

# BINDWEED ERADICATION IN OKLAHOMA

Circular 453



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# BINDWEED ERADICATION IN OKLAHOMA

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Field bindweed is the most serious weed pest in Oklahoma. Infested areas can be found in nearly every county, but the most extensive infestations are in the hard winter wheat section of the state. Bindweed occurs on both cropland and non-cropland. The infestations on cropland vary in size from small patches to several acres. Bindweed is also found along fence rows, stream banks, highways, railroads, and in other places. Where bindweed has become established control measures should be taken immediately. As the infestation spreads crop yields are reduced and land values are depreciated.

Bindweed is a long-lived perennial. It produces trailing or climbing vines. The leaves vary considerably in size and shape, but are generally shaped like a blunt arrow-head. The flowers are bell-shaped, usually about one inch in diameter and vary from white to pink in color. Bindweed plants develop very deep and extensive root systems. The roots may extend into the soil to a depth of more than 20 feet. The underground root stocks live through the winter and produce new growth the next season.

Bindweed spreads both by seed and by underground stems. Planting small grain or other crop seed containing mixtures of bindweed seed is a common method of spreading this dreaded weed pest. Bindweed seed usually begins maturing at about the same time as the small grains and is frequently found in crops harvested from infested land. If infested hay or straw is fed to animals or if animals are pastured on infested areas, bindweed seed may pass through the digestive tract and thus spread the infestation. Bindweed seed may also be spread by combines, trucks, or hay racks unless they are thoroughly cleaned before moving from infested fields to other fields.

After bindweed plants become established they spread rapidly by underground root stocks. A single plant may spread to a diameter of several feet in one season. Small infested areas may double in size in that time. Plows, harrows, and other tillage implements passing through infested areas break roots and spread them to other parts of the field where they develop new plants.

## CONTROL MEASURES

The deep and extensive root system of bindweed makes it extremely difficult to eradicate. If complete eradication is to

be accomplished, the root system must be destroyed either by depletion of the stored food reserves through intensive cultivation or by chemical treatment. Bindweed plants produce large quantities of seed, some of which may remain viable in the soil for a period of several years and germinate when soil and moisture conditions are favorable. The seedlings must be destroyed as they appear.

*Continuous Cultivation.* Bindweed can be eradicated by continuous intensive cultivation. This method is especially applicable where the infestation extends over large areas of cultivated land. The method consists in cutting the roots of the bindweed plants at a uniform depth in the soil by cultivating at designated intervals until the plants have been destroyed. It is essentially a starvation process. Food for plant growth is produced in the leaves of the growing plants. After the plants have attained a certain size more food is produced than is needed for growth. The extra food is stored in the roots and provides a reserve from which growth is normally renewed the following season. After each cultivation, growth is renewed by drawing on the reserve of food stored in the roots. New growth is produced from stored food until about one week after the plants emerge above the ground.

Cultivation may be started any time during the growing season. If no crop is on the land, it is usually best to start about 2 weeks after the bindweed plants emerge in the spring. The first operation should be with a moldboard plow at a depth of 4 to 6 inches. Cultivation should be repeated 8 days after emergence or at 15-day intervals where little or no emergence occurs, until about July 1. The land should then be planted to Sudan or a forage sorghum. The crop may be utilized for feed and the stalks or stubble will give some protection against erosion during the winter. The following spring, the land should again be plowed two weeks after the bindweed plants emerge. Cultivation should be continued every 2 weeks or 8 days after emergence, until wheat seeding time in late fall. The land may then be seeded to wheat.

If infested land is in wheat, cultivation should begin immediately after the crop is harvested. It should be repeated every 15 days or 8 days after emergence, throughout the summer and fall. Wheat may be planted in late fall for winter cover. In the spring, the wheat may be used for pasture, hay, or as a green manure crop.\* The land should be plowed 2 weeks after the bindweed plants emerge. Intensive cultiva-

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\* In areas where winter legumes are adapted, Austrian winter peas or hairy vetch may be substituted for wheat.

tion should be continued during the summer and until wheat seeding time in late fall. The land may then be seeded to wheat.

Old, deep-rooted bindweed plants are more difficult to destroy than young, shallow rooted plants. Consequently, if the bindweed infestation consists of old, well established plants, complete eradication may require more than 2 years.

A system which includes wheat and fallow in alternate years can be used to eradicate bindweed if intensive cultivation is practiced during the years when the land is in fallow. This method is especially adapted in the Panhandle area.

*Tillage Implements.* A field cultivator, equipped with overlapping sweeps or duck foot plows, is a very satisfactory implement to use in cultivation for bindweed control under most conditions. If there is a large amount of crop residues on the land, wide sweeps attached to a subsurface tiller with rolling coulters set ahead of the sweeps will operate more satisfactorily. The sweeps should be kept sharp and should overlap so that all bindweed plants will be cut at a uniform depth at each cultivation. The first cultivation in the spring should usually be with a moldboard plow at a depth of 4 to 6 inches.

#### CHEMICALS IN WEED CONTROL

*The 2, 4-D Preparations.* The new chemical 2, 4-D is a wartime development which has been widely advertised during the past 2 years. It is a selective spray chemical and will kill broad-leaved plants only. It does not kill Johnson grass, Bermuda, and most other grasses. The chemical is non-poisonous, non-inflammable, and does not corrode spray equipment. It is cheaper to use than sodium chlorate and it does not injure the soil. The preparations of 2,4-D now available include the sodium or ammonium salts, the amines, and the esters. On most plants the reaction of the different forms is about the same.

Preliminary tests indicates that 2,4-D, when properly applied may kill 90 to 95 percent of bindweed plants, but a single application has not given complete control. A dense growth of bindweed frequently contains 1,000 to 2,000 plants per square rod. Even though an application of 2,4-D might kill 95 percent of the bindweed plants, the remaining 50 or more plants per square rod would cover the entire area again in one season if left undisturbed. A second application will usually not kill the same percentage of the remaining plants as did the first treatment. Either some plants are more difficult to kill or they develop resistance to withstand later treatments.

For best results 2,4-D should be applied in the spring when the plants are growing rapidly and just before they start blooming. It may also be applied late in the fall after the plants have resumed rapid growth. Treatment should not be made during the hot, dry summer weather as it will have very little effect on bindweed during this period. Land should not be cultivated for a period of at least 25 to 30 days following an application of 2,4-D. Consequently, treatment of bindweed immediately after wheat harvest is not recommended if the land is to be prepared for wheat again in the fall.

The various forms of 2,4-D are sold under many different trade names, and the concentrations vary from 10 to 80 percent. In mixing spray solutions, the chemical should be accurately weighed or measured according to the manufacturer's directions printed on the package or container. The leaves of all bindweed plants should be thoroughly wet with the spray solution. In most cases, this will require about 1 gallon per square rod, or approximately 150 to 200 gallons per acre. The spray should be applied at a pressure of not less than 50 pounds and not over 100 pounds. The pressure should be kept constant in order to give even distribution of the spray solution.

In view of the limited amount of research information available, the best method of using 2,4-D in bindweed control has not yet been fully determined. When used in connection with intensive cultivation and suitable cropping practices, it may reduce the number of cultivations necessary to completely eradicate the bindweed plants. In many cases, infestations of bindweed occur on land normally planted to wheat. When conditions are favorable, 2,4-D may be applied in the fall after the wheat is planted. If applied on very young plants, it may cause some injury, but if the wheat is planted early and the spray applied just before frost very little injury to the wheat will result. The spray will kill such annual weeds as wild mustard and primrose and will delay bindweed growth until the wheat crop matures. The spray can be applied in the spring if the bindweed plants make sufficient top growth before the wheat plants start jointing, but severe injury to wheat may result if 2,4-D is applied after the joints start forming. Clean cultivation should be started immediately after harvest and continued until seeding time in the fall. If wheat is not grown the following year, a smother crop of Sudan or a forage sorghum may be planted in early July.

*Sodium Chlorate.* Sodium chlorate may be used to eradicate small patches of bindweed on cultivated land. It is especially recommended for treatment of bindweed along fence rows, stream banks, roadsides, and on all other non-cropland.

Sodium chlorate should be applied in October or early November at the rate of four pounds per square rod. It may be applied in the dry, crystalline form or mixed with water in the proportion of one pound to one gallon of water and applied as a spray. Dry sodium chlorate may be broadcast by hand or by a chemical spreader. Uniform distribution is important. The chemical should be applied well beyond the edge of the infested area in order to destroy all lateral underground root stocks. Power sprayers are well adapted for spraying bindweed along roadsides and ditch banks where treatment with dry chemical is difficult. Individual surviving plants may be treated by spreading one tablespoonful of sodium chlorate around the plant 8 to 10 inches in all directions. If a large number of plants survive, a light application of chemical over the entire infested area is advisable. The follow-up treatment should be made in the spring or late summer following the original application.

There is a considerable fire hazard in connection with the use of sodium chlorate in liquid form. When organic materials such as clothing, leather, or wood are saturated with sodium chlorate solution and allowed to dry, they may be ignited by friction or by spontaneous combustion from direct sun rays. All clothing worn by the operators should be removed and washed immediately after the work is completed. Spray equipment should be kept well painted. When applied as a liquid spray, Atlacide is less hazardous than sodium chlorate.

#### SUMMARY

1. Bindweed can be eradicated by intensive cultivation. This method is applicable where the infestations extend over large areas of cultivated land. If no crop is on the land, cultivation may be started approximately 2 weeks after the bindweed plants emerge in the spring and continued until about July 1. Sudan or a forage sorghum should then be planted. The crop may be harvested for grain or pastured, leaving the stubble on the land for protection against soil loss during the winter and early spring. If the land is in wheat, cultivation should be started immediately after the crop is harvested. It should be continued throughout the summer and fall. Wheat may be planted in late fall for winter cover and utilized for pasture, hay, or as a green manure crop.

In the spring, the land should again be plowed two weeks after the bindweed plants emerge. Intensive culti-

vation should be continued throughout the summer and until wheat seeding time in the fall. The land may then be planted to wheat.

2. An application of 2,4-D, when properly applied, may kill 90 to 95 percent of bindweed plants, but a single application has not given complete control. The best method of using 2,4-D in bindweed control has not yet been fully determined. When used in connection with intensive cultivation, it may reduce the number of tillage operations necessary for complete eradication. It should be applied in the spring when the bindweed plants are growing rapidly and just before they start blooming. If wheat is seeded early in the fall, 2,4-D may be applied on bindweed-infested areas just before frost. Spring applications may be made if bindweed emerges before the wheat plants start jointing.
3. Sodium chlorate may be used to eradicate small patches of bindweed on cropland. It is also recommended for treating infested areas on all non-cropland. The chemical is usually applied in dry form, at the rate of 4 pounds per square rod. The application should be made in October or early November. It may also be applied as a liquid spray, using 1 pound of sodium chlorate to 1 gallon of water. When used as a liquid spray, Atlacide is less hazardous to use than sodium chlorate.
4. Plant only seed which is known to be free of bindweed seeds. Destroy any bindweed plants which may appear on the farm before they produce seed.
5. Complete eradication of bindweed requires the cooperation of every person who has infested land. It should be eradicated on both cropland and non-cropland.

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