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Cultural Methods of Noxious Weed Control in South Dakota

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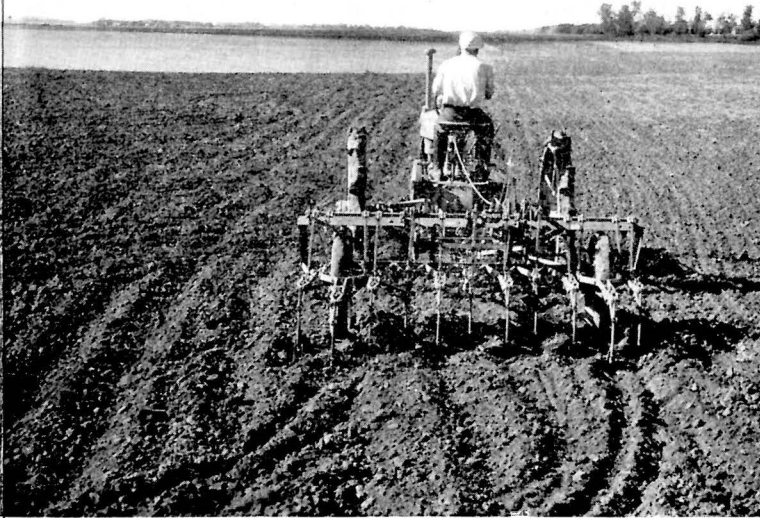
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Intensive Cultivation with a Duckfoot Cultivator

CULTURAL METHODS of
Noxious Weed Control
IN SOUTH DAKOTA

AGRONOMY DEPARTMENT

SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

SOUTH DAKOTA STATE COLLEGE ♦ BROOKINGS

This publication deals only with cultural methods of controlling noxious weeds. Details for use of chemicals for weed control may be obtained from the latest revision of Experiment Station Circular No. 69, which is being revised annually as chemical control practices change. This circular is available at your County Agent's office or at the Bulletin Department at South Dakota State College, Brookings, South Dakota.

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Cultural Methods of Noxious Weed Control in South Dakota¹

By L. M. STAHLER *and* LYLE A. DERSCHIED²

This outline has been prepared as a guide for field workers in weed control; for county, township, and neighborhood supervisors and for farmers cooperating in the program.

The control measures presented here are based on the latest information available from weed control research and proven field applications. A choice of methods and procedures is presented that will fit practically all situations. It is assumed that local practices will be kept within the limits of recommendations outlined.

Each of the eight weeds listed as noxious will be considered and recommendations for the use of intensive cultivation with various crops will be outlined for each weed. The choice of procedure to be adopted will depend on several factors, namely: (1) extent of infestation; (2) value and productivity of the land; (3) availability of material, equipment, and manpower; (4) adaptability of control practices, and (5) adaptability of crops.

If chemicals are to be used, Experiment Station Circular No. 69 should be obtained. The recommendations given in that publication should be followed closely.

Colored plates of the noxious weeds which show pictures and give characteristics of these weeds are also available. Copies of the Circular No. 69 or the colored plates can be obtained from the County Agent's office or from the Bulletin Department at South Dakota State College, Brookings, South Dakota.

Some cultural practices that are recommended for weed control involve long periods of intensive cultivation. Those that leave the soil barren during the winter are conducive to soil erosion. In areas where this condition is a hazard the practice should be modified to conform with recommended soil conservation practices.

Control of Field Bindweed (Creeping Jenny)

There are several satisfactory methods that may be used. These methods include the use of cultivation, crops, grazing, chemicals and combinations of two or more of these practices.

Intensive Cultivation and Rye

This method when done correctly gives practical control of bindweed in two seasons. Although two years of intensive cultivation alone is an effective method, it is seldom advisable to follow such a practice.

Equipment necessary: A duckfoot cultivator equipped with wide (12-24 inches) sweeps is essential to good results. The sweeps *must overlap 3 or 4 inches* in order to cut *every shoot by each cultivation*. The shovels *must be sharp* in order to cut all shoots and should operate at a *uniform depth* of 4 or 5 inches. The shovels must be adjusted so that the *wings of the blades are flat* when the cultivator is in the ground. Sweeps with an angle of 90 degrees are preferred.

1st year: Plow five inches deep three weeks after the bindweed plants have emerged (about June 1). No advantage is gained by earlier operations. *A good job of plowing is essential*. Cultivate at two week intervals until September 20-30

¹Contribution of the South Dakota Agricultural Experiment Station in cooperation with the Bureau of Plant Industry, Soils and Agricultural Engineering and the State Weed Board.

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and seed two bushels of rye to the acre. Shorter intervals between cultivations will not hasten elimination.

2nd year: *Combine* rye crop and plow immediately. Follow intensive cultivation procedure until September 20-30. Seed rye immediately at the rate of two bushels per acre.

3rd year: *Combine* rye crop and plow immediately after harvest. Cultivate until the soil freezes up.

4th year: Seed small grain and continue regular cropping system. Mop up surviving plants with chemical.

Smother Crops

1st year: Plow about June 1 and cultivate twice, at two week intervals. Cultivate four inches deep with a field cultivator equipped with sweeps 12 to 24 inches wide that overlap. If sufficient moisture is available about July 1st, drill sorghum (cane), sudan grass, or soybeans where adapted. Use a heavy rate of seeding and use a cultipacker to roll the field after seeding to induce rapid and even germination. Harvest the crop for forage before the first frost, and plow six or seven inches deep in November before the soil freezes.

In a dry year, when there is not enough soil moisture to produce a good crop of forage, omit the smother crop and continue an intensive cultivation program.

2nd year: Repeat the first year's operations.

3rd year: Repeat the first and second years' program if bindweed is not eliminated.

Perennial Forage Crops

This method is especially adapted to areas that are subject to erosion or are too rough or rocky to permit a regular cropping system. The use of perennial forage crops seldom eliminates bindweed; but a high degree of control can be obtained without reducing yields and value of forage.

1st year: Plow June 1 and cultivate at two week intervals until fall. Drill a light seeding of spring wheat or oats as a cover crop.

2nd year: In the early spring, seed alfalfa, brome grass, Ree wheatgrass, or crested wheatgrass, or a mixture of alfalfa and a grass depending upon which crop is adapted to the area infested with bindweed. *A good stand is essential.* For detailed grass culture see South Dakota Experiment Station Bulletin 361. It may be obtained from the County Agent's office or Agricultural Experiment Station, Brookings, South Dakota.

Successive years: Cut for hay or graze. If grazing is practiced, cut the first crop for hay when possible and graze subsequent growth. If it is not practical to cut the first crop, the grazing should be started in the spring when the crop is four to six inches tall.

Pasturing Bindweed with Sheep

This method is almost as effective as an intensive cultivation program. Two years of pasturing are necessary to control bindweed.

1st year: Seed rye September 20-30 at the rate of two bushels per acre.

2nd year: Graze with sheep from the time that the bindweed vines are four inches long (about May 15) until June 1-15. Plow five inches deep.

If there is enough soil moisture, seed 35 pounds of sudan grass to the acre, and roll with a cultipacker to induce rapid and even germination. Turn the sheep in when the sudan grass is six to eight inches tall and graze until September 20-30. Plow and immediately seed two bushels of rye to the acre. If there is not enough moisture in the soil in June to produce a crop of sudan, follow intensive cultivation until September 20-30. Plow and immediately seed two bushels of rye to the acre.

3rd year: If the area was grazed the second year, repeat as in the second year. If the area was cultivated and seeded to rye the second year, there are two alterna-

tives that may be taken: (1) graze rye and seed sudan in June as recommended for the second year, or (2) combine the rye and cultivate intensively until late fall.

Use of 2,4-D With Crops

A system for use of 2,4-D is outlined below and should be repeated every few years as necessary to control the bindweed.

1st year: Use 2,4-D in small grain before the grain has started to joint and when bindweed is starting to flower.

2nd year: Plant corn and cultivate thoroughly. Plow corn stalks under in late fall, just before the soil freezes.

Control of Canada Thistle and Perennial Sow Thistle

There are large areas of both Canada thistle and perennial sow thistle in South Dakota. These weeds are spreading quite rapidly. The practices outlined for use on bindweed are quite satisfactory for thistle control, but some modifications of such practices are necessary. Both Canada thistle and sow thistle emerge later in the spring, grow slower, and are more resistant to 2,4-D than bindweed. These, and other differences, make it necessary to modify certain control methods.

Intensive Cultivation

The procedure is essentially the same as recommended for bindweed, except that one season will generally eliminate 90 percent of the thistles, if done correctly. The plant roots are starved in this method. This method is not practical on land that has a tendency to erode.

Equipment needed: Use a field duckfoot cultivator equipped and adjusted as explained for bindweed. A wheatland (one way) plow that is sharp may also be used and should be operated to cut four or five inches deep.

1st year: Plow five inches deep three weeks after the plants have emerged (June 15). *A good job of plowing is essential.* Cultivate every three weeks until late fall (November 1-10). Plow before the soil freezes.

2nd year: Resume regular cropping system. Mop up stray plants.

The Use of Intensive Cultivation and Rye

A procedure similar to that outlined as the "intensive cultivation and rye method" for bindweed is satisfactory. Since Canada thistle and sow thistle are not quite as difficult to eradicate as bindweed, an alternate method may also be used.

Two methods are outlined, the first of which generally eliminates a high percentage of the plants.

1st year: Carry on an intensive cultivation program until September 20-30. Plow and seed rye immediately at the rate of two bushels per acre.

2nd year: *Combine* the rye crop and plow immediately. Re-plow or cultivate in the late fall just before the soil freezes (early November).

3rd year: Resume regular cropping system, and mop up surviving plants.

The second method offered will give control, but seldom eliminates all plants. The system is useful in areas where a season of intensive cultivation is impractical.

1st year: Seed spring small grain and *combine* at harvest time. Plow five inches deep as soon as possible (by August 1). Re-plow or cultivate September 20-30 and seed two bushels of rye to the acre.

2nd year: Combine the rye crop and plow immediately. Re-plow or cultivate in the late fall just before the soil freezes (early November).

3rd year: Resume regular cropping system, and mop up surviving plants where practical.

Perennial Forage Crops

The only perennial crops that have proven useful in the control of Canada thistle and sow thistle are alfalfa and Reed canary grass. Alfalfa is widely adapted,

but Reed canary grass does best on low wet ground. These perennials may be used as outlined below.

1st year: Use an intensive cultivation procedure until the latter part of July or August, when moisture conditions warrant the seeding of the alfalfa or the grass. Alfalfa may also be seeded about April 20 without intensive cultivation. *A heavy stand is essential to successful control.*

Successive years: Cut two or three crops for hay. It is not advisable to graze the area as most livestock will not eat the thistles.

Smother Crops

The practice of using smother crops is essentially the same as for bindweed. Two years are required to give control of Canada thistle or sow thistle, and it is practical only where use of forage can be made.

1st year: Plow the infested area on June 1st. Cultivate until July 1st. Seed sudan grass, sorghum, or soybeans, at a heavy rate with the grain drill. Cut the crop for forage before frost and plow five or six inches deep in late fall.

In a dry year when there is not enough moisture to produce a crop of forage, omit the crop and follow an intensive cultivation program.

2nd year: If a crop was seeded, repeat as the first year, but if a crop was not seeded, resume regular cropping system and mop up stray plants.

Use of 2,4-D With Crops

The above-ground portions of young thistles are readily eliminated by 2,4-D, but lateral roots develop new plants rapidly. It is necessary, therefore, to apply 2,4-D when reserves in the roots are low and a maximum number of shoots are above ground. Old flower stalks of both Canada thistle and sow thistle are difficult to kill.

The weather should be warm for several days preceding the treatment with 2,4-D and there should be an abundance of soil moisture. Two treatments a year are generally essential to good control. For further details, see Experiment Station Circular No. 69.

A system for use of 2,4-D is outlined here.

1st year: Use 2,4-D in small grain *when the flower stalks of the thistle first begin to shoot, but before the flower buds are larger than a pea.* Plants become tolerant as soon as buds show color. Re-treat 40 to 60 days after the first treatment, which should be sometime in August.

2nd year: Plant corn or sorghum and do a thorough job of cultivating. Plow stalks under in the late fall.

Control of Leafy Spurge

Leafy spurge starts growth early in the spring and normally matures seed by June 15, but will grow vigorously, bloom, and produce seed anytime during the growing season. A crown is produced at the soil surface from which new growth is produced. The roots are very tough and woody. Leafy spurge generally grows tall, and is a good crop competitor. Large acreages of spurge infestation are found on land not adapted to intensive cropping systems. Since leafy spurge sets seed early in the season, most cropping practices are not satisfactory.

With these characteristics in mind, the following recommendations for control and elimination are set forth.

Intensive Cultivation and Rye

This method starves the roots and is one of the best known for the elimination of leafy spurge. Two seasons and frequently more are needed. It is impractical on land that is low in value or easily eroded.

Equipment needed: A field duckfoot cultivator equipped and adjusted as explained for bindweed.

The procedure is the same as outlined in the "intensive cultivation and rye method" for bindweed except that the first operation each year will be about two weeks earlier (about May 15). The use of fall planted crops is useful only where intensive cultivation is practical.

Pasturing Spurge with Sheep

Large areas of leafy spurge infestation are on land not adapted to regular cropping systems and this method is especially adapted to those areas, although it has considerable value on better land. Sheep prefer leafy spurge tops and young shoots to most grasses; consequently, no seed will be matured. No harmful effects are produced on the sheep. The degree of control of the spurge is dependent on the intensity of grazing that the growth of planted or wild grasses will maintain.

1st year: In poorly grassed areas or in areas that are not grassed, seed brome-grass, Rye wheatgrass, or crested wheatgrass or a mixture of one or more grasses with alfalfa. Seedings should be made as recommended in the South Dakota Experiment Station Bulletin 361.

2nd year: Start grazing when spurge plants are six to eight inches tall.

3rd year and successive years: Follow a good pasture management plan. Pasture rotation should be followed where practical. In some cases, where sheep do not keep the grass down, it may be advisable to rotate cattle ahead of the sheep.

Control of Perennial Peppergrass, Russian Knapweed, and Horse Nettle

These weeds are not well established in South Dakota and most infestations are confined to small patches. Elimination of small infestations is important to prevent further spread. Peppergrass and knapweed resume active growth about the same time as leafy spurge. Horse nettle, however, is much later. Methods of control are outlined as follows:

Intensive Cultivation

This is a root starving method and is the only method that has proven to be practical on large infestations.

Equipment needed: A field duckfoot cultivator equipped and adjusted as for bindweed is the best implement for use on these weeds. Since the roots of these weeds are tougher than bindweed roots, it is more important to have sharp sweeps on the cultivator. Care should be used to prevent the spread of these plants by carrying root fragments on cultivator shovels as the root fragments become established quite easily and produce new plants.

1st year: The first operation for perennial peppergrass and Russian knapweed will be about May 15 but about June 15 for horse nettle. Cultivate, as for bindweed, at two week intervals until November.

2nd year: Repeat the first year's program.

3rd year: It may be necessary to repeat the second year as all plants may not be eliminated. If all plants are eliminated the second year, the regular cropping system may be resumed.

Cropping Systems

These weeds are generally not controlled by cropping practices. Since most infestations are in small patches, a cropping system is not recommended.

Control of Quack Grass

Quack grass differs from the other noxious weeds in that it is a grass and it has rhizomes (underground stems) that grow near the soil surface. In June or July, it sets seed and its root reserves and vigor of growth are more reduced. Quack grass is very difficult to eliminate in a wet year.

Intensive Cultivation

In addition to starving the roots, it is necessary to bring root fragments to the surface where they are dried out by the sun. For this reason, intensive cultivation produces good results in dry years and poor results in wet years. This method may be impractical where soil erosion is a serious problem.

Equipment needed: A wheatland (one way) plow is preferred to other machines, but the blades should be kept sharp and run to cut about *two inches deep*. As a first operation, the area should be gone over twice (once lengthwise and once crosswise) in order to cut the sod into small cubes. In later operations, the area should be gone over only once.

If a wheatland plow is not available, the first operation may be done with a moldboard plow and disk. The area should be plowed shallow (two or three inches) and disked to cut up the sod. Later operations may be done with a disk or a spring tooth harrow—preferably a spring tooth harrow.

Regardless of the equipment used, the removal of top growth by mowing before the first operation will aid later operations. Heavy grazing for a season prior to cultivation will also aid in the eradication program. *A field cultivator is next to worthless for quack grass control.*

1st year: The first operation may be with a wheatland plow or with a moldboard plow as discussed above. The first operation should be made about July 1 and may follow the harvest of small grain or intensive grazing. Earlier operations are of little value as soil moisture is generally fairly high. Later operations may be made with wheatland plow, disk, or spring tooth harrow. The later operations should be performed each time the quack grass gets to be one or two inches tall and should be continued until late fall. *In a wet season, intensive cultivation is of little value.*

2nd year: Repeat as the first year if necessary.

Cultivation and Special Cropping

The cropping systems presented here have practical use in areas unsuited to long periods of intensive cultivation.

FIRST PLAN

1st year: Raise small grain that is seeded to sweet clover.

2nd year: Cut the sweet clover for hay. Plow the area five inches deep immediately after cutting the hay. Cultivate intensively until fall.

3rd year: Plan a row crop and do a thorough job of cultivating. Mop up stray plants.

SECOND PLAN

1st year: Plant small grain and seed it to sweet clover.

2nd year: Cut the clover for hay. Plow the land five inches deep immediately after cutting the hay. Follow an intensive cultivation program until September 20-30, when rye should be seeded at the rate of two bushels to the acre.

3rd year: *Combine* the rye crop and plow to a depth of five inches immediately after harvest. Cultivate intensively until fall.

4th year: Plant to a row crop and cultivate thoroughly. Mop up stray plants.

THIRD PLAN

The method presented here is especially effective when the spring of the first year is dry.

1st year: Cultivate intensively from the time that the quack grass reaches a height of two inches until June 15 or July 1. Drill in German millet, proso millet, or buckwheat where it is adapted. Cut the German millet for hay, but harvest the proso millet or buckwheat for seed. In wet years, buckwheat is the best summer crop known for quack grass control.

2nd year: Resume original cropping system. Mop up stray plants.