Spruce ips bark beetles can be serious pests on water-stressed plants.
- Pinus edulis* - Pinyon Pine** zone 2 water 0  
 Evergreen native; gray-green, double needled pine; slow growing to 20' x 15'; full sun; tolerant to well-drained, high pH soils. No serious disease or insect problems. Has edible pine nut.
- Pinus longaeva* - Bristlecone Pine** zone 4-7(Dirr) water 1  
 Native, slow growing evergreen. With a maximum height of 8'-20' it is an excellent small pine for use in landscapes as an accent or rock garden plant. Few, if any, pests.
- Pinus nigra* - Austrian Pine** zone 4-7 water 1  
 Evergreen; dark green, long needles; moderate growth rate to 45' x 25'; full sun. Tolerant of city conditions, soils, heat, and alkalinity. No serious insect or disease problems.
- Pinus sylvestris* - Scotch Pine** zone 2-8 water 1  
 Evergreen; relatively short needles; moderate growth to 40' x 20'; full sun. Soil tolerant if well-drained. Unique form and color. No serious insect or disease problems.
- Populus alba* 'Bolleana' - Bolleana Poplar** zone 3-8 water 1  
 Deciduous; green leaves with white underside; columnar in form; fast growing to 40' x 15'; full sun; tolerant to high pH soils, air pollution, and salt spray. Suckers. Good for a rapid growing screen or windbreak, but susceptible to many insects and diseases.
- Populus deltoides* - Eastern Cottonwood** zone 3 water 2  
 Deciduous; large green leaves with yellow fall color; very fast growing to 70'-90' x 50'; full sun; tolerant to high pH soils. Good for a rapid growing shade tree in areas with ample room. Weak wooded, susceptible to multiple pests.
- Populus tremuloides* - Quaking Aspen** zone 3-7 water 3  
 A native, deciduous tree occurring in montane regions throughout the state. Initially fast growing. Not recommended for warmer valleys because of borers, suckers, and failure to produce desired white stems. May be an option for cooler mountain valleys. Yellow fall color.
- Prunus virginiana* 'Canada Red' - Canada Red Chokecherry** zone 2 water 1  
 Deciduous, small tree/shrub with maroon red foliage; grows to 20' x 10'. Red fruit in

mid-summer. Requires well-drained, aerated soils. Will sucker.

- Quercus gambelii* - Gambel's Oak** zone 2 water 0  
Deciduous, native oak; green leaves with brown fall color; slow growing to 20' x 15'; full sun; tolerant of high soil pH, but must have well-drained soils. Susceptible to a number of native pests including the formation of galls.
- Quercus macrocarpa* – Bur Oak** zone 3-8 water 1  
Deciduous, dark green leaves with yellow to brown fall color. Slow growing to 70'-80'. Full sun. Tolerant of high soil pH. Produces large acorns.
- Robinia x ambigua* 'Idaho' - Idaho Flowering Locust** zone 3-8 water 1  
Deciduous, green leaves; attractive purple blossoms; fast growing to 50' x 30'; full sun, tolerant to a wide range of soils. Good for use in difficult areas. Susceptible to borers.
- Syringa reticulata* - Japanese Tree Lilac** zone 3-7 water 2  
Deciduous; green foliage; no fall color. Moderate growth to 20' x 15'. Needs well-drained soil and full sun. Is pH tolerant. Resistant to lilac borer and powdery mildew that occur on common lilac. Flowers in May-June.
- Thuja occidentalis* - Northern Whitecedar** zone 2-8 water 2  
Native to northeast U.S., Lake States, Appalachian Mountains, and southern Canada. Not a true cedar. Medium to fairly large tree, medium to slow growth. Often found in swampy areas. Intermediate shade tolerance. More commonly planted in Utah in the past than now, though these are very desirable trees. Many different crown forms are available, from shrubby, to large pyramidal, to weeping. Good as hedge, visual screen, windbreak, or as specimen trees. Cold hardy but may need protection on harsh, dry, windy sites. Does not like extreme heat and dry conditions. Few insect or disease problems.
- Tilia americana* - American Linden** zone 2-9 water 2  
Large, deciduous tree (60'-80'). Flowers are fragrant and bloom in June. May be too large for many landscapes. 'Redmond' is a common cultivar though broader crowned varieties are better. A good choice for a large, hardy shade tree for park situations.
- Tilia cordata* - Littleleaf Linden** zone 3-7 water 3  
Deciduous; often pyramidal-shaped tree; grows to 60' x 30'. Easily transplanted; full sun; prefers well-drained soil and is soil-pH tolerant. Aphids can be a problem. Excellent shade tree with several nice cultivars.
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## SHRUBS

- Amorpha canescens* - Leadplant, False Indigo** zone 2 water 1  
Deciduous, pinnately compound leaves changing to yellow in fall; purple flower; moderate growth to 2'-4' x 4'-5'. Full sun; tolerant to wide range of soils; pH of 7-8.
- Amorpha fruticosa* – Indigo Bush Amorpha** zone 2 water 1  
Deciduous, multi-stemmed shrub with a spread to 4'-10'. Blue flowers. Full sun.
- Arctostaphylos patula* – Greenleaf Manzanita** zone 2-6 water 1  
Native, evergreen shrub growing to 3'-6' in height. Bright green leaves with red stems. Full sun. Pink flowers in spring.
- Aronia melanocarpa* - Black Chokeberry** zone 3-8 water 2  
A small, deciduous shrub growing to 5'-10' in height. Suckers to form large thickets. Red fall color, purple/black fruit, adaptable to many conditions. Variety *elata* is best for landscapes. Use as a mass planting.

- Artemisia cana* - Silver Sagebrush** zone 3 water 0  
Native, silver-leafed sage; evergreen leaves. Moderate growth of 3'-4' x 5'-10' width. Full sun; tolerant of most soils. Suckers profusely.
- Artemisia frigida* - Fringed Sage** zone 2 water 0  
Native, silver-leafed evergreen; rapid growing to 1' x 1'; full sun; soil tolerant. Used for border or color accent. Flower stalks which may need to be trimmed.
- Caragana arborescens* - Siberian Peashrub** zone 2-7 water 1  
Introduced, deciduous shrub with moderate to fast growth up to 15'-20' x 12'-18'. Yellow flowers; full sun; tolerant of saline soils and sprays, most soils, alkalinity, wind and drought. Good for hedge or windbreak in difficult situations.
- Caragana pygmaea* - Pygmy Peashrub** zone 3-7 water 1  
Deciduous; moderate growth rate; height of 2'-3' x 4'-5'; yellow flowers. Full sun. Tolerant of various soil types, salt, and high pH .
- Cercocarpus ledifolius* - Curl-leaf Mtn. Mahogany** zone 2 water 0  
Evergreen native; dull green leaf color year-round; slow growing to 15'-20' x 15'. Needs well-drained soils and a pH of 6-7. Withstands shearing.
- Cercocarpus montanus* - Mountain Mahogany** zone 2 water 0  
Native, deciduous shrub with pink flowers and white fruit; slow growing to 6' in full sun. Poor tolerance to salts. Grows best in well-drained soils.
- Chamaebatiaria millefolium* - Fernbush** zone 4 water 1  
Native, deciduous shrub with finely pinnate foliage; white blooms during the summer; grows to 8' x 8'. Tolerant to high pH soils.
- Cornus sericea* - Redstem Dogwood** zone 2-8 water 2  
Native, deciduous shrub with outstanding red bark; fast growing to 7' x 10'; shade to full sun; low salt tolerance. Adaptable to a wide range of soils and irrigation levels. Handsome utilitarian shrub, native to riparian areas. Susceptible to twig canker.
- Holodiscus dumosus* - Rockspray Spiraea** zone 3 water 1  
Deciduous native shrub; green leaves; white/pink flower in spring; full sun. Slow growing to variable height and width; requires well drained soils; can tolerate high pH. No significant pest problems. Largely uncultivated.
- Juniperus chinensis* - Chinese Juniper** zone 3-9 water 1  
Evergreen shrub; highly variable in size and color; full sun. Requires well-drained soils, pH tolerant . Susceptible to root rot when over-irrigated. Many cultivars available, including old Pfitzer types.
- Juniperus communis* - Common Juniper** zone 2-6 water 1  
Evergreen shrub; slow growth to 5'-10' x 8'-12'. Gray-green to blue-green in color. Full sun; wind tolerant. Adaptable to any well-drained soil. Very hardy; several cultivars.
- Juniperus horizontalis* - Creeping Juniper** zone 3-9 water 1  
Evergreen; green to blue/green color; moderate growth to 1'-2' x 4'-8'. Full sun; tolerant to most soils. More tolerant of heavy soils than other junipers. Many cultivars.
- Juniperus sabina* - Savin Juniper** zone 3-7 water 1  
Evergreen; green needles; moderate growth to 4'-6' x 5'-10', depending on cultivar. Full sun; well-drained, dry soils. Tolerant of urban conditions. Good cultivars are 'Broadmoor', 'Buffalo', Calgary Carpet, and var. *tamariscifolia*.. Potential for root rots.
- Mahonia fremontii* - Fremont Barberry/Utah Holly** zone 3 water 0  
Native broadleaf evergreen; gray/green leaf color; holly-like leaf. Slow growing to 5' x 3'. Full sun; well-drained soil.
- Mahonia repens* - Creeping Mahonia** zone 3 water 1  
Native broadleaf evergreen groundcover; green leaves changing to hues of green to red

- in fall; holly-like leaf; slow growing to 1' x 1'; partial shade to full sun. Tolerates high pH; low salt tolerance; requires well drained soils. No major pest problems.
- Pinus mugo* - Mugo Pine** zone 2-7 water 1  
Evergreen; two-needled pine; slow growing to variable size; full sun. Tolerant to high pH. Excellent alternative to junipers. Few disease or insect problems.
- Potentilla fruticosa* - Potentilla** zone 2-7 water 1  
Deciduous native plant with many selected cultivars; slow growth to 1'-4' x 2'-4'; wide range of flower colors; full sun to partial shade. Withstands poor, dry soils if well-drained. Tolerant of high pH. Few diseases or pests. Good color and blooming period.
- Prunus besseyi* - Sand Cherry** zone 3-6 water 1  
Deciduous shrub; shiny gray-green leaves with yellow fall color; white flower; full sun. Moderate growth to 4' tall; suckers. Low salt tolerance, but tolerant to heat and high pH. Few disease or insect problems.
- Prunus virginiana* - Chokecherry** zone 2-6 water 1  
Native deciduous shrub; green leaves changing to yellow in fall; unique white flower followed by red-black berries; full sun. Moderate growth rate to 12' x 8'; tolerant to wide range of soils; riparian. Susceptible to black knot; suckers profusely; fruit used for jellies.
- Rhus glabra* - Smooth Sumac** zone 2-9 water 1  
Native deciduous shrub; green foliage with bright red fruit and fall leaf color; fast growing to 9'-15'; full sun. Soil and salt spray tolerant; few pests; suckers.
- Rhus glabra* 'Cismontana' - Dwarf Mountain Sumac** zone 2-9 water 1  
Deciduous, dwarf shrub; green foliage with bright red fruit and fall leaf color; fast growing to 2'-5' x 3'-4"; full sun. Suckers and can be invasive.
- Rhus trilobata* - Oakleaf Sumac** zone 2 water 0  
Native deciduous shrub; green foliage with red fall color and red berries; full sun. Moderate growth rate to 6' x 10'; tolerant of most soils. No serious pest problems.
- Rhus typhina* - Staghorn Sumac** zone 3-8 water 1  
Deciduous shrub; green leaves with bright red fall color and fruit; full sun. Fast growing to 12' tall; suckers readily and can be invasive; tolerant to high pH and urban conditions. Few disease problems.
- Rosa rubrifolia* - Redleaf Rose** zone 2-8 water 1  
Deciduous; red/green foliage with pink flowers and orange hips; full sun. Moderate growth to 4' x 4'.
- Rosa rugosa* - Rugosa Rose** zone 2-7 water 1  
Deciduous; leaves green to orange/red in fall; fast growing to 5' x 5'. Tolerant to salt, pH, most soils if well-drained. Very trouble free for a rose.
- Rosa woodsii* - Woods Rose** zone 2 water 1  
Deciduous, native rose; green foliage with pink blooms and orange fruit; full sun. Moderate growth to 4' x 4'; salt tolerant; requires well-drained soil.
- Shepherdia argentea* - Silver Buffaloberry** zone 2-6 water 0  
Native, deciduous shrub; silver foliage with red/orange flower and fruit; not showy; full sun. Moderate growth to 10' x 10'; Tolerant to high pH and moderate salinity.
- Shepherdia rotundifolia* – Roundleaf Buffaloberry** zone 3-6 water 0  
Native, deciduous shrub. Silver foliage with soft gray hairs on the underneath side. Slow growth rate to 3'-4'. Tolerant of high pH and moderate salinity.
- Spirea x bumalda* - Bumald Spiraea** zone 3-8 water 3  
Deciduous shrub; light green leaves with lavender blooms; full sun. Moderate growth to 2' x 2'; not tolerant to high pH or soil salinity. Susceptible to iron chlorosis. Fruit and

spent blossoms rather unsightly.

- Symphoricarpos albus* - Snowberry** zone 3-7 water 2  
Deciduous; white flowers with white berry and green leaves; full to partial shade. Fast growth to 4' x 4'; tolerant to high pH but not soil salinity. Suckers. No serious disease or insect problems.
- Symphoricarpos oreophilus* - Mountain Snowberry** zone 2 water 2  
Native snowberry; green foliage with white flowers and berries; full sun to partial shade. Fast growing to 5' x 3'; requires well-drained soil, low salinity and neutral pH.
- Syringa meyeri* 'Palibin' - Dwarf Korean Lilac** zone 3-7 water 2  
Deciduous, dwarf shrub. Flowers lilac to lavender in color.
- Syringa patula* - Miss Kim Lilac** zone 3-7 water 2  
Deciduous dwarf shrub growing to 3'-5' x 3'-5'; glossy green leaves turn burgundy red in fall; pale, lilac colored flowers.
- Syringa vulgaris* - Common Lilac** zone 3-7 water 1  
Deciduous shrub; green foliage with white to purple flowers; fragrant; full sun. Moderate growth to 10' x 10'; tolerant of high pH and salt spray. Affected by powdery mildew and ash borer, but not seriously. Very tough, traditional plant. Many cultivars available.
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## GRASSES

- Festuca arundinacea* - Tall Fescue** cool season water 2  
Turf-type; bunch grass; dark green color; tall; partial shade to full sun; requires well drained soil.
- Festuca ovina* - Sheep Fescue** cool season water 0  
Ornamental/ground cover; bunch grass; blue/green color; low-moderate height; full sun; requires low salinity and well drained soil.
- Festuca rubra* - Red Fescue** cool season water 3  
Turf-type; rhizomatous; green color.
- Lolium perenne* - Perennial Rye** cool season water 3  
Turf-type; bunch grass; green color; partial shade to full sun
- Oryzopsis hymenoides* - Indian Ricegrass** cool season water 0  
Native; ornamental; bunch grass; green color; moderate height; moderately salt tolerant; requires well-drained soil.
- Poa pratensis* - Kentucky Bluegrass** cool season water 3  
Native; turf-type; rhizomatous; green color; moderate height; low salinity tolerance; needs well drained soils.
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## HERBACEOUS PERENNIALS

- Achillea millefolium* - Yarrow** zone 3 water 0  
Native; pink, red, white, and yellow flowers over green dissected leaf; mid to late season bloomer; height 12"-36"; use for borders or naturalized areas. Needs well-drained soils, full sun. Susceptible to mildew.
- Aegopodium podagraria* 'Variegatum' - Bishop's Weed** zone 4-8 water 3  
Leaves light green with white margins; height 8"-10"; vigorously growing and spreading. Full sun or shade, with shade best in warmer areas. No soil preference. Used

as a ground cover. Can be invasive. Tends to scorch and look unsightly in heat of summer.

- Anaphalis margaritacea* - Pearly Everlasting** zone 4 water 1  
Native; white flower with gray foliage; mid to late season bloom; height 24"-36"; use for borders. Needs well drained soils and partial shade. Can be invasive.
- Antennaria rosea* - Field Pussytoes** zone 4 water 2  
Native; white to pink flowers with white/gray foliage; blooms early in season; height 3"-12"; use for rock gardens. Tolerant to wide range of soil types; full sun.
- Armeria maritima* - Sea Pink** zone 4 water 2  
Evergreen leaves in clumps with pink or white flowers; leaves 3"-4" with flowers to 12" tall. Blooms in mid to late spring. Full sun; dry soils. Very salt tolerant; use for edges and rock gardens.
- Artemisia frigida* - Fringed Sage** zone 3 water 0  
Native; gray foliage with inconspicuous flowers; height 16"; used for foliage effects. Tolerant to various soil types; full sun. Requires trimming.
- Artemisia schmidtiana* - Silver Mound** zone 3 water 0  
Gray foliage with inconspicuous flowers; height 12"; used for foliage and as a border. Requires well-drained soils and full sun. Susceptible to rust; can become rather rank growing.
- Asclepias tuberosa* - Butterfly Weed** zone 3 water 1  
Native; multiple flower colors with green foliage; blooms mid to late season; height 24"-36"; used for border or naturalized areas. Tolerant to most soils; full sun. Pest free.
- Aubrieta deltoidea* - Purple Rock Cress** zone 4 water 1  
Purple flowers; blooms early to mid-season; height 6"; use in bed, edging or rock garden. Use in full sun with well-drained soil. Should be trimmed to maintain compact form. No serious diseases or insects.
- Aurinia saxatile compactum* - Dwarf Basket of Gold** zone 4 water 2  
Yellow blooms with gray foliage; early season bloomer; height 4"-6"; best use is for rock gardens. Requires a well-drained soil and full sun.
- Baptisia australis* - Blue False Indigo** zone 4 water 2  
Blue flowers. Good as a border plant. Full sun, well-drained soil. A member of the legume family. Easy to grow and pest free.
- Callirhoe involucrata* - Poppy Mallow** zone 3 water 0  
White or purple blooms with green foliage; blooms all season long; height 6"-12"; use in border or rock garden. Tolerant of soil extremes; full sun.
- Campanula rotundifolia* - Bluebells of Scotland** zone 3 water 3  
Bright blue 1-inch flowers in early to late summer; self seeding. Grows 1'-2' high; requires well drained soils and full sun.
- Centaurea montana* - Bachelor Button** zone 3 water 1  
Blue or white flowers with green to gray foliage; blooms early to mid-season; height 12"-18"; use for border. Requires well-drained soil; partial shade to full sun. Invasive.
- Centranthus ruber* - Jupiter's Beard** zone 4 water 1  
Pink, white, or red flowers with green foliage; blooms in mid-season; height 24"-36", used for borders and naturalized areas. Requires well drained soils, tolerant to high pH; partial shade to full sun.
- Cerastium tomentosum* - Snow-in-Summer** zone 3 water 2  
White blooms on green to gray foliage; blooms early to mid-season; height 3"-10"; used for borders, rock gardens and as a ground cover. Requires well drained soils and full sun.

- Dianthus barbatus* - Sweet William** zone 2 water 2  
A self-sowing biennial, 6"-10" tall, with a flat cluster of flowers. Used in borders or rock gardens. No scent.
- Dianthus 'Zing Rose'* - Zing Rose Dianthus** zone 2 water 2  
Grows to 6" tall, blooms from June to summer with rose red flowers. Dense green foliage.
- Dicentra eximia* - Fringed Bleeding-heart** zone 3 water 3  
Finely dissected gray-blue evergreen leaves, 12"-18" tall with pink to purple flowers. Partial shade with well-drained soil. Excellent for borders and rock gardens.
- Dicentra spectabilis* - Bleeding-heart** zone 2 water 3  
Pink, white, and red flowers with green foliage; blooms in mid-season; height 6"-36". Used for borders, requires well drained loam, partial shade. Suscept to stem rot.
- Echinacea purpurea* - Purple Coneflower** zone 3 water 0  
Purple flowers with green foliage; blooms in mid- to late season; height 30"-40"; use in borders or naturalized areas. Requires a well-drained soil; full sun. Leaf spot disease.
- Gaillardia aristata* - Indian Blanket Flower** zone 3 water 0  
Native; flowers are a mix of orange, red, and yellow; blooms mid- to late season; height 12"-30"; use for cutting, border or naturalized areas. Tolerant to most soils; full sun. Few serious problems.
- Hemerocallis Hybrids* - Daylily** zone 3 water 1  
Multiple flower colors with green, grassy foliage; blooms mid- late season; height 15"-30"; use for borders or naturalized areas. Tolerant to most soils; partial shade to full sun. Very few problems.
- Iberis sempervirens* - Candytuft** zone 3 water 2  
Forms a mound 6"-12" by 24" with linear, evergreen leaves. White flowers in spring cover the whole plant. Needs full sun and well-drained soils. Best for rock gardens and edging. Should be cut back after blooming to keep full.
- Iris Hybrids* - Iris** zone 3 water 1  
Multiple flower colors with green, grassy foliage; early blooming; height 6"-48"; use for borders and cut flowers. Tolerant to most soils, should be well-drained; full sun. Can be minor problems with borers and rots.
- Linum perenne* - Flax** zone 3 water 0  
Blue or white flowers with green foliage; blooms in mid- late season; height 12"-24"; use for naturalized areas or borders. Well drained soils, no serious problems.
- Lupinus 'Russell Hybrid'* - Lupine** zone 3 water 3  
Multiple flower colors with green foliage; blooms in mid-season; height 18"-36"; use in borders. Requires well-drained soils, quite tolerant to other soil factors; partial shade to full sun.
- Monarda didyma* - Bee Balm** zone 3 water 3  
Multiple flower colors in white/red/purple; blooms in mid- late season; height 18"-42"; use in mass plantings and naturalized areas. Full sun to partial shade. Few pests, but may be invasive.
- Narcissus species* - Daffodil** zone 3 water 2  
Flowers of white, orange, or yellow; blooms early; height 6"-24"; use in mass plantings or naturalized areas. Loam soil; full sun. Best of spring flowering bulbs for naturalizing.
- Oenothera elata* - Showy Primrose** zone 2 water 2  
Native primrose with yellow, orange, or red flowers; blooms from July to September; height 24"-48"; use as a border or naturalized areas. Full sun.

- Oenothera missouriensis* - Missouri Primrose** zone 3 water 1  
Yellow, 3"-4" wide blossoms that open in summer evenings. Tolerant of poor soils and full sun. Works well in rock gardens, edges, and raised beds.
- Papaver orientale* - Oriental Poppy** zone 3 water 2  
Red, orange or pink flowers with green foliage; blooms early to mid-season; height 24"-48"; use as border or cut flowers. Needs well-drained soils and partial shade to full sun.
- Penstemon* species - Penstemon** zone 2 water 0  
Native group of several species with a wide range of flower colors; blooms in mid-season; height 12"-36"; use as border or naturalized. Requires well-drained soils; full sun. Over irrigation causes root rot. ***Barbatus*** (Beardlip Penstemon) is an excellent species.
- Phlox subulata* - Creeping Phlox** zone 3 water 1  
Purple, pink or white flowers with green foliage form a carpet-like mass of color in the spring; blooms in mid-season; height 3"-9"; use as a rock garden plant or as a ground cover. Needs well drained soils and full sun for best performance.
- Physostegia virginiana* - Obedient Plant** zone 3 water 3  
Rose-purple or white flowers on spikes to 2'-4' tall. Grows well in full sun or partial shade; may require staking if in fertile soils. An aggressive spreader, it is good for back grounds and cut flowers.
- Ratibida columnifera* - Prairie Coneflower** zone 4 water 1  
Native with yellow and purple flower and green foliage; blooms in mid- to late season; height 12"-20" use in naturalized areas. Needs well-drained soils and full sun.
- Rudbeckia hirta* - Gloriosa Daisy** zone 3 water 1  
Flowers in shades of red/yellow with green foliage; blooms mid- to late season; height 24"-36"; use as a border plant. Tolerant of most soils; full sun to partial shade. Susceptible to mildew and sawfly damage.
- Saponaria ocymoides* - Soap Wort** zone 3 water 2  
A 4"-10" trailing plant with a pink flower in late spring. Does well in full sun with well drained, even poor quality soils. Good for rock gardens and stone walls. Should be cut back annually.
- Sedum* species - Sedum** zone 4 water 0  
Multiple flower colors with succulent foliage in shades of green to red; blooms early; height 8"-18"; use as ground cover or rock garden plant. Well drained soils and full sun.
- Solidago hybrids* - Goldenrod** zone 2 water 2  
Native with yellow flowers and green foliage; height 36"-60"; use in borders or naturalized areas. Requires well-drained soils and partial shade to full sun. Susceptible to rust.
- Stachys bysantia* - Lamb's Ear** zone 4 water 1  
Lavendar blossom with gray foliage; blooms mid- late season; height 8"-24"; use in border. Does best in well-drained soils and full sun. Used as a ground cover.
- Thymus* species - Thyme** zone 3 water 3  
Pink, red or white flowers with gray foliage; blooms in mid-season; height 3"-8"; use as a rock garden plant. Tolerant to most soils; requires full sun.
- Tulipa* Hybrids - Tulip** zone 2 water 1  
Multiple flower colors and forms with green foliage; blooms early; height 8"-24"; use naturalized or as a border plant. Must have well-drained soils and full sun for good performance and prevention of bulb rots.

- Veronica spicata* - Spike Speedwell** zone 3 water 1  
Blue, pink, or red flowers; blooms early to mid-season; height 6"-24"; use in border or rock gardens. Best performance in well-drained loams with partial shade to full sun.
- Vinca minor* - Periwinkle** zone 4 water 3  
Evergreen groundcover with blue blossoms; blooms early; height 6"-8"; use as a ground cover in full sun to full shade.

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