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Noxious Weed Control

Leon J. Wrage
Paul O. Johnson

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Noxious Weed Control

Cooperative Extension Service • South Dakota State University • U.S. Department of Agriculture

Leon J. Wrage, Extension Agronomist-Weeds
Paul G. Johnson, Extension IPM Coordinator

Noxious Weeds

Noxious weeds cause serious loss in field crops. Infestations frequently start from new patches in rights-of-ways, waste areas, fencelines and disturbed areas in pasture or range. State law requires control of all noxious weeds.

Declared Noxious Weeds

Six weeds currently are declared noxious statewide. The weeds and estimated acres infested are listed below.

<table>
<thead>
<tr>
<th>Weed</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>field bindweed</td>
<td>1,954,000</td>
</tr>
<tr>
<td>Canada thistle</td>
<td>431,000</td>
</tr>
<tr>
<td>leafy spurge</td>
<td>138,000</td>
</tr>
<tr>
<td>perennial sow</td>
<td></td>
</tr>
<tr>
<td>thistle</td>
<td>29,000</td>
</tr>
<tr>
<td>hoary cress</td>
<td>34,000</td>
</tr>
<tr>
<td>Russian knapweed</td>
<td>3,000</td>
</tr>
</tbody>
</table>

Criteria for noxious weed declaration include:
1. Must be perennial.
2. It must be capable of spread by seed and underground parts.
3. Cannot be controlled by normal management operations.
4. Is capable of materially reducing crop and livestock production.
5. The weed is capable of materially decreasing value of land and impeding the welfare of the people.

Designated Locally Noxious Weeds

Additional weeds may be designated locally noxious. Criteria are similar to those for declared noxious weeds except that locally noxious weeds may be a biennial or pernicious annual capable of rapid spread. These weeds are subject to the same requirements and enforcement as declared noxious weeds. Counties may request designation of a combination of four weed or pest species. Those approved by the South Dakota Weed and Pest Control Commission remain designated for a 5-year period.

The two most widespread locally noxious weeds are abarth wormwood (wormwood sage) and biennial pasture thistle (musk, plumeless, and bull). There are an estimated 161,000 acres of musk and plumeless thistle and 137,000 acres of abarth wormwood.

Other species designated in some counties include puncture vine, spotted knapweed, mullein, burdock and wild hemp.

Noxious Weed Control

Herbicides for pasture, range and noncrop areas, including roadside and other rights-of-way that may be harvested for hay or grazed, are included.

NONCROP AREAS. Noncropland is defined for herbicide purposes as areas not used to produce food or feed crops during the time herbicide residue remains in the soil. Noncrop areas include parking lots, utility storage areas and some rights-of-way. Pasture, range and hayland are cropland.

HERBICIDES. Herbicides are listed by tradename except where the active ingredients are available in several products. The common name (in parentheses) follows the first listing of the tradename. Product labels for the same active ingredient vary. Herbicides included are those considered for most situations and those generally available. Rights-of-way are frequently grazed or used for hay, therefore products that allow grazing or harvesting hay are given a priority.

Rates are based on research data available. Treatments include those that (1) provide a high level of eradication with one application for small areas; (2) have lower annual cost but give a high degree of eradication in a four or five year program or (3) have low cost but require repeated application for several years.

COST. Prices are based on average retail cost for small quantities. Application cost is not included.

NOTE: 2,4-D showing 3.8 lb/gal is the same as 4 lb/gal, and 5.7 lb/gal is the same as 6 lb/gal acid equivalent. The changes reflects new laboratory methods; products have not changed.

ABBREVIATIONS. Several abbreviations are used in the publication.

- pt = pint
- qt = quart
- gal = gallon
- lb = pound
- oz = ounce
- act = active, actual
- L = liquid
- gpa = gallons per acre
- psi = lb per square inch
- DF = dry flowable

SAFETY FIRST

Follow the Label. It is a violation of federal pesticide laws to use an herbicide 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.

McKennon Hospital, Sioux Falls, S.D. 1-800-952-0123
Dakota Midland Hospital, Aberdeen, S.D. 1-800-592-1889
Rapid City Regional Hospital, Rapid City, S.D. (605) 341-3333

Water Protection. Water quality is a public concern. 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 in the critical area.

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F&B: 2.2—April 1989—ES 530
LEAFY SPURGE, HOARY CRESS, RUSSIAN Knapweed

Tordon 22K (PICLORAM)

4 qt Tordon 22K 2L (2 lb act)

**SPRING** or **FALL**. Primarily for small patches. Apply Tordon 22K as a spray using 4 qts per acre in 20 to 40 gpa carrier. Tordon is the best choice for leafy spurge; it provides over 90% stand reduction. Lower rates provide less permanent reduction. Some regrowth may be noted after application during dry seasons. Apply anytime during the growing season. Make spring treatments before seeds form. Make fall applications before soil freezeup. An annual application of 2,4-D or other herbicide is required to control stragglers and seedlings in succeeding years. Most data are for leafy spurge; however, this treatment also is effective on hoary cress and Russian knapweed.

Tordon is used to control deep-rooted broadleaved weeds. Tordon has foliar activity and extended soil residual. It controls emerged topgrowth and also translocates into roots. Rainfall is required to move the herbicide into the root zone. Trees, legumes, and broadleaf plants are very sensitive to drift and soil residues.

Tordon 22K is registered for use on noncrop areas and has a state SLN (Special Local Need) label for use in grass pasture and range. It is not approved for use in cultivated fields. Bromegrass and wheatgrass may be killed or severely injured; bluegrass is tolerant. Treated areas can be grazed or harvested for hay. Tordon 22K is formulated as a liquid containing 2 lb/gal acid equivalent. Tordon K also contains 2 lb/gal picloram but is not approved for pasture or range. Tordon 2K pellet is being discontinued. ($94.40 per acre).

**RESTRICTIONS.** Do not use in trees or in cultivated fields. Avoid drift to trees or sensitive broadleaf crops. Do not apply to small areas where the treated weeds may affect sensitive crops. Do not apply to areas near irrigation ditches or other water sources where drift can occur. Treated areas can be grazed or harvested for hay. Avoid water contamination. Do not apply into water or on inner banks or irrigation or drainage ditches where water used for irrigation or domestic purposes may be contaminated. Avoid application on coarse soil (loamy sand or sand) or where the aquifer is shallow. RESTRICTED USE PESTICIDE.

Tordon 22K + 2,4-D ester (PICLORAM + 2,4-D)

1.5 pt Tordon 22K 2L + 1 qt 2,4-D ester 4L (.38 + 1 lb act)

**SPRING.** Tank-mix. Intended as a 4- to 5-year program. Apply in late bud stage. Use Tordon 22K 2K at 1.5 pts plus 2,4-D ester at 1 qt (4 lb/gal) per acre. Lower rates may not provide sufficient residual control into the fall. Apply in 20 to 40 gpa carrier. Intended as one application per year; some regrowth may be noted in wet seasons. Cost for the combination is less than for Tordon alone and it is more effective than 2,4-D. This treatment has provided 75 to 80% stand reduction after 4 years. Promising program.

Activity is primarily foliar; picloram has some soil residual effects. This tank-mix is part of a state SLN label for pasture and range. Treated areas may be grazed. Labels for ester forms of 2,4-D do not include hay uses. Grass is usually tolerant to these Tordon rates. Some stunting, especially if applied at boot stage, may be noted. ($20.75 per acre).

**RESTRICTIONS.** Do not use in trees or in cultivated fields. Avoid drift to sensitive broadleaf crops. Do not graze dairy animals for 7 to 14 days after application, depending on 2,4-D product used. Avoid contaminating surface or groundwater; follow precautions as for Tordon 22K alone. RESTRICTED USE PESTICIDE.

2,4-D ester

1.5 qt 2,4-D ester 4L or 1 qt 2,4-D ester 6L (1.5 lb act)

**SPRING or FALL.** Spring and fall applications are required each year. Selective, foliage applied, translocated herbicide. Apply 2,4-D ester at 1.5 qts (4 lb/gal) or 1 qt (6 lb/gal) per acre. Suggested carrier is 10 to 40 gpa for ground equipment. This treatment has been popular for large infestations; however, several years are required to achieve significant stand reduction. The labor expense for two applications per year is high.

Apply in spring at late bud stage. Treat leafy spurge when bracts begin to yellow. Retreat in September or early October when new growth is 4 to 6 inches. There is considerable variation in performance. One treatment per year prevents seed production. Stands have been reduced 50% in 3 years. Complete eradication is difficult even after 10 years. Best control is under favorable growing conditions. Surfactant or fuel additives increase rate of leaf burn but seldom increase stand reduction.

3 qt 2,4-D ester 4L or 2 qt 2,4-D ester 6L (3 lb act)

**SPRING or FALL.** Intended as a single application per year. Treat in spring at late bud stage. Treat leafy spurge when bracts begin to yellow. May be used to start a control program in the fall if there are 4 to 6 inches of active regrowth. Apply 2,4-D ester at 3 qts (4 lb/gal) or 2 qts (6 lb/gal) per acre. Suggested carrier is 10 to 40 gpa for ground equipment. Has shown promise in some tests; although control is less than for two applications of 1.5 lbs/A each. Best for inaccessible areas where the labor cost for a second application is prohibitive. Appears to be more successful for leafy spurge. ($9.15 per acre).
Registered uses for 2,4-D include grass pasture, range, and noncrop areas. Treated areas may be grazed. Labels for ester forms of 2,4-D do not include hay uses.

**RESTRICTIONS.** Avoid drift to trees and sensitive crops. Not suggested for use in trees. Do not graze dairy animals on treated areas for 7 or 14 days after application, depending on 2,4-D product label. Note other label precautions.

### CANADA THISTLE, FIELD BINDWEED, PERENNIAL SOW THISTLE

#### Tordon 22K (PICLORAM)

**3 qt Tordon 22K 2L (1.5 lb act)**

**SPRING or FALL.** Primarily for small infestations. Apply Tordon 22K as a spray using 3 qts/A in 20 to 40 gpa carrier. Lower rates provide less permanent stand reduction. Best choice for treating new, small patches. Has provided over 95% stand reduction. Apply anytime during the growing season. Make spring treatments before seeds form. Make fall applications before soil freezeup. Use 2,4-D or other herbicides to control stragglers or seedlings in succeeding years.

Tordon 22K is a semi-selective herbicide that controls deep-rooted broadleaved weeds. It has foliar activity and extended soil residual. The herbicide is absorbed into the leaves and controls emerged topgrowth. It also translocates into roots. Rainfall moves the herbicide into the root zone. Trees, legumes, and broadleaf plants are very sensitive to drift and soil residual.

Tordon 22K is registered for use on noncrop areas and has a state SLN label for use in grass pasture and range. It is not approved for use in cultivated fields at spot treatment rates. Bromegrass and wheatgrass may be killed or severely injured; bluegrass is tolerant. Treated areas may be grazed or harvested for hay. Tordon 22K is formulated as a liquid containing 2 lb/gal acid equivalent. Tordon K also contains 2 lb/gal picloram but is not approved for pasture or range. Tordon 2K is a 2% pellet that is being discontinued. ($70.80/A).

**RESTRICTIONS.** Do not use in trees or in cultivated fields. Avoid drift to trees or sensitive broadleaf crops. For rates above 2 qt/A, do not harvest for hay within 2 weeks of treatment. Do not graze dairy animals for 2 weeks after treatment. Remove slaughter animals 3 days before slaughter if grazing within 2 weeks after spraying. Avoid water contamination. Do not apply into water or on inner banks of irrigation or drainage ditches where water used for irrigation or domestic purposes may be contaminated. Avoid application on coarse soil (loamy sand or sand) or where the aquifer is shallow.

#### Banvel (DICAMBA)

**6 qt Banvel 4L (6 lb act)**

**SPRING or FALL.** Primarily for small infestations. Apply Banvel as a spray using 6 qt/A in 10 to 20 gpa carrier for ground equipment. Make spring applications at early bud stage. Make fall applications before new growth is killed by frost. Results on thistle are consistent. Banvel rate of 6 qt/A has provided a high degree of stand reduction. Thistle control exceeds 90% in some tests; field bindweed stand reduction is expected to be somewhat less, especially with the 6 qt/A rate as suggested on the label. Lower rates provide less permanent stand reduction. Control usually is greater in low rainfall areas. An application of 2,4-D or other herbicide is required to control seedlings and weakened plants in succeeding years.

Banvel is a selective, translocated herbicide used to control broadleaved weeds. It has foliar activity. High rates have soil residual extending through one season. Trees, legumes, and broadleafed plants are sensitive to drift and soil residues. Favorable growing conditions improve results.

Banvel is registered for use in pasture, range, and noncrop areas. It is not approved for use in cultivated fields at the high rates. Bromegrass may be severely stunted or killed; bluegrass and several other grasses are tolerant. Treated areas may be grazed or harvested for hay. Banvel is formulated as a liquid containing 4 lb/gal acid equivalent. ($87.80).

**RESTRICTIONS:** Do not use in trees. Remove meat animals from treated areas 30 days before slaughter. Do not graze lactating dairy animals on treated areas for 60 days. Do not harvest hay for dairy animals within 90 days after treatment. Avoid non-target drift.

#### Tordon 22K + 2,4-D (PICLORAM + 2,4-D)

**1 pt Tordon 22K 2L + 1 qt 2,4-D 4L (.25 + 1 lb act)**

**SPRING.** Tank-mix. Intended as a 4- to 5-year program with sufficient seasonal suppression so only one application per season is required. Apply at bud stage before flowers open. Use Tordon 22K at 1 pt plus 2,4-D (4 lb/gal) at 1 qt per acre in 20 to 40 gpa carrier. The annual cost is less than for Tordon used alone and is more effective than 2,4-D. This combination is a promising program to improve stand reduction over a period of several years. Some fall regrowth may be noted in wet seasons. Lower rates do not provide sufficient residual control into the fall.

Primary activity is from foliar uptake. The herbicides are translocated through the plant. Ester or amine form of 2,4-D may be used. Amines cause less leaf burn and are preferred if growth is lush.
This tank-mix has a state SLN label for use in grass pasture and range. Treated areas may be grazed or harvested for hay, according to the 2,4-D product label. Labels for 2,4-D products vary. Grass is usually tolerant to these Tordon rates. Some stunting, especially if applied at boot stage, may be noted. ($14.05 per acre).

RESTRICTIONS. Do not use in trees or in cultivated fields. Avoid drift to sensitive broadleaved crops. Avoid contaminating surface or groundwater; follow precautions as for Tordon 22K alone. Do not graze dairy animals on treated areas for 7 or 14 days after application, depending on 2,4-D product label. Ester formulation labels include grazing uses only; some amine formulation labels also allow harvesting hay 30 days after application and specify a 7-day removal period before slaughter if meat animals are grazing treated areas within 2 weeks of application. Note other label precautions.

**RESTRICTED USE PESTICIDE.

**Banvel + 2,4-D (DICAMBA + 2,4-D)

1 pt Banvel 4L + 1 qt 2,4-D 4L (.5 + 1 lb act)

SPRING. Tank-mix. Intended as a 4- to 5-year program with sufficient seasonal suppression so only one application per year is required. Apply at bud stage before flowers open. Mix Banvel at 1 pt plus 2,4-D at 1 qt (4 lb/gal) per acre. Apply in 10 to 20 gpa carrier. The annual cost is less than for Banvel used alone and it is more effective than 2,4-D. This combination is a promising program to improve stand reduction over a period of several years. It also is a good choice for inaccessible areas where the labor cost of a second application is prohibitive. Lower Banvel rates may not provide sufficient residual control into the fall, especially in wet seasons.

Primary activity is from foliar uptake. Ester or amine formulations of 2,4-D may be used. Amines cause less leaf burn and are preferred if growth is lush.

Banvel plus 2,4-D is labeled for use in grass pasture, range, and noncrop areas. Treated areas may be grazed or harvested for hay, according to 2,4-D label directions. Grass is usually tolerant to these Banvel rates; some stunting may be noted, especially if applied at boot stage. Weedmaster is a premix of 1 lb dicamba plus 2.8 lb 2,4-D amine per gallon. It may be used in pasture, range, and noncropland. Maximum rate is 2 qt/A, providing less dicamba than usually required for single-application treatments. Banvel 720 premix also contains dicamba + 2,4-D. ($9.95 per acre).

RESTRICTIONS. Do not use in trees. Avoid drift to sensitive broadleaved plants. Do not graze dairy animals on treated areas for 7 or 14 days after application, depending on 2,4-D product label. Ester formulation labels include grazing uses only; some amine formulation labels also allow harvesting hay 30 days after application and specify a 7-day removal period before slaughter if meat animals are grazing treated areas within 2 weeks of application. Do not graze lactating dairy animals on areas treated with up to 1 pt Banvel per acre until 37 days after application. Note other label precautions.

**2,4-D Amine

3 qt 2,4-D amine 4L (3 lb act)

LATE FALL. Intended primarily for treating patches not treated in early season. For late fall use only. Apply 2,4-D amine at 3 qt/A in late fall before leaves are damaged by frost. Suggested carrier is 10 to 20 gpa for ground equipment. Preliminary data indicate 50 to 60% stand reduction if fall conditions have produced considerable new growth. Light frost before application does not reduce control; high temperatures of 60 degrees F after application improve results.

1 qt 2,4-D amine or ester 4L or .66 qt 2,4-D ester 6L (1 lb act)

SPRING or FALL. Requires a spring and fall application each year. Make spring applications at bud stage but before flowers open; Retreat in September or early October after new fall growth reaches 6 inches. Apply 2,4-D amine or ester at 1 qt (4 lb/gal) or .66 qt (6 lb/gal) per acre. Suggested carrier is 10 to 40 gpa for ground equipment. There is considerable seasonal variability in performance. One spraying prevents seed production. Two sprays of 2,4-D have provided 50 to 70% stand reduction each year in SDSU trials. Reductions of 70 to 80% may be achieved after 3 years.

This has been a popular program for large infestations in pasture and along roadsides. However, several years are required to reach high levels of eradication. Labor costs are increased with programs requiring two applications each year.

Amine formulations are suggested for spring treatments when growth is lush. Esters may be used for fall spraying or if plants are stressed and there is less risk of leaf burn. Best results when conditions favor active growth. Fall retreating is critical with this system.

Registered uses for 2,4-D include grass pasture, range, and noncrop areas. Labels for 2,4-D products vary. Treated areas may be grazed; some products also include hay uses. ($4.50 per acre).

RESTRICTIONS. Avoid drift to trees and sensitive broadleaved crops. Do not graze dairy animals on treated areas for 7 or 14 days after application, depending on 2,4-D product label. Ester formulation labels include grazing uses only; some amine formulation labels also allow harvesting hay 30 days after application and specify a 7-day removal period before slaughter if meat animals are grazing treated areas within 2 weeks of application. Note other label precautions.
BIENNIAL THISTLES
(Musk, Plumeless, and Bull Thistle)

2,4-D Ester or Amine

1.5 qt 2,4-D 4L or 1 qt 2,4-D 6L (1.5 lb act)

**POSTEMERGENCE**: Apply in spring or fall when weeds are in rosette stage. Rate of 2,4-D is 1.5 qts (4 lb/gal) or 1 qt (6 lb/gal) per acre. Lower rates have been satisfactory under ideal conditions; 2 lb/A may be used in stress conditions. Low-volatile ester formulations are preferred for pastures; use amine salt or oil-soluble amine formulations when spraying near trees. Suggested carrier is 10 to 20 gpa for ground equipment. Control is reduced after flower stalks elongate (bolt). Apply when expected high temperature is to exceed 65 degrees F.

This treatment is registered for use in grass pasture and range. Treated areas may be grazed or harvested for hay, depending on 2,4-D product used. Labels for 2,4-D products vary. ($4.55 per acre).

**RESTRICTIONS**: Avoid drift to trees and sensitive broadleaved plants. Do not graze dairy animals on treated areas for 7 or 14 days after application, depending on 2,4-D product label. Ester formulation labels include grazing uses only; some amine formulation labels also allow harvesting hay 30 days after application, and specify a 7-day removal period before slaughter if meat animals are grazing treated areas within 2 weeks of application. Note other label precautions.

Tordon 22K (PICLORAM)

.5 pt Tordon 22K 2L (.13 lb act)

**POSTEMERGENCE**: Apply in spring or fall when weeds are in rosette stage. Use Tordon 22K at .5 pt/A. Apply in 10 to 20 gpa carrier for ground equipment or 1 to 4 gpa for aerial application. Provides excellent control under a wide range of growing conditions. Best treatment for fall application. Visual effects develop more slowly than for some treatments.

Tordon 22K is registered for use as a state SLN label for grass pasture and range. Treated areas may be grazed. Labeling does not include lower Tordon rates mixed with 2,4-D ($5.90 per acre).

**RESTRICTIONS**: Do not use in trees. Avoid drift to sensitive broadleaved plants. Avoid contaminating water. Note other label precautions. RESTRICTED USE PESTICIDE.

Banvel + 2,4-D (DICAMBA + 2,4-D)

Weedmaster

1 pt Banvel 4L + 1 qt 2,4-D 4L or 1 qt Weedmaster (.5 + 1 lb act)

**POSTEMERGENCE**: Tank-mix or use Weedmaster premix. Apply in spring or fall when weeds are at rosette stage. Use Banvel at 1 pt plus 2,4-D at 1 qt (4 lb/gal) per acre. Rates as low as .5 pt/A Banvel have been successful under ideal conditions. Use the high rate for large rosettes, dense stands, or under dry conditions. Use 10 to 20 gpa carrier for ground equipment. May be applied by air using 3 to 10 gpa carrier if there are no sensitive broadleaved crops in the area. Low volatile ester formulations are preferred for most situations.

This combination is registered for use in grass pasture and range. Treated areas may be grazed or harvested for hay, depending on the 2,4-D product used. Weedmaster is a premix of 1 lb dicamba plus 2.8 lbs 2,4-D amine. Labeled rate is 1 qt Weedmaster per acre; however, 1.5 to 2 qts provide rates similar to those listed for the tank-mix. ($19.55 per acre).

**RESTRICTIONS**: Avoid drift to trees and sensitive broadleaved plants. Do not graze dairy animals on treated areas for 7 or 14 days after application, depending on 2,4-D product label. Ester formulation labels include grazing uses only; some amine formulation labels also allow harvesting hay 30 days after application and specify a 7-day removal period before slaughter if meat animals are grazing treated areas within 2 weeks of application. Do not graze lactating dairy cattle on areas treated with up to 1 pt Banvel per acre until 37 days after application. Note other label precautions.
ABSINTH WORMWOOD (Wormwood Sage)

2,4-D Ester or Amine

2 qt 2,4-D 4L or 1.33 qt 2,4-D 6L (2 lb act)

POSTEMERGENCE. Apply in spring when wormwood is 8 to 10 inches. Rate of 2,4-D is 2 qts (4 lb/gal) per acre. Suggested carrier is 20 gpa for ground equipment. Control is somewhat variable. Good coverage and temperature over 65 degrees F. improve control. Low-volatile ester formulations are preferred for grass pasture and roadsides. Use amine or oil-soluble amine formulations near trees or where vapor-drift potential is critical for sensitive plants.

Registered uses for 2,4-D include grass pasture, range, and noncrop areas. Labels for 2,4-D products vary. Treated areas may be grazed; some products also include hay uses. ($6.10 per acre).

RESTRICTIONS: Avoid drift to sensitive plants. Do not graze dairy animals on treated areas for 7 or 14 days after application, depending on 2,4-D product label. Ester formulation labels include grazing uses only; some amine formulation labels also allow harvesting hay 30 days after application, and specify a 7-day removal period before slaughter of meat animals if grazing treated areas within 2 weeks of application. Note other label precautions.

Tordon 22K (PICLORAM)

1 qt Tordon 22K 2L (.5 lb act)

POSTEMERGENCE. Apply in spring before wormwood is over 12 inches. Apply Tordon 22K at 1 qt/A in 20 to 40 gpa carrier for ground equipment. Control has been excellent in SDSU tests. Good choice for small infestations in open areas. More effective under variable conditions than other treatments.

Tordon 22K is registered for use in noncrop areas and has a state SLN label for use in grass pasture and range. Treated areas may be grazed or harvested for hay. ($23.60 per acre).

RESTRICTIONS: Avoid drift to trees and sensitive broadleaved plants. Do not use in trees. Note other label precautions. RESTRICTED USE PESTICIDE.

Tordon 22K + 2,4-D Ester (PICLORAM + 2,4-D)

1 pt Tordon 22K 2L + 1 qt 2,4-D Ester 4L (.25 + 1 lb act)

POSTEMERGENCE. Tank-mix. Apply before wormwood is over 12 inches. Use Tordon 22K at 1 pt plus 2,4-D ester (4 lb/gal) at 1 qt per acre. Apply in 20 to 40 gpa carrier for ground equipment. Has provided excellent results. More effective than 2,4-D alone, especially under stress conditions. Results on larger wormwood plants the following year are better than for 2,4-D.

Tordon 22K has a state SLN label for use in grass pasture and range. Treated areas may be grazed. ($11.60 per acre).

RESTRICTIONS: Do not use in trees. Avoid drift to sensitive broadleaved crops. Do not graze lactating dairy animals on treated areas for 7 or 14 days after application, depending on 2,4-D product. Note other label precautions. RESTRICTED USE PESTICIDE.

Banvel + 2,4-D Ester (DICAMBA + 2,4-D)

1 pt Banvel 4L + 1 qt 2,4-D Ester 4L (.5 + 1 lb act)

POSTEMERGENCE. Tank-mix. Apply in spring before wormwood is more than 10 to 12 inches. Use Banvel at 1 pt plus 2,4-D ester at 1 qt per acre (4 lb/gal). More effective than 2,4-D alone. Apply in 10 to 20 gpa carrier with ground equipment. Results the following year are better than with 2,4-D alone when treating larger plants.

Banvel is labeled for tank-mixes with 2,4-D ester for use in grass pasture and range. Treated areas may be grazed. ($10.35 per acre).

RESTRICTIONS: Do not use in trees. Avoid drift to sensitive broadleaved crops. Do not graze lactating dairy animals on treated areas for 7 or 14 days after application, depending on 2,4-D product. Do not graze lactating dairy animals on areas treated with up to 1 pt Banvel per acre until 37 days after application. Note other label precautions.
### SHELTERBELTS
(Does not include fruit trees)

#### Roundup (GLYPHOSATE)

<table>
<thead>
<tr>
<th>2-4 qt Roundup 3L (1.5-3 lb act)</th>
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<tbody>
<tr>
<td><strong>POSTEMERGENCE:</strong> Apply when weeds are actively growing and at boot or bud to bloom stage. Fall application is more effective than spring. Has reduced quackgrass stand 90%; Canada thistle 75 to 85%; and field bindweed 50 to 75%. Field bindweed control is more variable. Apply in 10 to 40 gpa carrier. Rates are 2 qts for quackgrass, 3 qts for Canada thistle; and 4 qts per acre for field bindweed.</td>
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Roundup is a nonselective, foliar, translocated herbicide. There is no soil residual activity. Not suited for areas where perennial grasses are desired. ($38.25-76.55 per acre).

**RESTRICTIONS:** Avoid spray or drift contact on green leaves, stems, or bark of trees. Note other label precautions.

#### 2,4-D Amine or Oil Soluble Amine

<table>
<thead>
<tr>
<th>1-1.5 qt 2,4-D 4L (1-1.5 lb act)</th>
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<tbody>
<tr>
<td><strong>POSTEMERGENCE:</strong> Apply when weeds are actively growing and at bud stage. For broadleaved perennials. Requires retreatment in fall. Use extra caution to avoid injury to trees. Apply 1 to 1.5 qts (4 lb/gal) 2,4-D amine or oil soluble amine (Dacamine, Emulsamine) per acre. Suggested carrier is 40 gpa. Use no more than 20 psi pressure to produce coarse droplets and reduce risk of drift injury. Spray when it's calm and expected high temperature is below 75 degrees F. ($2.25-3.35 per acre).</td>
</tr>
</tbody>
</table>

**RESTRICTIONS:** Use caution to prevent droplet or vapor drift to trees. Some leaf burn may be noted.

### NOXIOUS WEED CONTROL IN CULTIVATED CROPLAND
(Fallow, after harvest)

Fallow and after-harvest periods when crops are not planted offer an opportunity to use special herbicides which will substantially reduce stands of Canada thistle, field bindweed, and other perennials. Results are best if weeds are growing actively and have 6 to 8 inches of growth. Early bud stage is best for most weeds.

Late fall applications are usually more effective than those applied in June or July, if fall conditions favor good growth. Discontinue tillage or herbicide use for annual weeds in perennial weed patches so perennials will have adequate growth when treated. Blade or sweep tillage is more effective than herbicides if it is dry or if fall regrowth is limited. Cultivation 10 to 14 days after spraying usually provides additional stand reduction. Apply herbicides before weeds are damaged by frost; however, light frost before spraying is not harmful.

Control of perennials is often variable. Variability increases as rates are reduced. Use caution to prevent drift to adjacent crops.

#### 2,4-D

<table>
<thead>
<tr>
<th>1-3 qt 2,4-D 4L (1-3 lb act)</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is the most common treatment for large infestations. Amine or ester forms are available. Use 1.5 lb/A of ester for leafy spurge; 1 lb/A of amine or ester for field bindweed and Canada thistle. Amine is preferred in spring or early summer when growing conditions are good. Use ester forms for less favorable conditions. Usually provides 10 to 25% stand reduction. Experimental tests using high rates (2 to 3 lb/A) have provided improved performance when applied in late September or October. Fall retreatment or tillage is required for best results. Treated areas may be tilled 2 weeks after application. No restrictions for spring planted crops after fall application. A 15-day interval between application and planting winter grain is suggested. ($3.05-8.15 per acre).</td>
</tr>
</tbody>
</table>

#### Banvel (DICAMBA)

<table>
<thead>
<tr>
<th>2-4 pt Banvel 4L (1-2 lb act)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banvel at 2 to 4 pt/A is very effective on Canada thistle. It is less effective on leafy spurge. Late fall treatments have given very good field bindweed control; mid-summer treatments have not been consistently better than with 2,4-D. Corn or sorghum may be planted the following year. Soil residual limits late fall use in some rotations. Allow an application to planting interval of 45 days during which soil is not frozen for each pint of Banvel before planting wheat, oats, or barley. Sunflowers and legumes are not labeled for planting the next season. May be used in grass pasture and fencelines. ($14.65-29.25 per acre).</td>
</tr>
</tbody>
</table>
Banvel + 2,4-D (DICAMBA + 2,4-D)

Weedmaster

1-4 pt Banvel 4L + 1 qt 2,4-D 4L or 2-8 pt Weedmaster (.5-2 + 1 lb act)

Tank-mix or use Weedmaster premix. Label rates are 1 to 4 pt/A Banvel plus 2,4-D amine or ester (suggested 1 lb/A). Control is better than for 2,4-D alone. Especially promising for Canada thistle. Best where Banvel rate must be minimal. Combinations using less than 1 pt/A Banvel may be slightly better than 2,4-D alone but are less consistent than higher rates. Follow crop rotation guidelines as for Banvel alone. Weedmaster is a premix containing 1 lb dicamba plus 2.8 lb 2,4-D amine per gallon. Labeling includes fallow or stubble to be planted to wheat. Lower rates give suppression; higher rates give seasonal control. Weedmaster labeling specifies at least 10 days per pint interval before planting wheat. ($9.55-31.50 per acre).

Roundup (GLYPHOSATE)

1-4 qt Roundup 3L (.75-3 lb act)

Minimum label rate is 4 qt/A for field bindweed or 2 qt/A for Canada thistle. Full rates give better control in mid-summer; however, in late fall 2 qt/A often appears similar to 4 qt/A. A special label allows 1 qt/A for fall application on quackgrass. Quackgrass and Canada thistle control is very good (75 to 95%). Primarily for patch treatment. Weeds should be actively growing and at bud stage. Do not cultivate in the fall or spring before application. Fall application preferred, especially for field bindweed. Field reports indicate excellent results following light frost. Lower rates (1 to 1.5 qt) give more variable results. Very low rates (.5-1 pt) intended for annual weeds frequently give topgrowth burn but do not consistently reduce stands. No restriction on labeled rotational crops. ($19.15-76.55 per acre).

Banvel + Roundup (DICAMBA + GLYPHOSATE)

1-4 pt Banvel 4L + 1-2 qt Roundup 3L (.5-2 + .75+1.5 lb act)

Tank-mix. Label rates are 1 to 4 pt Banvel plus 1 to 2 qt Roundup per acre. Appears to be a promising combination when compared to each product alone. A good choice for late fall application on Canada thistle or field bindweed using 1 to 2 pt Banvel plus 1 qt Roundup per acre. Note crop rotation guidelines for Banvel alone. The low rate (4 to 16 fl oz Roundup plus 4 to 8 fl oz Banvel) is labeled for annual weeds only. Topgrowth of perennials will be killed but the rates are too low to consistently reduce stands. ($26.45-67.55 per acre).

NONCROP

Includes treatments for special situations in noncropland and areas with aquatic limitations.

Telar (CHLORSULFURON)

.5 to 1 oz Telar 75DF

Labeled for noncrop areas. For Canada and musk thistle. Treatment controls topgrowth and reduces stand. Not labeled for use in cultivated fields or areas to be hayed or grazed.

Apply 1 oz/A to Canada thistle at bud to bloom stage or to new fall growth. Treat musk thistle after bolting to bud stage, using .5 to 1 oz/A. Adding 2.4-D at 1 lb/A improves rate of burndown on larger plants. Surfactant improves control. Telar is formulated as a dry flowable containing 75% active. ($6.60-17.60 per acre).

RESTRICTIONS: Not for use in cultivated fields, pasture, range, or other harvested areas. Use on highway rights-of-ways and similar areas is being discontinued.

Krenite (FOSAMINE)

1.5-3 gal Krenite 4S (6-12 lb act)

Labeled for noncrop areas. It may be used adjacent to and in areas surrounding domestic water reservoirs, streams, ponds, and rights-of-way. Labeling does not include cultivated fields or areas that are hayed or grazed.

Primarily used as a foliar spray to control brush. Treated portions of brush are killed. Also controls and suppresses leafy spurge. It is an option where aquatic limitations preclude the use of other treatments.
Krenite (Continued)

Apply as a spray between full bloom and seed set. Has provided 40 to 60% stand reduction in some tests. Follow-up treatments are required for greater permanent reduction. Underground shoots are inhibited and existing topgrowth is controlled. The higher rates are suggested for best results. Mix the desired amount of herbicide in 100 gal of water and thoroughly wet foliage. For small areas, use a 3% solution (8 tablespoons/gallon) and spray until foliage is wet. Add crop oil at 1 qt/100 gal of solution. Krenite is formulated as a liquid containing 4 lb/gal. ($68.70-137.40 per acre).

RESTRICTIONS: Do not use on food crops. Avoid spray contact with woody plants and other desirable plants.

Rodeo (GLYPHOSATE)

3 to 7.5 pt Rodeo 4L (1.5-2.5 lb act)

Labeled for aquatic and noncrop sites, including lakes, rivers, ponds, reservoirs, drainage ditches, and similar sites. It contains the same active ingredient as Roundup. Glyphosate is nonselective; both grasses and broadleaves are affected. There is no soil residual activity.

Performance is similar to Roundup. Rodeo controls several species of brush, perennial or annual grasses, and broad-leaves. Primary use is to control Canada thistle and other perennials in aquatic sites where other treatments cannot be used.

Rates are 3 to 4.5 pt/A for Canada thistle or 6 to 7.5 pt/A for field bindweed. Use a 1.5% solution (4 tablespoons per gallon) for hand-held equipment. Add 2 qt/100 gal solution of labeled surfactant. Apply in 3 to 20 gpa carrier. Rodeo is formulated as a liquid containing 4 lb/gal a.e. ($41.60-104.05 per acre).

RESTRICTIONS: Do not apply within 1/2 mile upstream of a potable water intake, in moving water, or within a half mile of a potable water intake in streams, ponds, or reservoirs. Allow a minimum of 7 days after treatment before reintroducing water if applying in dry ditches. There is no restriction on the use of treated water for irrigation, recreation, or domestic purposes.

Oust + 2,4-D or Tordon 22K (SULFOMETURON METHYL + 2,4-D or PICLORAM)

1.5 to 2.5 oz Oust 75DF + 1 qt 2,4-D amine 4L or 1.5 to 2 pt Tordon 22K 2L (.07-.12 + 1 or .38-.5 lb act)

Tank-mix. Labeled for use in noncrop sites. For leafy spurge. Not for use in pasture, range, cultivated fields, or if treated areas are hayed or grazed.

Has provided 80 to 95% control of existing stand. Controls topgrowth and stops underground bud development.

Apply at bloom stage. Add 1 qt surfactant per 100 gal solution. Some grass injury may be noted. Omitting surfactant reduces risk of grass injury. Minimum carrier is 15 gpa. Oust is formulated as a dry flowable containing 75% active. ($28.65-67.60 per acre).

RESTRICTIONS: Do not use in pasture, range, or immediately adjacent to cultivated land. Follow precautions as specified for 2,4-D or Tordon 22K. Use on highway rights-of-way and similar areas is being discontinued.

Weedar 64 (2,4-D)

2 qt Weedar 64 4L (2 lb act)

Section 2(ee) labeling includes Canada thistle and leafy spurge in non-crop areas, pasture, and range, including sites near marshes, ponds, irrigation ditches, rivers, streams, and lakes. Labeling includes guidelines for aquatic sites where labeling on other 2,4-D products cannot be used. Performance is expected to be similar to that for other 2,4-D amine treatments.

Rate is 2 qt/A product. Apply in minimum of 10 gpa carrier with ground or 5 gpa with aerial equipment. Apply at bud to early bloom stage. Repeat application required for improved results.

RESTRICTIONS: Delay use of treated water for domestic or irrigation purposes for 3 weeks, or until water contains less than .1 ppm 2,4-D. Do not graze dairy animals on treated areas within 7 days of treatment.

Buctril (BROMOXYNIL)

1-2 qt Buctril 2L

Labeled for noncrop areas. Provides topgrowth burndown to prevent seeding on Canada thistle. An option for treating areas difficult to mow. Contact action. Broadcast 2 qt Buctril + 2 qt surfactant in 150 gpa or spot treat using 1 qt Buctril + 1 qt surfactant in 100 and apply at least 200 gpa of the mixture. ($10.30-20.55).

RESTRICTIONS: Do not graze or hay treated areas.
## NOXIOUS WEED CONTROL

### HERBICIDE RATE GUIDE

**Amount for 1 acre**

<table>
<thead>
<tr>
<th>Weed Type</th>
<th>Tordon 22K</th>
<th>Tordon+2,4-D*</th>
<th>Banvel</th>
<th>Banvel+2,4-D*</th>
<th>2,4-D*</th>
<th>Roundup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leafy Canada &amp; Field Quack- Musk Wormwood</td>
<td>4 qt</td>
<td>3/4 qt + 1 qt</td>
<td>8 qt</td>
<td>1 qt + 1 qt</td>
<td>1 qt+1 qt</td>
<td>1 1/2 qt</td>
</tr>
<tr>
<td>Spurge</td>
<td>3 qt</td>
<td>1 pt + 1 qt</td>
<td></td>
<td>1 qt + 1 qt</td>
<td>2 qt</td>
<td>2 qt</td>
</tr>
<tr>
<td>Field Bindweed</td>
<td></td>
<td>1 pt + 1 qt</td>
<td>1 qt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quackgrass</td>
<td></td>
<td></td>
<td>1 pt+1 qt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Musk Thistle</td>
<td>.5 pt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wormwood Sage</td>
<td>1 qt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Based on 4 lb/gal product.

## SPOT TREATMENT

**Amount for 1 square rod**

<table>
<thead>
<tr>
<th>Weed Type</th>
<th>Tordon 22K</th>
<th>Banvel</th>
<th>2,4-D*</th>
<th>Roundup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoary Cress</td>
<td>5 tsp</td>
<td></td>
<td>5 tsp</td>
<td></td>
</tr>
<tr>
<td>Leafy Spurge</td>
<td></td>
<td>3 2/3 tsp</td>
<td>1 1/4 tsp</td>
<td></td>
</tr>
<tr>
<td>Russian Knapweed</td>
<td></td>
<td>3 2/3 tsp</td>
<td>3 2/3 tsp</td>
<td>3 2/3 tsp</td>
</tr>
<tr>
<td>Canada Thistle</td>
<td>3 2/3 tsp</td>
<td>9 2/3 tsp</td>
<td>1 1/4 tsp</td>
<td>9 2/3 tsp</td>
</tr>
<tr>
<td>P. Sow Thistle</td>
<td></td>
<td>9 2/3 tsp</td>
<td>1 1/4 tsp</td>
<td>9 2/3 tsp</td>
</tr>
<tr>
<td>Field Bindweed</td>
<td>3 2/3 tsp</td>
<td></td>
<td>1 1/4 tsp</td>
<td></td>
</tr>
<tr>
<td>Field Bindweed</td>
<td></td>
<td>1 1/4 tsp</td>
<td>2 tsp</td>
<td></td>
</tr>
<tr>
<td>Quackgrass</td>
<td>3 2/3 tsp</td>
<td></td>
<td>2 tsp</td>
<td>5 tsp</td>
</tr>
<tr>
<td>Musk Thistle</td>
<td>1/3 tsp</td>
<td></td>
<td>2 tsp</td>
<td>2 tsp</td>
</tr>
<tr>
<td>Wormwood Sage</td>
<td>1 1/4 tsp</td>
<td></td>
<td>2 1/2 tsp</td>
<td>2 1/2 tsp</td>
</tr>
<tr>
<td>Sage</td>
<td>1 1/4 tsp</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

tsp = level teaspoon