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# Cooperative Extension Service

NORTH DAKOTA STATE UNIVERSITY - FARGO, NORTH DAKOTA 58102  
UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING

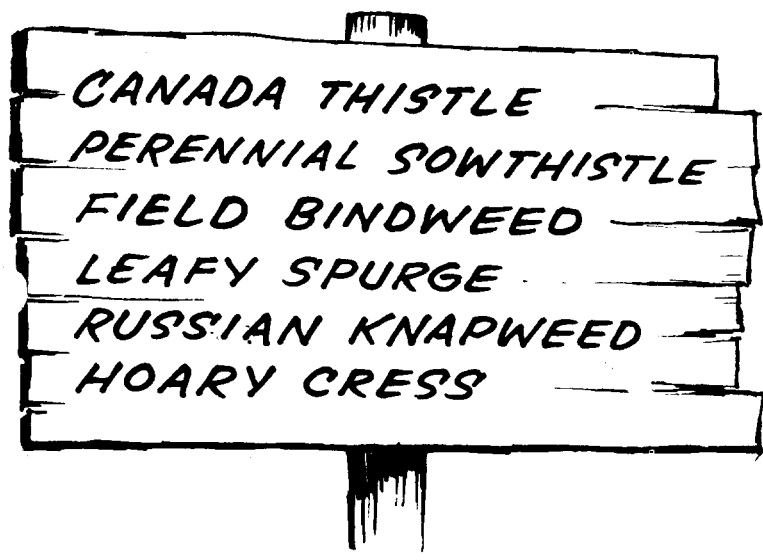
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## WEED CONTROL

# Perennial Weed Control



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Extension Agronomist

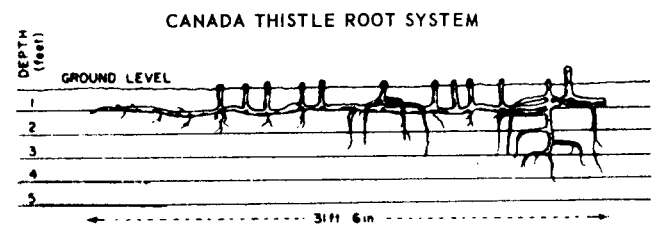


## CULTURAL CONTROL PRACTICES

1. Plow the thistle infestation just before freeze-up to weaken its growth. The following spring treat the small grain crop with 2,4-D or MCPA.
2. Plow or cultivate 4 to 6 inches deep immediately after harvest. Cultivate again every 2 to 3 weeks after the thistle regrowth emerges; repeat as often as necessary and make a final cultivation just before freeze-up.
3. Cultivate every 2 to 3 weeks until about July 1 the following year. Then plant a smother crop such as sudangrass or millet. Immediately after harvesting the crop for forage or seed, cultivate the thistles every 2 to 3 weeks until freeze-up.

The most satisfactory way to control large stands of perennial weeds is to combine cultural and chemical weed control practices. Eradication is possible only by continued use of the best weed control practices plus a thorough follow-up to eliminate stray plants and seedlings as they appear. Applying one of the more active herbicides is a practical way of eliminating small scattered stands of perennial weeds before they spread.

If 2,4-D is to be used to control perennial weeds in crops, grow the more tolerant cereals--rye, wheat and barley. Rates of 2,4-D required for controlling perennial weeds in small grain crops underseeded to legumes will seriously injure the legumes, especially sweetclover and alfalfa.



One half of a root system arising from small cutting of lateral root.

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4. Cultivate every 2 to 3 weeks until September, then sow fall rye. After harvesting the crop the following season, repeat the cultivations until freeze-up.
5. Cultivate the thistles intensively for at least 3 months, then sow alfalfa, grass or an alfalfa-grass mixture for hay which will be harvested over a period of several years.



CANADA THISTLE

### CONTROL IN SMALL GRAIN CROPS

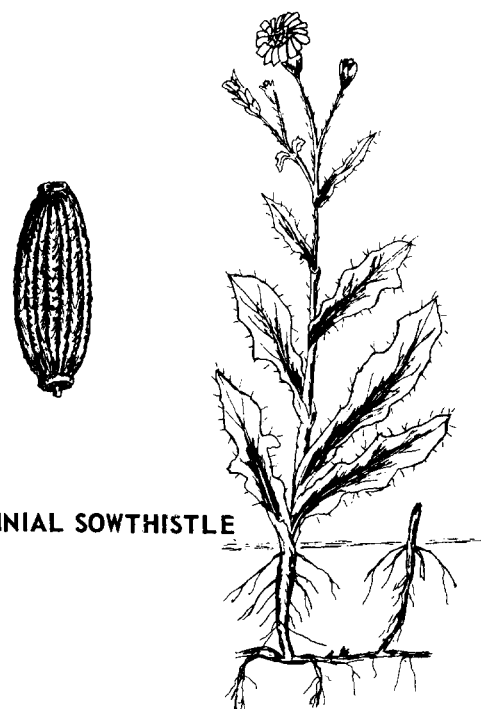
Herbicide applications weaken perennial weeds, preventing them from producing seed in small grain crops. MCPA is as effective as 2,4-D on Canada thistle, but 2,4-D gives better control of sowthistle. Use MCPA to suppress thistles in oats and flax. However, these crops do not tolerate rates of MCPA necessary to give adequate thistle control. Sowthistle is easier to control than Canada thistle, especially with 2,4-D low volatile ester.

When treating thistles in a crop, apply the maximum rate of chemical the crop will tolerate. See table 1. Apply the chemical as near to the bud stage of the thistle as possible without spraying during the sensitive stage of the crop.

Follow the chemical treatment in the growing crop with an after-harvest cultural operation, listed below in order of effectiveness:

1. Cultivate 4 to 6 inches deep at 2 to 3 week intervals, beginning immediately after harvest and continuing until freeze-up.
2. Plow after harvest and when thistle regrowth appears, apply  $\frac{3}{4}$  to 1 pound per acre of 2,4-D low volatile ester or MCPA ester.

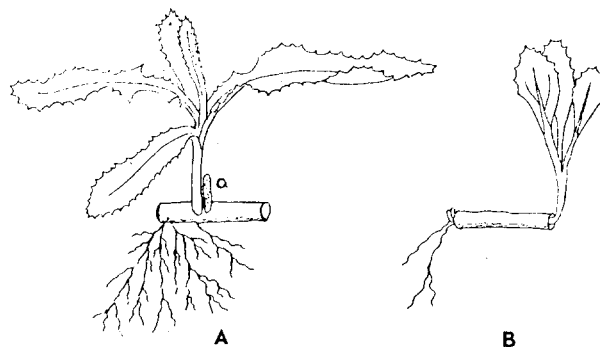
3. Treat thistles in the stubble with  $\frac{3}{4}$  to 1 pound per acre of 2,4-D low volatile ester or MCPA ester and plow 2 weeks after treatment.
4. Use a herbicide only during the vegetative stage of growth, applying  $\frac{3}{4}$  to 1 pound per acre of 2,4-D low volatile ester or MCPA ester.



PERENNIAL SOWTHISTLE

### CONTROL IN GRASSLAND

Two applications of 2,4-D low volatile ester or oil soluble amine at 1 pound per acre each year, over 3 or more years, generally are necessary to eradicate Canada thistle and sowthistle. Make the first application each year to the thistles at the early bud stage of growth and retreat one or more times later in the summer and/or early fall. Rates of chemical higher than 1 pound per acre are unnecessary.



SOWTHISTLE GROWS QUICKLY FROM PIECES OF ROOTS. Both plants are 20 days old from a one-inch piece of root but plant "B" is weaker and could be killed more easily.

TABLE 1. MAXIMUM 2,4-D AND MCPA TOLERANCES FOR CROPS

Crop	Chemical	Rate per acre (lbs.)	Latest stage for safe applications
Wheat or Barley	2,4-D amines or 2,4-D L.V. ester	3/4	early boot
		2/3	
Oats	MCPA amine or ester or 2,4-D amine	1/2	early boot
		1/2	
Flax	MCPA amine or ester or 2,4-D amine	1/3	before buds develop
		1/4	
Rye	2,4-D amines or 2,4-D L.V. ester	3/4	early jointing
		1/2	

Use of higher rates is likely to injure the crop severely but may be worthwhile, particularly in small areas, to obtain necessary weed control.

### CONTROL OF SMALL PATCHES

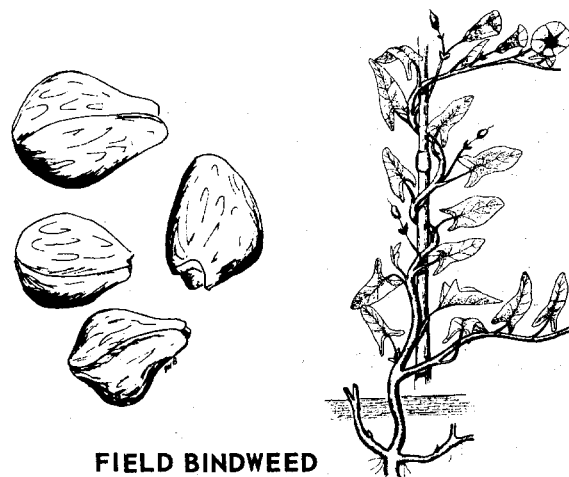
1. Use one of the more active herbicides suggested in table 2 to eradicate small areas of thistle on non-crop land.
2. Amitrole and amitrole-T give good control of Canada thistle on non-cultivated areas at the rate of 4 pounds of chemical in 30 gallons of water per acre. Treat just before the bud stage for best results, but when this is not possible, mow the thistles and spray the regrowth at the 4 pound per acre rate. Additional treatment may be necessary the following year.



### CULTURAL CONTROL PRACTICES

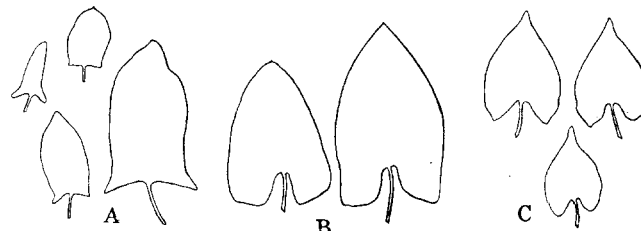
1. Two years of intensive cultivation 4 inches deep, each time regrowth is 4 inches tall (every 2 to 4 weeks), usually eliminates field bindweed. However, soil erosion may become a serious problem with this procedure.
2. Plow or cultivate 4 to 6 inches deep just before freeze-up. This retards the bindweed and gives early-sown spring grain crops a better chance to compete with it. This practice, followed by an application of 2,4-D in the crop, usually controls but does not eradicate bindweed.
3. Repeat the cultivations for 2 to 4 years and then plant a smother crop to control bindweed. Use a duckfoot cultivator to cut off all plants about 4 inches deep. Repeat this operation 8 to 10 days after each emergence of the bindweed shoots.

Make the first cultivation immediately after harvest. Continue cultivating through the next year and the following spring until late June. Such cultivations weaken the bindweed. Planting a smother crop of sudangrass, millet or buckwheat will further weaken the bindweed, in addition to reducing erosion and providing a return from the land. Cultivate again as soon as the smother crop is removed.



FIELD BINDWEED

4. Control on fallow is possible by cultivating in the spring and applying  $\frac{3}{4}$  pound per acre of 2,4-D low volatile ester or oil soluble amine after the plants have reached the bud or early bloom stage.
5. Duckfoot cultivate during one growing season until fall and plant grass. The following year, apply  $\frac{3}{4}$  to 1 pound per acre of 2,4-D low volatile ester or oil soluble amine during bud to early bloom stage of the bindweed. Continue treating each year until satisfactory control is obtained.
6. Duckfoot cultivate until early September and sow fall rye. The following year treat the crop with  $\frac{1}{2}$  to  $\frac{3}{4}$  pound per acre of 2,4-D low volatile ester or oil soluble amine and continue cultivating after harvest. This procedure usually must be repeated for several years to give satisfactory bindweed control.



LEAVES OF BINDWEEDS AND WILD BUCKWHEAT

- A. FIELD BINDWEED: leaves from different plants showing variation in size and shape, but mostly straight across at the base.
- B. HEDGE BINDWEED: leaves more triangular with broad spreading lobes at base.
- C. WILD BUCKWHEAT: leaves much more narrowed toward the tip and somewhat sharper at the base.

## CONTROL IN GROWING GRAIN

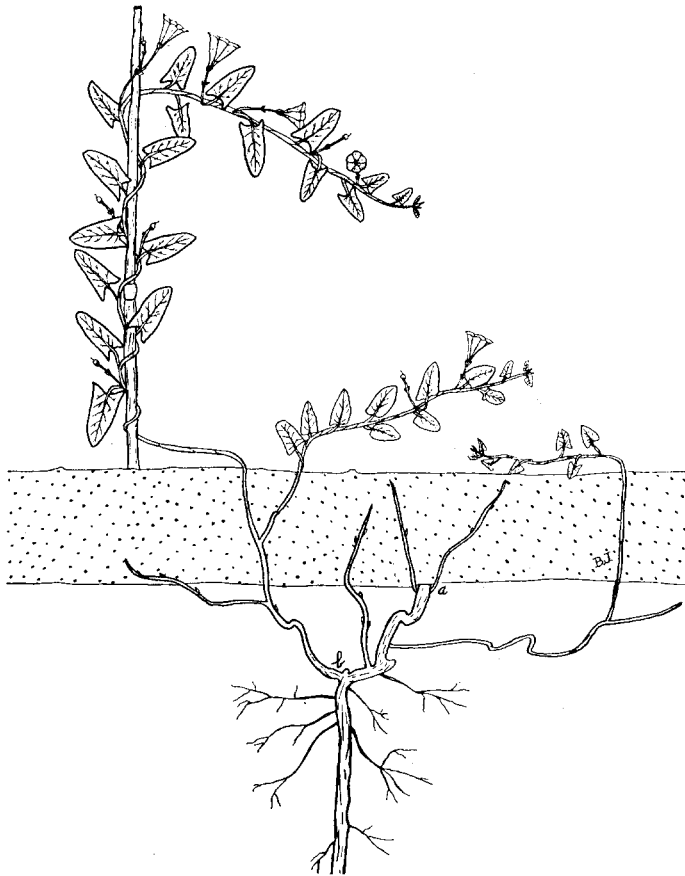
Applying 2,4-D to bindweed in a growing grain crop usually kills the top growth, preventing seed formation. Use as much chemical per acre as the crop will tolerate. See table 1. Apply the chemical as near to bud stage of the bindweed as possible without spraying during the sensitive stage of the crop.

Treat active fall bindweed regrowth with up to 1 pound per acre of 2,4-D low volatile ester or oil soluble amine. However, under dry conditions frequent fall cultivation usually is more practical than applying chemicals.

For maximum bindweed control, combine a 2,4-D application in the growing crop with some tillage practice suggested under cultural control.

## CONTROL IN GRASSLAND

Apply 2,4-D low volatile ester or oil soluble amine at  $\frac{3}{4}$  to 1 pound per acre in the bud to early bloom stage. One treatment per year generally is sufficient. Retreating annually for 3 to 5 years usually is necessary to thin or eradicate the bindweed stand.



GROWTH HABITS OF FIELD BINDWEED

New shoots from old roots cut off by the plant at (a), also at new shoots coming from below the plow line (b).

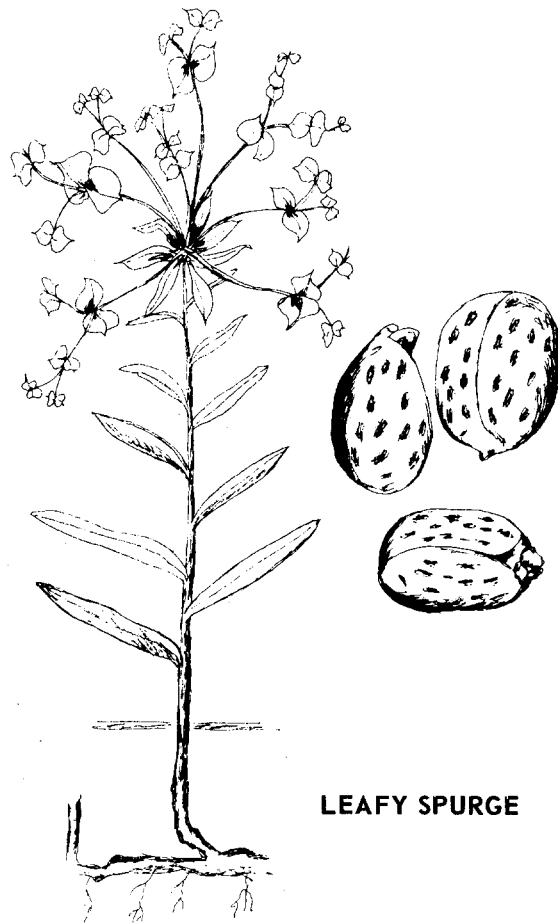
## CONTROL OF SMALL PATCHES

1. Use one of the more active herbicides suggested in table 2 to control small patches of bindweed on non-cropland areas.
2. Recommended chemicals for non-cropland areas include Tordon 22K, Tordon 212, Banvel and Benzabor. Only Tordon 22K and Banvel are cleared for use in pastures. Benzabor applied dry at 1 to 1½ pounds per square rod in late fall or early spring gives long-term control of vegetation.



## CULTURAL CONTROL PRACTICES

1. Two years of continuous cultivation 4 inches deep with a duckfoot cultivator, until freeze-up, each time growth is 4 inches tall, usually will eliminate leafy spurge. However, this practice is conducive to soil erosion. (A duckfoot field cultivator is one of the few implements that will cut the heavy, tough roots of leafy spurge.)



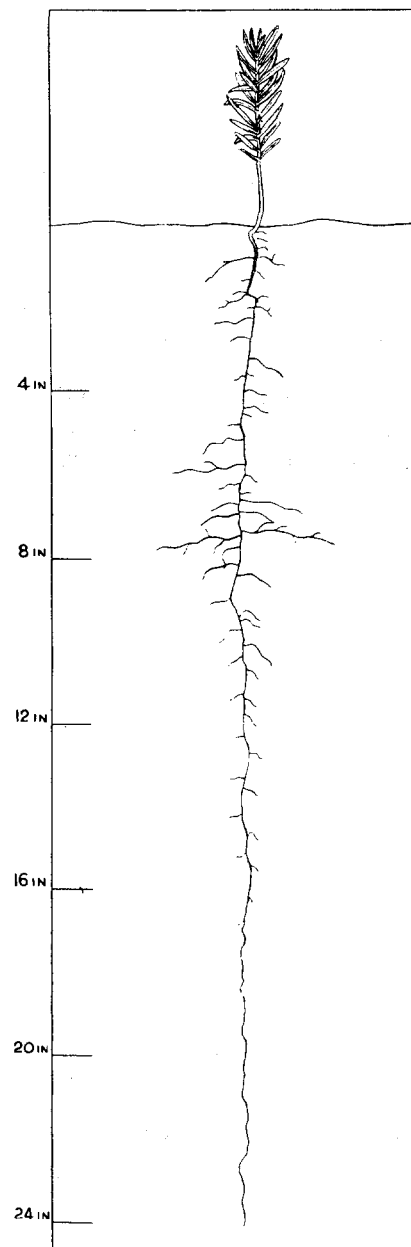
LEAFY SPURGE

2. Plow 4 to 6 inches deep after harvest and cultivate as described in paragraph No. 1 until freeze-up. Follow-up alternatives are:

- Duckfoot cultivate for one full growing season and until late June the second year, then plant sudangrass as a smother crop. After the sudangrass is harvested, cultivate again until freeze-up. This practice has given good control.
- Duckfoot cultivate until late June and plant sudangrass as a smother crop. When sudangrass is harvested, cultivate until freeze-up. Repeating this operation a second season gives good spurge control.
- Plow in the fall and apply 1 pound per acre of 2,4-D low volatile ester or oil soluble amine in the spring when spurge has begun active growth. Then duckfoot cultivate until freeze-up each time 4 inches of new regrowth occurs.
- Duckfoot cultivate until early September and sow fall rye. After harvest the next year repeat cultivation until time to seed rye again. Applying  $\frac{1}{2}$  to  $\frac{3}{4}$  pound per acre of 2,4-D oil soluble amine or low volatile ester to the rye crop may increase spurge control. Repeating this practice for several years generally is required for complete elimination of spurge.
- Duckfoot cultivate for one entire growing season. Plant wheat or barley the second year and apply  $\frac{2}{3}$  pound per acre of 2,4-D low volatile ester or  $\frac{3}{4}$  pound per acre of oil soluble amine before the sensitive stage of the crop. See table 1. Plow after harvest and cultivate intensively until freeze-up. Repeating the second year program for 4 to 5 years will control spurge.
- Duckfoot cultivate until fall and plant bromegrass. The following year apply 1 pound per acre of 2,4-D low volatile ester or oil soluble amine both in the spring and fall. Treating again the second year usually will control most of the spurge.

### CONTROL IN GROWING GRAIN CROP

Applying  $\frac{2}{3}$  pound per acre of 2,4-D low volatile ester or  $\frac{3}{4}$  pound per acre of oil soluble amine usually retards top growth of the spurge, preventing seed formation. Apply the 2,4-D as late as possible without injuring the crop. See table 1. The low volatile ester and oil soluble amine formulations of 2,4-D are the most effective. Applying herbicides in small grain crops should be combined with some cultural practice.



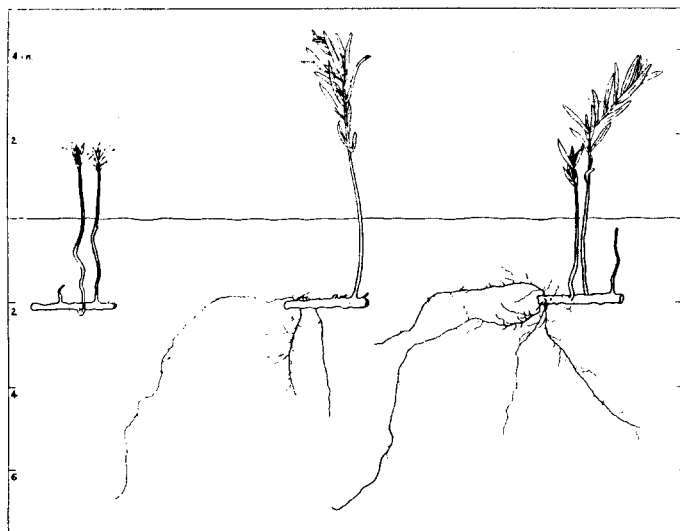
**ROOT SYSTEM OF SEEDLING**

Drawing was made of a plant growing in Fargo clay soil.

### CONTROL IN GRASSLAND

1. When a full season of cultivation does not precede the seeding of perennial grass, two applications of 2,4-D low volatile ester or oil soluble amine at 2 pounds per acre are required annually for 3 or 4 years to control spurge. Apply the 2,4-D in very early June and late August.
2. On non-cropland, twice a year applications of 2 pounds per acre of 2,4-D low volatile ester or oil soluble amine applied in very early June and late August will reduce stands of leafy spurge in 4 or 5 years.

3. On hilly or stony pastures, apply 2 pounds per acre of 2,4-D low volatile ester or oil soluble amine during bud stage. Treat again when regrowth is 4 to 6 inches tall. Apply 50 pounds per acre of nitrogen in the spring to stimulate growth of the grasses. Treated areas may be grazed moderately. Spurge will be controlled but several years of treatment are required to decrease the stand materially.
4. Sheep have been used to control large areas of leafy spurge. Turn sheep into the pasture in early spring and allow them to graze the spurge closely. The degree of control depends upon the intensity of grazing and use of a good follow-up practice. Grazing leafy spurge is not harmful to sheep.



LEAFY SPURGE PLANTS, 1 MONTH OLD  
Plants from 2-inch pieces of roots.

### CONTROL OF SMALL PATCHES

1. The chemicals suggested in table 2 are useful in controlling small patches of leafy spurge on non-cropland.



### CULTURAL CONTROL PRACTICES

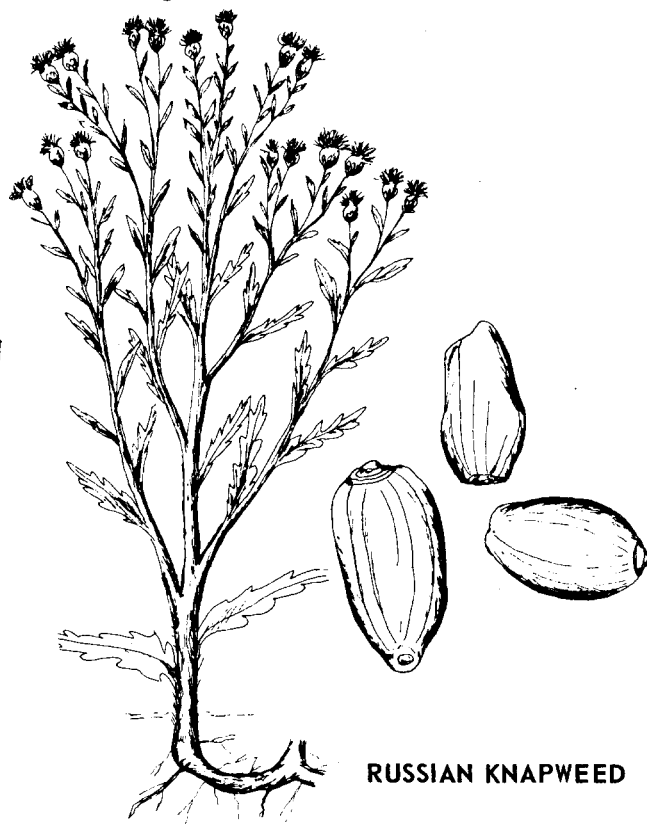
1. Two years of intensive duckfoot cultivation at 2-week intervals will eliminate Russian knapweed. This practice, however, may cause soil erosion.
2. Cultivation at 2-week intervals immediately after harvest and until freeze-up offers several opportunities for follow-up practices the next season. They are:
  - Duckfoot cultivate at 2-week intervals from early spring until early September and plant rye. Apply

1/2 pound per acre of 2,4-D low volatile ester or 3/4 pound per acre of 2,4-D amine in the rye crop the next summer and 1 pound per acre in the stubble immediately after harvest, followed after 2 weeks by plowing and reseeded to rye. Practicing this for 3 years generally controls knapweed. Early fall is a better time than summer to treat for knapweed control.

- Another possibility is the same as above except, during either of the last 1 or 2 years, cultivate until late June and plant sudangrass as a smother crop. Then after harvest cultivate until freeze-up.
- Duckfoot cultivate at 2-week intervals from spring until early fall and seed brome grass. Spray brome grass with 2 pounds per acre of 2,4-D low volatile ester both spring and fall for 2 or 3 years; fall application gives the better control.

### CONTROL IN GROWING GRAIN CROP

Applying 2/3 pound per acre of 2,4-D low volatile ester or 3/4 pound per acre oil soluble amine in the grain crop prevents knapweed from forming seeds. Apply the 2,4-D as late as possible without injuring the crop. See table 1. When fall knapweed growth occurs, apply 1 to 1½ pounds per acre of 2,4-D low volatile ester or oil soluble amine in the stubble after harvest and plow 2 weeks later. Then cultivate until freeze-up.



RUSSIAN KNAPWEED

## CONTROL IN GRASSLAND

Two applications of 2,4-D low volatile ester at 1 to 2 pounds per acre, applied just before blooming and again in the fall when considerable regrowth has occurred, will prevent knapweed from producing seed and aid in thinning the stand. Satisfactory chemical control seldom is obtained with the previous use of cultural treatments.

## CONTROL OF SMALL PATCHES

Eliminate small patches of hoary cress on non-cultivated areas with chemicals suggested in table 2.



## CULTURAL CONTROL PRACTICES

1. Intensive cultivation each time growth reaches 3 to 4 inches over a 2-year period will eliminate hoary cress, but this practice is conducive to soil erosion.
2. One year of intensive cultivation controls hoary cress, permitting a crop to be grown the next year, but this practice is not likely to eliminate the weed. Fair to good control may be obtained by applying  $\frac{2}{3}$  pound per acre of 2,4-D low volatile ester or  $\frac{3}{4}$  pound per acre of oil soluble amine to infested crops during the growing season. See table 1.
3. A combination of fallow and smother crops will eliminate hoary cress. Cultivate annually both before and after the smother crop. Follow the cultural control practices as outlined for Russian knapweed.
4. Treat plants in the fall with 1 to 2 pounds per acre of 2,4-D low volatile ester or oil soluble amine, and follow with clean tillage until fall of the next season, then seed to grass. The following season, apply 2,4-D at 1 pound per acre in bud stage and 1 to 2 pounds per acre in the fall vegetative stage. Continue to treat as needed to obtain control.

## CONTROL IN GROWING CROP

Applying 2,4-D at  $\frac{2}{3}$  to  $\frac{3}{4}$  pound per acre will control top growth of hoary cress when treated near or during bud stage. Treat as late as possible without

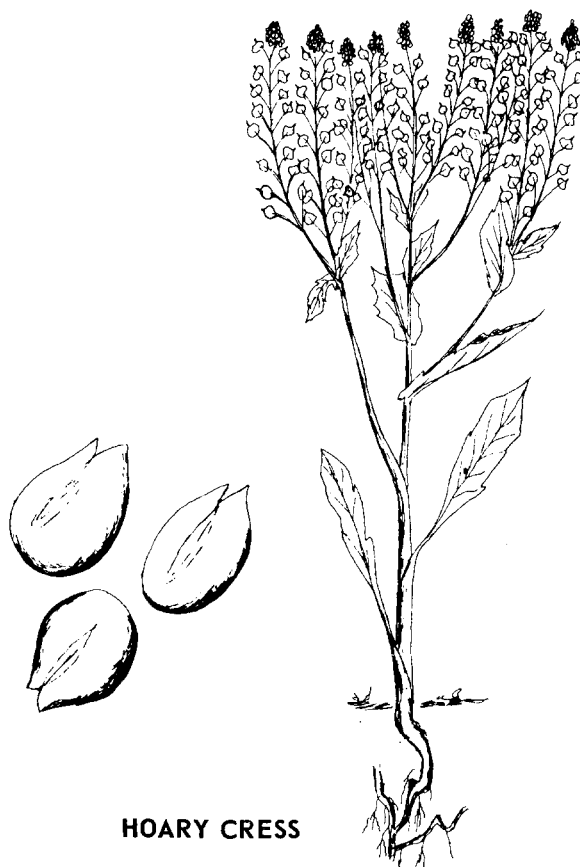
injuring the crop. See table 1. When moisture is available for growth in the fall, treat the plants with 1 to 2 pounds per acre of 2,4-D. Two chemical treatments per year should almost completely eliminate hoary cress after 2 or 3 seasons. Tillage in alternate seasons with 2,4-D application as previously described also is effective in controlling hoary cress.

## CONTROL IN GRASSLAND

Treating grassland with 1 pound per acre of 2,4-D low volatile ester during the bud stage, followed with an application of 1 to 2 pounds per acre of 2,4-D in the fall, should give nearly complete control of hoary cress after 2 or more seasons.

## CONTROL OF SMALL PATCHES

An application of the more active herbicides suggested in table 2 is effective in eliminating small patches of knapweed on non-cultivated areas.



HOARY CRESS

Weed	Herbicide	Rate <sup>1/</sup>	Remarks
Field bindweed	Tordon 22K Benzabor  TBA Banvel	1 lb/A 1 to 1½ lb/sq rd  10 to 20 lb/A 4 to 8 lb/A	Apply during active growth Controls all vegetation Residual effect 1 year or more Apply during bud stage Apply during active growth
Leafy spurge	Ammate X Amitrol-T Tordon 22K Banvel Benzabor Casoron	1 lb/sq rd 4 lb/A 2 lb/A 4 to 8 lb/A 1 to 1½ lb/sq rd 6 lb/A + 4 lb/A the second year	Use with a spreader sticker Retreat the following season Apply during active growth Apply during active growth Long-term control Apply in shelterbelts late fall or very early spring
Canada thistle and sowthistle	Amitrol or Amitrol-T Banvel Tordon 22K	4 lb/A  4 to 8 lb/A 1 lb/A	Apply pre-bud stage  Apply during active growth Apply during active growth
Russian knapweed	Tordon 22K Banvel Benzabor	1 lb/A 4 to 8 lb/A 1½ lb/sq rd	Apply during active growth Apply during active growth Long time sterility
Hoary cress	TBA Benzabor	10 to 20 lb/A 1½ lb/sq rd	Apply during bud stage Long term control

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