



Weed Control in Shelterbelt and Tree Plantings: 2005

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Weed control is especially important to improve survival and maximize growth. Heavy weed growth frequently reduces survival by 50% or more and reduces growth 25%. Weeds also harbor small rodents and insects that damage trees.

Cultivation

Cultivation is useful to reduce weed problems during the season before planting. Repeat operations will reduce perennials. Shallow cultivation is best; avoid root damage by staying away from the row. Special power driven equipment designed to operate between the rows is available in some areas.

Weed Barrier Fabric

Fabric mulch is a geotextile woven fabric product with a texture somewhat like burlap. It is biodegradable; with a minimum specification of a 5-year life. Water penetrates the fabric, but sunlight does not.

Weed barrier fabric is available in large rolls 4 to 12 feet wide by 300 to 500 feet long. Six-foot width is most common. It is also available in smaller sizes for homeground use.

Weed barrier is installed mechanically over the top of newly planted trees. Coulters or shovels form a trench for the edge of the fabric; soil is firmed over the fabric to anchor it securely. A short slit or "X" is cut at each tree to allow the tree to be pulled through the fabric. Cuts should be no larger than necessary. Small fabric squares are secured with pegs at the corner. A 4 x 4 square works well.

Mowing or the use of a labeled preemergence herbicide will help control weeds along the edge of the strips. Use caution to avoid contact with foliage.

Herbicides

Soil-Applied Herbicides. Preplant incorporated herbicides are mechanically incorporated into the soil. Preemergence herbicides must be applied before weeds emerge. Fall is the best time to use most preemergence herbicides.

Do not disturb soil in treated areas. Avoid throwing untreated soil onto the treated areas when cultivating between the rows. Too much herbicide will injure trees. Use higher rates on high organic matter, heavy textured soil. Use lower rates for low organic matter, sandy soil. Some herbicides cannot be used on gravelly, sandy, or high pH soils. Severe tree injury can occur. A soil test will give this information.

Follow label directions for species that may be treated. Some trees are very sensitive to herbicides.

Postemergence Herbicides. Post-emergence herbicides are applied after weeds have emerged. Translocated herbicides move to other parts of the plant.

How to Apply. Apply herbicides in a band 4 feet wide. A trip down each side of the tree row spraying a 2-foot band works best. Mechanical agitation is required to keep wettable powders from settling. A 50 mesh screen is required.

Treat small areas with hand equipment. Shake hand sprayers frequently to keep the herbicide in solution.

Screens in some single nozzle hand equipment are too fine. Measure the correct amount of herbicide for the area into a gallon of water. Refer to Table 1 for amount to use. Spray over the area several times until the solution is gone. Use hand-operated granular applicators to apply granules on small areas.

Herbicide Suggestions. Information in this publication is based on South Dakota Agricultural Experiment Station research, research from other experiment stations, or observations. Herbicides are included only after the chemical is registered by the Environmental Protection Agency (EPA).

Tradenames are for reader convenience. Users are responsible for following all label directions and precautions.

Rates for each herbicide are stated as the amount of product per acre on a broadcast basis. Adjust rates accordingly for band application. For example, a 4-foot band on 10,590 feet (about 2 miles) of tree row equals approximately one acre of area.

Abbreviations Used

pt = pint
qt = quart
gal = gallon
lb = pound
act = active ingredient
ae = acid equivalent
W = wettable powder
G = granule
DF = dry flowable (spray)
DG = dispersible granule
L = liquid

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WEED CONTROL BEFORE PLANTING

1. Plan one or two years in advance. Avoid using herbicides that leave soil residues that may damage trees. Herbicides such as Tordon, atrazine, Amber, Peak, Finesse, Ally, high rates of Banvel, Scepter, Pursuit, Command and long-term non-selective bareground herbicides are examples of products that have label restrictions for sensitive follow crops; some will damage trees.
2. Control annual weeds during the year before planting with tillage or herbicides that do not have harmful carryover.
3. Eliminate perennials before planting. Till at 2- to 4-week intervals or use a glyphosate product (Roundup, others) in single or repeat applications during the previous season to stop buildup of root reserves. Use glyphosate in the fall to eliminate grass if making a sod planting.

WEEDS in NEW PLANTINGS

1. Eliminate weed growth at planting with cultivation or herbicide such as glyphosate (Roundup). Preplant herbicide such as trifluralin can be incorporated as a broadcast treatment before planting.
2. Preemergence herbicides such as Princep, Karmex, Surflan, or Casoron require rain before weeds emerge to be most effective. Avoid concentrating the herbicide in planting furrows. These treatments are frequently delayed until late fall if the weeds can be controlled by another means during the first season.
3. Cultivate carefully. Special power driven implements are available in many areas. Hand labor to remove weeds from the row is often required.
4. Synthetic weed "barrier" provides control for several seasons. It reduces labor during the first 3 to 5 seasons.

SHELTERBELT HERBICIDES

This section includes herbicides commonly used for weed situations in most shelterbelts. These herbicides may be used on tree and shrub species frequently used in farm shelterbelts. See each herbicide section for specific listing.

Rates for each herbicide are stated as the amount of product per acre on a broadcast basis. Adjust accordingly for band application. Refer to Table 1 for amount to use when treating small areas with hand equipment.

Princep (simazine)

(\$8.25-16.50)

2.2-4.4 lb Princep Caliber 90DF or 2-4 qt Princep 4L (2-4 lb act)

Preemergence herbicide. Princep 4L and Caliber 90DF have full EPA registration for use in shelterbelts and Christmas tree plantings. A special SLN 24(c) label adds several species in windbreaks and shelterbelt plantings in South Dakota. Princep may be used on new shelterbelt transplants that are at least 2 years old.

Consult label for complete list of approved species. The full EPA label includes Austrian, Mugho, Norway, Scotch, and white pine; Norway, red, and white spruce, balsam, Douglas, Fraser and white fir; hemlock, juniper and red and white cedar. The SLN label adds apricot, chokecherry, green ash, Black Hills spruce, Mongolian cherry, Nanking cherry, Colorado blue spruce, Concolor fir, cotoneaster, caragana, Russian olive, boxelder, barberry, Eastern red cedar, elm, golden currant, hawthorn, honeysuckle, Juneberry, Kentucky coffee tree, larch, linden; Amur, Norway, red and silver maple; mulberry, bur oak, Harbin pear, plum, Ponderosa pine, Rocky Mountain juniper, Hanson hedge rose, Russian almond, skunkbrush, sumac and black walnut. Lilac, cottonwood, poplar, and some other species not listed on the label will be injured and should not be treated.

This herbicide gives fair to good control of several annual grasses including downy brome, foxtail, and wild oats and very good to excellent control of annual broadleaves including sunflower, lambsquarters, pigweed, purslane, Russian thistle, smartweed, and mustard. Control has been consistent in SDSU tests. The high rates are required for kochia and Russian thistle. Quackgrass control is fair. Established broadleaved perennials are not controlled.

Tree tolerance is fair to good. Do not use on sandy or gravelly, low organic matter soil. Risk of injury is greater on high pH (over 7.5) soil. Don't exceed label rates. New plantings are less tolerant; use lower rate on first-year-plantings. Avoid application where herbicides may be concentrated into planting furrow. Delay application on new plantings until trees are established 6 weeks or preferably don't treat until fall.

Apply in late fall for best results. Spring application is more erratic. Rainfall is required. Emerged weeds are not controlled. Higher rates are for heavy, high organic matter soil and for full season control in established plantings. Use low rate on questionable soils and on new plantings. Remove heavy plant residue before application. Apply in 25 gpa water. Agitation is required. Little risk of burn if spray contacts the leaves; however, avoid excessive leaf contact. Apply after leaf drop on deciduous species.

Casoron (dichlobenil)**(\$205.00-410.00)****8-12 lb Casoron 50W or 100-200 lb Casoron or Norosac or Dyclomec 4G (4-8 lb act)**

Preemergence herbicide for labeled species in established shelterbelts or on new plantings established at least 4 weeks. The label includes ash, barberry, boxelder, caragana, cottonwood, dogwood, hackberry, honeysuckle, lilac, maple, poplar, Russian olive, and willow. Consult the label for complete list of approved species.

Casoron gives fair control of some annual grasses including foxtail and crabgrass and several annual broadleaves including lambsquarter, peppergrass, pigweed, shepherdspurse, smartweed, Russian thistle, and wild mustard. The label for granules also includes artemisia, Canada thistle, curly dock, dandelion, leafy spurge, Russian knapweed, and quackgrass. Tolerance appears acceptable. Avoid use on very light, sandy soil.

Weed control has been somewhat variable; however some results have been very good. Granules have been more consistent. There are reports of satisfactory perennial control with granules. Casoron gives shorter residual control of annuals than Karmex or Princep. Control is reduced considerably if applied when soil temperature is over 50° F. Use the granular form for most situations.

For annuals, apply 8 to 12 lb Casoron 50W or 100 to 150 lb/A of 4G to the surface on a broadcast basis for the area treated. Apply in early spring before seeds germinate to control annual weeds. Shallow incorporation or sprinkler irrigation is recommended when application is made during periods of high soil temperature (over 50° F.). Minimum carrier is 50 gpa water for wettable powder.

For perennials, apply 150 to 200 lb of 4G to the surface on a broadcast basis for the area treated in late fall after a killing frost but before soil freezes. Early spring applications less desirable. May be shallowly incorporated, especially if spring applied. Do not remove dead weed growth before surface application. Do not make surface application to areas that have been cultivated during the season prior to application. Do not apply more than 150 lb/A granules to plantings less than one year old. The higher granule rate is suggested for deep-rooted perennials such as leafy spurge and Canada thistle.

Karmex (diuron)**(\$11.90-23.80)****2.5-5 lb Karmex 80DF (2-4 lb act)**

Preemergence herbicide for plantings established at least one year. The label includes caragana, cottonwood, green ash, honeysuckle, red cedar, Russian olive, Siberian elm, Douglas fir, Ponderosa pine and others. Karmex gives fair control of annual grasses such as barnyardgrass, foxtail, and sandbur; fair to good control of several annual broadleaves including mustard, pennycress, shepherdspurse, smartweed, and kochia. Established perennials are not controlled.

Tolerance of labeled species is fair to very good. Do not use on sand, loam sand, gravelly soil, or on exposed subsoil. Use the lower rate on questionable soils. Do not treat trees in low areas.

Apply 2.5 to 5 lb/A Karmex 80DF on a broadcast basis in the area treated. The high rate has provided the most consistent results in SDSU tests. Control usually persists into late season.

Labeling is for early spring application before weeds emerge and before new leaves develop. Do not allow spray to contact tree leaves. Late fall applications have given very good results and is suggested for most situations. Emerged weeds are not controlled. Rainfall required. Remove excessive trash before application. Apply in minimum of 25 gpa water.

Treflan or Trifluralin Products (trifluralin)**(\$4.70-9.30)****1-2 pt Trifluralin 4L or 10-20 lb Treflan 5G (.5-1 lb act)**

Labels vary. Trifluralin is used on new plantings or established trees. Treflan is usually used before planting as it is difficult to incorporate in the row after trees are planted. Treflan liquid and granule formulations have a specialty product label for uses on certain trees, ornamentals, and shrubs. Labeling on some products for field crops does not include tree plantings. Treflan 10G used on field crops is twice as concentrated as specialty Treflan 5G product for ornamentals. Trifluralin is available in several brandname products. Adjust rate according to recommendations for the specific formulation.

Most trees and ornamentals have excellent tolerance. Treflan 5G labeling includes white ash, red cedar, cottonwood, honeysuckle, lilac, and several species of maple, pine, and spruce. Additional species are listed on a 24(c) label for Trust 4L (Agrilience) product. Trust labeling include green ash, boxelder, caragana, Eastern red cedar, chokecherry, cotoneaster, elm, hackberry, honeysuckle, linden amur maple, bur oak, Russian olive, Ponderosa pine, and Black Hills spruce.

Treflan gives excellent control of many annual grasses including foxtail, barnyardgrass, sandbur, and annual bromes, and good control of some annual broadleaves including pigweed and lambsquarters. Perennials are not controlled. Grass control usually persists into late season. Cultivation is required for broadleaved weeds during the first season.

TREFLAN (Continued . . .)

Incorporate into the top 2 to 3 inches of soil. Immediate incorporation is preferred, but incorporation may be delayed for 4 to 20 hours if the soil is dry and wind velocity is low. Incorporate with a tandem disk set to cut 4 to 6 inches deep, field cultivator, or power driven tiller. A second pass insures thorough mixing with the soil.

Apply 1 to 2 pt of Treflan or 10 to 20 lb/A of Treflan 5G. Higher rates are not labeled for preplant incorporated applications. Use minimum of 5 gpa carrier for the spray formulation.

80 lb Treflan 5G (4 lb act)

Preemergence, surface application. Do not incorporate. Use labeled for a limited number of woody ornamental species. Requires rain or irrigation. Incorporated application preferred. Consult labeling on specialty products containing trifluralin.

Roundup or Other Glyphosate Products (glyphosate)

(\$5.00-50.70)

1-5 qt glyphosate Product 3Lae (.75-3.75 lb ae)

.8-4 qt glyphosate Product 4L ae (.75-3.75 lb ae)

.1-.33 ag glyphosate Product 4.5L ae (.75-3.75 lb ae)

Several glyphosate products are labeled for shelterbelts and non-food crop tree plantings. Glyphosate products designated as "Pro" include tree plantings in noncrop sites; other products include labeling for tree plantings associated with agricultural sites. Rates are for products containing 3 lb acid equivalent (4 lb active) per gal; adjust amount of product for other formulations.

Postemergence. Non-selective, translocated herbicide with no soil residual. Roundup is useful to control emerged annual and perennial weeds. Annual weeds controlled include downy brome, foxtail, kochia, lambsquarters, pigweed, ragweed, Russian thistle, and sandbur. Perennials controlled include field bindweed, curlydock, bluegrass, quackgrass, bromegrass, Canada thistle, and common milkweed.

Glyphosate is the most effective treatment to use for broadleaved perennials before planting or to control these weeds in established plantings. Control of 60 to 90% has been reported in SDSU tests. Retreatment the following year is required for eradication. Roundup gives excellent control of annual grasses and very good to excellent control of perennial grasses. It may also be used to control emerged annual broadleaf weeds during the season.

Glyphosate may be applied over the root area but do not allow spray to come in contact with tree leaves or green bark on young trees. Use a shield to protect trees. Use low pressure and coarse spray to reduce droplet drift. Spray only when calm. Vapor drift is not a problem. Apply in a minimum of 20 gpa water. Avoid spray runoff.

Labeling for some glyphosate products includes postemerge directed spray around woody ornamentals in plant nurseries or Christmas tree plantings. Conifers include pine, spruce and yew. Several deciduous ornamentals are also listed. Roundup products are not labeled for over-the-top broadcast application on Christmas tree plantings.

Annual Weeds. Apply 1 qt of 3L ae if weeds are under 6 inches or 1.5 qt/A for weeds over 6 inches tall. Treat when weeds are actively growing but before flowering.

Perennial Weeds. Rate varies according to weed species. Apply 2 to 3 qt of 3L ae for quackgrass and Canada thistle, and 4 qt/A of 3L ae for field bindweed. Use 3 to 5 qt/A of 3L ae for other perennial weeds listed on the label. Weeds should be actively growing and not stressed for moisture. Apply at bud to early bloom stage for broadleaves or when grasses are from 8 inches to boot stage. Areas should not be tilled in the fall or spring before application. Do not till treated areas for 7 to 10 days after application. Fall application is usually more effective than spring.

Use 3 tablespoons/gallon for small annual weeds or 5 tablespoons/gallon (3L ae) for perennials when treating small areas with hand sprayers. Spray to wet foliage.

Poast or Vantage (sethoxydim)

(\$12.25-20.30)

1.5-2.5 pt Poast 1.5L or 2.25-3.75 pt Vantage 1L (.33-.5 lb act)

Postemergence. Sethoxydim is a foliage applied, translocated herbicide. There is no residual soil activity. It may be applied over-the-top on several woody shrubs, ornamentals and trees.

Poast and Vantage provide very good to excellent control of most annual grasses 4 to 8 inches tall. High rates suppress quackgrass; repeat application improves results. Does not control broadleaves. Tolerance on labeled species is excellent.

POAST or VANTAGE (Continued . . .)

Poast contains 1.5 lb/gal active. Labeling includes deciduous trees and non-bearing food trees. There are no restrictions on species; however trial use is suggested when initially using it on new plant material. The rate is 1.5 pt for annual grass up to 6 inches and 2.5 pt/A for grass up to 12 inches. Use the high rate for quackgrass. Add crop oil concentrate at 2 pt/A. Use a minimum of 5 to 10 gpa carrier. For small areas, use 2.5 to 4 tablespoons of Poast and 2.5 tablespoons crop oil per gallon of water. Spray to wet foliage.

Vantage contains 1 lb/gal active. Labeling is for ornamental and nursery plantings; and deciduous and Christmas tree plantings. Tree species include green ash, elm, maple, fir, pine, spruce, willow, and others. Rates are 2.25 pt for annual grass up to 6 inches; 3.75 pt/A for grasses up to 12 inches. Minimum carrier is 5 to 10 gpa. Use 4 to 6 tablespoons per gallon of water for spot treatment. Vantage may be tank-mixed with Surflan, Basagran T/O, or other herbicides.

Fusilade II or Fusilade DX (fluazifop-butyl)

(\$16.00-24.00)

1-1.5 pt Fusilade II 2L or Fusilade DX (.25-.38 lb act)

Postemergence. Fusilade is a foliage-applied translocated herbicide. Fusilade II is labeled for over-the-top use on more than 400 species of established ornamental plants and flowers and on several species of fir, pine, spruce, juniper, maple; cotoneaster, honeysuckle, Russian olive, oak, weeping willow, and Korean lilac. Labeling also includes several species of nonbearing fruit trees. The label does not include all common shelterbelt species. Fusilade DX labeling include Christmas tree plantings and several non-bearing fruit and nut trees. Check the complete list on product label.

Fusilade provides good to very good control of most annual grasses. Repeat applications give fair to good control of quackgrass. Broadleaved weeds are not controlled. There is no residual effect. Has potential for controlling emerged grass in the tree row.

The rate is 1 to 1.5 pt/A for annual grasses, including foxtail, barnyardgrass, sandbur, and wild oat. Grasses should be 2 to 8 inches tall. Use the high rate for quackgrass; apply when it reaches 6 to 10 inches. Add .5 pt non-ionic surfactant per 25 gallons of solution. Do not use crop oil concentrate on ornamentals or trees. Control is reduced if weeds are under stress from drought or cold weather. Apply before grasses are tillered or headed. Direct the spray to reduce contact with foliage. Good weed coverage is important. Use minimum of 5 gpa carrier.

For small areas, use 1.5 tablespoons of Fusilade product and .5 tablespoon surfactant for 1 gallon of spray.

Goal (oxyfluorfen)

(\$45.00-95.00)

4-8 pt Goal 2L (1-2 lb act)

Preemergence or postemergence herbicide for new or established plantings. Labeled as a Special Local Needs (SLN) use in South Dakota. Labeling is for conifers including several species of fir, pine, spruce, arborvitae, Juniper and red cedar; and deciduous species such as ash, crabapple, lilac, black maple, red oak, Russian olive, poplar (cottonwood) and black walnut. Goal is primarily for annual broadleaves such as wild buckwheat, kochia, lambsquarters, ladythumb, prickly lettuce, mustards, nightshade, pigweed and Russian thistle. Annual grasses may be suppressed. Broadleaf weeds should not exceed 4 leaves; grasses should be less than 2 leaves. Rainfall is required for preemergence applications; weeds must be small and actively growing for postemergence use.

Tolerance is acceptable if applied according to directions. Soil applications should be made after final seedbed preparation but before transplanting. Conifers may be treated before planting, post-directed, or postemergence (over the top); however Goal must be applied prior to bud break or delayed until foliage has hardened. Deciduous species can be treated before planting or as a directed spray applied toward the base of the tree, prior to bud break. Avoid direct or indirect spray contact on foliage of deciduous species.

The rate is 4 to 8 pt/A for both preemergence and postemergence use. The higher rate improves consistency. Adding non-ionic surfactant at 2 pt/100 gal improves postemergence control.

OTHER HERBICIDES

Several other herbicides have more limited general use in shelterbelts but have use in special situations. Frequently, the approved species list fails to include many common trees and shrubs, or weed control is short term or limited to a few weed species.

Finale (glufosinate)

(\$43.70-87.40)

3-6 qt Finale 1L (.75-1.5 lb act)

Postemergence. Labeling is for noncrop areas and for trimming or edging around trees and shrubs. It is a nonselective, foliar herbicide with no soil residual activity. It controls emerged vegetation. The 3 qt rate is for small annuals; use 5 to 6 qt/A for larger weeds. For spot application, use 1.5 to 4 oz per gallon of water. Finale is labeled for tank-mixing with many soil-applied herbicides that are used for residual control in ornamentals and certain tree plantings. Avoid any spray contact to trees or other desirable vegetation.

Basagran T/O (bentazon)**(\$27.50-55.00)****2-4 pt Basagran T/O 4L (1-2 lb act)**

Basagran T/O is labeled for use as a directed application in several tree and shrub species including green ash, and several maple, pine, and spruce species. Basagran does not injure grass. Do not apply over-the-top. It controls several annual broadleaves and will suppress Canada thistle. Weeds should be small, usually less than 4 to 6 inches for most weeds. Basagran T/O fits situations where trees and ornamentals are in grass turf area. Control limited to labeled weed species.

The rate is 2 to 4 pt/A. Use a minimum of 20 gpa carrier to assure good coverage. Use 2 to 4 pt/A of nontoxic crop oil; the high rate is for 50 to 100 gpa carrier.

Pennant or Pennant Magnum (metolachlor)**(\$30.10-60.10)****2-4 pt Pennant 8L or 1.3-2.6 pt Pennant Magnum 7.6L (2-4 lb act)**

Pennant is a preemergence herbicide that gives very good control of several annual grasses for 8 to 12 weeks. Labeling includes several field or container grown ornamental plants including maple, barberry, dogwood, ash, juniper, pine, willow, lilac, spruce, and poplar as well as several other landscape ornamentals. Several common shelterbelt species are not included.

Apply as a directed spray to the soil surface along the tree row. If applied over the top, apply ample irrigation to wash residue from the foliage. Use the low rate for coarse, low organic matter soils. Minimum carrier is 10 gpa. Pennant may be tank-mixed with Princep or other herbicides to improve broadleaf control.

Barricade (prodiamine)**(\$30.10-60.10)****1-2.3 lb Barricade 65DG (.65-1.5 lb act)**

Preemergence. Labeled for use in many species of ornamentals and other perennial shrubs. A limited number of shelterbelts species are included; use is primarily in ornamental plantings and turf. Tolerance is very good. Barricade controls foxtails, crabgrass, pigweed, Kochia, lambsquarters, purslane, and other common annual weeds. May be applied in fall or early spring.

Gallery (isoxaben)**(\$87.00-172.70)****.66-1.33 lb Gallery 75DF (.5-1 lb act)**

Preemergence herbicide for labeled species in ornamentals, noncropland, nursery stock and non-bearing fruit and nut trees, and vineyards. Consult label for complete list of approved species. The label includes ash, birch, cedar, spruce, elm, fir, maple, oak, pine, willow and lilac. Non-bearing fruit such as apple, grape, pear, plum and walnut are included.

Limited test results. Label listed several common broadleaves (mustard, pigweed, lambsquarters, chickweed, knotweed, and velvetleaf) that are controlled at the lower rates. The higher rate is for less susceptible broadleaves and annual grasses such as purslane, prostrate spurge, barnyardgrass, crabgrass, and foxtails.

Apply Gallery in late summer, early fall or early spring prior to weed germination. Areas to be treated should be free of established weeds. Use minimum of 10 gpa carrier.

Pendulum (pendimethalin)**(\$25.00-50.00)****2.4-4.8 qt Pendulum 3.3L or 100-200 lb Pendulum 2G (2-4 lb act)**

Preemergence dinitroanilin herbicide used to control annual grass and certain annual broadleaves. Emerged weeds are not controlled. Pendimethalin controls foxtail, crabgrass, barnyardgrass, purslane, oxalis, and prostrate spurge. Labeling for ornamentals includes white ash, cottonwood, crabapple, elm, honey locust, lilac, weeping willow, black walnut, and several species of spruce, red cedar, pine, oak, and maple. Several shrubs and groundcover are also labeled.

Pendulum is applied to the soil surface; do not incorporate or allow the herbicide to concentrate in the planting furrow. Apply the low rate for short term weed control; use the high rates for extended (6-8 mos.) control. May be applied over-the-top of labeled species.



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Lasso (alachlor)**(\$22.20)****4 qt Lasso 4L or 27 lb Lasso II 15G (4 lb act)**

Preemergence herbicide Lasso 4L labeling includes newly planted or established ornamental yew and juniper. Lasso II labeling includes field growth cotoneaster, crabapple, dogwood, Euonymus, holly, juniper and yew. Labeling does not include common shelterbelt species.

Apply in early spring before weed emergence. Liquid is applied as a directed spray. Not recommended for over-the-top application. Lasso gives very good to excellent control of annual grasses for 8 to 12 weeks. Late season weeds are not controlled. Broadleaf control is limited. Rates are 4 qt Lasso or 27 lb/A Lasso II on a broadcast basis. Minimum carrier is 10 gpa. Present labeling appears to limit its use in shelterbelts. Restricted Use Pesticide.

Oust (sulfomethuron methyl)**(\$12.00-24.00)****1-2 oz Oust 75DF**

Preemergence herbicide with label directions for noncrop weed control. Several pine species are tolerant; the herbicide may be used on sites where these trees are present. Other common shelterbelt species are not labeled. Some deciduous species are considered sensitive. Injury has been observed with high rates. Do not apply Oust over tree foliage. Weed control is promising as Oust gives excellent full season control of most common annual grasses and annual broadleaves, including foxtail, Kochia, and Russian thistle.

Experimental rates tested are .5 to 2 oz/A product on a broadcast basis. Apply in early spring. Limited postemergence activity. Not recommended for use until additional data and labeling for rates and a tolerant species list is available.

Ronstar (oxadiazon)**(\$150.00-300.00)****100-200 lb Ronstar 2G (2-4 lb act)**

Preemergence herbicide for use on several species of newly transplanted or established ornamental shrubs and trees. Approved species in established plantings include ash, honeysuckle, lilac, Russian olive, and spruce. Limited tests indicate fair to good control of annual grasses including foxtail, barnyardgrass, and some annual broadleaves such as pigweed, lambsquarters, and purslane.

Ronstar may be applied any time during the season; however, early spring before weed emergence is recommended. Control lasts for 2 to 4 months. Rainfall or irrigation soon after application improves performance. Rates are 100 to 200 lb/A Ronstar 2G on a broadcast basis. The higher rate is suggested for most situations. Retreatment may be required for full season control. Do not apply when foliage is wet.

Surflan (oryzalin)**(\$44.50-89.00)****2.66-5.33 lb Surflan 75W or 2-4 qt Surflan 4L (2-4 lb act)**

Preemergence. Surflan is labeled for application in several fruit, nut, and woody ornamental species. Many of the uses are for container grown plants only. The label does not include common shelterbelt species. Use only the specialty product labeled for ornamentals.

Surflan gives very good annual grass control. Surflan does not control emerged weeds. It may be tank-mixed with Princep or Karmex for improved broadleaf control. Tank-mix with Roundup for emerged weeds if trees are protected from the spray. The rate is 2.66 to 5.33 lb Surflan 75W or 2 to 4 qt/A Surflan 4L on a broadcast basis. Use the high rate for most situations. Apply as a directed spray or over the top of the trees before weeds emerge. Combinations with Roundup may be applied as a directed spray. Minimum carrier is 20 gpa.

2,4-D**(\$3.10-4.60)****1-1.5 qt 2,4-D Amine 3.8L (1-1.5 lb act)**

Postemergence. Selective, translocated herbicide for broadleaved weeds. This herbicide is useful to reduce stands of perennial weeds including field bindweed, Canada thistle, or leafy spurge. Labeling is for noncrop areas; tree uses are not listed.

Very small amounts of herbicide from vapor or droplet drift can seriously damage or kill deciduous trees. Conifers are somewhat less sensitive, especially when not actively growing. Use low pressure, coarse spray, and spray only when calm. Avoid heavy application over tree root zone. Use amine salt formulation. Apply when temperature is under 80° F. Ester formulations should not be used near trees. Suggested use is limited to special situations where risk of exposure to trees can be assumed. Apply 1 to 1.5 lb acid equivalent/A. Labelers will not be responsible for damage to trees. Other herbicide choices are preferred.

Plateau (imazapic)

(\$19.20-28.80)

8-12 oz Plateau 2L (.12-.18 lb act)

Preemergence and postemergence. Labeled for use on approved brush and tree species. Not intended for use on nursery, orchard, ornamental plantings, new plantings or seedling trees. Plateau controls mustard, smartweed, crabgrass, foxtail, pigweed, lambsquarters, leafy spurge, woodsorrel, foxtail barley, bedstraw and several other grasses and broadleaved weeds.

Early postemergence suggested for most weeds; however there is residual activity for preemergence effect. Always add a methylated seed oil (MSO) at 1.5 to 2 pt when using less than 30 gpa carrier. For carrier over 30 gpa, use MSO or crop oil concentrate at 1 gal/100 gal. Ammonium sulfate may also be added. A non-ionic surfactant may be used in place of the seed oil in some situations.

Apply Plateau as a directed spray below the foliage for best selectivity. Some chlorosis may be noted. Suggest use on a limited basis to determine tolerance. Labeled species for directed application include green ash, boxelder, red cedar, cottonwood, hackberry, juniper, locust, sugar maple, oak, white pine, serviceberry, and walnut. Plateau may be mixed with Pendulum or other herbicides approved for use. Plateau is marketed to public or governmental agencies but may be used on private lands.

Stinger (clopyralid)

(\$15.00-39.50)

.25-.66 pt Stinger 3L (.2-.5 lb act)

Postemergence. Useful to control emerged broadleaves such as Canada thistle, knapweeds and some annuals. Very effective on Canada thistle. Labeled for over-the-top or directed application on certain species of Christmas tree plantings, including Douglas, Fraser, grand, balsam and noble fir; blue spruce; and lodgepole, Ponderosa, and white pine. Use the high rate for perennials. Maximum rate for blue spruce is .5 pt/A. Reports indicate good tree tolerance. Labeling also includes over-the-top or directed application on well established cottonwood/poplar plantings. Do not apply to first-year transplants. Do not use additives.

Table 1. Guide for Small Areas*(Refer to section for each herbicide or product labels for information on other rates.)*

Chemical Tradenames, Formulations	Rate Lb/A Active	Amount of Product	
		Per Acre	4-Foot Band on 100 Feet of Row ^{1/}
Princep Caliber 90DF	4	4.4 lb	3 Tbsp
Princep 4L	4	4 qt	2.66 Tbsp
Karmex 80DF	4	5 lb	3 Tbsp
Pendulum 3.3L	4	4.8 qt	3.2 Tbsp
Casoron 50W	6	12 lb	3.33 Tbsp
Casoron, Norosac 4G	6	150 lb	3.66 Cup
Goal 2L	2	8 pt	2.6 Tbsp
Treflan 4L	1	1 qt	2 tsp
Treflan 5G	1	20 lb	2/3 Cup
Poast 1.5L	.5	2.5 pt	.75 Tbsp
Fusilade 1L	.38	1.5 qt	1 Tbsp
Plateau 2L	.18	12 oz	.5 tsp
Glyphosate 3L ae	3	1 gal	2.66 Tbsp
2,4-D 4L	1.5	1.5 qt	3 tsp
Finale	1.5	6 qt	1.8 fl oz

^{1/} Approximate amount

Tbsp=level tablespoon; tsp=level teaspoon

SAFETY FIRST***Follow the Label.*** Read the entire label before using.***Poison Control Center - 1-800-222-1222***