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Weed Control in Soybeans

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COOPERATIVE EXTENSION SERVICE
SOUTH DAKOTA STATE UNIVERSITY
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WEED CONTROL IN Soybeans

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Soybeans are a good cash crop for eastern counties of the state. The number of acres devoted to soybeans has increased annually since 1960, reaching 346,000 in 1966.

Weeds are a serious problem in soybeans. Numerous farmers have not raised soybeans because they could not control the weeds. Higher yields could undoubtedly be obtained by planting more acres in narrow (20-inch) rows. However, there is no sure way to control weeds without the use of a row-crop cultivator, and these are not readily available for use on 20-inch rows.

The best weed control generally is obtained by applying a pre-emergence herbicide in bands over the rows, followed by cultivation with rotary hoe or flextine harrow, and final cultivation with a row-crop cultivator.

CULTIVATION

For many years soybeans were planted and cultivated with corn planting and cultivating equipment. Good weed control was difficult to obtain because the crop could not be cross-cultivated. Using corn planting equipment made it essential to plant soybeans in 40- to 42-inch rows. Better annual weed control has been obtained with a rotary hoe, flextine harrow, and herbicides; newer implements and herbicides can be used on beans planted in narrower rows. Even though newer weed control methods are helpful, it frequently is necessary to use at least one row-crop cultivation to get good weed control. Do not "hill" the row during last row-crop cultivation; this prevents harvesting of lower pods and results in unnecessary loss of 2 to 5 bushels of beans per acre.

Rotary Hoe

The rotary hoe controls annual weeds early in the season. Its efficiency depends on pulling it at a speed of 8 to 10 miles per hour when the weeds are just emerging. Use a shield over the hoe or behind the tractor driver's head as protection from flying clods and stones. It is most effective if the soil is crusted as a result of drying after a rain, but it is also effective on moist soil. It may cover small plants growing in furrows, wheel tracks, or loose soil. If crop plants are large, hoe during the heat of the day to prevent breaking plants.

A much larger acreage can be hoed than can be row-crop cultivated in the same time. Although several hoeings are generally needed to replace one row-crop cultivation, two hoeings can be done for approximately the same cost as the first row-crop cultivation. (The first cultivation is slightly higher than later cultivations.) The rotary hoe is generally not effective if weed seedlings are large enough to develop a green color.

Flextine Harrow

The flextine harrow is used in much the same way as the rotary hoe, but it is operated more slowly. It is most effective at 2 miles per hour or less. The rotating action of the flexible tines makes it effective for killing weed seedlings. As with the rotary hoe, a much larger acreage can be covered than with the row-crop cultivator. Several harrowings generally are needed to replace one row-crop cultivation, but three harrowings can be made for about the same cost of the first cultivation. The harrow is most effective on weed seedlings ¼ inch high or less.

Costs of Cultivation

If labor is not considered, the cost of rotary hoeing is about 45 cents per acre, while the flextine harrow costs 21 to 24 cents per acre, and row-crop cultivation costs about 66 cents. If labor is worth $1.25 per hour, the costs are 67 cents, 35 cents, and 91 cents per acre, respectively. The first row-crop cultivation takes longer than others and the cost would be somewhat higher than the 66 or 91 cents quoted here. Consequently, two rotary hoeings or three harrowings can be done for approximately the same cost as the first row-crop cultivation.

PRE-EMERGENCE SPRAYING

Since soybeans are damaged by most herbicides applied post-emergence, the best chemicals for controlling weeds are applied pre-emergence. Herbicides that have been most satisfactory in South Dakota are Amiben, Trifluralin, and CDAA. Since they are absorbed by the roots of the weeds, they must be moved into the root zone in the soil. Rain will leach Amiben and CDAA into the soil, but Trifluralin must be incorporated mechanically.

Amiben

Use 2 to 3 pounds active ingredient per acre on the area treated. Use the higher rate on heavy clay or high organic matter soils. Apply in 12 to 15 gallons of water per acre at planting time or as soon after planting as possible. Apply in 12- to 14-inch bands over the row. Control the weeds between the rows by hoeing or harrowing and one cultivation, or by two cultivations. If beans are planted in narrow rows that cannot be cultivated, apply 3 pounds per acre as an over-all spray. The chemical normally controls weeds for 6 weeks to 3 months.

Amiben is sold as a liquid containing 2 pounds active ingredient per gallon and as "Amiben Granular" containing 10 per cent active ingredient. Numerous broad-leaved and grassy annuals can be controlled with this herbicide. Bands may be applied with equipment similar to that shown in Figures 1 and 2. However, sprays may be applied with a regular field sprayer that has nozzles spaced the same width as the rows. Be sure to use nozzles designed for applying spray in bands.

Beans are sometimes stunted by Amiben, but yield is seldom reduced. Good weed control is obtained if ½ to 1 inch of rain falls within a week to 10 days after application. The chemical is ineffective if no rain falls or if weeds germinate shortly after treatment. However, if weeds do not germinate until after a rain, satisfactory weed control will be obtained, even though it does not rain for 2 or 3 weeks after treatment.

An over-all application frequently makes it unnecessary to cultivate; but band treatments require two cultivations to kill weeds between the rows. The chemical generally gives better weed control when beans are planted in rows spaced 20 inches apart than when spaced in wider rows. However, control is not consistently good enough to make it possible to produce beans without cultivating for some of the weed control.

Trifluralin

Use ½ to 1 pound active ingredient per acre on the area treated. Apply ½ pound on light textured soils, ¾ pound on soils of medium texture and 1 pound per acre on heavy soils. Incorporate immediately after application to a depth of 2 to 4 inches. Check the label for the latest restrictions concerning the use of treated forage for feed.

Trifluralin is sold under the tradename "Treflan" as a liquid containing 4 pounds active ingredient per gallon. It is effective for the control of annual grasses and some broad-leaved annual weeds, but it is not effective on cocklebur, velvet leaf, and ragweed. Although rainfall is helpful for leaching it into the soil, mechanical incorporation is essential to get the herbicide near the roots of germinating weeds before it vaporizes into the atmosphere.

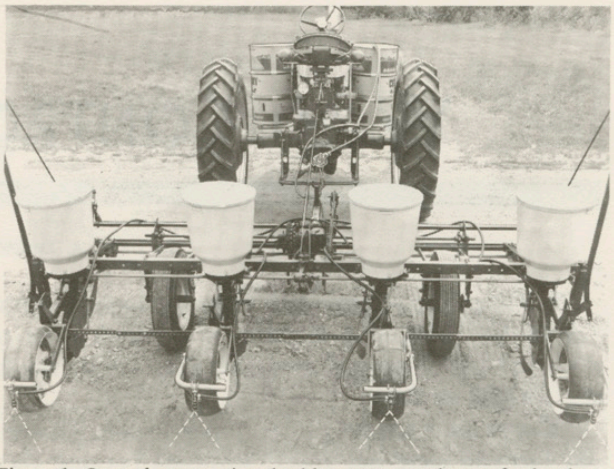

Figure 1. Corn planter equipped with sprayer attachment for band application of pre-emergence herbicides.
(Photo courtesy of Century Engineering Company)

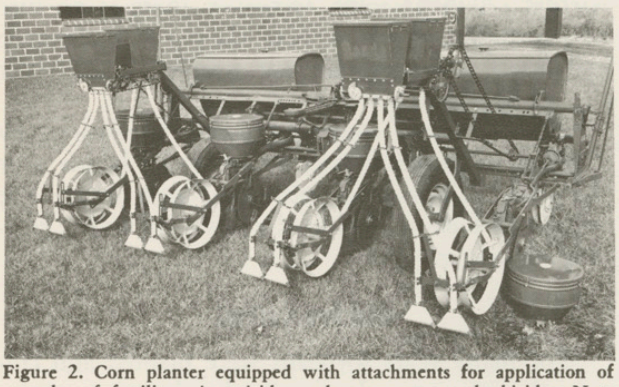

Figure 2. Corn planter equipped with attachments for application of granules of fertilizer, insecticide, and pre-emergence herbicides. Note different placement in soil for each chemical.
(Photo courtesy of Gandy Company, Inc.)

Since trifluralin must be incorporated mechanically, it generally will be applied before planting. It may be worked into the soil with a disk harrow, power driven rotary hoe, or a spiketooth harrow with spikes set at a 45° to 90° angle. It could be applied in bands if sections of power driven rotary hoe were mounted in front of each planter shoe.

CDAA

Use 4 pounds active ingredient per acre of CDAA to control annual grassy weeds. Apply in 14-inch bands over the rows. Use a row-crop cultivator twice.

An over-all application seldom replaces more than the first row-crop cultivation. Since two cultivations generally are required to give good weed control and will control between rows, there is no point in making over-all treatments. Band applicators are shown in Figures 1 and 2.

CDAA controls most annual grasses and gives good control if applied to warm soil (60° to 65° F.)

and if a minimum of ½ to ¾ inch of rain falls during the first week after application. CDAA generally gives better weed control on heavy soils high in organic matter than on light soils low in organic matter. It is relatively volatile and relatively emulsifiable in water; therefore, it must be leached into the soil before it volatilizes, but heavy rain (2½ inches) may leach sprays beyond the root zone of weed seedlings.

Granules are effective if applied to cool soil or if rain is not received for 10 days or 2 weeks; they are not rendered ineffective by heavy rains.

Rainfall at planting time in eastern South Dakota has been adequate in 5 out of 10 years to activate CDAA sprays and give good weed control. Granules have been effective 7 years.

CDAA sprays have a repulsive order and are highly irritating to the skin and eyes. Since granules are less irritable to handle, granule formulations are much preferred over liquid formulations. If you do use a spray, wear goggles and protective clothing.

POST-EMERGENCE SPRAYING

Only one chemical is suggested for spraying soybeans after the plants emerge. It contains 4(2,4-DB) which kills broad-leaved weeds. Although it has not been tested in South Dakota, it has been tested in other states, and some farmers may wish to try it on an experimental basis.

4(2,4-DB) is formulated by two companies especially for use in soybeans. It controls cockleburs and suppresses pigweed. It is sold under the two trade names "Butyrac 175" and "Butoxone SB." Both are liquid and contain approximately 1.75 pounds 4(2,4-DB) acid equivalent per gallon.

For those who wish to apply this herbicide on an experimental basis, use 2 to 3 ounces acid equivalent per acre in 10 to 12 gallons of water, 7 to 10 days before soybeans bloom. This is equivalent to 1 gallon of chemical on 10 acres of soybeans. Do not feed treated forage to livestock for 60 days after treatment.

COST OF HERBICIDES

The cost of band application is very low if the chemical is applied with a planter attachment; however, applications with a field sprayer after planting cost about 75 cents per acre.

The cost of herbicides is given in Table 1.

Table 1. Chemical Costs

Herbicide†	Cost per gal. Product	Cost per lb. Active	Average Cost of Herbicide per Acre				
			Overall	40″ row		20″ row	
				14″ band	8″ band	14″ band	8″ band
Amiben (liquid)	$10.15	$5.20	$15.30	$5.10	$3.06	$10.20	$6.12
Amiben (granular)	0.58*	5.80	17.40	5.80	3.48	10.60	6.96
CDAA (granules)	0.44	2.20	8.80	2.93	1.76	5.86	3.52
CDAA (liquid)	7.80	1.95	7.80	2.60	1.56	5.20	3.12
Trifluralin	34.00	8.50	6.30-10.50	2.10-7.85	----	----	----
4(2,4-DB)	11.80	6.75	1.18	----	----	----	----

*Cost per pound of product.
†Propazine is formulated as an 80% wettable powder. CDAA is formulated as a 4 pounds per gallon emulsifiable concentrate or 20% granule.

Use of a trade name does not indicate endorsement of one product over another.

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