

WEED CONTROL IN GRASS PASTURES

(Roger L. Becker)

Impacts of Weeds and Cultural Practices

- GP 1.** Considerable grass pasture acreage in Minnesota is infested with broadleaf weeds, many of which are on the noxious weed list and several are poisonous to livestock. These broadleaf weeds are generally less palatable, less nutritious, lower yielding, and are less dependable as a forage supply for livestock than the desirable grass or legume pasture species that they replace.
- GP2.** In established pastures, good management and controlled grazing are necessary to maintain a productive, weed-free stand. Protect new seedlings from grazing until they are well established and graze moderately thereafter. Allowing established pastures a recovery period after grazing by excluding cattle for 3 to 4 weeks, on a rotational basis, will reduce weeds and increase forage yields. If necessary, mow after each grazing period to control many pasture weeds and encourage new forage growth. Do not clip closer than 3 to 4 inches above the soil. In very weedy pastures where perennial forage grasses are thin, reseeding may be the best practice. To be successful, lime and fertilize according to soil test, destroy old sod and weeds by plowing or extensive surface tillage and seed an adapted mixture of legumes and grasses in a firm seedbed. If topography is not conducive to tillage, chemical control of existing vegetation and no-till interseeding desirable species may be an option.

Herbicide Use in Pastures

- GP3.** Many years of research data and practical farmer use have shown that herbicides labeled for use in pastures are not harmful to livestock when applied on pasture grass and weeds at recommended usage rates and label restrictions are followed. However, because applied herbicides may make toxic weeds more palatable to livestock, livestock should be excluded from the sprayed area for 7 to 10 days after treatment if poisonous plants are present. Additionally, always **follow grazing restrictions (see table GP3)** and safety precautions as prescribed on the label for the specific herbicide applied. All broadleaf herbicides labeled for use in grass pastures will severely injure or kill legumes. Therefore, if legumes are present and desirable, only spot treatments should be used. Products for CRP establishment include exceptions (see GP15).
- GP4.** The **endangered species act** impacts the use of certain herbicides on pasture or rangeland in Minnesota to protect plants such as the prairie brush clover and the Minnesota trout lily. Herbicide restrictions may apply to only a few sites within Jackson, Cottonwood, Renville, Goodhue and Rice counties. Check with the Minnesota office of the U.S. Fisheries and Wildlife Service (612) 725-3276 before applying most pasture herbicides in counties listed if these protected species are in your area.
- GP5.** Annual, biennial, and perennial weeds are most effectively controlled with herbicides as seedlings that have leafed out but while still small. Winter annuals, and biennial rosettes may be effectively controlled with herbicides applied in late-summer, or early-fall, or in the spring before bolting (producing flower stalks). Shoots of established herbaceous perennial weeds arise from parent rootstocks or underground rhizomes. Established perennial weeds are best controlled with herbicides when the most complete translocation of herbicide will occur to these perennial roots and rhizomes. In Minnesota, sugars produced in perennial plant shoots start to move downward to rebuild depleted underground root and storage organ reserves after flowering has occurred. Herbicides simply go where the sugars go, and as such, the most efficacious and consistent perennial kill occurs when herbicides are applied in late-summer or early-fall, anytime before hard, killing frosts. If perennial weeds must be controlled in the spring, wait until shoots reach at least 6- to 8-inches in height for most plant species before herbicide application to improve control.
- GP6. Sulfonyleurea herbicides for pasture use are Cimarron (metsulfuron-methyl), Cimarron Max (metsulfuron-methyl co-packaged with dicamba plus 2,4-D) and Rave (triasulfuron + Na salt of dicamba).**

Cimarron can be broadcast applied at 0.1 to 1.0 oz. product/A (0.004—0.0375 lb ai/A) or spot treated at 1 oz. product per 100 gallons water to control broadleaf weeds. Use 0.1 to 0.2 oz product/A to control buttercups, chickweed, mullein and curly dock. Use 0.2 to 0.75 oz. for musk thistle, or 0.5 to 1.0 oz Cimarron/A to control plumeless thistle, applied spring or early summer pre-flower. Use the spot treatment rate and application for control of Canada thistle in the spring when shoots are at least 6 to 10 inches tall but before flowering.

Do not:

- apply through irrigation equipment or exceed one application per year
- apply in liquid fertilizer or liquid N with a pH below 3.0 as rapid product degradation can occur. If applying in liquid N, do not add surfactant otherwise, **always** add nonionic surfactant (at least 80% active) at 1 to 2 pints per 100 gallons of water. Bluegrass, bromegrass and orchardgrass must be established 6 months: timothy 12 months and fescue 24 months before using Cimarron

- use more than 0.4 oz. Cimarron/A and 1 pint surfactant/100 gallons water on fescues
- use on ryegrasses, fine turf, or grasses grown for seed
- use on soils with pH greater than 7.9. Cimarron has no grazing restrictions.

Crop rotation restrictions must be followed if rotating out of grass pasture. Tank mixtures with most pasture herbicides are labeled to broaden spectrum of control and to reduce chances of weed resistance development. Cimarron can be applied to establish or maintain numerous warm season and select cool season grasses in the **Conservation Reserve Program**. Apply preplant, preemergence, postemergence to new planting or postemergence to stands planted the previous season to prevent or reduce weed competition.

Cimarron Max is a two-part product of metsulfuron-methyl (60% dry flowable) and a package mixture of dicamba and 2,4-D (1 lb + 2.87 lb ai/gallon, respectively). The pre-package product has a 7 day grazing PHI for lactating dairy, no grazing restriction for non-lactating animals, a 37 day hay harvest PHI, and animals must be removed 30 days prior to slaughter.

- GP7. Dicamba herbicides for pasture are Banvel, Clarity, others (dicamba), Overdrive (diflufenzopyr + dicamba), and Weedmaster (dicamba + 2,4-D). Dicamba alone (Banvel/Clarity) controls most broadleaf weeds in grass pastures. For most annual broadleaf weeds, apply 0.5 to 1.0 pt/A of Banvel or Clarity (0.25 to 0.5 lb ai/A), or for hard to control perennial broadleaf weeds apply 1.0 to 4.0 pts/A. Tank mixing with 2,4-D, or using up to 4 pts/A of the package mixtures **Weedmaster** or **Banvel + 2,4-D** is more economical, provides more consistent control of a broad spectrum of broadleaf weeds, and poses less environmental concerns than using higher rates of dicamba alone. The addition of diflufenzopyr to dicamba in the package mixture **Overdrive** (4 to 8 oz product/A, maximum 8 fl oz per season) improves control of perennial weeds compared to dicamba used alone via auxin inhibition by diflufenzopyr and unlike dicamba products, Overdrive has no grazing restrictions. This mode of action diflufenzopyr is reported to improve the efficacy of other growth regulator herbicides when tank mixed with Overdrive. See the Overdrive label for specific tank mixture rates of other growth regulator herbicides. Rates of dicamba much higher than those discussed here can be used as a spot treatment to control brush or difficult to control perennial weeds. Dicamba is persistent and soluble in water. **Do not** apply dicamba products on or near desirable trees or plants or in locations where it can leach to roots of desirable plants. Caution should be used when applying dicamba containing products in areas susceptible to contamination of surface and ground water. **Grazing restrictions apply**, see **Table GP3**.**
- GP8. Glyphosate formulations** can be applied as a spot treatment or applied with a wiper applicator for control of many annual and perennial weeds. No more than one-tenth of any given acre should be treated at one time. Spot treatments with glyphosate are particularly useful for localized patchy problems such as Canada thistle or brush control. Wiper applications are well suited for tall broadleaf weeds such as thistle, giant ragweed, goldenrod, hemp, etc. which may overstory legume mixtures such as birdsfoot trefoil or clover where broadcast broadleaf herbicide sprays are not an option. **Grazing restrictions apply**, see **Table GP3**.
- GP9. MCPA and 2,4-D** can be applied to control many annual and perennial broadleaf weeds and small brush. Repeated treatments for 2 or more years are usually necessary to control perennial weeds. Ester formulations are generally labeled at, and are effective at lower rates than amines, but ester formulations have more vapor movement at the time of application. These phenoxy herbicides are effective against numerous broadleaf weeds, are economical to use, weed rarely develop resistance to them, and they pose little risk to the environment. MCPA and 2,4-D degrade rapidly once applied, rarely leach or move with surface runoff to water resources, and do not pose replanting concerns. **Grazing restrictions apply**, see **Table GP3**. Many formulations exist, so be sure to check individual labels for rates and precautions specific to the product used.
- GP10. Plateau 2L (imazapic)** can be applied at 2 to 6 fl oz product/A to control annual weeds to establish native grasses or grass/wildflower mixtures, or to renovate established stands. See Plateau 2L label for recommended rates, and tolerance to preemergence or postemergence applications. 2 to 4 fl oz Plateau 2L/A generally results in good annual weed control under Minnesota conditions. Add 1.5 to 2 pts methylated seed oil vegetable based COC per acre or 0.25% v/v nonionic surfactant. May add 2 to 3 pts UAN or AMS nitrogen/A to improve burndown of annual weeds. Plateau 2L at 8 to 12 fl oz/A can be used for perennial weed control, but can be injurious to desirable species under Minnesota conditions, especially on stands that are not established. These rates can be used to reclaim established native grass stands infested with leafy spurge. Plateau is not recommended to establish pure stands of switchgrass as seedlings can be severely injured or killed by imazapic. Some introduced cool-season grass species have tolerance but will have greatly reduced yields, such as bromegrass or Kentucky bluegrass. Tall fescue may be killed at higher rates. May be used on Conservation Reserve Programs acres. 7 day PHI before cutting for hay. The DG formulation label does not allow use on areas that will be grazed or hayed.

GP11. Spike 20P (tebuthiuron) pellets applied at 3.75 to 20.0 lbs product/A (0.75 to 4.0 lbs ai/A) will control many woody species. Broadleaf forages and weeds will also be severely injured where treated. Dormant season applications are recommended to minimize desirable grass forage injury. Pasture use rates will control or suppress white or bur oak, sumacs, cottonwood, elms, some spruces and firs. Non-crop use rates, greater than 20 lbs product per acre, are generally required for pines, most maples, cherry species, dogwood, red or pin oaks, willows, and aspen. If renovating, grass seed may be broadcast seeded without any soil disturbance the fall or spring following application.

Do not:

- reseed for at least two growing seasons following brush is removal
- use where feeder roots of desirable trees may come in contact with this herbicide, or where soil or water movement from the application site is likely as very small amounts of tebuthiuron can cause severe injury to desirable trees and vegetation and is persistent, preventing the growth of some species for years
- use on heavy clay soils that crack extensively upon drying

Control will be erratic on soils with more than 5% organic matter or 30% clay. If the site will be grazed or hayed, do not exceed 20 lb/A of the pelleted 20P formulation annually where rainfall exceeds 20 inches per year, do not exceed 10 lb/A of the 20P where rainfall is 20 inches or less. A maximum rate of 10 lbs/A is specified if used on a site vulnerable to groundwater contamination with greater than 20 inches annual precipitation, 5 lbs/A maximum if less than 20 inches annual precipitation. Do not exceed 5 lb/A if using the 80 DF formulation regardless of rainfall. See grazing restrictions, Table GP3.

GP12. Clopyralid and triclopyr are available for pasture use as Stinger (clopyralid amine), Curtail (clopyralid amine + 2,4-D amine), Curtail M (clopyralid free-acid + MCPA ester), Remedy (triclopyr ester), Crossbow (triclopyr ester + 2,4-D ester), and Redeem (triclopyr amine + clopyralid amine).

Clopyralid and triclopyr are picolinic acid family herbicides. Clopyralid and triclopyr are marketed alone or in package mixtures with the phenoxy growth regulator herbicides 2,4-D or MCPA. These analogs of picloram are generally less persistence and have fewer environmental concerns compared to picloram. Yet, triclopyr and clopyralid have moderate soil persistence which provides some root uptake in addition to postemergence foliar uptake, therefore improved control and some residual seedling control of susceptible broadleaf weeds. Clopyralid in particular can persist and carryover injuring composites (Asteraceae) in renovations/forb seedings. Clopyralid adds aggressive control of composites and triclopyr adds aggressive control of herbaceous and woody plants (see **Table GP2**). The use rate of 0.5 to 1.33 pts/A Stinger is expensive, but has no grazing or haying restrictions and so may be used in some cases where other products may not. The prepackage mixtures containing clopyralid; **Curtail, Curtail M, and Redeem**, are an economical approach for Canada, musk and plumeless thistle, oxeye daisy, orange or yellow hawkweed, perennial sowthistle, and spotted knapweed control; control a broader spectrum of broadleaf weeds, and reduce leaching or surface runoff potential compared to Stinger or Tordon used alone. **Redeem** (clopyralid + triclopyr) is another non-phenoxy option without the odor associated with phenoxy use. Clopyralid and triclopyr may be used under trees as long as label precautions for sensitive trees species are followed. The 2,4-D or MCPA component in the package mixtures generally causes few problems applied under trees. **Remedy** (triclopyr) is primarily for deciduous brush control as foliar, cut-stump or basal bark sprays. **PastureGuard and Surmount** are the picolinic acids, fluroxypyr, tank mixed with triclopyr or picloram, respectively, but the species controlled by the addition of fluroxypyr are not typically found in Minnesota. **Tordon** is still the best herbicide for use on leafy spurge (see GP 14).

Use Rates:

- Apply 2 to 8 pts **Remedy** per 100 gallons carrier with oil added as per Remedy label instructions for improved control. Controls ash, cherry, oak, locust, willow species, and more.
- **Redeem** will suppress brush species, but primarily is for herbaceous broadleaf weed control, since less triclopyr is applied than when using Remedy. Apply 0.5 to 2 pts/A Redeem 3S for most broadleaf weeds including oxeye daisy, 2 to 3 pts for perennial sowthistle, and 4 pts for orange or yellow hawkweed control.
- Apply 2 qts/A or less **Crossbow** for most herbaceous broadleaf weeds as rates higher than 2 qts/A generally are for brush control.
- Apply 2 to 3 qts/A **Curtail** or **Curtail M** to control most broadleaf weeds. Particularly effective on the thistle complex and other composites.

Precautions:

- **Do Not** apply manure, or use hay or straw from clopyralid or triclopyr treated areas for mulch, compost, or apply treated plant residue to susceptible broadleaf crops.
- Clopyralid may leach to groundwater in sensitive areas, see groundwater precautions on the label of products containing clopyralid.
- **Grazing restrictions apply to the prepackage mixtures** (see **Table GP3**). Follow guidelines on the label if rotating out of pasture to sensitive crops as clopyralid and triclopyr persist in the soil.

GP13. Aminopyralid (Milestone 2 S) is a new product. Aminopyralid also is a picolinic acid family herbicide. A package mixture of aminopyralid with 2,4-D, called **Forefront** is pending registration and should be available by the 2006 season. Aminopyralid is a low-use rate product, does not have ground water restrictions, is not a restricted use product, and has less persistence compared to picloram (**Tordon**). Aminopyralid, like

triclopyr and clopyralid, has moderate soil persistence which provides some root uptake in addition to postemergence foliar uptake, therefore improved control and some residual seedling control of susceptible broadleaf weeds. Aminopyralid is an excellent replacement for picloram (**Tordon**), especially for Canada, musk and plumeless thistle control (see **Table GP2**).

Use Rates:

- Apply 3 to 5 oz **Milestone** to control musk and plumeless thistle, 4 to 6 oz for tall buttercup, chicory, oxeye daisy, curly dock, orange and yellow hawkweed, or bitter sneezeweed, 5 to 7 oz to control Canada thistle, spotted knapweed or fireweed, and 6 to 7 oz to control absinth wormwood.

Precautions:

- **Do not** apply manure, or use hay or straw from aminopyralid treated areas for mulch, compost, or apply treated plant residue to susceptible broadleaf crops.
- **Grazing restrictions apply to the prepackage mixture Forefront.** Follow guidelines on the label if rotating out of pasture to sensitive crops as aminopyralid can persist in the soil.

GP14. The picolinic acid herbicides containing picloram are Tordon 22K (picloram potassium salt) and Grazon P + D (picloram amine + 2,4-D amine). Tordon is the most effective herbicide for broadleaf weed and deciduous brush control available. Tordon has long soil residual which improves control of perennial species and controls seedlings which germinate after application. This soil persistence poses some water resource and nontarget plant concerns, but using the lowest effective rate, proper application timing, and following label precautions will minimize these risks. Preferred application timing of key Minnesota Noxious weeds is in the early summer or in the fall for leafy spurge control, to Canada thistle regrowth in the fall, and to biennial thistles (musk, plumeless, bull) rosettes in the fall or before bolting in the spring. Broadcast apply Tordon at up to 2 qts/A to control noxious weeds, broadcast up to 1 qt/A for other weeds. Can spot treat up to a 2 qt/A equivalent rate to control any weed, but do not treat more than 50% of any given acre. Use low rates of Tordon (0.37 to 0.5 pts/A) tank mixed with 2,4-D (1 qt/A 4 lb/gal equivalent) or use Grazon P + D (prepackage mixture of picloram + 2,4-D amine), to significantly lower costs, reduce potential damage to nontarget plants, and reduce leaching or surface runoff compared to higher rates of picloram used alone. Significantly improves control of most broadleaf weeds compared to use of 2,4-D or most other pasture herbicides alone. Lower Tordon rates also reduce injury to sensitive grass species. Tank mix 1.0 lb ai/A 2,4-D with 6 to 8 fl oz Tordon 22K for spring, or 8 fl oz Tordon 22K for fall control of biennial thistle rosettes, or with 16 fl oz Tordon 22K for wormwood or spotted knapweed control. Grazon can be tank mixed with Remedy (see GP 13) for broad spectrum brush control. Do not apply manure, or use hay or straw from picloram treated areas for mulch, compost, or land application to susceptible broadleaf crops. Picloram is not recommended where soils have rapid to very rapid permeability, such as on sands or loamy sands, and where the underlying aquifer is shallow. Also not recommended for use where sinkholes overlay limestone bedrock, severely fractured surfaces, and substrates which allow direct introduction into aquifers exist. Assess surrounding area and topography for possible movement to non-target plants and desirable trees before use. **Grazing restrictions apply, see Table GP3. Restricted use herbicide,** however, a pre-diluted formulation for brush control, Tordon RTU, is not a restricted use product.

GP15. Glyphosate formulations and Gramoxone Max 3L or Gramoxone Inteon 2L (paraquat) can be used to reestablish desirable species in improved pasture or to upgrade unimproved pasture. Glyphosate may be applied as a broadcast treatment or in inter-seeded banding applications. Apply paraquat only as a broadcast application to grazed or mowed pastures not more than 3 inches in height. Apply paraquat at 0.25 to 0.47 lbs ai/A (0.6 to 1.3 pts 3L or 0.8 to 1.5 pts 2.5L formulation) or glyphosate at 2 to 4 lb ai/A (52 to 104 oz) depending on species. **Grazing restrictions apply, see Table GP3.** Paraquat grazing restrictions are one month minimum to allow for adequate seedling growth before grazing, generally at least 6 inches of grass or legume height, rather than any residue concerns. There are no residue concerns with glyphosate either, but the 8-week grazing restriction applies. The 14-day grazing restriction only applies to spot treatments with glyphosate.

GP16. Federal Conservation Reserve Program land. Bromoxynil products, Plateau (imazapic), Pursuit (imazethapyr) and Cimarron (metsulfuron) can be used to establish CRP grass-dominant vegetation. **Plateau and Pursuit** have tolerance on many native, warm season grasses, and less so on some cool season grasses. **Cimarron and bromoxynil** have tolerance on both, but still can cause injury. Note: **atrazine is no longer labeled** for CRP or warm season grass establishment in Minnesota although it is still labeled in some surrounding states. **Pursuit** can be applied postemergence to seedling legumes after 3 fully-expanded trifoliolate leaves and to grasses at or after the 4-leaf stage of growth in CRP. Refer to the Pursuit label for labeled legume and grass species. Pursuit treated forage may not be grazed or hayed if acreage is released for emergency forage. **See GP6 for details on Cimarron use, GP10 for details for Plateau use.**

Buctril 2L, Buctril 4 EC, others (bromoxynil) controls most broadleaf weeds postemergence in CRP grass seedlings. Apply 1 to 2.0 pt 2L or 0.5 to 1.0 pt/A 4EC after grass emergence. If alfalfa is planted with grasses, apply after the 4 trifoliolate leaf stage and do not exceed the 1.5 pt 2L or the 0.75 pt 4EC rate. Unacceptable injury may occur to alfalfa in the 2 trifoliolate stage or smaller with uneven stands, or under

conditions favoring leafburn. Legumes other than alfalfa may be severely injured. Broadleaf weeds should not exceed 2 inches in height, the 4-leaf stage, or 1 inch in diameter, whichever comes first. Use the low rate on eastern black nightshade, cocklebur, lambsquarters, shepherdspurse, pennycress, smartweeds, and wild buckwheat. Use the high rate on redroot pigweed, velvetleaf, ragweeds, Kochia, and wild mustard. The low rate of bromoxynil can be tank mixed with 0.25 to 0.5 MCPA to improve kochia and pigweed control.

Do not:

- add adjuvants or fluid fertilizers if seeded with alfalfa or other legumes
- graze treated areas
- use MCPA with bromoxynil if grasses are seeded with legumes

Table GP1. Summary of herbicides for use in Grass Pastures

Application Type			
Herbicide / Formulation	Rate Range	Crop Tolerance	Remarks
Surface applied			
Spike 20 P	3.75 to 20 lbs	-	For brush control in pastures. Very persistent. Spot treat with 0.25 oz per 1 to 2 inch stem diameter. Use 0.25 oz per 22 square feet for larger stumps or multiple stems. Grazing restrictions apply.
Spike 80 DF (tebuthiuron)	1.25 to 5 lbs (0.75 to 4 lb ai/A)		
Postemergence			
2,4-D Amine 4 S	0.5 to 2 qts	-	Use higher rates for perennial or biennial weeds and small brush. Affordable, broad spectrum control of broadleaf weeds and degrades rapidly in the environment. Grazing restrictions apply.
2,4-D Ester 4 E (2,4-D)	0.5 to 2 qts (0.5 to 2 lb ai/A)		
Banvel 4 S (dicamba)	0.25 to 2 qts (0.25 to 2 lb ai/A)	-	Annual and perennial broadleaf weed control. Use lower rates for broadcast application. Use high rates only for spot application. Grazing restrictions apply.
Brash 3.87 L (dicamba & 2,4-D)	0.5 to 4 pts (0.25 to 2.0 lb ai/A)	-	Annual and perennial broadleaf weed control. Prepackage mixtures provide more economical, more consistent control of a broad spectrum of broadleaf weeds, and poses less environmental concerns than using higher rates of dicamba alone. Grazing restrictions apply.
Buctril 2 E (bromoxynil)	1 to 2 pts (0.25 to 0.5 lb ai/A)	-	For CRP only. Controls broadleaf weeds in grass seedlings. Use lower rates when seeded with alfalfa. Can not be grazed,
Cimarron 60 DF (metsulfuron-methyl)	0.1 to 1.0 oz (0.004 to 0.0375 lb ai/A)	-	Control of certain annual and perennial broadleaf weeds and suppression of many others. No grazing restrictions.
Cimarron Max 60DF + 3.87L (metsulfuron-methyl + dicamba & 2,4-D)	0.25 to 1 oz + 0.5 to 2 qts (0.009 to 0.0037 + 0.48 to 1.9 lb ai/A)	-	Adds broad spectrum control of broadleaf weeds compared to use of Cimarron above. Grazing restrictions apply.
Clarity 4 S (dicamba)	0.25 to 2 qts (0.25 to 2.0 lb ai/A)	-	Annual and perennial broadleaf weed control. Use lower rates for broadcast application. Use high rates only for spot application. Grazing restrictions apply.
Clopyr AG 3 S (clopyralid)	0.6 to 1.33 pts (0.19 to .5 lb ai/A)	-	Clopyralid provides aggressive control of composite (Asteraceae) species. No grazing or haying restrictions.
Crossbow 3 E (triclopyr & 2,4-D)	up to 2 qts (up to 1.5 lb ai/A)	-	Additional control brush and some broadleaf weeds compared to 2,4-D above. Grazing restrictions apply.
Curtail 2.38 L (clopyralid & 2,4-D)	2 to 4 qts (1.19 to 2.38 lb ai/A)	-	Additional control of Asteraceae, especially biennials and Canada thistle compared to 2,4-D alone. Grazing restrictions apply.
Curtail M 2.77 E (clopyralid & MCPA)	2 to 4 qts (1.38 to 2.77 lb ai/A)	-	Additional control of Asteraceae, especially biennials and Canada thistle compared to MCPA alone. Grazing restrictions apply.
glyphosate, others (glyphosate)	varies by product (1.5 to 3 lb ai/A)	-	Many formulations available including Roundup and Cornerstone. Spot treatment or wiper applications for control of many annual and perennial weeds. Also for pasture renovation broadcast applications. Grazing restrictions apply. Check specific formulation label for rates and restrictions.

Table GP1. Summary of herbicides for use in Grass Pastures

Application Type			
Herbicide / Formulation	Rate Range	Crop Tolerance	Remarks
Postemergence			
Gramoxone Inteon 2 S	1.0 to 1.8 pts	-	For pasture renovation or interseeding, broadcast applications only. Grazing restrictions apply. Restricted Use Herbicide.
Gramoxone Max 3 S (paraquat)	0.67 to 1.25 pts (0.25 to 0.47 lb ai/A)		
Grazon P+D 2.54 S (picloram & 2,4-D)	2 to 8 pts (0.64 to 2.54 lb ai/A)	-	Package Mix. Allows use of lower rates of picloram than possible with Tordon used alone. May reduce nontarget or environmental concerns. Grazing restrictions apply.
MCPA Amine 4 S	0.25 to 2 qts	-	Use higher rates for perennial weeds. Use either ester or amine formulations. Grazing restrictions apply.
MCPA Ester 4 E (MCPA)	0.25 to 2 qts (0.25 to 2 lb ai/A)		
Milestone 2 L (aminopyralid)	3 to 7 fl oz (0.047 to 0.11 lb ai/A)	-	Annual and perennial broadleaf weed control. Excellent on the musk, plumeless and Canada thistle. Up to 14 fl oz/A (0.22 lb ae/A) may be applied to no more than 50% of any given acre.
Overdrive 70 DF (diflufenzopyr & dicamba)	4 to 8 oz (0.18 to 0.36 lb ai/A)	-	Auxin transport inhibitor available only in a package mixture with dicamba. Improves performance of dicamba, but generally recommended to add reduced rates of other broadleaf weed herbicides for general overall performance (see label for details on tank mixtures and specific additive instructions).
Plateau 2 L (imazapic)	2 to 12 fl oz (0.032 to 0.189 lb ai/A)	-	Establish or renovate native grass and grass wildflower stands. The 2 to 4 oz rate generally performs well th establish native grasses under Minnesota conditions.
Pursuit 2 S	3 to 6 fl oz	-	For CRP only. Controls many annual broadleaf and grass weeds. Can not be grazed if released for emergency forage.
Pursuit 70 DG (imazethapyr)	1.08 to 2.16 oz (0.47 to 0.94 lb ai/A)		
Rave 58.8 WDG (triasulfuron & dicamba)	2 to 5 oz (0.07 to 0.17 lb ai/A)	-	Improved spectrum and consistency of control over use of triasulfuron alone. Grazing restrictions apply.
Redeem R&P 3 S (triclopyr & clopyralid)	1.5 to 4 pts (0.56 to 1.5 lb ai/A)	-	Provides a control option with no phenoxy oder. Broadleaf weed and brush control. Grazing restrictions apply.
Remedy 4 E (triclopyr)	1 to 4 qts (1 to 4 lb ai/A)	-	Deciduous bush control foliar, cut-stump, or basal bark sprays. Add oil to carrier per Remedy Label instructions for improved control. Controls ash, cherry, oak, locust, willow specirs and more.
Sterling 4 S (dicamba)	0.25 to 2 qts (0.25 to 2 lb ai/A)	-	Annual and perennial broadleaf weed control. Use lower rates for broadcast application. Use high rates only for spot application. Grazing restrictions apply.
Stinger 3 S (clopyralid)	0.6 to 1.33 pts (0.19 to 0.5 lb ai/A)	-	Clopyralid provides aggressive control of composite (Asteraceae) species. No grazing or haying restrictions.
Tordon 22K 2 S (picloram)	up to 2 qts (up to 1.0 lb ai/A)	-	Annual and perennial broadleaf weed control. Use up to 2 qts/A for noxious weeds, up to 1 qt/A for others. Spot treat at a rate equivalent to 2 qts/A, but do not treat more than 50% of a given acre. Restricted Use Product.
Weedmaster 3.87 L (dicamba & 2,4-D)	0.5 to 4 pts (0.25 to 2.0 lb ai/A)	-	Annual and perennial broadleaf weed control. Prepackage mixtures provide more economical, more consistent control of a broad spectrum of broadleaf weeds, and poses less environmental concerns than using higher rates of dicamba alone. Grazing restrictions apply.

Table GP2. Effectiveness of herbicides on major weeds in Grass Pastures.

Herbicides	Annual			Biennial			Perennials																				
	Hemp	Burdock	Knapweed, Spotted	Mullein	Thistle, Bull	Thistle, Musk	Thistle, Plumelless	Alyssum, Hoary	Aster spp.	Bracken Fern	Buttercup spp.	Daisy, Oxeye	Dandelion, Common	Dock, Curly	Goldenrod spp.	Hawkweed	Nettle, Stinging	Snakeroot, White	Sowthistle, Perennial	Spurge, Leaty	Tansy	Thistle, Canada	Toadflax, Yellow	Waterhenlock spp.	Wormwood, Absinth		
Postemergence																											
2,4-D, others (2,4-D)	G	G	G	P	G	G	G	F/G	F/G	P	F	F	G	F	F	F	G	F	F	P/F	F	F	N	G	F/G		
Banvel (dicamba)	G	G	G	F	G	G	G	F	G	F	P	F	G	G	G	F	F	G	G	P	F	G	P	F	G		
Cimarron (metsulfuron-methyl)	-	-	-	F	G	F/G	F/G	-	F	-	F/G	F/G	G	-	-	-	-	-	F	P	F/G	F	-	-	-		
Cimarron Max (metsulfuron-methyl + dicamba & 2,4-D)	G	G	G	F	G	G	G	F/G	F/G	P/F	F/G	F/G	G	F/G	F/G	F	F/G	F/G	F/G	P/F	F/G	F/G	N	F/G	F/G		
Clarity (dicamba)	G	G	G	F	G	G	G	F	G	F	P	F	G	G	G	F	F	G	G	P	F	G	P	F	G		
Clopyr AG (clopyralid)	-	G	G	-	G	G	G	-	G	P	F	G	G	-	G	G	-	G	F	N	-	G	N	-	F		
Crossbow (triclopyr & 2,4-D)	G	G	G	P	G	G	G	F	F	P	G	F	G	G	G	F	G	F	F	F	F	F	N	G	F		
Curtail (clopyralid & 2,4-D)	G	G	G	P	G	G	G	F/G	G	P	F	G	G	G	G	G	G	G	F	P/F	F	G	N	G	G		
Curtail M (clopyralid & MCPA)	G	G	G	P	G	G	G	F/G	G	P	F	G	G	G	G	G	G	G	F	P/F	F	G	N	G	G		
glyphosate, others (glyphosate)	G	G	G	G	G	G	G	G	G	F	G	G	G	G	G	G	G	G	G	F	G	G	G	G	G		
Grazon P+D (picloram & 2,4-D)	G	G	G	G	G	G	G	F	G	F	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		
MCPA, others (MCPA)	G	G	G	P	G	F	F	F	F	P	G	F	G	F	F	P	F	F	F	N	N	F	N	F	P		
Milestone (aminopyralid)	G	G	G	F/G	G	G	G	N	G	N	G	G	P	G	P	G	F	N	G	P	F	G	N	N	G		
Overdrive (diflufenzopyr & dicamba)	G	G	G	F/G	G	G	G	-	F/G	-	F/G	F/G	G	-	-	-	-	-	F	P	F/G	F/G	-	-	-		
Plateau (imazapic)	-	-	F/G	-	G	G	G	F/G	P	-	-	N	F	F/G	-	-	-	-	-	F/G	-	F	F/G	-	-		
Redeem (triclopyr & clopyralid)	G	G	G	F	G	G	G	G	F	P	F	G	G	G	G	G	G	G	G	P/F	-	G	N	-	G		
Remedy (triclopyr)	G	-	-	-	-	-	-	F	-	-	F	-	F	G	-	-	-	-	-	-	-	-	-	-	-		
Sterling (dicamba)	G	G	G	F	G	G	G	F	G	F	P	F	G	G	G	F	F	G	G	P	F	G	P	F	G		
Stinger (clopyralid)	-	G	G	-	G	G	G	-	G	P	F	G	G	-	G	G	-	G	F	N	-	G	N	-	F		
Tordon 22K (picloram)	G	G	G	G	G	G	G	G	G	F	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		

NOTE: G = Good; F= Fair; P = Poor; N = No control. Effectiveness ratings apply if herbicide is used according to label recommendations as to rate, time of application, etc., and favorable temperature and moisture conditions prevail.

Table GP3. Grazing Restrictions for Pasture Herbicides.¹

Herbicides	Rates		Lactating Dairy Animals		Beef and Non-Lactating Dairy Animals		Removal before slaughter
			Before Grazing	Before Hay Harvest	Before Grazing	Before Hay Harvest	
			Product	lb/A	Product	lb/A	
Aminopyralid (Milestone 2S) ^a	3 to 7 oz	0.047 to 0.109 ae	0	0	0	0	0
Clopyralid (Stinger 3E) ^a	0.33 to 1.33 pt	0.12 to 0.5 ae	0	0	0	0	0
Clopyralid							
+ 2,4-D (Curtail 2.38S)	2 to 3 qts	1.19 to 1.78 ae	14 days	30 days	0	30 days	7 days ^b
+ MCPA (Curtail M 2.77S)	2 to 3 qts	1.38 to 2.0 ae	7 days	Not specified	0	Not specified	7 days ^c
Dicamba (Banvel 4S)	Up to 1 pt	0.5 ae	7 days	37 days	0	0	30 days
	Up to 2 pt	1.0 ae	21 days	51 days	0	0	30 days
	Up to 4 pt	2.0 ae	40 days	70 days	0	0	30 days
Banvel + 2,4-D/Weedmaster	0.5 to 4 pts	0.25 to 2.0 ae	7 days	37 days	0	0	30 days
Overdrive (dicamba + diflufenzopyr)	4 to 8 oz	0.18 to 0.36 ae	0	0	0	0	0
Glyphosate (Roundup UltraMax 4S)							
Spot or Wiper ^d	labeled rate varies	---	14 days	14 days	14 days	14 days	0
Broadcast	labeled rate varies	---	8 weeks	8 weeks	8 weeks	8 weeks	0
Imazapic (Plateau 2L)	2 to 12 fl oz	0.032 to 0.189 ai	0	7 days	0	7 days	0
Metsulfuron methyl (Cimarron 60 DF)	0.1 to 0.4 oz	0.004 to 0.015 ai	0	0	0	0	0
metsulfuron-methyl + dicamba & 2,4-D (Cimarron Max)	0.25 to 1 oz + 1 to 4 pts	0.012 to 0.047 ai + 0.48 to 1.94 ae	7 days	37 days	0	0	30 days
Paraquat ^e							
(Gramoxone Extra)	0.67 to 1.25 pts	0.25 to 0.47 ai	1 month	1 month	1 month	1 month	0
(Gramoxone Inteon)	1.0 to 1.8 pts	0.25 to 0.47 ai	1 month	1 month	1 month	1 month	0
Picloram ^a (Tordon 22K)	1 to 2 qts	0.5 to 1.0 ae	14 days	14 days	0/14 days ^f	0/14 days ^f	3 days ^b
Picloram + 2,4-D (Grazon P+D)	1 to 4 pts	0.31 to 1.25 ae	7 days	30 days	0	30 days	3 days ^b
Tebuthiuron ^g							
(Spike 20P)	3.75 to 20.0 lbs	0.75 to 4.0 ai	0	1 year	0	1 year	0
(Spike 30 DF)	1.25 to 5.0 lbs	1.0 to 4.0 ai	0	1 year	0	1 year	0
Trisulfuron + dicamba (Rave 58.8 DF)	2 to 5 oz	0.07 to 0.17 ae	7	Not specified	0	Not specified	30 days ^h
Triclopyr (Remedy 4 S)	≤ 2 qts > 2 to 4 qts > ≥ 4 qts	≤ 2.0 ae 2.0 to 4.0 ae > 4.0 ae	14 days Next season Next season	Next season Next season Next season	0 days 14 days ⁱ 14 days ⁱ	7 days 14 days Next season	3 days ^c 3 days ^c 2 days ^c
Triclopyr + clopyralid ^a (Redeem R & P 3 S)	1.5 to 4.0 pts	0.56 to 1.5 ae	14 days	Next season ⁱ	0 days	7 days ⁱ	3 days ^c
Triclopyr + 2, 4-D ^a (Crossbow 3S)	≤ 2 gal. 2 to 4 gal.	≤ 6.0 6.0 to 12.0	14 days Next season	Next season ⁱ Next season	0 14 days ⁱ	7 days ⁱ 14 days	3 days ^c 3 days
2,4-D/MCPA ^k	0.25 to 2 qts	0.25 to 2.0	7-14 days	30 days	0-7 days	30 days	0 to 3 days

^a Move livestock to untreated grass pasture for 7 days before transferring livestock to broadleaf crop or pasture areas.

^b Removal before slaughter is not needed if the restricted grazing interval has expired since application.

^c Applies to grazing or hay harvested during the season of treatment.

^d Do not treat more than one-tenth of any given acre at one time with spot or wiper applications. Remove livestock before application.

^e Restrictions based on the degree of new seedling establishment before grazing. Suggested at least 6 inches of grass or legume seedling growth which is approximately one month. Late fall seeding may require 3 to 5 months before the suggested 6 inch height is reached.

^f 14 days if >1 qt/A applied, 0 days if ≤ 1 qt/A.

^g Restrictions apply to application rates listed. If grazed, do not exceed 20 lbs product per acre where rainfall exceeds 20 inches per year, 10 lbs per acre where rainfall is less than 20 inches per year. Do not exceed 5 lbs 80 DF product regardless of rainfall. Do not harvest for hay for 1 year following any application.

^h Wait 30 days before removing animals for slaughter.

ⁱ When harvesting green forage instead of dried hay, the less restrictive grazing restriction of 14 days applies for lactating dairy, or 0 days for beef and non-lactating dairy.

^j No grazing restriction if less than 25% of grazed area is treated.

^k Be sure to check individual product labels for restrictions and use rates due to the large number of formulations available.

¹ Buctril (bromoxynil products) and Pursuit (imazethapyr) do not have clearance for grazing when used in CRP acres.