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Lyle Derscheid

Kenneth R. Frost

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CONTROL AND ELIMINATION OF noxious weeds

By Lyle Derscheid, Extension Agronomist
Kenneth R. Frost, Jr., Extension Agronomist—Weeds
Control and Elimination of Noxious Weeds

All of South Dakota's noxious weeds are perennials. They spread by underground parts and by seeds. Field bindweed (creeping jenny) infests 1¼ million acres on 29,000 farms; Canada thistle, 133,000 acres on 21,000 farms; perennial sowthistle, 156,000 acres on 14,000 farms; quackgrass, 280,000 acres on 14,000 farms; leafy spurge, 50,000 on 4,500 farms; hoary cress, 1,200 acres on 300 farms; Russian knapweed, 1,100 acres on 280 farms; and horse nettle, 240 acres on 104 farms.

Intensive studies have been conducted over a period of 10 years for leafy spurge; 8 years for Russian knapweed; 6 years each for Canada thistle, perennial sowthistle, and field bindweed to determine methods of controlling and eliminating these weeds. All of them can be almost completely eliminated while raising crops adapted to South Dakota. Detailed suggestions for the control of these weeds are given in separate publications.

Less time has been spent studying quackgrass, hoary cress, and horse nettle. Consequently, most of the suggestions offered in this publication are based on results obtained in neighboring states. Detailed suggestions for the control of quackgrass are given in a separate publication.

Use of cultivation, competitive crops, and spraying is suggested in numerous combinations. Cultivation should be performed with a field cultivator equipped with wide sweeps (12 to 30 inches) that are kept sharp and operated at a depth of 4 inches. For June spraying, spray small grain when in the 5-leaf stage of growth and spray corn between first and second cultivations. Always use an ester of 2,4-D on leafy spurge, Russian knapweed, or hoary cress. Use an ester on field bindweed and thistles when growing conditions are hot and dry, but use an amine of 2,4-D under good growing conditions. MCPA is as effective as 2,4-D on thistles. Use nonvolatile formulations of 2,4-D when spraying in shelterbelts or near gardens.

CROPS CULTIVATION AND CHEMICALS*

FIELD BINDWEED

Reduce stands 75 to 90%
1) Intensive cultivation at 2-week intervals June-July and 3-week intervals August-October.
2) Small grain, ¾ lb. 2,4-D June, cultivate stubble 3 or 4 times.
3) Cultivate 3 times, sudangrass in late June, harvest and cultivate in September.
4) Intensive cultivation June 1 to August 15, alfalfa and/or perennial grass.
5) Intensive cultivation June 1 to August 1, ¾ lb. of 2,4-D September 1.

Reduce stands 10 to 25%
1) Small grain, ¼ lb. 2,4-D in June, ¼ lb. 2,4-D in stubble.
2) Corn, ¾ lb. 2,4-D after 1st cultivation, ¼ lb. after tasseling.
3) Perennial grass, ¾ lb. 2,4-D in June, ¼ lb. 2,4-D late August or September.
4) Good stand of alfalfa or alfalfa-grass mixture.
5) In shelterbelt, amitrole-T—6 lb. in 40 to 50 gallons of water. Direct spray away from trees.

Prevent spreading
1) Small grain, ¾ lb. 2,4-D in June.
2) Corn, ¾ lb. 2,4-D in June.
3) Perennial grass, ¾ lb. 2,4-D in June.

CANADA THISTLE AND PERENNIAL SOWTHISTLE

Reduce stands 75 to 90%
1) Intensive cultivation, 3-week intervals June-July and 4-week intervals August-September.
2) Small grain, ¾ lb. 2,4-D June, cultivate stubble 3 or 4 times.
3) Small grain, ¾ lb. 2,4-D June, plow stubble early, ¾ lb. 2,4-D September.
4) Small grain, ¾ lb. 2,4-D June, plow October 15.
5) No crop, amitrole-T—4 lb. in 40 to 50 gallons of water when Canada thistle is budding. In shelterbelt use 6 lb. and direct spray away from trees.
6) Cultivate 3 times, sudangrass late June, harvest and cultivate September.
7) Intensive cultivation June 1 to August 15, alfalfa and/or perennial grass.

Reduce stands 10 to 50%
1) Small grain, ¼ lb. 2,4-D June, ¼ lb. in stubble.
2) Corn, ¾ lb. 2,4-D after 1st cultivation, ¼ lb. after tasseling.
3) Perennial grass, ¾ lb. 2,4-D June, ¼ lb. 2,4-D late August.
4) Good stand of alfalfa or alfalfa-grass mixture.

Prevent spreading by roots
1) Small grain, ¾ lb. 2,4-D in June.
2) Corn, ¾ lb. 2,4-D in June.
3) Perennial grass, ¾ lb. 2,4-D in June.

*Treatment rates of chemicals are in pounds acid equivalent or active ingredient per acre.
Prevent seed production
1) Mow before flowers have been open 7 days.
2) Spray with ½ to ½ lb. 2,4-D in June.

Prevent reinfestation
1) Small grain or corn, ½ to ½ lb. 2,4-D in June.
2) Alfalfa or perennial grass crop.

LEAFY SPURGE
Reduce stands 75 to 90%
1) Intensive cultivation at 2-week intervals May-July and 3-week intervals August-October.
2) Cultivate 3 times, sudangrass late June, harvest and cultivate in September.
3) Intensive cultivation May 15 to August 15, alfalfa and/or perennial grass.
4) *Small grain, ¼ lb. 2,4-D ester in June, 5 lb. TBA in stubble, plow.
5) Heavy grazing with sheep.
6) 50 lb. 2,4-D amine after October 15.

Reduce stands 10 to 20%
1) Small grain, ½ lb. 2,4-D ester in June, cultivate stubble 3 or 4 times.
2) Perennial grass, 1 lb. 2,4-D ester, early June, 1 lb. late August.
3) In shelterbelt, amitrole-T—6 lb. in 40 to 50 gallons of water. Direct spray away from trees.

Prevent spreading
1) Small grain, ½ lb. 2,4-D ester in June, 1 lb. 2,4-D ester in stubble.
2) Corn, ½ lb. 2,4-D ester after 1st cultivation, 1 lb. after tasseling.
3) Good stand of alfalfa or alfalfa-grass mixture.
4) Perennial grass, 1 lb. 2,4-D ester June.

Prevent reinfestation
1) Small grain or corn, ½ to ½ lb. 2,4-D ester in June.
2) Alfalfa or sweet clover crop.

RUSSIAN KNAPWEED
Reduce stands 75 to 90%
1) Intensive cultivation at 2-week intervals May-July and 3-week intervals August-October.
2) 1½ lb. 2,4-D ester August, cultivate 3 times in spring, sudangrass late June, harvest and cultivate in September.
3) Intensive cultivation mid-May to mid-August, alfalfa and/or perennial grass.

Reduce stands 10 to 30%
1) Cultivate 3 times, sudangrass late June, harvest and cultivate in September.
2) Small grain, ½ lb. 2,4-D ester in June, 1½ lb. in stubble.
3) Perennial grass, 1 lb. 2,4-D ester early June, 1½ lb. late in August.

Prevent spreading
1) Small grain, ½ lb. 2,4-D ester, cultivate stubble 3 or 4 times.
2) Perennial grass, 1½ lb. 2,4-D ester in June.

Prevent reinfestation
1) Small grain, ½ to ½ lb. 2,4-D ester June.
2) Corn, ½ to ½ lb. 2,4-D ester after 1st cultivation.

QUACKGRASS
Reduce stands 90%
1) Intensive cultivation with duckfoot or one-way disk every 3 weeks during dry year.
2) 6 lb. dalapon when quack is 4-6 inches tall, plow 10 days later, cultivate. Crop can be planted in 4 to 6 weeks.
3) Mow in August, 10 lb. dalapon when regrowth 4 to 8 inches tall, plow 10 days later.
4) Plow shallow in September, 20 lb. TCA immediately.
5) 4 lb. atrazine September or October, plow in late fall (at least 3 weeks after application) or May, raise corn and cultivate.
6) 4 lb. amitrole-T in 40 to 50 gallons of water before quack heads, plow 2 or 3 weeks later.
7) 8 lb. atrazine on noncropland.
8) In established shelterbelts, use 6 lb. simazine and 2 lb. amitrole-T in at least 50 gallons of water.

HOARY CRESS
Reduce stands 75 to 90%
1) Perennial grass, 2 lb. 2,4-D May, 2 lb. September.
2) 10 lb. 2,4-D amine early spring or after October 15.
3) 6 lb. amitrole-T June, cultivate 2 or 3 times.

*Use of TBA in this manner not approved by Federal Pure Food and Drug Administration.
Reduce stands 10 to 20%
1) Small grain, ½ to 1 lb. 2,4-D ester late May or early June, cultivate stubble 3 times.

Prevent reinfestation
1) Crop, ½ lb. 2,4-D ester.
2) Good crop of perennial grass.

HORSE NETTLE
Reduce stands
1) 2 lb. 2,4,5-T ester before weed starts to bud.

BUR RAGWEED
Reduce stands 75 to 90%
1) 2 lb. 2,4-D ester in oil during June.

CALIBRATION OF EQUIPMENT
(Field and Band Sprayers and Granule Band Applicators — see fact sheet entitled “Weed Control in Crops.”)

FERTILIZER OR CART TYPE SPREADER
(For Treating Small Patches)
1. Divide the number of square feet in a square rod (273) by width of spreader swath. Example: If the spreader swath is 3 feet wide, divide 273 by 3. The answer is 91. This is the number of feet the spreader will have to travel in order to cover a square rod.
2. Measure the circumference of the wheel with a string. Suppose the circumference is 5 feet.
3. Determine the number of revolutions the wheel will make in order to cover a square rod. Divide the distance that spreader must travel (91 feet in No. 1) by the circumference of the wheel (5 feet in No. 2), $91 \div 5 = 16.2$. The wheel must turn 16 1/5 times in order to cover a square rod.
4. Fill spreader with chemical, put container under spreader to catch chemical, jack up wheels and turn wheels the number of times required to cover a square rod (16 1/5 times in No. 3). Weigh the chemical that was discharged by spreader. If necessary, adjust spreader, turn wheel and weigh chemical. Repeat this process until the desired amount of chemical is discharged.

CHEST BROADCAST SPREADER
(For Treating Small Patches)
1. Same as for fertilizer spreader. Divide 273 by width of swath. Suppose the swath is 6 feet. $273 \div 6 = 45\frac{1}{2}$.
2. Weigh amount of chemical put into hopper.
3. Walk 45½ feet while cranking spreader.
4. Weigh amount of chemical left in the hopper. The difference between this weight and the weight of the amount put in hopper (No. 2) is the amount spread.
5. Adjust spreader and repeat steps 2, 3, and 4 until the desired amount of chemical has been spread.

HAND SPRAYER
(For Treating Small Patches)
1. Mark out a square rod plot (16½ feet by 16½ feet) and spray with hand sprayer at a slow walking speed, so good saturation and penetration will be accomplished.
2. If 1 gallon is used to treat this square rod, then mix enough chemical for 1 square rod with each gallon of water and always spray at same walking speed. A slow steady pace is suggested.
SMALL PATCH CONTROL

Numerous chemicals can be used to eliminate patches (weed nurseries) of noxious weeds with one treatment. Apply the chemical to a band 6 or 8 feet wide around the outside of the patch to kill roots that extend beyond the patch. Seedling growth may appear after 2 or 3 years. These young plants can be eliminated with a 2,4-D application. Many new nonselective chemicals do no permanent injury to perennial grasses but will prevent crop growth for 2 or more years.

The following chemicals generally give 95 to 100% elimination when applied at the rates designated below. Rates are given in pounds, pints, or fluid ounces of commercial product for each square rod. Use the higher rates for summer application for those chemicals indicating a range of treatment rate.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Field bindweed</th>
<th>Thistle</th>
<th>Russian knapweed</th>
<th>Hoary cress</th>
<th>Horse nettle</th>
<th>Bur ragweed</th>
<th>Cost in dollars*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMS (1)</td>
<td>—</td>
<td>4-6 lb.</td>
<td>4-6 lb.</td>
<td>5-7 lb.</td>
<td>—</td>
<td>—</td>
<td>1.44-2.52</td>
</tr>
<tr>
<td>&quot;Altaicide&quot;</td>
<td>8-10 lb.</td>
<td>6-8 lb.</td>
<td>6-8 lb.</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.10-1.85</td>
</tr>
<tr>
<td>Sodium chlorate</td>
<td>5-6 lb.</td>
<td>5 lb.</td>
<td>5 lb.</td>
<td>4-6 lb.</td>
<td>5 lb.</td>
<td>4-6 lb.</td>
<td>0.87-1.05</td>
</tr>
<tr>
<td>2,3,6-TBA (2)</td>
<td>¾ pt.</td>
<td>¾ pt.</td>
<td>½ pt.</td>
<td>½ pt.</td>
<td>½ pt.</td>
<td>½ pt.</td>
<td>0.47-0.63</td>
</tr>
<tr>
<td>Fenac (8)</td>
<td>½ pt.</td>
<td>½ pt.</td>
<td>½ pt.</td>
<td>½ pt.</td>
<td>—</td>
<td>—</td>
<td>0.52</td>
</tr>
<tr>
<td>Borate-TBA Mixture (3)</td>
<td>1 lb.</td>
<td>1 lb.</td>
<td>1½ lb.</td>
<td>1½ lb.</td>
<td>1½ lb.</td>
<td>1½ lb.</td>
<td>0.58-0.87</td>
</tr>
<tr>
<td>CBMM (7)</td>
<td>—</td>
<td>6-8 lb.</td>
<td>6-8 lb.</td>
<td>6-8 lb.</td>
<td>—</td>
<td>5-7 lb.</td>
<td>1.60-2-56</td>
</tr>
<tr>
<td>Dicamba (4)</td>
<td>1½ fl. oz.</td>
<td>1½ fl. oz.</td>
<td>—</td>
<td>1½ fl. oz.</td>
<td>—</td>
<td>—</td>
<td>0.38</td>
</tr>
<tr>
<td>Picloram (5)</td>
<td>¾ fl. oz.</td>
<td>½ fl. oz.</td>
<td>½ fl. oz.</td>
<td>½ fl. oz.</td>
<td>—</td>
<td>—</td>
<td>0.25</td>
</tr>
<tr>
<td>TBP-2,4-D Mixture (6)</td>
<td>5 fl. oz.</td>
<td>5 fl. oz.</td>
<td>6½ fl. oz.</td>
<td>6½ fl. oz.</td>
<td>—</td>
<td>—</td>
<td>0.38-0.50</td>
</tr>
</tbody>
</table>

*Approximate retail cost of chemical for 1 square rod at lower rates for areas 10 to 15 square rods in size. Cost decreases for large areas and varies somewhat with local situations.

(1) Brand Name "AMMATE X"
(2) Brand Names "BENZAC 1281", "TRYSBEN 200" (approved for use on noncropland—do not graze within 1 year)
(3) Brand Names "BENZABOR", "AMOCO NOXIOUS WEED KILLER", and "COOP-TBA GRANULES"
(4) Brand Name "BANVEL D" (approved for use on noncropland only)
(5) Brand Name "TORDON 22K" (approved for use on noncropland only)
(6) Brand Names "TRITAC D", "AMOCO NOXIOUS WEED KILLER D", and "TBP LIQUID WEED KILLER"
(7) Brand Name "Chlorea"
(8) Brand Name "Fenac" (Do not use treated forage for feed)

AMOUNTS OF PRODUCT NEEDED FOR SPRAYING PATCHES OF NOXIOUS WEEDS WITH A HAND SPRAYER

The foregoing table indicates how much chemical to use when applying chemicals to noxious weed patches. The following table may be helpful when applying 2,4-D, 2,4,5-T, amitrole or amitrole-T, atrazine, or other herbicides to small patches of noxious weeds with a hand sprayer.

<table>
<thead>
<tr>
<th>Treatment rate per acre in lbs. acid equiv. or active ingredient</th>
<th>Product to treat 1 square rod if the product contains the following amounts of acid equivalent or active ingredient.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 lbs. /gal.</td>
<td>3 lbs. /gal.</td>
</tr>
<tr>
<td>½ tsp.</td>
<td>1 tsp.</td>
</tr>
<tr>
<td>¾ tsp.</td>
<td>1½ tsp.</td>
</tr>
<tr>
<td>1 tsp.</td>
<td>1¼ tsp.</td>
</tr>
<tr>
<td>1½ tsp.</td>
<td>2 tsp.</td>
</tr>
<tr>
<td>2 tsp.</td>
<td>2½ tsp.</td>
</tr>
<tr>
<td>2½ tsp.</td>
<td>3 tsp.</td>
</tr>
<tr>
<td>4 tsp.</td>
<td>4½ tsp.</td>
</tr>
<tr>
<td>6 tsp.</td>
<td>6½ tbsp.</td>
</tr>
<tr>
<td>8 tsp.</td>
<td>8½ tbsp.</td>
</tr>
</tbody>
</table>

* tsp.—teaspoonsful
tbsp.—tablespoonsful
Small patch treatments are based on rates of application by square rods. Not all patches of noxious weeds are perfect square rod plots. Also more area is treated than indicated by the patch because of roots extending out from the top growth area. The following table may help in figuring the area to treat and the amount of chemical to apply to that area. Granted all patches are not perfect circles in area but are usually more circular than rectangular. The following formula was used for determining the area of circular patches noted in the table:

Area to be treated = \( \frac{r^2 \pi}{\text{sq. ft./sq. rd.}} = \frac{r^2 \times 3.1416}{272.25} \)

Example: A patch is 30 feet in diameter. Area to be treated is 40 feet in diameter. Radius is one-half of diameter (20).

\[
\begin{align*}
(20)^2 \times 3.1416 &= \frac{1256.64}{272.25} = 4.6 \text{ sq. rd.}
\end{align*}
\]

To obtain the area of rectangular patches, add 10 feet to both the width and length of the patch and multiply to get the area in square feet; then divide by 272.25 for the area in square rods.

The area of either a circular or rectangular patch can then be multiplied by the rate of product applied per square rod to obtain the amount of chemical needed for the patch treatment. This has been done for the various circular patches in the following table. Areas from rectangular patches could be fitted into this table.

<table>
<thead>
<tr>
<th>Approx. diam. of nox. weed patch (ft.)</th>
<th>Approx. diam. of area to treat (ft.)</th>
<th>Sq. rds. in area to treat</th>
<th>Chlorate &amp; AMS at 5 lb./sq. rd.</th>
<th>Atalacide &amp; Chlore at 8 lb./sq. rd.</th>
<th>TBA &amp; Fenacet at ½ pt./sq. rd.</th>
<th>TBA at ½ pt./sq. rd.</th>
<th>TBP-2,4-D</th>
<th>Pilocram at 5½ fl. oz./sq. rd.</th>
<th>Dicamba at 1½ fl. oz./sq. rd.</th>
<th>Borate-TBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>20</td>
<td>1.2</td>
<td>6 lb.</td>
<td>10 lb.</td>
<td>10 fl. oz.</td>
<td>8 fl. oz.</td>
<td>6 fl. oz.</td>
<td>8 fl. oz.</td>
<td>1 fl. oz.</td>
<td>1¼ lb.</td>
</tr>
<tr>
<td>20</td>
<td>30</td>
<td>2.6</td>
<td>13 lb.</td>
<td>21 lb.</td>
<td>21 fl. oz.</td>
<td>1 pt.</td>
<td>13 fl. oz.</td>
<td>17 fl. oz.</td>
<td>2 fl. oz.</td>
<td>2½ lb.</td>
</tr>
<tr>
<td>50</td>
<td>60</td>
<td>10.4</td>
<td>52 lb.</td>
<td>83 lb.</td>
<td>5¼ pt.</td>
<td>3 pt.</td>
<td>3½ pt.</td>
<td>5¼ pt.</td>
<td>8½ fl. oz.</td>
<td>11 lb.</td>
</tr>
<tr>
<td>60</td>
<td>70</td>
<td>14.2</td>
<td>71 lb.</td>
<td>114 lb.</td>
<td>7 pt.</td>
<td>5½ pt.</td>
<td>4½ pt.</td>
<td>5½ pt.</td>
<td>12½ fl. oz.</td>
<td>14½ lb.</td>
</tr>
<tr>
<td>100</td>
<td>110</td>
<td>35.0</td>
<td>175 lb.</td>
<td>280 lb.</td>
<td>8¾ qt.</td>
<td>6½ qt.</td>
<td>5½ qt.</td>
<td>7½ qt.</td>
<td>28 fl. oz.</td>
<td>21½ lb.</td>
</tr>
<tr>
<td>120</td>
<td>130</td>
<td>49.0</td>
<td>245 lb.</td>
<td>392 lb.</td>
<td>3 gal.</td>
<td>2½ gal.</td>
<td>7½ qt.</td>
<td>10 pt.</td>
<td>19 fl. oz.</td>
<td>23½ lb.</td>
</tr>
<tr>
<td>140</td>
<td>150</td>
<td>65.2</td>
<td>326 lb.</td>
<td>522 lb.</td>
<td>4 gal.</td>
<td>3 gal.</td>
<td>10¼ qt.</td>
<td>10 pt.</td>
<td>28 fl. oz.</td>
<td>35 lb.</td>
</tr>
<tr>
<td>160</td>
<td>170</td>
<td>83.8</td>
<td>419 lb.</td>
<td>670 lb.</td>
<td>5¼ gal.</td>
<td>4 gal.</td>
<td>3½ gal.</td>
<td>10 pt.</td>
<td>38 fl. oz.</td>
<td>49 lb.</td>
</tr>
<tr>
<td>180</td>
<td>190</td>
<td>104.6</td>
<td>523 lb.</td>
<td>837 lb.</td>
<td>6½ gal.</td>
<td>5 gal.</td>
<td>4½ gal.</td>
<td>10 pt.</td>
<td>54 fl. oz.</td>
<td>74 lb.</td>
</tr>
<tr>
<td>200</td>
<td>210</td>
<td>127.8</td>
<td>639 lb.</td>
<td>1022 lb.</td>
<td>8 gal.</td>
<td>6 gal.</td>
<td>5 gal.</td>
<td>10 pt.</td>
<td>62 fl. oz.</td>
<td>98 lb.</td>
</tr>
<tr>
<td>220</td>
<td>230</td>
<td>153.2</td>
<td>766 lb.</td>
<td>1225 lb.</td>
<td>9½ gal.</td>
<td>7½ gal.</td>
<td>6 gal.</td>
<td>12½ pt.</td>
<td>74 fl. oz.</td>
<td>126 lb.</td>
</tr>
<tr>
<td>240</td>
<td>250</td>
<td>181.2</td>
<td>906 lb.</td>
<td>1450 lb.</td>
<td>11½ gal.</td>
<td>8½ gal.</td>
<td>7½ gal.</td>
<td>15 pt.</td>
<td>9 fl. oz.</td>
<td>157 lb.</td>
</tr>
</tbody>
</table>
Use of a trade name does not imply endorsement of one product over another.