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Minimizing Deer Damage in Residential Settings

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DEER (*Odocoileus spp.*) ARE THE MOST WIDELY DISTRIBUTED and best recognized large animal in North America. Two species most common in Montana are the white-tailed (**Figure 1**) and mule deer (**Figure 2**); hereafter called deer. The most obvious difference between the two species is the tail and antler configuration in male individuals. Mule deer have a white rump and a tail with a black tip at the end of it. Whitetail deer have a brown rump and only the underside of their tail is white. This white portion of the tail can only be seen when the deer "flags" or holds its tail aloft as a signal to other deer. The antlers of a whitetail deer typically grow a main beam, with single points coming off of that main beam. The antlers of a mule deer fork, meaning the points that come off of their main beam split into two points.

Deer are generalists that can persist across a wide range of habitat conditions. They favor early vegetation stages that keep brush and sapling browse within reach. Dense cover is used for winter shelter and protection. Because deer are so adaptable and residential areas sometimes provide suitable habitat conditions, deer can pose challenges to homeowners.

Since deer lack upper incisors, they are not able to clip plants. Instead, they must twist and tear plants. Thus deer-browsed plants will often exhibit a jagged or torn surface. This jagged or torn appearance on vegetation makes deer damage distinct (**Figure 3**) from that of rabbits and rodents which typically is a clean, 45-degree angle cut. Deer browse can also occur up to six feet in height.

In both urban and rural areas, deer can wreak havoc on yard and garden landscapes, leaving property owners frustrated and in a constant battle trying to keep deer away from their trees or garden plants. While exclusion, scare devices, and repellents have a place in deer damage control; initial selection of plantings may provide the most cost-effective way to prevent deer damage.

Figure 1. Example of a white-tailed deer noting the tail and antler configuration which are the most obvious differences from that of a mule deer. (Photo: Wikimedia Commons)

Figure 2. Example of a mule deer noting the tail and antler configuration which are the most obvious differences from that of a white-tailed deer. (Photo: USFWS Mountain-Prairie)

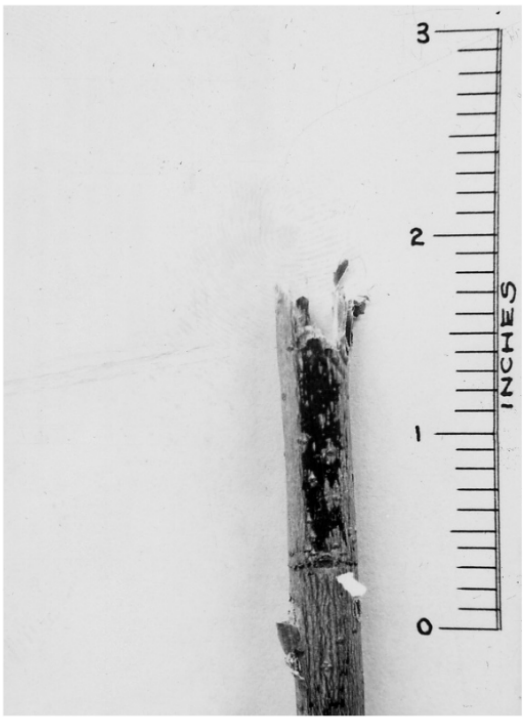

Figure 3. Example of a deer browse on a soft maple (*Acer spp.*) tip. (Photo: National Archives and Records Administration)

Cultural Methods and Habitat Modification

Deer are preferential feeders, which means that they are selective in choosing plants to consume. Although ornamental plants are usually not their first choice, this can change depending on availability of suitable forage, deer population density, competition, and proximity to deer habitat. Many Montana gardeners find themselves at odds with deer, which will eat flowers and foliage during the growing season and feed on tender buds and young plants in the fall and winter. This has prompted many to seek out plant lists, remedies, troubleshooting tips and tricks, all of which seem to be abundantly available in an era of information accessibility. Some of these recommendations can be limited by their function, relevance or accuracy, and can result in wasted time and money. Any experienced deer biologist or gardener will tell you that **"deer-resistant" does not mean "deer-proof"** especially since deer don't often consult these plant lists before they browse on plants. Ultimately, no plant is safe from a hungry deer.

That being said, deer damage to ornamental plants can be minimized by selecting landscape and garden plants that are less-likely to be chosen by deer as they inevitably make their way through yards and gardens (**Table 1**). Many plants have natural defenses that they have curated over millions of years as a response to herbivore feeding. Plants that have physical irritants like prickles and spines, plants with unpalatable and tough/leathery leaves, plants that produce milky sap or other toxic compounds, and plants that emit strong aromas are often left alone if there are other choices of more favorable options nearby. Other things to keep in mind include designing a landscape in a way that makes it less inviting to deer, and more resistant to damage if deer decide to nibble on the plants. By arranging deer-resistant plants to surround those that are more preferable, damage can be reduced.

Younger and more tender plants, in addition to newly transplanted ones, are often going to be more significantly damaged by deer browsing than larger and well-established plants, which can often withstand some feeding damage and fully recover. Well-fertilized trees and shrubs are also more attractive to deer feeding than those that are unfertilized and not as consistently maintained. Growth stage and season can also impact the plants' palatability. Planting preferred trees and shrubs closer to a home and/or protecting them with physical barriers can help to deter deer. In addition to planting plants more resistant to deer browsing, harvesting garden crops as early as possible reduces the period of vulnerability to deer. Planting susceptible crops as far as possible from wooded cover will also reduce deer damage.

We have put together a list of plants resistant to deer browsing as well as provided some science-based recommendations for deterring deer and minimizing damage to help Montana gardeners.

This publication includes a list of plants that generally grow well in our state and confer some degree of deer resistance (with a ranking system that indicates the potential level of resistance, with 1 being lower resistance, 2 as moderately resistant, and 3 as most resistant; **Table 1**). As always, level of resistance will vary based on several factors including available forage, deer density, competition, proximity to deer habitat, etc. and plants ranked with higher resistance values are not guaranteed to eliminate deer browsing. This list includes both species as well as some genus level recommendations for deer-resistant plants. Some species of a particular genus will grow well in Montana; although some will not (in which case it is important to determine the hardiness and suitability of the species prior to incorporating it in Montana landscapes). As a very general rule of thumb, plant only those perennial

species that are adapted to Zones 2 and 3 in eastern Montana gardens, Zones 3 and 4 in central Montana gardens, and Zones 4 and 5 in western Montana gardens. For more specific information regarding regional hardiness zones, consult the local MSU Extension office.

In the case of established landscaping, replacing plantings may not be very realistic or cost effective. In these cases, one may need to explore alternative options either in place of or in addition to cultural methods and habitat modification.

Exclusion

In some situations, exclusion may be the most logical method of preventing deer damage. However, it is important to note that exclusions are meant to exclude or prevent the movement of deer to certain areas of the landscape. Therefore, it is important to concentrate exclusions only around critical areas (e.g., gardens, high value trees, etc.) so they occupy as small of an area as possible. They can also be designed to be temporary or seasonal in nature.

In backyard gardens, where deer depredation may be a constant challenge, a permanent fence at least 6 feet high may be cost effective. In orchards and around ornamentals or raised garden beds, electric fences may be a solution. Several fencing designs are available to meet specific needs.

PERMANENT WOVEN-WIRE FENCING

Woven-wire fences are used for year-round protection of areas subject to high deer pressure. These fences are expensive and difficult to construct, but easy to maintain. Woven-wire fences were used most often before the advent of high-tensile electric fencing. The high cost has resulted in reduced use of woven-wire fences.

ELECTRIC FENCING

Vertical electric fences are effective at protecting gardens and orchards from moderate to high deer pressure. Because of the prescribed wire spacing, deer either attempt to go through the fence and are effectively shocked or they are physically impeded by the barrier. Vertical fences use less ground space than three-dimensional fences, but are less effective at preventing deer from jumping over them. A wide variety of fence materials, wire spacings and specific designs are available.

It is important to note that corner posts and support braces for corners are critically important for high-tensile systems and often need significant engineering and time to install them correctly and to a good depth.

Maintenance includes weekly fence inspection and voltage checks. Applying a molasses-peanut butter mixture to the hot wires using a mop glove will encourage deer to touch the fence with their noses or tongues. This will provide greater repellent effectiveness by exposing/training the animal to the electric shock.

FRIGHTENING DEVICES

Frightening devices use sight, sound, or a combination of the two to scare animals away from unwanted areas without harming them. Unlike repellents, frightening devices do not use chemicals so they are not regulated by the EPA or the Montana Department of Agriculture. Like repellents, frightening devices are effective for only short periods of time (i.e., a few days to weeks) because deer quickly learn that the frightening event does not pose a real threat. Devices that initiate based on motion sensors are more effective than those that work on a timer.

Frightening devices are classified by mode of action, audio, visual, audio-visual and biological. Audio frightening devices rely on a scary noise to frighten deer such as the loud boom of a propane cannon. Deer are initially frightened by audible devices. However, they soon learn that there is no threat. Audible devices can also annoy neighbors. While deer can hear in the ultrasonic range, ultrasound has not been shown to frighten deer.

Visual frightening devices rely on a scary sight to frighten deer. Research has shown that green and red lasers are not effective in frightening deer. Air-inflated plastic effigies, the kind used by car dealers to grab our attention, frighten deer, but again only for a limited period of time.

Audio-visual frightening devices combine both sight and sound to scare deer. Pyrotechnics have proven very effective in dispersing deer. However, they pose a fire risk, require human presence, and deer quickly return.

Biological frightening devices take advantage of the deer's inbred response to biological cues, such as a deer alert sound or deer distress sound. The rationale behind these devices is that deer cannot habituate to them because their response to these cues is hardwired into their psyche. Deer Shield® is one product based on this theory. It has shown some efficacy in certain studies but very low efficacy in others. Keep in mind that it is an audible device so neighbors may complain if the volume is too high.

SPECIFIC RECOMMENDATIONS

When compared to repellents, frightening devices are significantly less effective for reducing deer browse damage. They also are only applicable in more remote areas away from neighbors who may complain about the noise.

For additional information on frightening devices, contact the MSU Extension Wildlife Specialist or the MDA's Vertebrate Pest Specialist.

Repellents

Repellents are chemicals with irritating qualities applied in sensitive locations to reduce or eliminate unwanted animal behavior. Repellents are categorized either by their mode of action or by the application method (e.g., area, contact, and systemic). Fear repellents use predator odors to frighten deer. Conditioned-aversion repellents work by causing illness in the deer, such as an upset stomach. The idea is for the deer to remember what it ate, along with the bad experience and thereby avoid repeating the behavior again. Pain causing repellents usually cause a burning or stinging sensation when the deer touches the repellent. Finally, taste repellents attempt to make the food inedible. While this latter category can stand alone, most repellents classified in other categories will attempt to utilize taste repellency as well.

Much confusion exists about how effective repellents are as some swear by them and others at them. Before we dive into the details of which repellents work best, consider the key points below before employing repellents to manage deer damage.

GENERAL PRINCIPLES

- Typically, repellents will only **reduce** damage. Even the most effective repellents only reduced deer browsing by 60%. Only in rare circumstances will repellents **stop** damage completely for an extended period of time.
- Repellents are less effective on highly palatable plants and more effective on less palatable ones. Consult the plant list for guidance in selecting deer-resistant plants.
- Repellents are only effective if deer have access to alternative sources of food. Do not expect repellents to reduce deer browsing in areas with high deer densities. If a deer is forced to choose between eating something that tastes bad and starvation, it will choose to eat.
- Repellents work only over short periods of time, namely one to two weeks. Reapplication (according to label directions) is required to protect areas of new plant growth and to replace repellent reduced by rain or degradation.

COMMERCIAL DEER REPELLENTS

Legally, repellents are classified as pesticides and are regulated by the Environmental Protection Agency (EPA). Anyone applying a repellent must abide by the product's label instructions. The catch phrase is, "The Label is the Law!" In addition to the EPAs oversight, Montana Department of Agriculture (MDA) requires that all pesticides (including repellents) used in the state be registered with the MDA. Montanan's may only use products registered by the EPA and the MDA. Brick and mortar stores in Montana will only sell registered products. However, online stores may not be aware that a product is not registered in Montana. When purchasing a repellent from an online store, visit mtplants.mt.gov/ProductRegFSA/BrandSearch.aspx to ensure the product is registered for use in Montana.

25B PRODUCTS

25B products are pesticides the EPA has deemed to be "minimum risk" because they are either used in food production or very low toxicity levels. For a list of 25b chemicals visit www.epa.gov/minimum-risk-pesticides/active-ingredients-eligible-minimum-risk-pesticide-products. The 25b exemption means that the products have not undergone the normal pesticide review process and thus are not registered by the EPA. Note, however, that Montana law requires all 25b products sold in the state to be registered with the MDA.

ACTIVE INGREDIENTS IN DEER REPELLENTS

With the variety of brand name repellents available, which repellent should be used? The key is to ignore the brand names and fancy boxes and pay attention to the active ingredient listed in the small print on the label. The active ingredient is the chemical that performs the repellent action. All pesticides, including 25b pesticides, must list the active ingredient along with the amount by percentage.

Ammonium Soaps of Higher Fatty Acids

This active ingredient causes deer to experience nausea when eaten and avoid browsing that area again. One study found that this active ingredient reduced deer browse by white-tailed deer by 50%. Keep in mind, however, that aversive conditioning repellents only work when the deer eats the treated plant material. Expect some damage to occur as deer feed on the treated plant.

Capsaicin

Capsaicin, the chemical that makes chili peppers hot, repels deer through pain. Products containing capsaicin at concentrations of 6.2% repelled deer for two weeks. However, at concentrations of 0.062%, no efficacy was observed.

Coyote Urine

Coyote urine employs fear to keep deer from unwanted areas. Coyote urine has shown some efficacy in lowering deer browsing when applied directly on the food source. Be aware, however, that coyote urine may damage plants. Examples: Shake-away Coyote Urine Granules (EPA# 80917-1) and Shake-Away Coyote/Fox Urine Granules (EPA 80917-5) are registered. Note that use of unregistered urines may expose a person to infectious material present in the raw urine.

Dried Blood (Porcine or Bovine)

Dried animal blood, as sold in the name brand Plantskydd®, is a fear-based deer repellent. Research has shown that dried blood can protect plants for up to 11 weeks in the winter and one week in the spring. Other tests found that the efficacy was shorter lived.

Garlic

Garlic is a taste and odor repellent. It is often combined with other active ingredients. One study found that 93% of plants, treated at three times the recommended rate, suffered damage within four days in a high deer pressure setting.

Putrescent Whole Eggs

The sulfurous compounds contained in putrescent whole-eggs causes a fear-response in deer. Research has demonstrated that putrescent whole egg-based repellents can protect plants for up to 13 weeks during the winter and three weeks in the spring. Powder formulations work better than liquid versions as do formulas with higher concentrations of the active ingredient. Deer and Rabbit Repellent RTU Formula II Away (50932-13) is 4.63 to 6.25%.

Thiram

Thiram (e.g., Thiram 480 DP) is a fungicide which has been found to have repellent qualities by changing the plant's taste. A study revealed that thiram could reduce winter deer browse damage by 43%. Thiram-based products may leave a white residue on the plant.

Home Remedies

Unsurprisingly, home-remedy repellents have demonstrated mixed results. Keep in mind that the government requires repellents to be registered by the EPA. Use of home-remedy products as repellents is illegal. Nevertheless, we provide some insight on some of the more common items used to repel deer.

- Human hair. Human hair can be hung in bags around plants. One study showed hair bags reduced damage by moderate deer feeding by only 35%.
- Milorganite®. Milorganite is a soil amendment made from processed sewage from a waste-treatment facility. One study showed that adding it to soil around plants provided about a 30% reduction in deer browse damage.
- Soap. Tallow-based soap bars (e.g., Ivory® soap), suspended from trees, reduced damage by 38%. It is suggested that protection ranged between an 18-to-36-inch radius of the bar. Perfume did not enhance the effectiveness of the soap in all uses.

SPECIFIC RECOMMENDATIONS

According to the research studies, the most effective repellents used putrescent whole egg solids, ammonium soap of higher fatty acids, and capsaicin (particularly those containing 6.2% or more). Some efficacy was found with blood-based products as well. One question that remains unanswered is whether some of these repellents work better in winter versus spring and vice versa. Hopefully, future research will find an answer to that question. In the meantime, the authors welcome anecdotal reports regarding seasonal efficacy of repellents.

If a new repellent comes on the market, check to see if the product contains a new active ingredient or whether it is just a repackaged mix of known active ingredients. Make sure that products with new active ingredients are registered with the EPA and the MDA. If registered, read the label carefully to see if the guidelines meet current needs. If they do, trial the product in the area to determine if the product "works" in certain circumstances. A cautious approach to new products allows one to be open to advances in repellent technology but can also save one from spending too much time or money on a product that does not work. Consult the local MSU Extension Agent or the MDA's Vertebrate Pest Specialist for any information they may have about the product.

In conclusion, readers should understand that repellents will not be the ultimate solution for stopping damage by browsing deer. Nevertheless, repellents dutifully applied in the right situation and conditions can play a part in reducing damage to plantings by hungry deer.

Conclusion

In short, no solution is fool proof or a fix for every situation. However, with some planning, effort, and perhaps a little innovation, one can have success at reducing and minimizing deer damage around the home or garden.

Table 1: Deer-Resistant Plants for Montana, listed by level of deer-resistance (with 1 indicating low resistance, 2 indicating moderate resistance, and 3 indicating high resistance). Actual resistance will vary based on several factors including available forage, deer density, competition, proximity to deer habitat, etc. and plants ranked with higher resistance values are not guaranteed to eliminate deer browsing. This list was compiled using a combination of current publications along with observational data.

HARDINESS ZONE	BOTANICAL NAME	COMMON NAME	RESISTANCE (Low to high 1-3)	USE TYPE
4-8	*Epipactis gigantea*	Stream Orchid	1	Flower
4-8	*Eriogonum umbellatum*	Sulphur Flower	1	Flower
5-10	*Rosa (x) hybrid*	Hybrid Tea Rose	1	Flower
4-9	*Tradescantia occidentalis*	Prairie Spiderwort	1	Flower
5-10	*Stipa comate*	Needlegrass	1	Ornamental Grass
3-10	*Fragaria spp.*	Wild Strawberry	1	Perennial
4-8	*Huechera spp.*	Coral Bells	1	Perennial
4-8	*Ceanothus herbaceus*	Prairie Redroot	1	Shrub
3-8	*Cornus racemosa*	Panicled Dogwood	1	Shrub
4-11	*Cotinus coggygria*	Smokebush	1	Shrub
4-7	*Cotoneaster apiculatus*	Cranberry Cotoneaster	1	Shrub
5-7	*Cotoneaster horizontalis*	Rockspray Cotoneaster	1	Shrub
3-9	*Hydrangea arborescens*	Smooth Hydrangea	1	Shrub
3-7	*Hydrangea paniculata*	Panicle Hydrangea	1	Shrub
3-8	*Philadelphus coronarius*	Sweet Mock Orange	1	Shrub
3-7	*Potentilla fruticosa*	Bush Cinquefoil	1	Shrub
3-9	*Quercus gambelii*	Gambel Oak	1	Shrub
4-8	*Rhus typhina*	Staghorn Sumac	1	Shrub
5-9	*Rhododendron albiflorum*	White-flowered Rhododendron	1	Shrub
5-8	*Rubus deliciosus*	Boulder Raspberry	1	Shrub
4-8	*Spiraea (x) bumalda*	Anthony Waterer Spirea	1	Shrub
5-8	*Spiraea prunifolia*	Bridalwreath Spirea	1	Shrub
3-7	*Syringa (x) persica*	Persian Lilac	1	Shrub
3-7	*Syringa reticulata*	Japanese Tree Lilac	1	Shrub
5-8	*Viburnum rhytidophyllum*	Leatherleaf Viburnum	1	Shrub
3-5	*Abies balsamea*	Balsam Fir	1	Tree
3-7	*Abies concolor*	White Fir	1	Tree
4-7	*Abies fraseri*	Fraser Fir	1	Tree
3-7	*Acer platanoides*	Norway Maple	1	Tree
3-9	*Acer rubrum*	Red Maple	1	Tree
4-8	*Acer saccharum*	Sugar Maple	1	Tree
4-7	*Aesculus hippocastanum*	Common Horsechestnut	1	Tree

HARDINESS ZONE	BOTANICAL NAME	COMMON NAME	RESISTANCE (Low to high 1-3)	USE TYPE
4-8	*Amelanchier arborea*	Downy Serviceberry	1	Tree
3-8	*Chamaecyparis thyoides*	Atlantic White Cedar	1	Tree
2-9	*Juniperus virginiana*	Eastern Red Cedar	1	Tree
3-6	*Larix decidua*	European Larch	1	Tree
3-5	*Malus spp.*	Apples	1	Tree
3-8	*Pinus strobus*	Eastern White Pine	1	Tree
5-8	*Pyrus communis*	Common Pear	1	Tree
3-9	*Quercus alba*	White Oak	1	Tree
4-10	*Salix spp.*	Willows	1	Tree
3-8	*Sorbus aucuparia*	European Mountain Ash	1	Tree
4-7	*Taxus spp.*	Yews	1	Tree
2-7	*Thuja occidentalis*	American Arborvitae	1	Tree
5-9	*Thuja plicata*	Western Red Cedar	1	Tree
3-8	*Tilia americana*	Linden	1	Tree
4-10	*Campsis radicans*	Trumpet Creeper	1	Vine
5-9	*Euonymus fortunei*	Wintercreeper	1	Vine
4-13	*Hedera helix*	English Ivy	1	Vine
5-9	*Lonicera (x) heckrottii*	Goldflame Honeysuckle	1	Vine
3-9	*Parthenocissus quinquefolia*	Virginia Creeper	1	Vine
3-7	*Anaphalis margaritacea*	Pearly Everlasting	2	Flower
3-9	*Aquilegia spp.*	Columbine	2	Flower
2-6	*Arctostaphylos uva-ursi*	Kinnikinnick	2	Flower
4-9	*Astilbe spp.*	Astilbe	2	Flower
3-8	*Bergenia spp.*	Pigsqueak	2	Flower
5-8	*Campanula glomerata*	Clustered Bellflower	2	Flower
4-9	*Campanula rotundifolia*	Bluebells	2	Flower
4-9	*Coreopsis spp.*	Tickseed	2	Flower
4-9	*Coreopsis tinctoria*	Plains Coreopsis	2	Flower
3-9	*Dianthus spp.*	Pinks	2	Flower
2-9	*Dicentra spp.*	Bleeding Heart	2	Flower
3-8	*Digitalis spp.*	Foxglove	2	Flower
3-7	*Dracocephalum spp.*	Dragon's Head	2	Flower
3-10	*Echinacea angustifolia*	Narrow-Leaf Coneflower	2	Flower
3-8	*Echinacea spp.*	Purple Coneflower	2	Flower
4-8	*Epimedium spp.*	Epimedium	2	Flower
4-9	*Erigeron spp.*	Showy Daisy	2	Flower

HARDINESS ZONE	BOTANICAL NAME	COMMON NAME	RESISTANCE (Low to high 1-3)	USE TYPE
3-7	*Erysimum asperus*	Western Wallflower	2	Flower
4-9	*Eupatorium purpureum*	Joe-Pye-Weed	2	Flower
3-9	*Gaillardia spp.*	Blanketflower	2	Flower
4-8	*Geranium spp.*	Lilac Cranesbill	2	Flower
4-8	*Helianthus spp.*	Sunflower	2	Flower
4-9	*Helleborus spp.*	Hellebore	2	Flower
3-9	*Iberis spp.*	Candytuft	2	Flower
4-11	*Ipomopsis aggregata*	Scarlet Gilia	2	Flower
5-9	*Lavandula spp.*	Lavender	2	Flower
3-9	*Liatris spicata*	Blazing Star	2	Flower
4-9	*Lupinus spp.*	Lupine	2	Flower
4-8	*Lychnis coronaria*	Rose Campion	2	Flower
5-9	*Macaeranthera tanacetifolia*	Tansy Aster	2	Flower
4-8	*Narcissus spp.*	Daffodil	2	Flower
2-8	*Oxytropis spp.*	Locoweed	2	Flower
3-9	*Phlox subulata*	Creeping Phlox	2	Flower
3-8	*Pulmonaria spp.*	Lungwort	2	Flower
4-8	*Pulsatilla patens*	Pasque Flower	2	Flower
4-8	*Ratibida columnifera*	Prairie Coneflower	2	Flower
4-10	*Rudbeckia spp.*	Coneflower	2	Flower
2-8	*Solidago spp.*	Goldenrod	2	Flower
3-8	*Veronica spp.*	Speedwell	2	Flower
4-8	*Ajuga reptans*	Carpet Bugle	2	Ground Cover
2-7	*Convallaria majalis*	Lily-of-the-Valley	2	Ground Cover
3-8	*Lamium spp.*	Dead Nettle	2	Ground Cover
5-9	*Pachysandra terminalis*	Pachysandra	2	Ground Cover
4-8	*Vinca minor*	Periwinkle	2	Ground Cover
3-9	*Anemone spp.*	Windflower	2	Perennial
2-9	*Arnica latifolia*	Broadleaf Arnica	2	Perennial
4-8	*Asarum caudatum*	Wild Ginger	2	Perennial
3-7	*Geum triflorum*	Prairie Smoke	2	Perennial
5-9	*Hymenoxys hoopsii*	Orange Mountain Daisy	2	Perennial
3-10	*Hypericum souleri*	Western St. Johnswort	2	Perennial
2-8	*Paeonia spp.*	Peonies	2	Perennial
3-9	*Sisyrinchium spp.*	Blue-Eyed Grass	2	Perennial
3-9	*Thalictrum spp.*	Meadowrue	2	Perennial

HARDINESS ZONE	BOTANICAL NAME	COMMON NAME	RESISTANCE (Low to high 1-3)	USE TYPE
5-9	*Tricyrtis hirta*	Toad Lilly	2	Perennial
2-6	*Amorpha canescens*	Lead Plant	2	Shrub
3-7	*Berberis Koreana*	Korean Barberry	2	Shrub
4-8	*Berberis thunbergii*	Japanese Barberry	2	Shrub
2-7	*Caragana arborescens 'Lorbergi'*	Fernleaf Caragana	2	Shrub
2-7	*Caragana arborescens 'Sutherland'*	Sutherland Caragana	2	Shrub
4	*Caragana aurantiaca*	Pygmy Caragana	2	Shrub
2	*Caragana erincaea*	Maximowicz Peashrub	2	Shrub
2-3	*Caragana frutex*	Russian Caragana	2	Shrub
2-3	*Caragana frutex globosa*	Dwarf Russian Caragana	2	Shrub
3-8	*Cornus sericea*	Red Osier Dogwood	2	Shrub
4-8	*Crataegus laevigata*	English Hawthorn	2	Shrub
3-6	*Eleagnus commutata*	Silverberry	2	Shrub
5-7	*Enkianthus campanulatus*	Redvein Enkianthus	2	Shrub
3-10	*Ericameria nauseosa*	Rubber Rabbitbrush	2	Shrub
4-9	*Fallugia paradoxa*	Apache Plume	2	Shrub
3-8	*Forsythia spp.*	Forsythia	2	Shrub
2	*Halimodendron halodendron*	Siberian Salt Tree	2	Shrub
4-9	*Juniperus chinensis*	Chinese Juniper	2	Shrub
5-9	*Kalmia latifolia*	Mountain Laurel	2	Shrub
4-8	*Kolkwitzia amabilis*	Beautybush	2	Shrub
3-8	*Lonicera spp.*	Honeysuckle	2	Shrub
4-8	*Philadelphus spp.*	Mockorange	2	Shrub
3-8	*Prunus americana*	American Plum	2	Shrub
2-6	*Prunus tenella*	Dwarf Russian Almond	2	Shrub
4-6	*Rhus trilobata*	Fragrant Sumac	2	Shrub
2-7	*Ribes alpinum*	Alpine Currant	2	Shrub
3-8	*Ribes aureum*	Golden Currant	2	Shrub
2-7	*Rosa rugosa*	Rugose Rose	2	Shrub
3-7	*Rosa virginiana*	Virginia Rose	2	Shrub
5-8	*Rosa wichuraiana*	Memorial Rose	2	Shrub
4-8	*Rosa Woodsii*	Woods Rose	2	Shrub
3-9	*Sambucus spp.*	Elderberry	2	Shrub
3-9	*Shepherdia spp.*	Buffaloberry	2	Shrub
3-8	*Spiraea spp.*	Bridalwreath	2	Shrub
3-7	*Symphoricarpos albus*	Snowberry	2	Shrub

HARDINESS ZONE	BOTANICAL NAME	COMMON NAME	RESISTANCE (Low to high 1-3)	USE TYPE
3-7	*Syringa villosa*	Late Lilac	2	Shrub
3-7	*Syringa vulgaris*	Common Lilac	2	Shrub
3-8	*Viburnum opulus*	Highbush Cranberry	2	Shrub
5-10	*Yucca spp.*	Yucca	2	Shrub
3-9	*Sedum spp.*	Stonecrop	2	Succulent
3-8	*Acer grandidentatum*	Bigtooth Maple	2	Tree
2-9	*Acer negundo*	Boxelder	2	Tree
4-7	*Acer platanoides*	Norway Maple	2	Tree
3-9	*Acer saccharinum*	Silver Maple	2	Tree
2-6	*Betula papyrifera*	Paper Birch	2	Tree
2-6	*Betula pendula*	European White Birch	2	Tree
4-6	*Crataegus spp.*	Hawthorn	2	Tree
3-9	*Gleditsia triacanthos*	Honey Locust	2	Tree
2-7	*Physocarpus monogynus*	Ninebark	2	Tree
3-7	*Picea abies*	Norway Spruce	2	Tree
2-6	*Picea glauca*	White Spruce	2	Tree
3-7	*Picea pungens*	Colorado Blue Spruce	2	Tree
2-7	*Pinus mugo*	Mugo Pine	2	Tree
4-7	*Pinus nigra*	Austrian Pine	2	Tree
3-7	*Pinus sylvestris*	Scots Pine	2	Tree
4-9	*Sassafras albidum*	Common Sassafras	2	Tree
3-7	*Tsuga canadensis*	Canada Hemlock	2	Tree
3-8	*Tsuga heterophylla*	Western Hemlock	2	Tree
3b-8	*Celastrus scandens*	American Bittersweet	2	Vine
3-8	*Clematis spp.*	Clematis	2	Vine
4-9	*Wisteria floribunda*	Japanese Wisteria	2	Vine
4-9	*Hedera helix 'Baltica'*	Baltic Ivy	2	Vine
3-8	*Adiantum spp.*	Maidenhair Fern	3	Fern
4-8	*Athyrium spp.*	Lady Fern	3	Fern
5-8	*Dryopteris spp.*	Wood Fern	3	Fern
3-8	*Polysticum spp.*	Sword Fern	3	Fern
4-8	*Acontium spp.*	Monkshood	3	Flower
2-10	*Allium spp.*	Alliums	3	Flower
3-8	*Antennaria*	Pussytoes	3	Flower
5-10	*Calochortus gunnisonii*	Mariposa lily	3	Flower
3-7	*Cerastium tomentosum*	Snow-in-Summer	3	Flower

HARDINESS ZONE	BOTANICAL NAME	COMMON NAME	RESISTANCE (Low to high 1-3)	USE TYPE
1-10	*Cleome serrulata*	Rocky Mountain Bee Plant	3	Flower
3-8	*Delphinium spp.*	Larkspur	3	Flower
3-10	*Iris spp.*	Iris	3	Flower
4-9	*Liatris punctata*	Dotted Blazing Star	3	Flower
3-9	*Linum lewisii*	Blue Flax	3	Flower
3-8	*Lythrum alatum*	Winged Lythrum	3	Flower
4-10	*Monarda fistulosa*	Wild Bergamot	3	Flower
4-9	*Monarda spp.*	Bee Balm	3	Flower
3-9	*Nepeta spp.*	Catmint	3	Flower
3-7	*Papapever spp.*	Poppies	3	Flower
4-9	*Penstemon spp.*	Penstemon	3	Flower
5-9	*Perovskia atriplicifolia*	Russian Sage	3	Flower
3-8	*Polemonium caeruleum*	Jacob's Ladder	3	Flower
3-8	*Primula spp.*	Primrose	3	Flower
3-7	*Prunella vulgaris*	Common Selfheal	3	Flower
4-8	*Salvia sylvestris x 'Mainacht'*	May Night Salvia	3	Flower
3-9	*Saponaria ocymoides*	Soapwort	3	Flower
4-9	*Stanelya spp.*	Prince's Plume	3	Flower
4-8	*Teucrium canadense*	Canada Germander	3	Flower
5-9	*Thymus spp.*	Thyme	3	Flower
2-12	*Triodanis perfoliata*	Clasping Bellflower	3	Flower
5-10	*Epilobium canum garrettii*	Garrett's Firechalice	3	Ground Cover
4-8	*Festuca glauca*	Blue Fescue	3	Ornamental Grass
4-8	*Festuca idahoensis*	Idaho Fescue	3	Ornamental Grass
4-9	*Helictotrichon sempervirens*	Blue Avena Oat Grass	3	Ornamental Grass
4-8	*Agastache occidentalis*	Western Giant Hyssop	3	Perennial
2-10	*Alcea rosea*	Hollyhocks	3	Perennial
4-9	*Asclepias spp.*	Milkweed	3	Perennial
3-11	*Mentha spp.*	Mint	3	Perennial
4-9	*Mertensia spp.*	Bluebells	3	Perennial
3-9	*Mimulus spp.*	Monkeyflower	3	Perennial
3-9	*Oenthera spp.*	Evening-Primrose	3	Perennial
3-9	*Phlox diffusa*	Spreading Phlox	3	Perennial
5-7	*Saxifraga spp.*	Saxifrage	3	Perennial
4-9	*Thermopsis spp.*	Golden Banner	3	Perennial
5-10	*Viola spp.*	Violet	3	Perennial

HARDINESS ZONE	BOTANICAL NAME	COMMON NAME	RESISTANCE (Low to high 1-3)	USE TYPE
5-10	*Xerophyllum tenax*	Beargrass	3	Perennial
4-8	*Armeria maritima*	Sea Pink	3	Shrub
4-8	*Artemisia spp.*	Silver Sage	3	Shrub
7-9	*Buxus sempervirens*	Common Boxwood	3	Shrub
5-9	*Caryopteris x clandonensis*	Blue Mist Spirea	3	Shrub
5-7	*Cotoneaster lucidus*	Hedge Cotoneaster	3	Shrub
2-9	*Juniperus spp.*	Juniper	3	Shrub
4-8	*Mahonia repens*	Oregon Grape	3	Shrub
3-7	*Pentaphylloides floribunda*	Shrubby Potentilla	3	Shrub
2-7	*Potentilla spp.*	Potentilla	3	Shrub
3-8	*Salvia nemorosa*	Purple Flowering Sage	3	Shrub
2-10	*Opuntia macrorhiza*	Prickly Pear	3	Succulent
3-8	*Cercocarpus montanus*	Mountain Mahogany	3	Tree
5-9	*Ilex opaca*	American Holly	3	Tree
4-8	*Larix occidentalis*	Western Larch	3	Tree
5-8	*Pinus edulis*	Pinyon Pine	3	Tree
4-6	*Pseudotsuga menziesii*	Douglas-fir	3	Tree

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