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CC201 Soybean Weed Control

L. R. Robinson

O. C. Burnside

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SOYBEAN WEED CONTROL

L. R. Robison and O. C. Burnside

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Introduction

Soybean acreage in Nebraska increased from 165,000 acres in 1959 to 786,000 acres in 1966. Soybeans complement corn and sorghum production by providing the farmer an additional crop he can produce using much of the same equipment. Soybean growers are improving production methods but there is much to be learned about how to fit together the pieces of the crop production puzzle.

Losses and Problem Weeds in Soybeans

Of the three classes of soybean pests (disease-insects-weeds), weeds have been by far the most important. Losses from weeds in soybeans in the United States due to reduced yield and quality and the cost of soybean weed control exceeds 300 million dollars each year.

In Nebraska, this loss is about 11 million dollars or \$14 per acre (excluding soybeans at \$2.75 per bushel).

In Illinois, six giant foxtail plants per foot of row reduced soybean yields 10% and 50 plants per foot of row reduced yields 28%. Similar research in Delaware indicated one morningglory plant per foot of row reduced yields about 20%. In Nebraska, 1 bu/A decrease in soybean yields occurred for every 86 lb/A of weeds produced.

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Problem weeds in Nebraska soybeans are foxtail, pigweed, crabgrass, lambs-quarter, velvetleaf, smartweeds, cocklebur, sunflower, jimsonweed, and shattercane.

Fortunately, mechanical, cultural and chemical weed control methods are available which, when used in combination, will usually provide adequate weed control.

Weed Control Methods

1. Mechanical weed control

- (a) Seedbed preparation: Seedbed preparation involves an important series of production operations. Weed control measures often are considered the series of operations following planting.

Seedbed preparation frequently determines crop success or failure as poorly prepared seedbeds seldom produce good soybean stands and often do not destroy existing weeds.

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Tillage operations should provide a firm, mellow seedbed for soybeans. There is little if any benefit from early spring tillage operations so far as stimulating weed seed germination and weed control is concerned.

The final operation should be timed so that weeds are destroyed when soil temperature is conducive to rapid soybean emergence and growth. The important thing is to provide a favorable environment for rapid germination and uniform stand establishment.

- (b) Rotary hoe: Properly used, the rotary hoe is an effective weed control tool. Too often weed control failure results from delaying the rotary hoeing until weeds can be seen and 1/2 inch or more tall---this is too late.

Most annual weed seeds germinate in the upper inch of soil. Larger seeded crops such as soybeans usually are planted deeper and are rooted deeper than most annual weeds. The main purpose of the rotary hoe is to disturb the weeds without appreciably disturbing the crop.

Timing is critical and should be geared to the stage of weed growth rather than to soybean growth except that you should try to avoid rotary hoeing soybeans in the "crook" stage.

Rotary hoe operations should begin when most of the weeds have germinated and are in the "white" stage but not yet emerged. Weeds are easily killed at this stage, but once emerged and greater than 1/4 inch tall they cannot be effectively destroyed with a rotary hoe. Usually weeds will be in the "white" stage five days after soybean emergence.

The grower should walk into the field and dig in the top soil--weed seedlings are easily seen. A timely rotary hoeing often gives 80 to 90% weed control. Delaying rotary hoeing three or four days after weeds emerge will reduce weed control effectiveness 50% or more.

The rotary hoe should be operated at 8 to 12 miles per hour and be heavy enough to give shallow soil penetration. Do not worry about breaking off a few soybean plants. If the soybean stand is reduced 10% a good rotary hoeing job is being done and soybean yields will not be reduced. Timely operation of the rotary hoe is sometimes interrupted or delayed due to rainfall, but the farmer should be an opportunist and be ready when soil moisture is low enough so that the rotary hoe can be operated without the soil "balling-up."

In general, two rotary hoeings should be enough. Stop rotary hoeing after soybeans are 4 inches tall. It is practically useless to rotary hoe after weeds are established; furthermore, the larger the soybeans the greater the injury. Properly used, the rotary hoe is the most effective and economical weed control method available to the soybean producer.

- (c) Cultivation: Cultivation is still the most widely used weed control method for soybeans grown in rows wide enough to cultivate. Cultivation is the only method of controlling perennial weeds such as milkweed, hemp dogbane, or clammy groundcherry. Many annual weeds are also missed by presently available herbicides (e.g. smartweed, velvet-leaf, cocklebur, sunflower, and jimsonweed).

Cultivation is aimed at burying surviving weeds in the row and controlling weeds between rows. Again, timeliness is important. The longer weeds compete, the greater the soybean loss, and larger weeds are more difficult to destroy by cultivation than small ones. Do a thorough job--missed weeds cause trouble at harvest time. Combine losses may be increased 10% in weedy soybean fields.

2. Cultural weed control

- (a) Soybean variety: Do not pick up a stranger--you may get taken. University testing programs determine and suggest which varieties are best adapted to Nebraska conditions. Suggested varieties generally will provide better weed competition than untested imports because of environmental adaptation. Check the suggested varieties before buying seed; do not get shortchanged.
- (b) Seed quality: Bargain seed generally reduces your profits. Seed low in germination with poor vigor or contaminated with weed seeds is an invitation to weedy soybeans. Why plant your weed problem? Uniform soybean stands--without skips and open spots--provide crop competition to weeds. Can a farmer afford anything but the very best seed available?
- (c) Row spacing: One significant production practice that has the potential of boosting soybean yields and helping in weed control is that of narrow row planting. In soybeans, narrow rows generally mean 20-inch spacing or less. Narrow rows aid in weed control by providing greater competition and earlier shading of weeds. Nebraska research on 10-, 20-, 30-, and 40-inch row soybeans indicates it took 36, 47, 58, and 67 days, respectively, for soybeans to cover the ground.

Weeds must be controlled if narrow rows are to help rather than hinder your efforts of increasing crop production. Unfortunately, crop competition and shading are not adequate weed control measures by themselves so mechanical and chemical weed control methods must be utilized. The more weed control methods used the more effective and dependable will be your weed control.

Herbicides now available do not give consistent or adequate control of some common Nebraska weeds. Cultivation must also be used. This means a farmer should plant his soybeans in row widths he can rotary hoe and cultivate. Another factor to consider is the adaptation of machinery to other row crops being grown. One can hardly afford separate equipment for several different row spacings.

- (d) Planting rate and date: Planting rate should be 8 to 12 seeds per foot of row. This will be adequate to allow germination loss and soybean plant loss due to rotary hoeing and still give six to eight established plants per foot of row. High planting rates, within reason, provide greater competition to weeds--too low a rate leaves too many open spaces for weeds to fill in.

Seeding dates may vary from year to year and will differ according to location in the state. Soybeans are usually planted May 10 to June 5 but plantings as early as May 5 to May 15 are being considered by some farmers. Soybean planting dates will generally be similar, or slightly after, corn. If soil temperature conditions are unfavorable for rapid soybean germination and emergence, weed problems increase.

3. Chemical weed control

Generally, herbicides for selective weed control in soybeans need to be supplemented. Cultivation is especially needed where resistant weeds and/or perennials are present in the soybean fields. Herbicides may not be economical in fields where weeds do not pose a serious production problem or cultivation has provided effective weed control. Band applications of herbicides should be considered to reduce herbicide cost.

(a) Preemergence Herbicides for Nebraska

- (1) Amiben: Amiben (amiben) should be used preemergence at 2 to 3 lb/A. Use the higher rate on heavier soil types. Amiben is mostly a selective, translocated, root-absorbed herbicide, but also may be absorbed to some extent through the leaves. To be most effective, Amiben should be incorporated into the soil. The most common incorporation method is rainfall. Mechanical incorporation with a rotary hoe or some other tillage implement will improve weed control in case rainfall does not occur within two or three days after application.

Amiben will control most annual broadleaf and grassy weeds. Weeds such as cocklebur, morningglory, jimsonweed, shattercane, and sunflower are not controlled. Also missed are such common perennial weeds as clammy groundcherry, common milkweed, and hemp dogbane.

Amiben is quite water soluble and in years of excess rainfall may leach through the soil profile and give little weed control. Amiben generally gives weed control for four to six weeks before being dissipated. Generally, soybeans are quite tolerant to Amiben. Beating rains right after application may cause a hard crust to form on the surface of some soils through which soybeans have difficulty emerging. Amiben reduces the emergence pressure of soybeans and further aggravates the emergence problem. Rotary hoeing to break the crust may be necessary.

- (2) Treflan: Treflan (trifluralin) should be used preplant at 1/2 to 1 lb/A. Use the lower rate on sandy soils. Treflan is highly volatile and must be incorporated immediately after, or in conjunction with, application for best results. Thorough soil incorporation by disking two times at right angles 3 to 6 inches deep with a tandem disk or incorporator is beneficial for weed control. Harrowing or rotary hoeing in Nebraska will not provide adequate incorporation. Treflan will provide season long control of most annual grassy weeds but is weak on broadleaf weeds with the exception of pigweed and lambs-quarters. Tolerant weeds include cocklebur, common ragweed, jimsonweed, smartweed, sunflower, and velvetleaf. Shattercane can be controlled with Treflan at 1 lb/A in conjunction with cultivation.

Treflan may be applied and incorporated two to three weeks before planting. Soybeans are quite tolerant to Treflan but planting soybeans more than 2 inches deep in Treflan treated soil may result in severe soybean injury. To avoid possible Treflan carryover in the soil, do not exceed manufacturer's recommended application rate.

(b) Other Preemergence Herbicides Available for Use on Soybeans

- (1) Alanap: Use Alanap (NPA) preemergence at 4 lb/A. Use lower rate on sandy soils. Alanap is absorbed through the root system after seed germination. The sodium salt form (Alanap-3) is soluble and leaches readily. Weed control from three to six weeks may be expected. Rainfall or mechanical incorporation of Alanap is needed to get weed control. Alanap should not be used on shallow planted soybeans due to injury possibilities. Alanap controls mainly broadleaf weeds.

- (2) Ramrod: Apply Ramrod (CP-31393) preemergence at 4 to 5 lb/A. Use lower rate on sandy soils. Ramrod is a selective, root-absorbed herbicide that will give four to six weeks weed control. Ramrod is especially effective on grassy weeds but weak on broadleaf weeds. Present FDA approved use limits the application of Ramrod to soybeans intended for seed purposes only.

- (3) Vernam: Apply Vernam (vernolate) preplant at 3 lb/A. Vernam is highly volatile and must be incorporated immediately for best weed control. It may be applied preplant (plant seed as soon after treatment as possible) or preemergence. Vernam will leach readily but generally will give three to six weeks weed control of many annual broadleaf and grassy weeds. Soybeans should be planted at least 2 inches deep to avoid Vernam injury.

- (4) Lorox: Lorox (linuron) should be applied preemergence at 2 lb/A. Lorox has some foliar as well as root activity. Lorox will control annual broadleaf and grassy weeds for four to eight weeks. Lorox should be incorporated by rainfall or mechanically for maximum weed control effectiveness. Heavy rainfall immediately after seeding may cause excessive leaching and subsequent soybean injury.

- (5) Radox: Apply Radox (CDA) preemergence at 5 lb/A. Radox is a selective, root-absorbed herbicide which affects young seedlings. Rainfall or mechanical incorporation two or three days after application improves weed control effectiveness. Radox will effectively control grassy weeds for three to six weeks but is weak on broadleaf weeds. Radox is quite soluble and under conditions of high rainfall may leach rapidly and not give weed control.

(c) Postemergence Herbicides

There are only a few postemergence herbicides and these have been found relatively ineffective under Nebraska conditions.

- (1) 2,4-DB: 2,4-DB is used postemergence at 1/5 lb/A as an overall soybean spray primarily for cocklebur control. It should be applied to soybeans seven to ten days before bloom up to mid-bloom. Later application, or application to soybeans under severe drought stress, may cause injury and reduced yields.

Nebraska research indicates 2,4-DB to be partially effective on cocklebur but ineffective on other broadleaf weeds (e.g. pigweed). Do not confuse with the more common 2,4-D.

- (2) Tenoran: Tenoran is a postemergence soybean herbicide used at 3 lb/A or 1 to 1/2 lb/A + 0.25 to 0.5% surfactant WK. Tenoran may be applied postemergence up to last cultivation. Injury symptoms may appear following application but soybeans generally will outgrow them.

Nebraska has only limited research data on Tenoran. Information from other states indicates control of broadleaf weeds (not grasses) when these weeds are less than 1 1/2 inches tall.

General Considerations

Weed control programs should be planned in advance with specific practices outlined for each field. The following points should be considered.

(1) Plant good seed in moist, warm soil. This promotes rapid establishment and even stands. Uneven stands invite weed competition.

(2) Soybeans should be planted on well drained fields which are conducive to cultivation and other weed control measures. Low spots--poorly drained--provide severe weed problems.

(3) Avoid fields containing severe broadleaf weed problems. Use crop-herbicide rotations. If a field has a specific weed problem that cannot be controlled in soybeans, plant another crop and follow production practices which give control.

(4) Plan weed control practices early. Try to anticipate the problem. Weeds are the number one problem in soybean production. Plant soybeans so you can still take care of the weeds even if the herbicide fails. Herbicides for use in soybeans, like those for other crops, are most effective when incorporated into a well-planned production program.