



2022 Weed Control

Pasture and Range

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Safety First

Follow the Label. It is a violation of federal pesticide laws to use an herbicide in a manner inconsistent with its labeling. Read the entire label before using.

Applicator Safety. The most serious risk of exposure from chemicals is during handling and mixing operations with the concentrated product. Use protective equipment specified on the label. Use chemical resistant gloves, eye shield, long-sleeved clothing, rubber boots, and appropriate respirator as required.

Poison Control Center 1-800-222-1222

Water Protection. Preventing spills and accidents during handling and mixing reduces risk of groundwater and surface water contamination. Mix herbicides away from wells and water sources. Prevent back-siphoning into wells. Install anti-backflow devices in irrigation equipment used for pesticides. Triple rinse containers. Store herbicides properly. Identify high-risk areas, such as coarse soils or areas where the water table is near the surface. Be aware of herbicide properties that increase the risk of contamination.

ABBREVIATIONS:

Several abbreviations are used in this publication.

ae=acid equivalent

NIS=non-ionic surfactant

ai=active ingredient

oz=ounces

COC=crop oil concentrate

P=pellet

DF=dry flowable

pt=pint

gal=gallon

qt=quart

gpa=gallons per acre

T=tablespoon

L=liquid

t=teaspoon

lb=pound

WDG=water soluble powder or crystals

ml=milliliter

% v/v=percent volume per volume

MSO=methylated seed oil



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March 2022

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There are 24 million acres of native and tame pasture and range as well as 1.4 million acres of grass hayland in South Dakota. Many herbaceous and woody plants are present in these grasslands. Forbs add to the productivity and are desirable. Some may be desirable when found in sparse stands, but become undesirable in heavier stands. Invasive plant species alter the grass species mix and reduce production of palatable forage. Undesirable plants reduce the quality of animal products and still others may be poisonous to livestock. Vigorous grass plants are good weed competitors. Herbicides are an aid to recommended grazing or haying practices. Quality seed, proper seedbed, and good planting techniques will reduce weed problems in new grass seedings.

Herbicide Suggestions

Herbicides are included only after the chemical is registered by the Environmental Protection Agency (EPA) as to residue tolerances in crops used for food or feed. This fact sheet provides a summary of herbicide uses and does not imply a guarantee. Consider the label to be the final guide. Tradenames are for reader convenience. Users are responsible for following label directions and precautions.

Weed Control. Information is based on Agricultural Experiment Station data, other research and observations in South Dakota. Ratings are based on performance using recommended rates and application at proper weed stage and satisfactory growing

conditions. Herbicide performance is better if the grass stand is full and vigorous.

Herbicides. Most herbicides are listed by tradename except where the active ingredient is available in several products. The common name (in parentheses) follows the first listing of the tradename. Product labels for the same active ingredient may vary. Consult the label of the product being used.

Rates. Rates for each treatment and each formulation are stated as the amount of product per acre. The amount of active ingredient (ai) or acid equivalent (ae) is also listed for each treatment.

Cost. The cost per acre for low and high rates is listed. Prices do not consider special marketing programs. Consult your dealer/distributor for actual prices.

Time to Apply. Most herbicides for pasture and range are applied when weeds and grass are growing. The optimum growth stage for control of specific weeds is listed in sections of this publication.

Noxious Weed Treatments

Noxious weeds are found in range and pasture as well as noncrop areas and cropland. Troublesome statewide noxious weeds like Canada thistle, leafy spurge, perennial sow thistle, absinth wormwood, and hoary cress can be serious problems in pasture and rangeland. Locally noxious weeds like biennial thistle (musk, plumeless, bull and Scotch) are a major concern

in pasture and range across the state. Locally noxious weeds that can be a problem in pasture and range in certain areas of South Dakota include: common mullein, biennial knapweeds, tansy, St. Johnswort, dalmatian and yellow toadflax, and burdock. This guide includes treatments for many of these weeds. For a more complete listing of herbicide recommendations refer to SDSU Fact Sheet, "Noxious Weed Control".

Pasture and Range IPM

An effective weed control plan for pasture and range involves several management practices. The grazing scheme takes into account the type of livestock as well as the grass and forb species available. Grazing intensity influences the relative abundance of undesirable forbs and grasses. Weeds that are unpalatable when mature may provide acceptable grazing for certain classes of livestock when weeds are young. Grazing schedules are a good IPM practice for weed management. Cultural or mechanical weed management includes mowing or clipping, hand digging, prescribed burning, or cultivation. Other IPM tactics include biological control, especially for noxious weeds. Herbicides are an aid to control unwanted weeds.

Mowing or clipping temporarily removes weed topgrowth but also removes topgrowth from grass. This system stops seed production but has different effects on the weeds. Annual forbs can be controlled by cutting below the lowest leaf early in the growing season. Undesirable annual grasses should be mowed after the seed stalk has elongated but prior to seed formation. Usually mowing perennial weeds one time reduces seed production; repeated mowing reduces vigor and slows spread. Clipping perennials like Canada thistle or leafy spurge in the spring works well as a set up for fall herbicides when moisture encourages new growth. Digging or chopping works well for scattered biennial thistle. Musk thistle rosettes can be stopped when the root is cut several inches below ground level. This requires more labor and is limited to small patches or scattered plants.

Burning is a valuable tool for managing weeds and grasses in range. Most annual broadleaf weeds and grasses and many undesirable perennial broadleaves can be controlled with fire. Forb response to fire depends on the timing of the burn. Burning in late spring when the plants are actively growing is the best

time to control most perennial forbs. Biennial weeds that are in the rosette stage are not controlled by fire.

Biological control is another weed control tool, especially for noxious weeds. Biological control utilizes natural enemies as a means of weakening or killing the host plant. Insects have been the most common approach to biological control in South Dakota. Noxious weeds that have approved biological control agents (insects) in the state include leafy spurge, musk thistle, Canada thistle, toadflax, St. Johnswort, and biennial knapweeds. South Dakota currently has a collection and release program for leafy spurge flea beetles (*Aphthona* species), coordinated by the South Dakota Department of Agriculture. The county weed and pest board is the local contact point for landowners and managers considering the use of flea beetles on leafy spurge.

Herbicide options are available to control many of the undesirable plants found in pasture and range. Many of these treatments, especially those targeting broadleaf weeds, will also remove all or many of the desirable forbs or legumes. Reducing or eliminating beneficial forbs can reduce livestock gains and alter the forage mix.

Herbicides perform best if conditions are favorable for plant growth. Careful and selective use of herbicides, combined with proper grazing management and other control tactics hasten recovery of weed infested pastures or range. Use herbicides that are labeled for the target weed and registered for use on pasture and range. Follow all grazing and haying intervals and environmental restrictions.

Deferred grazing gives the grasses an opportunity to build up root reserves, develop more topgrowth and produce more herbage. In some pastures, desirable native species no longer abundant will become re-established during the rest period. Deferred grazing can be used in conjunction with other improvement practices to speed recovery.

ESTABLISHED GRASS, PASTURE and RANGE

Herbicides control many annual, biennial, or perennial broadleaved weeds and woody plants in grass pasture and range. Legumes and other desirable plants will be damaged or killed. Herbicides are more effective than mowing for perennials.

Restrictions on grazing or haying after application or removal of slaughter animals from treated areas are specified for each treatment. Check the product label. Some herbicides affect palatability of certain plants, causing livestock to graze species that normally would be avoided. Unpalatable poisonous plants can become more palatable to livestock following an herbicide application. Remove livestock for at least 3 weeks after treatment if poisonous plants are present.

2,4-D ESTER OR AMINE

(\$2.35-15.45)

1 pt - 2 qt 2,4 -D 3.8L (0.5 -2 lb ae)

2,4-D controls many annual and biennial broadleaved weeds and suppresses or controls many broadleaved perennials and woody plants in grass pasture or range. Legumes and other desirable broadleaves will be damaged or killed. It is the most popular herbicide for pasture and range.

Ester formulations are more effective than amines on many pasture weeds. Use esters on woody plants. Diesel oil carrier with esters improves control of tolerant woody species. Use amine formulations where sensitive crops such as alfalfa, sunflowers, soybeans, or trees and shrubs are in the area.

Most 2,4-D products specify sufficient carrier for adequate coverage. Higher amounts of carrier (3-5 gpa air, 10-20 gpa ground) may be helpful for dense weed growth, tolerant species, or woody plants.

PRECAUTIONS: Avoid drift to trees and sensitive broadleaved crops. Labeling for 2,4-D products varies, reflecting changing regulatory requirements. Most labels do not allow grazing lactating dairy animals on treated areas for 7 days after application. Most labels allow harvesting hay 7 days after application. A 3-day removal period before slaughter is required for most animals grazing treated areas within 2 weeks after application. Check label on product used.

Refer to 2,4-D formulation table below to determine product rates for other formulations.

2,4-D RATE – Product Per Acre

Lb/A ae Required	FORMULATION			
	3.8L	5.7L	80% WSP	90% WSP
0.5	1 pt	0.66 pt	0.66 lb	0.6 lb
1	2 pt	1.33 pt	1.25 lb	1.1 lb
1.5	3 pt	2 pt	1.9 lb	1.7 lb
2	4 pt	2.66 pt	2.5 lb	2.2 lb

Rates of 2,4-D vary according to weed species. A spring application of 1 to 1.5 qt 3.8L per acre is a good program for general broadleaf control. Rates above 1.5 to 2 qt 3.8L may cause temporary stunting of grasses, especially during boot stage. Do not treat from boot to milk stage where grass seed production is desired.

Annuals. Small actively growing annual weeds require less herbicide than larger, more mature plants. Most annuals can be controlled with 1 to 2 pt 3.8L per acre. Winter annuals can be treated in fall or early spring. The low rate is for weeds under 6 inches and growing actively. Use the high rate for amine formulations.

Biennials. (Gumweed, biennial thistle, etc.). Apply 1 pt to 1.5 qt 3.8L per acre at rosette stage. Usually applied in spring. Results are best when temperatures exceed 65 degrees F. Gives good to very good control when applied at rosette stage. Weeds become more tolerant and control diminishes considerably after flower stalk elongates.

Perennials. (Goldenrod, noxious weeds, etc.). Apply 1 to 2 qt 3.8L per acre at pre-bud stage. Good to very good control of noncreeping perennials. Limited stand reduction of creeping perennials. Retreatment in the fall required.

Woody Plants. Apply 1 to 2 qt 3.8L per acre. Use ester formulations. Control is fair to good. Results are best when plants are actively growing and not under stress. Diesel oil for air or an emulsion of diesel oil and water (1 part fuel, 3 parts water) as carrier for ground application improves control of most tolerant species.

RATE of 2,4-D to CONTROL SEVERAL BIENNIAL AND PERENNIAL WEEDS

Rates in () are lb ae per acre

Biennials	Perennials	Brush
Gumweed (0.75) Musk thistle (1.5-2) Plumeless thistle (1.5-2) Bull thistle (1.5-2) Burdock (1)	Wormwood sage (2) Goldenrod (1.5) Canada thistle (1.5) Leafy spurge (1.5)	Buckbrush (2) Sand sagebrush (1.5-2) Fringed sagebrush (1.5-2) Green sagewort (1.5-2) Silver sagebrush (2)

FREELEXX (2,4-D choline)**(\$5.90-11.85)****2-4 pt Freelexx 3.8L (1-2 lb ae)**

Less volatile than 2,4-D ester or amine and low odor. Formulation is a SL (soluble liquid concentrate). Contains 3.8 lb ae/gal, which is a similar concentration as other "4 lb ai" 2,4-D products. Similar use sites and target weeds as many 2,4-D amine products.

May be applied by ground (10 gpa minimum) or air (3 gpa minimum). Do not apply within 7 days of forage harvest. Maximum use rate is 4.2 pt/A per application (8.4 pt/A per season). Do not make more than 2 applications per season.

Annuals. Apply at a rate up to 2 pt/A on susceptible annuals when small (vegetative stage) and actively growing. Activity may decline after flower stalks appear.

Biennials and Perennials. Apply 2-4 pt/A at rosette or vegetative growth stage. Biennials may include gumweed, biennial thistle, etc. and perennials may include goldenrod, Canada thistle, and other noxious weeds. For perennials, repeated applications may be needed for control.

Woody plants. Apply up to 4 pt/A. Results are best when plants are actively growing and not under stress and leaves are fully expanded but yet still somewhat tender (usually late spring or early summer). A 1:4 oil-water emulsion may be used for challenging weeds and/or conditions.

DICAMBA PRODUCTS (dicamba) RESTRICTED USE PESTICIDES**0.5 -2 pt dicamba 4L (0.25 -1.0 lb ae)****(\$3.40-25.55)**

Dicamba is available in several brand name products including **Banvel, Clarifier, Clarity, Clash, Detonate, Diablo, Rifle, Sterling Blue, Strut, Vision**, and others. Formulation and use may vary. Follow label for product use.

Dicamba products control several annual, biennial, and perennial broadleaf weeds and woody plants in grass pasture and range. Legumes and other desirable broadleaf plants will be killed. Dicamba is especially useful for perennial weeds. Banvel and Sterling Blue are examples of products formulated as a dimethylamine salt; Clarity is a diglycolamine salt. Weed control has been similar for these products. Minimum carrier is 3 gpa (4L) for ground and 2 gpa (4L) for air.

Annuals. Apply 0.5 -1 pt (4L), to control small susceptible weeds. Small annual weeds require lower rates than larger weeds. Use 1-1.5 pt (4L) for larger, established weeds. Control is best when weeds are actively growing. Very good control.

Biennials. Apply 1 to 2 pt per acre for most biennials in the rosette stage. Rates of 0.5-1 pt (4L), may be satisfactory for rosettes under 3 inches. Apply 1-2 pt (4L), for rosettes greater than 3 inches. Increase rates to 2 pt (4L) if plants have bolted. Good to very good control of weeds when applied at the rosette stage. Expect considerably reduced control if plants have bolted.

Perennials. Apply 0.5-1 pt (4L), for fair to good topgrowth suppression. Apply 1-2 pt (4L), for topgrowth control. Apply 2 to 4 pt (4L) for spot treatment applications. Treat perennials before bloom stage. Retreatment the following season is usually required.

Woody Plants. Apply 0.5 -1 qt (4L) for topgrowth suppression only. Apply 1 qt (4L) for topgrowth control and stem and sprout suppression. Some retreatment usually required.

Spot Treatment. Dicamba may be applied at 1-2 qt (4L) as a spot treatment to individual clumps or small areas using a handgun or similar equipment. Apply diluted sprays to allow complete wetting (up to runoff) of foliage and stems.

PRECAUTIONS: Do not exceed a total of 1 qt/A (4L) during a growing season. Do not apply more than 1 qt/A (4L) in a single application. Higher rates are for spot treatment only. Do not treat areas where movement into soil or surface water may occur. Do not treat over the root zone of trees and shrubs. Do not treat grasses to be harvested for seed. Do not apply dimethylamine formulations if expected daytime temperature exceeds 85 degrees F.

RESTRICTIONS: Some labels require 30 days after last application before slaughter of meat animals. Some 4L dicamba products require 7 days before hay harvest. Grazing or haying restrictions for lactating dairy animals (cows, goats, horses) are listed below:

Restriction for Lactating Dairy

Dicamba Rate 4L/A	Days before Grazing	Days before Hay Harvest
1 pt	7 days	37 days
1-2 pt	21 days	51 days
1-2 qt	40 days	70 days

TANK-MIXES AND PREMIXES

Dicamba may be tank-mixed with several approved herbicides to control additional broadleaf weeds and woody brush. Labeled tank-mix partners include metsulfuron-methyl, picloram, triclopyr, 2,4-D and others. Refer to specific product label for approved tank-mix partners.

Dicamba Products + 2,4-D (dicamba + 2,4-D)

0.25 -2 pt dicamba 4L + 0.5 - 4 pt 2,4 -D 3.8L ae (0.12-1 + 0.25 -2 lb ae)

Weedmaster, Brash, Range Star, Rifle-D (dicamba + 2,4-D)

0.5 - 4 pt Weedmaster, Brash, Range Star, Rifle-D 3.87L (0.06 - 0.5 + 0.18 -1.44 lb ae) (\$2.35-23.55)

Brush-Rhap or Latigo (dicamba + 2,4-D)

0.33-2.5 pt 4.2L (0.07-0.56 + 0.1-0.75 lb ae)

Premixes with 3.87L contain 1 lb dicamba (Banvel) + 2.87 lb 2,4-D amine per gal and 4.2L premixes contain 1.8 lb dicamba and 2.4 lb 2,4-D. Low rates are for annuals and some biennials. Rates over 4 pt (3.87L) or 2.5 pt (4.2L) are for spot treatment only. Equivalent rates of Banvel + 2,4-D are listed below.

Premix pt/A	Equivalent Product/A	
	Dicamba 4L	2,4-D 3.8L ae
0.5	2 oz	0.38 pt
1	4 oz	0.75 pt
2	8 oz	1.5 pt
4	16 oz	3 pt

Annuals. Tank-mix 0.25 to 0.5 pt dicamba + 0.5 to 1 pt 2,4-D 3.8L per acre or use 0.5-3 pt 3.87L or 0.33-1.66 pt 4.2L dicamba/2,4-D herbicide premix when weeds are actively growing. Use higher rates after the seedling stage. Very good control.

Biennials. Tank-mix 0.5 to 1 pt dicamba + 1 to 2 pt 2,4-D 3L per acre or use 1-4 pt 3.87L or 0.66-2.5 pt 4.2L dicamba/2,4-D herbicide premix when weeds are in the rosette stage. Good to excellent control.

Perennials. Tank-mix 0.5 to 1 pt dicamba + 1 to 2 pt 2,4-D 3.8L per acre for topgrowth suppression of perennials or to control alfalfa and dandelion. Tank-mix 1 to 2 pt Banvel + 1 qt 2,4-D 3.8L per acre or use 2-4 pt 3.87L or 1.125-2.5 pt 4.2L dicamba/2,4-D herbicide premix to control other perennials. Good stand reduction of noncreeping perennials. Limited stand reduction of creeping perennials. Retreatment required the following season.

Woody Plants. Tank-mix 2 qt 2,4-D 3.8L ester + 1 to 4 pt dicamba per acre as suggested in the section for dicamba alone or 4 pt 3.87L or 2.5 pt 4.2L dicamba/2,4-D premix. The 2,4-D will improve control, especially with lower dicamba rates. Very limited SDSU tests.

PRECAUTIONS: Do not allow grazing lactating dairy animals on treated areas for 7 days after application. Do not harvest hay for 7 days after application. A 30-day removal period before slaughter is required for animals grazing treated areas.

E-2 (dicamba + 2,4 -D + fluroxypyr)

(\$14.40-36.00)

2-5 pt E-2 4L (0.1- 0.25 + 0.8 -2 + 0.1- 0.25 lb ae)

Scorch (dicamba + 2,4-D + fluroxypyr) 1-4 pt Scorch 4.77L

E-2 is a premix containing 0.4 lb ae/gal dicamba + 3.2 lb ae/gal 2,4-D amine + 0.4 lb ae/gal fluroxypyr (Comet). Scorch contains 1 lb ae/gal dicamba + 3.02 lb ae/gal 2,4-D + 0.75 lb ae/gal fluroxypyr. Rates vary by weed species. May require retreatment; however, do not make more than 2 applications per year and allow 21 days (E-2) or 30 days (Scorch) between treatments. Tank-mixes may be required for control of difficult weeds. Scorch may be used for spot treatment at 5.33 pt/A.

PRECAUTIONS: Do not graze lactating dairy for 7 days. No grazing restrictions for other animals. Do not harvest hay or forage for 7 days. Do not slaughter animals for 3 days (Scorch) or 30 days (E-2).

OVERDRIVE (dicamba + diflufenzopyr)**(\$11.35-22.65)****4-8 oz Overdrive 70WDG (0.125 - 0.25 + 0.05 - 0.1 lb ae)**

Overdrive contains 50% dicamba (0.5 lb ae) plus 20% diflufenzopyr (0.2 lb ae). Overdrive is a selective postemergence herbicide used to control annual and biennial broadleaf weeds and control or suppress perennial broadleaf weeds in pasture, hay, and rangeland sites. Overdrive controls weeds by auxin transport inhibition.

Spring or Fall. Rate is 4 to 8 oz per acre based on weed species and maturity; use the higher rates for perennials like Canada thistle, sowthistle and biennial thistle. A maximum of 8 oz per acre can be applied in pasture, hay, or rangeland per season. Add 1 qt NIS per 100 gal or MSO at the rate of 1.5 to 2 pt per acre. Minimum carrier is 3 gpa for ground application or 2 gpa for aerial application. Spray is rainfast 4 hours after application. Overdrive can be tank-mixed with several labeled tank-mix partners to improve weed spectrum.

PRECAUTIONS: Overdrive may injure bentgrass and buffalograss. Severe injury will occur if applied to alfalfa, clovers, vetch, and other legumes. Established grasses growing under stress may exhibit more pronounced injury symptoms. Do not plant any crops for 30 days after last application. Pasture or rangeland grass treated with Overdrive can be grazed or harvested for livestock feed immediately after application. Do not apply to newly seeded grasses.

TORDON 22K, TRIUMPH 22K, TROOPER 22K (picloram) RESTRICTED USE PESTICIDE**(\$4.80-38.50)****0.5 pt-2 qt Tordon 22K, Triumph 22K, Trooper 22K, 2L (0.125 -1 lb ae)**

Tordon 22K controls several annual, biennial, or perennial broadleaved weeds in established pasture and range. Legumes, trees, and desirable broadleaved plants will be severely damaged or killed. Most useful for improved control of difficult biennial or perennial weeds which are not adequately controlled with 2,4-D.

Results with lower rates for annual weeds are best when weeds are growing actively. Higher rates give consistent performance under varied conditions due to extended soil residual (1 to 3 years).

Minimum carrier is 10 gpa for ground and 2 gpa for air. Spot treatment rates require 20 gpa minimum. Most grasses are tolerant to rates up to 2 qt per acre. Grasses such as bromegrass will be seriously damaged with higher rates. Bluegrass is tolerant. Do not apply to grass seed crops.

Avoid drift to sensitive crops. Do not rotate or interseed treated areas to other crops. Do not apply where soils have rapid permeability (such as loamy sand to sand) and where the underlying aquifer is shallow.

Annuals. Apply 1 pt per acre in spring when weeds are in seedling stage. Limited potential when compared to other treatments.

Biennials. Apply 0.5 to 2 pt per acre in late fall when weeds are in the rosette stage.

Biennial thistles. Apply at the seedling or rosette stage at 0.5 pt per acre in the fall. Provides excellent control under wide range of growing conditions. Visual effects develop more slowly than for some treatments.

Common mullein. Apply in spring at rosette stage or prior to stalk elongation. Use 1 qt per acre. Reduction is apparent for at least 2 years.

Perennials. Apply 1 to 2 qt per acre in spring or fall.

Leafy spurge. Spot treatment. Spring or fall. Apply 2 qt per acre using minimum of 20 gpa carrier. Primarily for small patches. Will reduce stand, however, follow-up Tordon or other herbicide applications may be required. Apply anytime during growing season.

Canada thistle. Spot treatment. Use 1 to 2 qt per acre for small infestations in spring or fall. The 2 qt rate is a spot treatment program using 20 gpa carrier. Apply anytime during the growing season. Make spring treatment before seed forms. Make fall applications before soil freeze up. Use 2,4-D or other herbicides to control stragglers or seedlings in succeeding years.

Toadflax (dalmatian and yellow). Spot treatment. Apply 2 qt to actively growing plants in spring before full bloom or in late summer or fall. Use lower rate for fall application shortly after killing frost.

PRECAUTIONS: There are no restrictions for haying or grazing for non-lactating dairy or beef at rates of 1 qt per acre or less. Do not treat more than 50% of an acre when making spot treatments at rates over 1 qt per acre. Do not harvest for hay within 2 weeks after treatment when spot treating with rates of 1 qt per acre or more. Meat animals grazing treated areas within 2 weeks after application should be removed 3 days before slaughter. Do not graze lactating dairy animals on treated areas for 2 weeks after treatment.

TANK-MIXES AND PREMIXES (RESTRICTED USE PESTICIDES)

Tordon + 2,4 -D (picloram + 2,4 -D)

0.5-1 pt Tordon 22K 2L + 1 qt 2,4 -D 3.8L ae (0.13- 0. 25 + 1 lb ae)

Grazon P+D, Gunslinger P+D or Trooper P+D (picloram + 2,4 -D)

(\$8.25-16.50)

2- 4 pt Grazon P+ D, GunSlinger P+D, Trooper P+ D (0.14 - 0. 27 + 0.5 -1 lb ae)

Graslan L (picloram + 2,4 -D)

(\$7.22-15.35)

1.25-2.66 pt Graslan L (0.13-0. 27 + 0.47-1 lb ae)

Primarily for infestations of mixed weed species or to provide improved suppression of perennial (noxious) broadleaved weeds. Improves seasonal suppression of perennials; however, Tordon rate is too low to provide substantial stand reduction in one season. Has potential for use in a 3 to 4-year program for large infestations.

Primary activity is foliar uptake. The herbicides are translocated through the plant. Ester or amine formulations of 2,4-D may be used. Amines cause less leaf burn and are preferred if growth is lush. Visual effects develop more slowly than for some treatments. Apply in minimum of 10 gpa for ground or 2 gpa for aerial application.

Grazon P+D is a premix containing 0.54 lb picloram (Tordon) + 2 lb ae 2,4-D amine per gal. The 2 pt rate is equivalent to 0.54 pt Tordon+ 1 pt 2,4-D 3.8L.

Graslan is a premix containing 0.81 lb picloram (Tordon) + 3lb ae 2,4 D Choline per gal. The 1.25 pt rate is equivalent to 0.5 pt Tordon + 1 pt 2,4-D 3.8L.

Biennial Thistles. Apply at the seedling or rosette stage. Provides excellent control under a wide range of growing conditions. Best fall treatment. Rates of 0.5 pt Tordon + 1 qt 2,4-D 3.8L per acre or 2 to 3 pt Grazon P+D gives excellent biennial thistle control. Surfactant improves penetration through wooly leaf surfaces. Reduction is apparent for at least 2 years.

Perennials. Apply 1 to 1.5 pt Tordon 22K + 1 qt 2,4-D 3.8L or 4 pt Grazon P+D per acre. Weeds should be actively growing and treated at pre-bud stage.

Leafy spurge and Russian knapweed. Tank-mix Tordon at 1.5 pt + 1 qt 2,4-D 3.8L ester per acre. Intended as a 4 to 5-year program. Apply in late bud stage. Lower rates may not provide sufficient residual control into the fall. Use ester 2,4-D formulation unless site limitations require 2,4-D amine. Intended as one application per year; some regrowth may be noted in wet seasons.

Canada thistle, field bindweed, and perennial sowthistle. Tank-mix Tordon at 1 pt + 1 qt 2,4-D 3.8L per acre or use 4 pt Grazon P+D premix per acre. This combination is promising to improve stand reduction over a period of several years. Lower rates do not provide sufficient residual control into fall.

Absinth wormwood. Apply spring or fall before wormwood is over 12 inches. Tordon at 0.5 to 1 pt + 2,4-D ester at 1 qt 2,4-D ester 3.8L per acre has provided excellent results in SDSU tests. Results on larger plants have been better than 2,4-D alone. Promising as a fall treatment.

PRECAUTIONS: Avoid drift to sensitive broadleaf plants and trees or to other cropland. Avoid contaminating water. Note other label precautions. Do not graze lactating dairy for 7 days after application. Labels allow harvesting hay 30 days after application and require a 3-day removal period before slaughter.

SURMOUNT OR TRIUMPH XTR (picloram + fluroxypyr) RESTRICTED USE PESTICIDE

(\$25.60-51.15)

3-6 pt Surmount or Triumph XTR 1.34L (0. 25 - 0.5 + 0. 25 - 0.5 lb ae)

Surmount is a premix containing 0.67 lb ae/gal picloram (Tordon) and 0.67 lb ae/gal fluroxypyr (Vista XRT or Comet). Surmount at 4 pt/A provides the similar active ingredient as Tordon at 1.3 pt/A and Vista at 1.8 pt/A. Intended to control broadleaf weeds such as field bindweed, buffalobur, cocklebur, goldenrod, western ragweed, biennial thistles, absinth wormwood and others. Also controls brush species such as honeysuckle, wild rose, cactus species, and others.

Spring or Fall. For most species, apply prior to flowering in spring or early summer. Fall applications may be made to perennials that produce vegetative growth. For brush species, the optimal time is in the spring just after the leaves have fully expanded until early fall. Best if applied to actively growing plants during warm temperatures (above 50°F for 3 days). To control brush regrowth, wait until growth is 3 – 4 ft tall. For brush, use a NIS at 0.25 – 0.5% v/v (1 – 2 qt per 100 gal of water). NIS rates may vary for target species and application equipment. Minimum carrier is 5 gpa for ground applications or 3 gpa for aerial applications.

PRECAUTIONS: Do not apply more than 3 qt/A per year. Lactating dairy animals must not graze treated grass and hay should not be cut for 14 days after application. Withdraw livestock from grazing or consumption of treated hay at least 3 days before slaughter.

MILESTONE or WHETSTONE (aminopyralid)**(\$6.70-18.35)****3-7 oz Milestone or Whetstone 2L (0.05 - 0.11 lb ae)**

Milestone is a growth regulator herbicide that controls many annual, biennial, and perennial broadleaf weed species in pasture and range. Very effective on many invasive and noxious weeds, but will not control leafy spurge, field bindweed, or yellow toadflax.

Milestone may be applied to non-irrigation ditch banks and seasonally dry wetlands but may not be applied over surface water. Applications may be made on warm and cool season grasses.

For most applications, apply when weeds are actively growing prior to the bud to early flowering growth stage unless specified otherwise on the label. Use higher rates for weeds at advanced growth stages or in adverse growing conditions. May provide some soil residual control of emerging weed seedlings.

Use a non-ionic surfactant (NIS) at 0.25-0.5% v/v (1-2 qt per 100 gallons spray solution) under adverse growing conditions, advanced weed growth stages, or pubescent plants. Coverage is important for optimal efficacy. To allow for uptake and translocation, avoid mowing or burning for 14 days following application.

Perennials. Apply 5-7 oz/A to control Canada thistle and 3-5 oz/A to control perennial sowthistle. Make applications before the bud stage or early flowering. For absinth wormwood (wormwood sage), apply 6-7 oz/A. For tansy ragwort, apply 4-5 oz/A to actively growing plants prior to flowering. For Russian knapweed, apply 4-6 oz/A in the spring and summer to plants in the bud to flower growth stage and to dormant plants in the fall.

Biennials. For bull, musk, or plumeless thistles, apply 3-5 oz/A in the spring or summer to plants in the rosette or bolting growth stages or in the fall to seedlings or rosettes. Apply 4-5 oz/A when plants are in the late bolting through early flowering growth stages. For diffuse and spotted knapweeds, apply 5-7 oz/A when plants are actively growing in the rosette to bolting stage or in the fall.

PRECAUTIONS: Do not apply more than 7 fl oz (0.11 lb ae) per acre per year for broadcast applications or 14 fl oz (0.22 lb ae) for spot treatments (less than ½ acre). There are no grazing restrictions, but allow animals to graze for 3 days on an untreated pasture before moving to areas with sensitive broadleaf crops as aminopyralid may be transferred in manure from livestock. Do not spread manure on areas used for broadleaf crops if animals have grazed treated areas or consumed aminopyralid treated forage or hay. There are no haying restrictions, however see supplemental label for off farm distribution/sale of hay. After grass seeding, wait until perennial grasses are well established with a secondary root system before applying Milestone. Some grasses, such as smooth brome, may be suppressed under adverse growing conditions.

DURACOR or TERRAVUE (aminopyralid + florpyrauxifen)**(\$8.95-18.40)****12-20 oz DuraCor L (0.063 - 0.104 + 0.0063 - 0.0104 lb ai)
2-2.85 oz TerraVue WDG (0.075 - 0.107 + 0.0075 - 0.0107 lb ai)**

DuraCor and TerraVue are premixes of the growth regulator herbicides aminopyralid (Milestone) and florpyrauxifen (Rinskor active). DuraCor at 20 oz provides the equivalent amount of aminopyralid as 7 oz Milestone. Controls many annual, biennial, and perennial broadleaf weed species on rangeland, grass pasture, grass hayland, and CRP (Conservation Reserve Program) acres. May be applied to non-irrigation ditch banks and seasonally dry wetlands but may not be applied over surface water. TerraVue may also be used in non-crop areas such as rights-of-way, fencerows, and roadsides. Relative to Milestone, DuraCor and TerraVue have greater activity on gumweed, poison hemlock, wild carrot, wild parsnip, and several other weeds.

Spring or Fall. Apply in early summer or to regrowth in the fall. Rates of 12-20 oz/A DuraCor or 2-2.85 oz/A TerraVue are based on weed species as listed in label. For most applications, apply when weeds are actively growing prior to the bud to early flowering growth stage. Specific timing recommendations are also listed by weed species. Use higher rates for weeds at advanced growth stages.

Use a non-ionic surfactant (NIS) at 0.25-0.5% v/v (1-2 qt per 100 gallons spray solution) under adverse growing conditions, advanced weed growth stages, or pubescent plants. Minimum recommended carrier volume is 10 gpa for ground application or 2 gpa for aerial application. May be tank-mixed with 2,4-D, picloram, triclopyr, and several other herbicides. Check www.DuraCorTankmix.com or www.terrauetankmix.com for prohibited tank-mixes.

PRECAUTIONS: Do not apply more than 20 fl oz DuraCor or 2.85 oz TerraVue per acre per year for broadcast applications. Do not apply more than 40 fl oz DuraCor or 5.7 oz TerraVue for spot treatments (less than 50% of an acre). See label for off farm distribution/sale of hay or harvested forage use. There are no grazing restrictions, but allow animals to graze for 3 days on an untreated pasture before moving to areas with sensitive broadleaf crops as aminopyralid may be transferred in manure from livestock. Do not spread manure on areas used for broadleaf crops if animals have grazed treated areas or consumed aminopyralid treated forage or hay. A field bioassay is required before a broadleaf crop can be planted on areas that were treated the previous year with manure from animals that have grazed or eaten treated hay. To allow for uptake and translocation, avoid mowing or burning for 14 days following application.

FOREFRONT HL, GRAZONNEXT HL or GUNSLINGER AMP (aminopyralid + 2,4-D)**(\$8.85-15.45)****1.2-2.1 pt ForeFront HL, GrazonNext HL, Gunslinger AMP 3L (0.06 - 0.107 + 0.5 - 0.87 lb ae)**

ForeFront HL and GrazonNext HL are premixes containing 0.41 lb/gal aminopyralid (Milestone) +3.33 lb/gal 2,4-D. ForeFront HL or GrazonNext HL at 1.5 pt/A contains similar active ingredients as 5 oz/A Milestone and 1.25 pt/A 2,4-D amine 4L. Controls broadleaf weeds and certain woody plants on rangeland, grass pasture, grass hayland, and CRP (Conservation Reserve Program) acres. Relative to Milestone, ForeFront may have slightly greater activity on common pasture weeds, such as vervain, gumweed, absinth wormwood, and others.

Spring or Fall. Apply prior to flowering in early summer or to regrowth in the fall. Rates of 1.2 to 2.1 pt per acre are based on weed species as listed in label. Use NIS as recommended for Milestone (0.25-0.5% v/v). Minimum recommended carrier volume is 10 gpa for ground application or 2 gpa for aerial application.

PRECAUTIONS: Do not harvest forage for hay within 14 days after application. See supplemental label for off farm distribution/sale of hay. There are no grazing restrictions, but allow animals to graze for 3 days on an untreated pasture before moving to areas with sensitive broadleaf crops as aminopyralid may be transferred in manure from livestock. Do not spread manure on areas used for broadleaf crops if animals have grazed treated areas or consumed aminopyralid treated forage or hay. Do not apply more than 2.1 pt/acre in a growing season, but spot treatments (less than 50% of an acre) may be allowed up to 4.2 pt/A per season. Avoid injury to non-target plants especially desirable legumes.

OPENSIGHT OR CHAPARRAL (aminopyralid + metsulfuron)**(\$6.15-21.40)****1.0-3.33 oz Opensight, Chaparral (0.033- 0.11 lb ae + 0.006 - 0.02 lb ai)**

Opensight is a premix containing 0.525 lb ae aminopyralid (Milestone) + 0.0945 lb metsulfuron methyl (Escort). Opensight at 2 oz/A contains similar active ingredients as 4 fl oz/a Milestone and 0.3 oz wt/A Escort. Controls susceptible broadleaf weeds and certain woody plants on rangeland, permanent grass pastures, and CRP (Conservation Reserve Program) acres. Good control of difficult weeds such as goldenrod, gumweed, buckbrush, and others.

Spring or Fall. Apply prior to flowering in early summer or to regrowth in the fall. Rates of 1.0 to 3.3 oz per acre are based on weed species as listed on label. Specific timing recommendations are also listed by weed species. Use COC or MSO at 1 gal/100 gal spray solution or NIS at 0.25% v/v (1 qt per 100 gal spray solution). Minimum recommended carrier volume is 10 gpa for ground application or 2 gpa for aerial application.

PRECAUTIONS: Do not use on grasses grown for seed. Do not use on areas where loss of broadleaf plants, including legumes, cannot be tolerated. Treated plants may become more palatable to livestock so do not graze areas with poisonous plants. There are no grazing restrictions, but allow animals to graze for 3 days on an untreated pasture before moving to areas with sensitive broadleaf crops as aminopyralid may be transferred in manure from livestock. Do not spread manure on areas used for broadleaf crops if animals have grazed treated areas or consumed aminopyralid treated forage or hay. Do not harvest forage for hay within 14 days after application. See supplemental label for off farm distribution/sale of hay. Do not apply more than 3.3 ounces of Opensight per year.

CAPSTONE (aminopyralid + triclopyr)**(\$29.25-65.85)****4-9 pt Capstone 1.1L (0.05 - 0.11 lb ae + 0.5 - 1.1 lb ai)**

Capstone is a premix containing 0.1 lb/gal aminopyralid (Milestone) and 1 lb/gal triclopyr (Remedy). Capstone at 4 pt/A contains similar active ingredients as 3.2 oz Milestone and 1 pt Remedy. Controls several common weed and brush species in pastures (including grass grown for hay), CRP, forests, and non-crop areas such as right-of-way and natural areas. Controls weeds such as thistles (use 8 – 9 pt/A for Canada thistle), sowthistle, knapweeds, absinth wormwood, St. Johnswort, western ragweed, wild licorice, knotweeds, primrose, curly dock, dandelion, cocklebur, chicory, field bindweed, oxeye daisy, and others. Controlled or suppressed brush species include poison ivy, rose, cottonwood, poplar, and others. May be used for foliar or cut stump applications.

Spring or Fall. For most species, apply prior to flowering in spring or early summer. Fall applications may be made to perennials that produce vegetative growth in the fall, but spring applications may be most consistent. Rates vary for targeted weed species. May add NIS or MSO to enhance foliar coverage or leaf penetration during adverse growing conditions. May be applied by aerial or ground equipment.

PRECAUTIONS: Do not apply more than 9 pt/A per year. Manure from treated grass should not be exposed to fields that will be planted to broadleaf crops or used in compost. Aerial applications must maintain at least 50 ft of border from any susceptible non- target plant species. Do not use on grass intended for seed production. See supplemental label for off farm distribution/sale of hay. See label for additional restrictions.

STINGER, TRANSLINE, BITE, CLEAN SLATE, SPUR (clopyralid)

**0.5-1.33 pt Stinger, Transline, Bite, Clean Slate, Spur 3L (0.19 - 0.5 lb ae)
0.3-0.8 pt Stinger 5L**

(\$7.45-33.50)

Controls some annuals and or suppresses some perennial broadleaf weeds in rangeland and permanent grass pasture. Lower rates are for annuals such as cocklebur, sunflower, and buffalobur. Higher rates are for spotted and diffuse knapweed, Canada thistle and suppression of perennial sow thistle, and Russian knapweed. Pasture grass has good tolerance. Weeds should be treated at early stages. Minimum carrier is 2 gpa for ground equipment. Excellent spot treatment option for thistles.

PRECAUTIONS: New grass seedlings may be injured until development of tillers and secondary roots. Some forbs are susceptible. Do not spray pastures containing desirable broadleaf plants, especially legumes. There are no grazing restrictions for treated areas. Remove livestock for 7 days before transferring to pasture with sensitive broadleaf plants. Do not apply to new pasture seedlings.

TANK-MIXES AND PREMIXES

**CURTAIL OR COMMANDO (clopyralid+ 2,4 -D)
2-4 qt Curtail or Commando (0.19 - 0.38 + 1-2 lb ae)**

(\$30.90-61.75)

Premix containing 0.38 lb clopyralid (Stinger) plus 2 lb ae 2,4-D amine per gallon. Controls several annual and some perennial broadleaf weeds in rangeland and permanent grass pasture. Treat early when weeds are small. Apply 2 to 4 qt per acre when weeds are actively growing. For biennial thistle, spotted and diffuse knapweed, and Canada thistle, apply 2 qt per acre for light to moderate infestations or for poor growing conditions. Minimum carrier is 2 gpa for ground or air.

PRECAUTIONS: Do not graze lactating dairy cattle for 14 days after application. Remove meat animals from freshly treated areas 7 days before slaughter. Remove livestock for 7 days before transferring to pasture with sensitive broadleaf plants. Do not use on new seedlings. Do not cut treated grass for hay within 7 days after application for Curtail or 30 days for Commando.

PRESCOTT (clopyralid + triclopyr)

(\$6.90-27.50)

1-4 pt Prescott 3L (0.09+0.28 - 0.375+1.125 lb ai)

Prescott is a premix containing 0.75 lb clopyralid and 2.25 lb triclopyr per gallon. Controls annual, biennial and perennial weeds. Apply to actively growing weeds. Use lower rate for weeds that are 6 inches or less; increase rate for larger weeds up to flowering. Minimum carrier is 3 gpa for air or 10 gpa for ground application. Add NIS at the recommended rate.

PRECAUTIONS: Do not graze or harvest green forage or hay until the next growing season for lactating dairy animals. There are no grazing restrictions for other livestock. Do not harvest hay for 14 days for other livestock. Withdraw livestock from treated areas at least 3 days prior to slaughter. Remove livestock for 7 days before transferring to pasture with sensitive broadleaf plants.

REMEDY ULTRA (triclopyr ester) or VASTLAN (triclopyr choline)

**0.5-4 pt Remedy Ultra 4L (0.25 -2 lb ae)
2-4 pt Vastlan (1-2 lb ae)**

(\$4.90-50.60)

Remedy is an emulsifiable concentrate ester formulation whereas Vastlan is a soluble liquid choline formulation that is almost non-volatile and has less odor. Vastlan may be applied to aquatic areas. These products control several woody plants, shrubs, and annual broadleaf weeds. Both may be applied as a foliar spray or cut stump treatments, but Remedy Ultra may also be mixed with oil solutions and applied as a basal bark treatment. Include surfactants with Vastlan applications for best results.

Annual, biennial, perennial broadleaf weeds. For broadcast treatments in pasture, apply 2-4 pt/A Remedy Ultra or Vastlan. Minimum spray volume for both products is 10 gpa for ground applications. For aerial application; minimum spray volume is 2 gpa for Remedy Ultra or 10 gpa for Vastlan. Both products may be tank mixed with 2,4-D amine or ester or other herbicides.

Woody plants and brush. For most woody plant species, use 2-4 pt/A Remedy Ultra or Vastlan. May be tank mixed with 2,4-D, Tordon 22K, or other products to enhance efficacy or control additional species.

PRECAUTIONS: Do not spray on pastures containing desirable forb or legume species unless injury is acceptable. Do not reseed treated areas for at least 3 weeks after application. Withdraw livestock from treated areas at least 3 days prior to slaughter. Do not harvest hay for 14 days after application. Apply no more than 2 qts/A per growing season.

PREMIX

CROSSBOW, CROSSROAD (triclopyr + 2,4 -D)

1- 4 qt Crossbow, Crossbow L, Crossroad (0. 25 -1 + 0.5 -2 lb ae)

(\$11.45-56.40)

Premix containing 1 lb ae triclopyr (Remedy) plus 2 lb ae 2,4-D ester per gallon. Controls several annual and perennial broadleaves and provides very good brush control. Use lower rates for annuals and higher rates for perennials and brush. Apply when weeds are actively growing. Biennials are controlled best in the rosette stage. Minimum carrier is 10 gpa.

PRECAUTIONS: For lactating dairy, do not graze until the next season. Do not harvest hay for 14 days after treatment. Remove slaughter animals for 3 days before slaughter if grazing or feeding forage or hay. Do not make more than one application per year. Do not apply by fixed-wing aircraft.

PASTUREGARD HL (triclopyr + fluroxypyr)

(\$16.65-66.55)

1-4 pt PastureGard HL 4L (0.375 -1.5 + 0.125 - 0.5 lb ae)

PastureGard is a premix containing 3 lb/gal triclopyr + 1 lb/gal fluroxypyr acid equivalent. It is recommended for the control of unwanted broadleaf and woody plants in rangeland and permanent pastures. Individual plant treatment may be made using broadcast, foliar, basal bark, or cut stump applications. Broadcast or directed foliar spray applications must be made to plants that are in full leaf at the time of application. Rates of 1-4 pt per acre are based on weed/brush species. Do not apply more than 0.5 lb ae fluroxypyr or 1.5 lb ae triclopyr (4 pt PastureGard) per acre per annual growing season. May apply up to 2 lb ae triclopyr per season when tank-mixing. The use of NIS or liquid fertilizer at 1-2 qt per 100 gal spray solution may improve weed control. Minimum carrier is 5 gpa for ground and 3 gpa for aerial applications.

PRECAUTIONS: There are no grazing restrictions. Do not harvest hay within 14 days after application. Withdraw livestock 3 days prior to slaughter. Do not use from early boot to milk stage if grass is grown for seed production. Avoid spray drift and runoff to surface water or off-site exposure.

COMET, FANCY, FLAGSTAFF or VISTA XRT (fluroxypyr)

(\$9.95-38.30)

0.66-2.66 pt Comet 1.5L or Fancy 1.6L (0.12- 0.5 lb ae)

6-23 oz Flagstaff or Vista XRT 2.8L (0.13- 0.5 lb ae)

Comet or Vista XRT are translocated postemergence herbicides used to control certain broadleaf weeds. Fluroxypyr provides an alternative mode of action to control ALS-resistant kochia biotypes. Apply to actively growing weeds prior to bud stage. Rates vary depending on weed species. Do not apply more than 2.66 pt/A of Comet or 23 oz/A of Vista XRT per growing season. Minimum carrier is 5 gpa for ground or 3 gpa for air.

PRECAUTIONS: Do not harvest forage or hay from treated areas within 7 days of application. Avoid drift or contact to susceptible broadleaf plants and crops. Remove animals at least 2 days before slaughter.

PLATEAU, IMAZAPIC or PANORAMIC (imazapic)

(\$2.15-12.90)

2-12 oz Plateau 2L, Imazapic 2SL, or Panoramic 2SL (0.03- 0.18 lb ai)

Plateau is an imidazolinone herbicide used for specific weed problems in pasture and range, including leafy spurge, dalmatian toadflax, and Russian knapweed. Rates depend on weed species. Plateau has activity on several grassy weed problems. Several native warm- season grasses have very good tolerance. Add 1 qt MSO plus 1 qt 28% N per acre for postemergence applications. Minimum carrier is 10 gpa for conventional ground or 2 gpa for low volume equipment.

Annuals. Several grass and broadleaf weed species are controlled and suppressed. Rates are 2 to 8 oz Plateau 2L per acre. Apply 4 oz per acre in a single application that coincides with successful establishment or release of desirable vegetation. For best results, maximum weed size is 2 in for "cheatgrass". It has been used at 2 to 4 oz per acre to control green and yellow foxtail in new CRP seedings.

Perennials. Apply 8 to 12 oz per acre in the fall for difficult to control perennial weeds.

Leafy spurge. Suggested rates are 8 to 12 oz per acre as a fall treatment on active growth. Use the higher rate for dense infestations that have been established for longer periods of time. Results have been promising in SDSU tests; 70 to 90% control has been reported the year after application. Field plot data suggest follow-up control programs are required to prevent reinfestation. Be sure milky sap is still present in leafy spurge stems when making fall applications.

Russian knapweed and dalmatian toadflax. Apply 12 oz per acre as a fall treatment. Follow up treatments will be required to maintain control.

Spot Treatment. Mix a 0.25 to 1.5% solution (0.3-1.9 oz Plateau 2L per gal). Add 1% MSO. Do not exceed the maximum broadcast rate of 12 oz per acre.

PRECAUTIONS: Grass tolerance is an important issue. Plateau is labeled as a seedhead growth suppressant for cool-season grasses. Many warm-season grass species and forbs have tolerance. Moderate to severe injury may occur if applied to switchgrass, tall fescue, reed canarygrass, ryegrass (annual, perennial, or Italian), or timothy. Refer to label for lists of susceptible and tolerant species. Do not exceed 12 oz per acre in one year. Do not harvest hay for 7 days after treatment. There are no grazing restrictions.

DETAIL (saflufenacil)

(\$5.70-11.35)

1-2 oz Detail 2.85L (0.022- 0.044 lb ai)

Detail is used for control of annual weeds and suppression of perennial weeds. Minimum carrier is 5 gpa for air and 10 gpa for ground. Use MSO at 1% v/v.

Leafy spurge. A tank-mix with Plateau is useful to improve control of leafy spurge. Use 1-2 oz/A Detail plus 4-6 oz/A Plateau and apply to leafy spurge at the yellow bract stage in late spring/ early summer. Do not apply in the fall as it may result in unsatisfactory control. Use NIS at 0.25% v/v and AMS 8.5-17 lb/100 gal. COC or MSO may be used however grass injury (necrosis, stunting) will be increased.

PRECAUTIONS: Do not apply to buffalograss. Do not apply more than 1 oz/A to switchgrass. Do not apply more than 6 oz/A per season. Do not add nitrogen fertilizers when spraying warm season grasses. No grazing restrictions.

ESCORT, MSM 60, PATRIOT, or ROMETSOL (metsulfuron-methyl)

(\$0.45-9.05)

0.1-1.66 oz Escort, MSM 60, or Rometsol 60XP (0.004 - 0.062 lb ai)

0.1-1 oz Patriot (0.004-0.0375 lb ai)

Metsulfuron is a sulfonyl-urea herbicide used to control or suppress several annual, biennial, and perennial broadleaf weeds in pasture and range. Herbicide tolerance differs with forage grass varieties. Bluegrass, bluestem, bromegrass, grama and timothy have shown good tolerance in SDSU studies. For best results, apply to young, actively growing weeds. Rate depends on weed species and size. Rate of 0.3 oz is used for most pasture situations: with higher rates for special weed problems. Lower rates are usually used with 2,4-D or other tank-mix partners. Refer to rate chart in label for specific weeds. For spot application, use 1 oz per 100 gal. The addition of NIS at 2 to 4 pt per 100 gal is recommended; reduce NIS to 0.5 pt per 100 gal for fescue or timothy. Minimum carrier is 10 gpa for ground and 2 gpa by air.

PRECAUTIONS: Do not use on grasses grown for seed. Stunting and seedhead suppression may be noted under cool, wet conditions. Broadleaf forages or legumes in pasture may be severely injured or killed. Do not apply on or near desirable trees or plants. There are no grazing restrictions at rates less than 1.66 oz per acre. For native grasses, rates of 1.66 to 3.33 oz allow forage grasses to be cut for hay, fodder, green forage, and fed to livestock including lactating dairy 3 days after treatment.

TANK-MIXES AND PREMIXES

May be tank-mixed with 2,4-D, dicamba, Tordon 22K, Grazon P+D, Weedmaster, Remedy, or Amber to improve performance on hard to control weeds.

Metsulfuron + 2,4 -D (metsulfuron + 2,4 -D)

0.1-1 oz metsulfuron 60DF + 1-2 pt 2,4 -D 3.8L (0.004 - 0.008 lb ai + 0.5 -1 lb ae)

Tank-mix 0.1 to 1 oz metsulfuron + 1 to 2 pt 2,4-D 3.8L per acre to increase control on certain pasture weeds including cocklebur, common ragweed, western ragweed, Canada thistle, perennial sowthistle, and others. Tank-mix rates are 0.2 to 0.3 oz metsulfuron for most situations.

Canada thistle and perennial sowthistle. Apply in spring after most thistles have emerged and are actively growing at the rosette to 6-inch elongating stem stage.

CIMARRON MAX (metsulfuron + dicamba + 2,4 -D)

20-5 Acres/5 oz Part A + 2.5 gal Part B (0.01- 0.038 lb ai + 0.12- 0.5 lb ae + 0.38 -1.5 lb ae)

Controls many common general broadleaf weed species including, common mullein, gumweed, houndstongue, goldenrod, and others. Cimarron Max herbicide is a twin-pack combination. Part A contains metsulfuron. Part B contains 1 lb dicamba (Banvel) plus 2.87 lb ae 2,4-D amine per gal. The use ratio is 5 oz Part A (metsulfuron) to 2.5 gal of Part B (dicamba + 2,4-D amine) to treat 5 to 20 acres. Refer to following rate table for acres treated.

Cimarron Max Rate	Part A Rate (oz/A)	Part B Rate (pt/A)	Acres Treated with 5 oz Part A + 2.5 gal Part B
Rate I	0.25	1	20A
Rate II	0.5	2	10A
Rate III	1	4	5A

The Rate II or 10-acre rate provides the equivalent of 0.5 oz Escort 60XP + 0.5 pt Banvel 4L + 1.5 pt 2,4-D 3.8L per acre. Rates are based on weed species and weeds less than 4 inches tall. Do not apply more than the equivalent of 1.66 oz per acre of Cimarron Max Part A per year. Add NIS at 2 to 4 pt/100 gal. May be applied by ground or air.

PRECAUTIONS: No restrictions or waiting period between treatment and grazing for non-lactating animals. Remove meat animals 30 days prior to slaughter. Do not graze lactating dairy within 7 days of treatment. Do not harvest hay for 37 days after treatment.

CIMARRON PLUS (metsulfuron + chlorsulfuron) (\$1.15-11.15)
0.125 -1. 25 oz Cimarron Plus 63 DF (0.004 - 0.038 + 0.001- 0.012 lb ai)

Premix containing 48% metsulfuron-methyl + 15% chlorsulfuron (Telar) by weight. It is recommended for use on land primarily dedicated to the production of pasture, rangeland, or established grasses in CRP (Conservation Reserve Program). Apply to actively growing weeds that are less than 4 inches.

Rates range from 0.125 oz to 1.25 oz per acre based on weed species. Rates of 0.125-0.25 oz/A controls weeds such as bur buttercup, dandelion, and curly dock, 0.25-0.375 oz/A controls buckbrush; 0.375 – 0.625 oz controls chicory, cocklebur, and sweet clover; 0.625 – 1.25 oz/A controls black henbane, biennial thistles, spotted knapweed; and 1.25 oz/A controls hoary cress, gumweed, houndstongue, common tansy, poison hemlock, and others. Minimum carrier is 10 gpa for ground or 3 gpa for air. Add COC or MSO at 1 gal/100 gal or NIS at 1 qt/100 gal. Do not use where legumes are desired. Refer to tolerant grass species list on label. May tank mix with Tordon, Grazon P+D, Weedmaster, Remedy, 2,4-D, and dicamba.

PRECAUTIONS: Do not apply to grass stressed from severe weather conditions. No grazing or haying restrictions when applied at labeled rates. Avoid contact with desirable tree species as injury may occur. Do not use on grasses grown for seed. Do not apply more than the equivalent of 1 oz of chlorsulfuron (Telar) or 1 oz of metsulfuron-methyl per acre per year.

TELAR XP (chlorsulfuron) (\$5.10-27.05)

0.25 -1.33 oz Telar 75XP (0.012- 0.062 lb ai)

Telar controls and suppresses several broadleaf weeds in pasture, range, and CRP. It is effective in Canada thistle and knapweed control programs. Use 0.25 to 0.5 oz for annuals or 0.5 to 1 oz per acre for biennial and perennial weeds. Annual weeds are controlled best when treated at early stages. Perennial weeds should be treated in the bud to bloom stage or at fall rosette. Grass tolerance should be considered. Rates of 0.25 to 1 oz per acre are suggested for blue grama, bromegrasses, bluegrass, wheatgrasses and orchardgrass. Grass species listed for 0.25 to 0.5 oz per acre rate include bluestem, fescues, green needlegrass, side-oats grama, buffalo grass, switchgrass, Indiangrass and wild ryegrass. Perennial ryegrass may be severely injured.

PRECAUTIONS: Do not apply more than 1.33 oz per acre in one year. Broadleaf forage species are sensitive to Telar and may be injured. Applications made to grass under stress may cause injury. Applications made to some cool season grasses before the initiation of flowering may cause abortion or suppression of seedheads. There are no grazing or haying restrictions when applied at labeled rates.

AMBER (triasulfuron) (\$3.45-6.90)

0.28-0.56 oz Amber 75DF (0.013- 0.026 lb ai)

Amber can be used in several pasture and range grasses including bluestem, smooth brome; blue and sideoats grama and several wheatgrass species. Grasses must be established at least 60 days.

Amber at the low rate controls mustards, kochia, pigweed, cocklebur, and common mallow and suppresses western ragweed. Annuals should be small. The high rate suppresses curly dock, Canada thistle, goldenrod, and musk thistle. Downy brome suppression can be noted with the high rate in fall application prior to weed emergence; control is variable. Control of most weeds will be improved if tank-mixed with 2,4-D, Banvel, and other herbicides used for pasture and range. Minimum carrier is 3 gpa for ground or 2 gpa for air.

PRECAUTIONS: Do not apply more than 0.84 oz Amber per acre in one year. Do not hay for 30 days. Allow 60 days between applications in split treatments. Refer to label for restrictions on specific grass species in new grass seedings.

TANK-MIXES AND PREMIXES

Amber can be applied with other labeled herbicides to manage weed resistance and improve weed spectrum. Approved tank-mix partners include 2,4-D, dicamba (Banvel, Clarity), Curtail, Crossbow, Grazon P+D, Stinger, Tordon and Weedmaster. Tank-mix partner should be used at recommended tank-mix rate.

RAVE (triasulfuron + dicamba) (\$3.60-7.15)
2-4 oz Rave 63.8WDG (0.011- 0.022 lb ai + 0.06 - 0.12 lb ae)

Rave is a premixed selective herbicide for control of many broadleaf weeds in pasture and range. Rave has two modes

of action. Rave contains 8.8% triasulfuron (Amber) and 55% dicamba sodium salt (50% ae) in a water dispersible granule. Postemergence rates are based on weed species and size using 2 to 4 oz per acre. Rave may be applied at 5 oz per acre in pasture and range for heavy infestations. Apply to actively growing weeds. Add NIS at 1 to 2 pt per 100 gal or COC at 1 qt per 100 gal.

PRECAUTIONS: The maximum amount of Rave is 5 oz per acre. Make only one application per year. Do not graze lactating dairy animals for 7 days following application. Allow 30 days after application before removing animals for slaughter. Hay use not listed on label. Do not apply Rave to grasses underseeded with legumes. Do not allow spray to drift to nontarget crops or other desirable plants. Refer to label for restrictions on specific grass species in new seedings.

FACET, PRIZE or QUINSTAR (quinclorac)

(\$6.65-66.15)

0.18-1 lb QuinStar 75DF (0.14 - 0.75 lb ai)
4.5-25 oz QuinStar 3.8L or Prize 4.02L (0.13- 0.74 lb ai)
12-64 oz Facet L 1.5L

QuinStar may be used for postemergence control of annual grass species such as foxtail, crabgrass, and barnyardgrass. Also has activity on some annual broadleaf weed species, such as prickly lettuce or perennial weed species, such as field bindweed and leafy spurge. May be applied to cool season forage grasses (bromegrass, Kentucky bluegrass, orchardgrass, ryegrass, wheatgrass, and others) or warm season forage grasses (bluestem, buffalograss, grama, Indiangrass, switchgrass, and others).

Add either MSO (1.5 pt/A) or COC (2 pt/A). May also add either AMS (2.5 lb/A) or UAN (2-4 qt/A) for added activity.

Annuals. Apply 0.34-1 lb (75DF) or 8-12.5 oz (3.8L) to young, actively growing grass or broadleaf weeds.

Perennials. For field bindweed, apply 0.34-1 lb (75DF) or 8 oz (3.8L) in the fall prior to the first frost. Apply to actively growing bindweed with at least 4 inches of growth. Repeat applications may be necessary in subsequent years. For leafy spurge, apply 1 lb (75DF) or 25 oz (3.8L) alone or 12.5 oz (3.8L) with Overdrive at 4-6 oz/A. This has resulted in approximately 75% control the spring following application in SDSU trials.

PRECAUTIONS: Rainfast after 6 hours. Do not cut treated areas for hay within 7 days after application. No grazing restrictions. Aerial applications not allowed in Bennett, Brookings, Brown, Clay, Codington, Day, Deuel, Grant, Lincoln, Minnehaha, Moody, Roberts, Todd, Turner, Union, or Yankton counties.

LAMBIENT (propoxycarbazone)

(\$10.60-14.15)

0.9-1.2 oz Lambient 70DG (0.039-0.053 lb ai)

Lambient can be used to control "Cheatgrass" in pasture, rangeland, and CRP. Controls true cheat, downy brome, Japanese brome, ripgut brome, soft chess, wild oat, and several other annual grass and broadleaf weeds. The label lists range and pasture grass species that are tolerant or moderately sensitive (transient stunting or suppression depending on growing conditions). Tolerant grasses include big bluestem, blue gramma, buffalograss, Indiangrass, Kentucky bluegrass, sideoats grama and several others. Some moderately sensitive species include needle-and-thread, needlegrass, smooth brome, and several wheatgrasses (crested, intermediate, and western). Try on a small area to determine tolerance of species not listed on label.

Apply 0.9-1.2 oz/A (depending on weed species) in spring or fall to actively growing grass weeds before tillering. Add NIS at 0.25-0.50% v/v. Minimum carrier is 5 gpa ground and 3 gpa for air applications. Use 15 gpa ground and 5 gpa air for dense weed stands. Treat overseeded grass seedlings after the five-leaf stage to minimize injury.

PRECAUTIONS: Do not apply more than 1.2 oz per acre per year. Use on grasses grown for seed is not recommended. Do not overseed or reseed for at least 90 days after treatment. There are no grazing restrictions. Do not harvest hay within 7 days after application. Avoid spray drift and runoff to surface water or off-site exposure. Do not apply within 48 hours if heavy rain that may cause runoff is expected.

REJUVRA (Indaziflam)

(\$25.65-42.75)

3-5 oz Rejuvra 1.67L (0.039-0.065 lb ai)

Rejuvra is a preemergence herbicide used for controlling annual grass and broadleaf weed species. It also will control some germinating seedlings of perennial weeds. Rejuvra is labeled as safe on blue grama, wheatgrasses (crested intermediate, streambank, and western), green needlegrass, needle-and-thread, prairie Junegrass, and sand dropseed. Other grasses may be tolerant but have not been tested. Treat a small area to determine tolerance of species. Apply spring or fall before weed seedlings germinate. Rejuvra needs 0.25-0.5 inches of moisture after it is applied before it is activated to control germinating weeds. Do not apply more than 6 oz per year in any area to be hayed or grazed. Minimum carrier is 10 gpa ground and 5 gpa for air applications.

PRECAUTIONS: There are no grazing restrictions. Do not harvest hay within 40 days after application. Avoid spray drift and runoff to surface water or off-site exposure. Do not apply within 48 hours if heavy rain that may cause runoff is expected. Do not apply a second application within 60 days. Do not apply on snow or frozen ground.

SPIKE (tebuthiuron)**(\$40.45-323.40)****2.5-20 lb Spike 20P (0.5 - 4 lb ai)**

Spike 20P is a surface applied soil-active herbicide that controls woody plants and smooth brome in warm-season grasses. Spike must be applied with equipment capable of accurate and uniform calibration. Misapplication or poor distribution may result in injury or death of vegetation outside the intended treatment area. Dormant season application is recommended to minimize injury to non-target grasses and herbaceous plants. Rates for application are dependent on weed species. Refer to species rate chart in label for correct application rates.

PRECAUTIONS: Do not apply more than 10 lb per acre Spike 20P in pasture and rangeland receiving 20 inch or less annual rainfall. For areas receiving 20 inch or more annual rainfall, apply no more than 20 lb per acre. Do not apply to areas where the water table is predominantly shallow (5 ft or less), or areas adjacent to streams or lakes. Do not apply more than once per year. No grazing restrictions with labeled rates. Grass may be harvested for hay 1 year after application.

VELPAR (hexazinone)

Velpar L is a water dispersible liquid herbicide that controls brush and weeds. Effectiveness depends on sufficient moisture to activate.

Woody Plants and Brush (basal treatment): For brush control in pasture and range, apply Velpar from late winter through summer, pre- bud break until new growth hardens off. May be applied in late fall or winter before soil freezes. For basal treatments, apply at the rate of 2 to 4 ml for each inch of stem diameter at breast height using an exact delivery handgun. Do not exceed 0.33 gallon per acre per year. Direct the treatment to the soil within 3 inches of the root collar of woody plants. When treating large stems, make applications on opposite sides of the stem.

PRECAUTIONS: Do not use on frozen soil. Injury or loss of desirable trees or other plants may result if equipment is drained or flushed in non-target areas. Injury may result when desirable grasses are under stress. There are no restrictions on haying or grazing for basal soil treatments.

NEW GRASS SEEDINGS

New seedings of perennial grasses are poor weed competitors. New seedings may be damaged if treated before grasses are well established. Clip annual broadleaved weeds until grasses are well established. Annual grasses cannot be controlled with herbicides in new grass seedings.

Several herbicides are labeled for establishment of perennial grass stands in Conservation Reserve Program (CRP) acres. Many have a broadleaf weed component and susceptible pasture/range broadleaf forbs and legumes may be injured or killed. Refer to product label for specific rates and precautions.

2,4-D AMINE

(\$1.15-5.80)

0.5-1.5 pt 2,4 -D amine 3.8L (0. 25 - 0.75 lb ae)

Primarily for controlling small, susceptible annual broadleaves such as mustard, lambsquarters, and sunflower. Gives limited topgrowth suppression of broadleaved perennials. Poor kochia control. Annual weeds should be less than 4 to 6 inch tall. Grasses must be well established before treating. Delay application on new spring seedings until mid-summer or fall. Fall application will control winter annual seedlings such as pennycress. Grasses are tolerant to spring applications the year after seeding.

Reports indicate cool-season grasses are more tolerant than warm-season species. Grasses should have reached the 5-leaf stage before treating. Maximum rates are lower for new seedings than for established pasture. Suggested rates are 0.5 to 1.5 pt 2,4-D amine 3.8L ae for cool-season grasses and 0.5 to 1 pt 2,4-D amine 3.8L ae for warm-season species. Amine formulations provide better crop tolerance than esters. Drought stress increases the risk of injury to new grass seedings. Refer to restrictions in 2,4-D Established Pasture Section.

PLATEAU or IMAZAPIC (imazapic)

(\$2.15-12.90)

2-12 oz Plateau 2L, Imazapic 2SL (0.03- 0.18 lb ai)

Preemergence: For best results in establishing mixed grass stands with Plateau, make application at planting prior to grass seedling emergence. Rates of 2 to 6 oz per acre will provide control or suppression of several annual grasses and broadleaf weeds. Tests at SDSU have shown excellent foxtail control at 4 oz per acre. The 2 oz rate is used on soils with a pH less than 7 and have a low CEC or coarse texture with minimum clay and organic matter.

Postemergence: Newly emerged grasses can be sensitive to Plateau. If grasses have begun to emerge, wait until they reach the five leaf stage to make the postemergence application. Use NIS instead of COC for postemergence applications to avoid loss of grass species tolerance. The use of high rates may result in foliar and/or seedhead suppression of established grass stands. Grass injury will more likely occur on light soils and where there is low weed pressure, low rainfall, and short growing season.

Grass tolerance is an important consideration. Refer to rate chart for maximum rates and special precautions for specific grass species.

Grass (Common name)	Plateau Herbicide Rate (oz/A)	
	New Seeding	Established
Big & little bluestem	2-12	2-12
Indiangrass	2-12	2-12
Needlegrass	----	2-12*
Needle and thread	----	2-12*
Smooth brome	----	2-12*
Kentucky bluegrass	----	2-12*
Wheatgrasses	----	2-12*
Russian wildrye	2-6*	2-12*
Side-oats grama	2-8**	2-8
Blue grama	2-8**	2-8
Buffalograss	2-4	2-8

* High rates may result in stunting and growth suppression.
 ** High preemergence rates applied to newly seeded sideoats and blue grama may result in thinning or loss of stand.

The Plateau label lists many prairie wildflower and forb species that have varying degrees of tolerance for both the preemergence and postemergence treatments. Refer to label for specific species tolerances.

PRECAUTIONS: Do not use Plateau for establishment of pure stands of switchgrass as severe injury or stand loss may result. Treatment of Plateau on smooth brome grass, common Kentucky bluegrass and the wheatgrasses may result in foliar height and seedhead suppression. Treated areas may be grazed. Do not harvest hay for 7 days after treatment.

PASTURE RENOVATION

Renovation of permanent pasture or range is an improvement practice best suited to areas that cannot be tilled and reseeded. The practice utilizes herbicides to suppress existing grasses and other vegetation so more desirable grasses and/ or legumes may be direct seeded with no-till equipment. Rainfall for establishing the new forages is the major factor for success.

PARAQUAT PRODUCTS (paraquat) RESTRICTED USE PESTICIDE.

(\$3.05-6.75)

1-2 pt Gramoxone 2.0, 2L (0.25 - 0.5 lb ai)

0.7-1.3 pt Devour, Gramoxone 3.0, Helmqat, Paraquat, Para-shot, or Parazone 3L (0.25-0.5 lb ai)

Paraquat is a contact herbicide that kills topgrowth of existing grasses and broadleaves. It frequently is applied in a narrow band in the row area. Results on bluegrass have been more satisfactory than with bromegrass or other vigorous, spreading grasses. Apply 1 to 2 pt/A (2L) or 0.7-1.3 pt/A (3L) at the time of seeding. Use the higher rate for dense vegetation. Existing vegetation should be closely grazed or mowed so it is not over 3 in tall. Minimum carrier is 10 gpa for ground and 5 gpa for air. Use higher volumes for dense vegetation. Add NIS at 1 pt per 100 gal or COC at 1 gal per 100 gal. New seedings should be 3 to 6 in high before grazing. Paraquat is highly toxic if ingested; follow label precautions.

GLYPHOSATE PRODUCTS (glyphosate)

(\$3.05-42.35)

11 oz-3.3 qt Glyphosate 4.5L ae (0.38 -3.7 lb ae)

Can be used for spot treatment, wiper applications, or pasture renovation. Controls many annual and perennial plants. Rates are 11 oz to 3.3 qt (0.38-3.7 lb ae) of 4.5 lb ae glyphosate per acre. Adjust rates for other formulations. Emerged grasses will be damaged or killed.

Rates of 0.38 to 0.75 lb ae are used for most annual weeds; most perennials require 1.5 to 3 lb ae per acre. Perennial grasses to be controlled in renovation programs require 1.5 to 2.25 lb ae for most situations. Retreatment may be required for tolerant species. Spot treatment can be used in bluegrass, brome, orchardgrass, wheatgrass, alfalfa and clover. Minimum carrier is 3 gpa.

Refer to the glyphosate formulation table below to determine product rate for other formulations.

GLYPHOSATE PRODUCTS – Equivalent Rates

Formulation	Amount of Product for lb ae				
	0.38 ae	0.75 ae	1.5 ae	3 ae	3.7 ae
3 lb ae (4 lb ai)	16 oz	32 oz	64 oz	128 oz	158 oz
3.75 lb ae (5 lb ai)	13 oz	26 oz	51 oz	102 oz	126 oz
4 lb ae (5.4 lb ai)	12 oz	24 oz	48 oz	96 oz	118 oz
4.17 lb ae (----)	12 oz	23 oz	46 oz	92 oz	114 oz
4.5 lb ae (5.5 lb ai)	11 oz	22 oz	44 oz	85 oz	105 oz

PRECAUTIONS: Spot or Wiper: Do not treat more than 10% at one time. Remove livestock and do not harvest for 7 or 14 days after treatment depending on individual product used.

Pasture Renovation: No restrictions with rates of 2.25 lb ae/A or less (consult individual product label). With rates above 2.25 lb ae/A, remove livestock before application and do not harvest or graze livestock for 8 weeks.

SPECIAL WEED PROBLEMS

When to Treat

Refer to herbicide sections and weed response chart for treatment options.

Weed	When to Treat
Absinth wormwood	Perennial. Spring treatment before weeds are over 8 to 10 in. tall. Temperature over 60°F improves results with 2,4-D. Late fall is effective if plants were mowed and new growth is present. Grows very late.
Buffalobur	Native annual. Apply herbicides while plants are young and actively growing. Herbicides applied at flowering or later are generally not effective.
Burdock	Biennial. Treat in early spring before flower stalk is fully elongated. Mow or chop before bloom.
Canada thistle Perennial sowthistle Russian knapweed Field bindweed	Noxious perennials. Treat or mow thistle from bud to 7-10 days after flowering. Fall herbicide treatments may be effective if adequate regrowth is present.
Curly dock	Perennial. Apply herbicides in early spring while plants are in the rosette growth stage. 2,4-D ester 4L (1.5-2 qt/a) may be somewhat effective, but may require repeat applications. More effective options include dicamba (4L product at 1-2 pt/a), triclopyr products such as Crossbow (2,4-D + triclopyr) at 2-4 qt/A, metsulfuron products such as Escort at 0.5-1 oz wt/A, or clopyralid products such as Stinger at 0.25-0.5 pt/A.
Deathcamas	Perennial. Treat in spring at bud stage.
Downy brome Japanese brome Foxtail barley	For downy and Japanese brome (cheatgrass), apply imazapic (e.g. Plateau) in the spring or fall. For foxtail barley, apply imazapic in the spring (i.e. May).
Goldenrod	Native perennial. Make applications while weeds are less than 6 in tall. Metsulfuron (e.g. Escort) products most effective for later applications (taller than 6 inches but prior to flowering).
Gumweed	Biennial. Treat from May to early June. 2,4-D ester 4L at 1-2 qt/A if effective until mid-June. Metsulfuron products (e.g. Escort at 1 oz/A) may be more effective for late applications (after mid-June but prior to flowering).
Hoary cress	Noxious perennial. Mustard species. Flowers in early May. Treat in late April – early May. Growth regulator herbicides (2,4-D, Tordon, and others) are not effective. Metsulfuron (e.g. Escort) products are most effective.
Leafy spurge	Noxious perennial. Apply spring treatments at early bud stage (usually early to mid- June) or in fall while white sap is still flowing. Picloram (Tordon) is effective for spring or fall applications. Standard recommendation is Tordon (1.5 pt/A) + 2,4-D ester 4L (1 qt/A) in a multiple year program. Plateau (8-12 oz/A) is effective for fall applications, but grasses may be suppressed. Annual 2,4-D ester applications prior to flowering may be an effective maintenance program. Consider flea beetles (<i>Aphthona lacertosa</i> or <i>Aphthona nigricutis</i>) for large infestations.
Musk, Bull, Plumelless, Scotch thistle	Biennials. Control rosettes in late fall or spring (mid to late May). 2,4-D ester or amine 4L (1-2 qt/A) is effective on rosettes. Metsulfuron (e.g. Escort at 0.5-1 oz/a), picloram (Tordon, Grazon P+D) products, and aminopyralid (Milestone, GrazonNext HL) products are effective on bolting thistles. Picloram and aminopyralid products may provide short-term soil residual activity to suppress growth of later emerging thistle rosettes. Temperature over 65°F improves results. If mowing, mow before flowers open. Some regrowth is possible.
Prickly pear	Perennial. Apply herbicide from bud to flowering stage (applications at flowering are most effective). Tordon (picloram) at 0.5-1 qt/A may be effective. Control may not occur until 2-3 years after application. High rates of fluroxypyr products such as Vista XRT (0.38-0.56 lb a.i./A) have been somewhat effective.
Puncturevine	Annual. Treat while plants are young and actively growing. 2,4-D is effective, but regrowth or new seedling growth may occur requiring repeated applications.
Rabbit brush	Woody perennial. Treat in spring when new growth is expanding and exceeds three inches. May require retreatment.
Russian olive	Woody perennial. Treat fully expanded foliage in June. Foliar treatments include imazapyr (e.g. Arsenal at 4-6 pt/A or Habitat near aquatic areas at 2-4 pt/A or 1% solution). Basal bark or cut stump applications with herbicides such as triclopyr (e.g. Remedy Ultra) may be applied at any time during the season. Retreating may be necessary.
Sand sagebrush Fringed sagebrush Green sagewort	Perennials. Apply herbicides in spring when new twig growth is elongating. Dry conditions reduce effectiveness. Retreatment the following year may be required for complete control.

Weed	When to Treat
Silver sagebrush Big sagebrush	Woody perennials. Apply herbicides in spring when new growth is developed but before it becomes hardened. Use full rates. Reduced results in dry season.
Western snowberry Buckbrush Sumac	Woody perennials. Apply herbicides in spring when new leaves are fully expanded. 2,4-D ester 4L at 1-2 qt/A is effective at early application timings. Metsulfuron products (e.g. Escort) may be more effective at later application timings. Efficacy declines under dry, poor growing conditions.
Willows	Woody perennial. Treat in spring when new leaves are fully expanded. Herbicides are usually very effective.

WEED RESPONSE

Response of weed species to several herbicides is shown in the table below. Performance is affected by rate, weather conditions, temperature and weed size. Ratings are based on SDSU field test data, other research and observations.

P = Poor F = Fair
M = Marginal G = Good

Weed	2,4-D amine	2,4-D ester	Dicamba	Overdrive	DuraCor	Milestone	GrazonNext	Opensight	Tordon	Tordon+2,4-D	Dicamba+2,4-D	Plateau	Stinger/Transline	Curtail	Remedy	Escort	Cimarron Max	Escort+2,4-D	Telar
ANNUALS																			
Buffalo bur	P	M	F	F	G	F	F	G	F	G	F	M	F	M	F	M	G	M	M
Cocklebur	G	G	F	G	G	G	G	G	G	G	G	F	F	G	F	G	G	G	F
Common ragweed	F	G	G	G	G	G	G	G	G	G	G	F	M	F	G	M	F	F	F
Kochia (ALS)	M	M	G	G	P	P	M	P	P	M	G	P	P	M	F	P	F	M	P
Marestail	M	F	F	F	G	F	G	F	F	G	G	P	F	F	G	M	F	M	F
Puncturevine	G	G	G	G	G	G	G	G	G	G	G	M	F	G	F	F	G	G	G
Russian thistle	F	F	F	G	M	M	F	F	M	F	G	F	--	F	F	F	G	G	F
BIENNIALS																			
Bull, musk, plumeless thistle	F	G	F	G	G	G	G	G	G	G	G	M	G	G	F	F	G	G	G
Biennial knapweeds	M	F	F	F	G	G	G	G	G	G	G	--	G	G	F	F	G	F	--
Common burdock	F	G	G	G	G	G	G	G	G	G	G	--	F	F	G	M	F	F	M
Common mullein	M	M	M	M	G	F	F	G	F	F	M	G	F	M	M	G	G	G	G
Gumweed	F	G	F	G	G	F	G	G	G	G	G	P	M	G	F	G	G	G	G
Poison hemlock	M	F	G	G	G	F	G	G	G	G	G	F	P	M	P	M	F	M	--
Scotch thistle	M	F	F	F	G	G	G	G	G	G	F	M	G	G	F	F	G	F	F
Sweetclover	F	F	G	G	G	G	G	G	G	G	G	P	M	F	M	F	G	G	F
PERENNIALS																			
Absinth wormwood	F	F	F	F	G	F	G	F	G	G	F	P	M	F	F	P	F	F	P
Blue vervain	F	G	F	F	G	F	G	G	G	G	F	M	F	F	F	P	F	M	P
Canada thistle	M	M	F	G	G	G	G	G	G	G	G	P	G	F	M	F	G	G	G
Common tansy	P	P	M	M	P	P	F	G	G	F	M	--	P	P	M	F	G	F	F
Curly dock	M	M	G	G	G	G	G	G	G	F	F	M	M	M	F	F	G	F	F
Dalmatian toadflax	P	P	F	F	M	M	F	G	G	G	F	M	P	P	P	F	M	M	F
Dandelion	F	M	M	F	G	F	G	G	M	F	F	F	F	F	M	F	G	G	--
Deathcamas	M	M	F	F	M	M	M	M	M	M	M	--	--	--	--	--	--	--	--
Goldenrod	M	F	F	F	P	P	F	G	G	F	F	P	P	M	M	G	G	G	G
Leafy Spurge	M	M	M	P	P	P	P	P	G	F	M	G	P	P	M	P	M	M	P
Perennial ragweed	M	F	M	G	G	G	G	G	G	G	F	--	G	F	F	--	--	--	--
Russian knapweed	P	M	M	M	G	G	G	G	G	F	M	F	G	F	M	M	F	M	F
Scouring rush	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	M	M	M	F
St. Johnswort	P	M	M	M	G	G	G	G	G	F	M	F	P	M	P	F	G	F	G
Water hemlock	M	M	M	M	F	F	F	G	M	M	M	--	P	M	P	G	G	G	G
Yellow toadflax	P	P	P	P	P	P	M	P	P	P	P	P	P	P	P	P	P	M	P

WEED RESPONSE

Weed	2,4-D ester	2,4-D amine	Dicamba	Tordon	Tordon+2,4-D	Remedy	Crossbow	Spike 20P	Velpar L	Escort	Opensight	Cimarron Max
BRUSH:												
Buckbrush	M	G	F	P	M	P	F	F	F	G	G	G
Eastern red cedar	P	M	F	G	M	P	M	M	G	M	M	F
Fringed sagebrush	P	F	M	G	F	--	--	--	--	--	--	F
Green sagebrush	P	F	--	F	F	--	--	--	--	--	--	--
Sand sagebrush	M	G	--	G	G	--	--	--	--	--	--	--
Silver sagebrush	P	F	--	F	F	--	--	--	--	--	--	--
Russian olive	P	M	F	--	--	--	--	F	--	--	--	--
Sumac	F	F	F	F	F	G	G	G	F	P	M	M
Willow	M	F	F	F	F	F	F	F	F	G	M	G
Yucca	--	P	M	F	P	F	M	--	F	--	M	--

Summary Grazing and Haying Restrictions

Herbicide	Grazing Restrictions	Haying Restrictions	Aquatic Use	Aerial Application
2,4-D ester/amine	Lactating dairy-7 dy Slaughter interval-3 dy	7, 30 dy ⁹	Some ²	Yes
Amber (<i>triasulfuron</i>)	None	30 dy	No	Yes
Cimarron Max (<i>metsulfuron+dicamba+2,4-D</i>)	Lactating dairy-7 dy Slaughter interval-30 dy	37 dy	No	Yes
Cimarron Plus (<i>metsulfuron+chlorsulfuron</i>)	None	None	No	Yes
Crossbow (<i>triclopyr+2,4-D</i>)	Lactating dairy- next year Other livestock- none Slaughter interval-3 dy	14 dy	No	Yes
Curtail, Commando (<i>clopyralid+2,4-D</i>)	Lactating dairy-14 dy Non-lactating dairy-none Slaughter interval-7 dy ³	7 dy (Curtail) 30 dy (Commando)	No	Yes
Dicamba Products (<i>dicamba</i>)	Lactating dairy: 1 pt/A-7 dy 1-2 pt/A-21 dy 1-2 qt/A-40 dy Non-lactating dairy & beef – none Slaughter interval-30 dy ⁹	Lactating dairy: 1 pt/A-37 dy 1-2 pt/A-51 dy 1-2 qt/A-70 dy Non-lactating dairy & beef: 7 dy	No	Some ⁹
Escort (<i>metsulfuron</i>)	<1.66 oz-None	<1.66 oz-None	No	Yes
ForeFront HL, GrazonNext HL (<i>aminopyralid+2,4-D</i>)	None	7 dy ^{7,8}	No	Yes
Glyphosate Products	Spot treatment - 7 or 14 dy ⁶ Broadcast treatment–Up to 8 weeks ⁵	Spot treatment-7 or 14 dy ⁶ Broadcast treatment-Up to 8 weeks ⁵	Some ²	Yes
Graslan L, Gunslinger P+D, Trooper P+D (<i>picloram+2,4-D amine</i>)	Lactating dairy-7 dy Other livestock-none Slaughter interval-3 dy	30 dy	No	Yes
Milestone (<i>aminopyralid</i>)	None	None ^{7,8}	No	Yes
Opensight, Chaparral (<i>aminopyralid+metsulfuron</i>)	None	None ^{7,8}	No	Yes
Overdrive (<i>dicamba+diflufenopyr</i>)	None	None	No	Yes
Plateau, Imazapic 2SL (<i>imazapic</i>)	None	7 dy	No	Yes
Rave (<i>triasulfuron+dicamba</i>)	Lactating dairy-7 dy Slaughter interval-30 dy after application	Use not listed	No	Yes
Remedy Ultra (<i>triclopyr ester</i>)	None Slaughter interval-3 dy	14 dy	No	Yes
Spike 20P (<i>tebuthiuron</i>)	None-Note rate restrictions ⁴	1 yr-Note rate restrictions ⁴	No	Yes
Stinger, Transline, Clean Slate (<i>clopyralid</i>)	None	None	No	Some ⁹
Telar (<i>chlorsulfuron</i>)	None	None	No	Yes
Tordon, Triumph, Trooper (<i>picloram</i>)	Lactating dairy-14 dy Non-lactating dairy & beef – none ¹ Slaughter interval-3 dy ³	1 qt/A or more – 14 dy	No	Yes

1. Remove livestock to untreated grass pasture for 7 days before transferring livestock to broadleaf or broadleaf-mixed pasture areas. Otherwise, urine may contain enough product to cause injury to sensitive broadleaf plants.
2. Refer to specific label for aquatic use products.
3. Withdrawal not needed if 2 weeks or more time elapsed since application.
4. Maximum rate 20 lb if >20 in rainfall or 10 lb/A if <20 in rainfall.
5. Depending on application rate, see individual label for specific rate limits.
6. Do not treat more than 1/10 of any given acre at one time with spot or wiper applications. Remove livestock before application.
7. See supplemental label for off farm distribution/sale of hay.
8. For best weed control allow 14 days before hay harvest.
9. See individual label.

Spot Treatment for Noxious Weeds (Spray to Wet)

Herbicide	Leafy Spurge	Canada & P. Sow Thistle	Field Bindweed	Hoary Cress	Biennial Thistle	Wormwood Sage
Amount for 1 gallon...						
Tordon 22K 2L	2.5 T	2.5 T	2.5 T	2.5 T	1 t	2 t
Dicamba Product 4L	---	2.5 T	2.5 T	---	3 t	4 t
Glyphosate Product 3L	---	4 T	4 T	5 T	---	3 T
Stinger/ Transline 3L	---	2 t	---	2 t	2 t	---
2,4-D 4L	4 T	3 T	3 T	4 T	3 T	3 T
Milestone	---	0.8 t	---	0.8 t	0.66 t	0.8 t
ForeFront HL/GrazonNext HL	---	1.4 T	---	1.4 T	1 T	1.4 T
Tordon+2,4-D	3+4 t	2+4 t	2+4 t	3+4 t	1+4 t	1+4 t
Dicamba Product 4L + 2,4-D	---	4+4 t	4+4 t	---	2+4 t	2+4 t
Curtail 2.38L	---	2.5 T	---	2.5 T	2 T	---
Plateau 2L	1.5 t	---	1.5 t	1.5 t	---	---
Amount for 10 gallons...						
Tordon 22K 2L	1.6 C	1.6 C	1.6 C	1.6 C	0.2 C	0.4 C
Dicamba Product 4L	---	1.6 C	1.6 C	---	0.6 C	0.8 C
Glyphosate Product 3L	---	2.5 C	2.5 C	3 C	---	1.9 C
Stinger/ Transline 3L	---	0.4 C	---	0.4 C	0.4 C	---
2,4-D 4L	2.5 C	1.9 C	1.9 C	2.5 C	1.9 C	1.9 C
Milestone	---	2.8 T	---	2.8 T	2 T	2.8 T
ForeFront HL/GrazonNext HL	---	0.8 C	---	0.8 C	0.7 C	0.8 C
Tordon+2,4-D	0.6+0.8 C	0.4+0.8 C	0.4+0.8 C	0.6+0.8 C	0.2+0.8 C	0.2+0.8 C
Dicamba Product 4L+2,4-D	---	0.8+0.8 C	0.8+0.8 C	---	0.4+0.8 C	0.4+0.8 C
Curtail 2.38L	---	1.6 C	---	1.6 C	1.2 C	---
Plateau 2L	0.3 C	---	0.3 C	0.3 C	---	---

Select product based on labeling for the site or crop.

t = teaspoon

T = Tablespoon

C = Cup

1 tablespoon = 15 ml

1 fl oz = 2 Tablespoons

1 fl oz = 6 teaspoons

8 fl oz = 1 cup

1 fl oz = 30 ml



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