University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Historical Materials from University of Nebraska-Lincoln Extension

Extension

1974

EC74-198 Soybean Weed Control

R. S. Moomaw

O. C. Burnside

A. R. Martin

Follow this and additional works at: http://digitalcommons.unl.edu/extensionhist

Moomaw, R. S.; Burnside, O. C.; and Martin, A. R., "EC74-198 Soybean Weed Control" (1974). *Historical Materials from University of Nebraska-Lincoln Extension*. 4229.
http://digitalcommons.unl.edu/extensionhist/4229

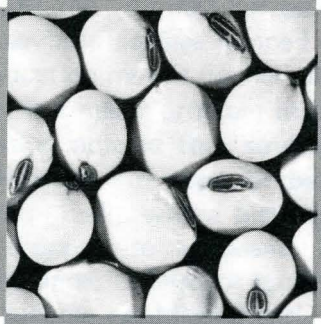
This Article is brought to you for free and open access by the Extension at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Historical Materials from University of Nebraska-Lincoln Extension by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

AGRI
S
85
E7
#74-198

EC 74-198

EC 74-198

SOYBEAN



Weed Control

RECEIVED
OCT 22 1974
C. Y. THOMPSON
LIBRARY

Extension Service
University of Nebraska-Lincoln College of Agriculture Cooperating with the
U.S. Department of Agriculture and the College of Home Economics
J. L. Adams, Director

SOYBEAN weed control

R. S. Moomaw, O. C. Burnside, and A. R. Martin[1/]

INTRODUCTION

Soybeans are an established crop in the eastern third of Nebraska. In 1972 the 742,000 harvested acres averaged 33 bu/A yield. Nebraska soybean acreage jumped to 1,200,000 acres in 1973 and soybean production moved further west.

Weed control is a major problem in soybean production. Survey results in Nebraska indicate that soybean yield reductions ranged from 2 to 5 bu/A because of weed competition. Losses in some fields were much greater. Fields with a history of heavy weed infestation are often not cropped to soybeans. Entire soybean fields are sometimes plowed under because of broadleaf weed infestations.

Weeds that become established early in the growing season are the strongest competitors to soybeans. After 4 to 6 weeks, soybeans provide dense shade within the row which prevents most weed seed germination.

CULTURAL WEED CONTROL

Use Clean Seed

Why create a weed problem? Weed-free soybean seed is a good investment resulting in fewer weed problems during subsequent growing seasons. Seed low in germination with poor vigor or contaminated with weed seeds is an invitation to weedy soybean fields. Use of certified soybean seed will assure purity and quality.

[1/] R. S. Moomaw is District Extension Specialist (Crops), Northeast Station, Concord; O. C. Burnside is Professor, Weed Science, Department of Agronomy, Lincoln; and A. R. Martin is Extension Agronomist (Weeds), Lincoln.

Select a Competitive Variety

Soybeans vary in their ability to compete with weeds (Table 1). The three varieties showing the least yield loss from weed competition are Harosoy 63, Amsoy, and Corsoy. Varieties showing the greatest yield loss are Hawkeye 63, Shelby, and Clark 63.

Table 1. Influence of weed control treatments and cultivars on soybean yields at Lincoln, Nebraska during 1968, 1969, and 1970.

	Soybean yield bu/A		*% yield reduction*
Variety	*Kept weed-free all season*	*Kept weed-free first 3 weeks*	*caused by delayed weed control*
Hark	36	31	14
Corsoy	38	35	8
Lindarin 63	34	29	15
Harosoy 63	32	31	3
Amsoy	34	32	6
Hawkeye 63	34	27	20
Ford	32	29	9
Shelby	38	31	18
Wayne	36	32	11
Clark 63	38	32	16

Amsoy and Corsoy are excellent varieties for Nebraska in their maturity zone. Amsoy 71 has replaced Amsoy as a recommended variety in Nebraska because of resistance to phytophthora root rot but otherwise the two varieties are similar.

Row Spacing

Investigation has shown that in the Midwest soybean yields will increase with row spacings narrower than 36 to 42 inches. Soybean plants are more evenly distributed over the soil surface resulting in better use of available water, mineral nutrients, and light. Narrow rows also reduce weed growth by providing earlier shading of the soil surface. Research with 10-,20-,30-, and 40-inch row soybeans indicated it took 36, 47, 58, and 67 days respectively, for Ford soybeans to shade the soil surface.

Data from Nebraska research (Table 2) showed that average yields of Ford soybeans in 10-, 20-, 30-, and 40-inch rows were 40, 34, 30, and 27 bu/A. Weed yields increased as row width increased.

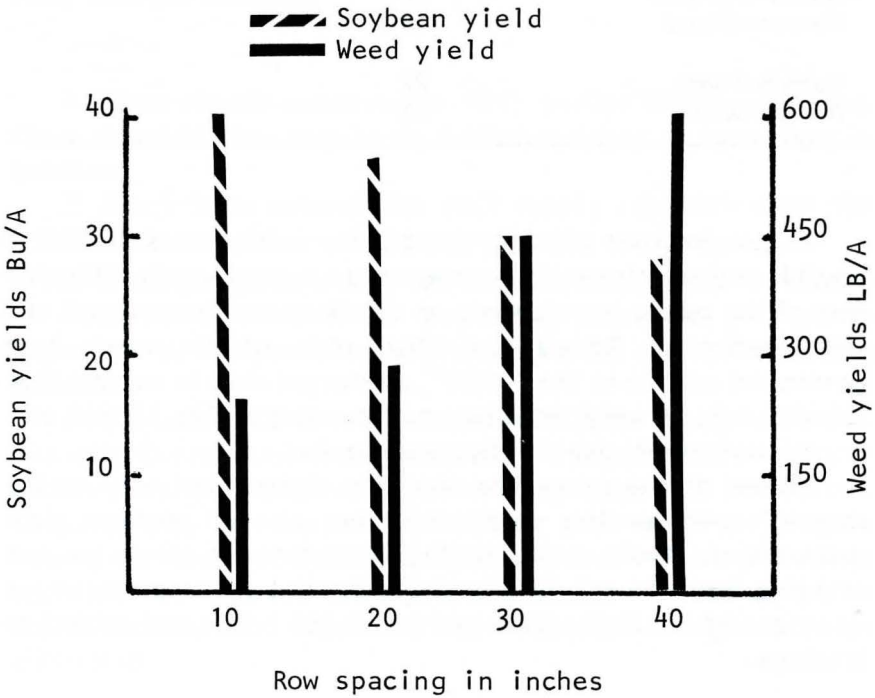


Table 2. Ford soybean yields and weed yields as affected by row spacing on herbicide treated but untilled plots at Lincoln, Nebraska during 1961 and 1962.

MECHANICAL WEED CONTROL

Present soybean production relies in part on use of the rotary hoe and the field cultivator to control weeds. Nebraska research (Table 3) showed that even on herbicide treated soybeans, cultivation increased soybean yield 7 bu/A and rotary hoeing added 2 bu/A. As other methods of weed control become more effective, our reliance on tillage will be reduced.

Table 3. Effect of cultivation and rotary hoeing on herbicide-treated soybeans at Concord, Nebraska during 1968, 1969, and 1970.

Tillage treatment	*Soybean yield bu/A*
Rotary hoed once	30
Non-rotary hoed	28
Cultivated once	32
Non-cultivated	25

To prevent root pruning, operate the cultivator as shallow as possible and no oftener than necessary to control weeds. Effectiveness of the rotary hoe depends on timeliness, optimum speed, and soil penetration. Rotary hoe when most of the weeds have germinated and are in the "white", unemerged stage to no later than ¼ inch height. A weighted rotary hoe traveling at 8 to 12 mph on a dry soil surface will give effective weed control.

Success of the rotary hoe operation depends not only on the stage of weed seedling development but also on soybean plant development. Avoid rotary hoeing when soybean plants are just emerging from the soil. Wait until the daytime air temperatures are warm enough so the soybean plants are not brittle and subject to breakage.

CHEMICAL WEED CONTROL

Introduction and widespread usage of herbicides is one of the major agricultural developments of the past two decades. Herbicides are now used on over 60% of the Nebraska soybean acreage. Advantages of using herbicides on soybeans include:

1. Less time and labor required for weed control.
2. Less equipment and tillage used.
3. Weed control even during rainy periods which may stop cultivation operations at a critical time.
4. More effective weed control.

Herbicide Formulations

Herbicides are formulated to be applied as solutions, emulsions,

suspensions, or granules. Various additives are used to facilitate application or to increase wetting characteristics. Since performance of liquid or granular herbicide formulations is generally comparable, the decision on what formulation to use should be based on factors other than performance.

1. *Water-soluble concentrates (WC)* readily dissolve in water. Once dissolved they require no further agitation to keep them in solution.

2. *Emulsifiable concentrates (EC)* readily mix with water but mild agitation may be required to maintain the emulsion.

3. *Wettable powders (WP)* are insoluble or only slightly soluble in water or oil. The finely ground particles must be kept in suspension by mechanical or jet by-pass agitation during the spraying operation.

4. *Granules (G)* can be formulated with most herbicides. Granular formulations usually cost more than wettable powders or concentrates due to extra material being used and transported. Granules may be less effective under dry conditions due to incomplete release of the active ingredient, and they are difficult to apply uniformly at low rates. Granules may be more convenient to apply because the water required with liquid applications is eliminated.

Factors Affecting Herbicide Performance

Reports of herbicide failure or crop injury can often be traced to several causes:

1. *Weeds are resistant to the herbicide used.* Learn what weed species are present in individual fields. Then select a herbicide which will be effective against these weeds. Information in Table 4 will help you select the right herbicide to control specific weed species.

2. *Rate of herbicide applied.* Reducing the application rate because of herbicide cost is often poor economy. For some herbicides, the rate must be adjusted for the soil texture and organic matter content. This information will appear on the herbicide label.

Table 4. Toxicity of selected soybean preplant and preemergence herbicides to specific weed species.

Herbicide	*Weed Species*																	
	Annual morning-glory	*Barnyardgrass*	*Black nightshade*	*Cocklebur*	*Crabgrass*	*Fall pancium*	*Foxtail*	*Jimsonweed*	*Kochia*	*Lambsquarters*	*Pigweed*	*Ragweed*	*Sandbur*	*Shattercane*	*Smartweed*	*Sunflower*	*Velvet leaf*	*Crop tolerance*
Amiben	P[a]	G	G	P	G	G	G	P	G	G	G	G	F	P	G	P	G	G
Lasso	P	E	G	P	E	E	E	P	P	G	E	P	F	P	P	P	P	G
Lasso + Bromex or Maloran	P	E	G	F	E	E	E	F	F	G	E	G	F	P	G	F	G	G
Lasso + Lorox	P	E	G	F	E	E	E	F	F	G	E	G	F	P	G	F	G	G
Lasso + Lexone or Sencor	P	E	G	G	E	E	E	G	F	E	E	E	F	P	G	G	E	G
Treflan	P	E	P	P	E	E	E	P	F	G	G	P	E	E	P	P	P	G
Treflan + Lexone or Sencor	P	E	F	G	E	E	E	G	G	E	E	E	E	G	G	G	E	G

[a] *Response ratings: E = Excellent; G = Good; F = Fair; P = Poor. Plant response may be altered by growing conditions, soil type, and rates of application. Ratings may vary from season to season and geographical areas within the state.*

3. Wrong herbicide used for the soil type involved. Table 5 classifies several herbicides by leaching characteristics. Such physical characteristics indicate, for example, that Amiben and Ramrod would generally be less effective on sandy soils low in organic matter.

Table 5. Leaching characteristics of several herbicides.

	Leaching characteristic in different soil types	
Herbicide	*Low organic matter, sandy soils*	*Other soil types*
Amiben	Leaches readily	Some resistance to movement
Ramrod	Leaches readily	Considerable resistance to movement
Lasso	Moderate leaching	Little or no leaching
Lorox Vernam Treflan	Slight leaching	Essentially no leaching

4. Improper application methods. Carefully calibrate herbicide application equipment. Consult E.C. 74-130 A Guide For Herbicide Use in Nebraska, for instructions on calibration of equipment. Follow carefully all label instructions regarding incorporation of preplant herbicides.

Soybean Herbicides

Many herbicides have label clearance for use on soybeans. Two broadcast rates will be given for each herbicide listed. The first rate will be lb/A of active material; the second rate will be the amount of commercial product to use per acre. If the herbicide is to be band applied, compute the band rate/A by use of this formula:

$$\frac{\text{Band width (inches)}}{\text{Row width (inches)}} \times \text{Broadcast rate} = \text{Amount needed/A}$$

Preplant Incorporated Applications

1. Treflan (trifluralin), 0.75 lb/A or 0.75 qt EC. Treflan controls annual grasses including shattercane and certain broadleaf weeds such as pigweed and common lambsquarters. Large seeded broadleaf

weeds such as velvetleaf, common cocklebur, sunflower, smartweed, jimsonweed, morningglory, and ragweed are not controlled satisfactorily by Treflan. Immediately incorporate Treflan by cross tandem disking or equivalent soil mixing. Treflan requires very little soil moisture to be effective for weed control.

2. Treflan (trifluralin) + Sencor or Lexone (metribuzin), 0.75 + 0.38 lb/A or 0.75 qt EC + 0.75 lb/A WP. Treflan must be applied preplant incorporated. Then the Sencor or Lexone is applied as an overlay treatment at planting time or before soybean or weed emergence. Sencor or Lexone greatly improves control of many large-seeded broadleaf weeds not controlled by Treflan alone.

Preemergence Applications (from Planting to Crop Emergence)

1. Amiben (chloramben), 2 to 3 lb/A or 4 to 6 qt WC or 20 to 30 lb/A G. Under favorable moisture conditions, Amiben has consistently controlled annual grass, common broadleaf weeds such as pigweed and common lambsquarters, and to a lesser extent such large-seeded broadleaf weeds as velvetleaf and smartweed. Amiben is highly soluble in water so it may lose effectiveness under high rainfall. The 3 lb/A rate is recommended for heavy soil types high in organic matter.

2. Lasso (alachlor), 2.5 lb/A or 2.5 qt EC or 17 lb/A 15% G. Lasso gives control of most annual grasses and satisfactory control of pigweed and common lambsquarters. Lasso does not control the large-seeded broadleaf weeds. Lasso does not leach readily and generally is effective under conditions of high rainfall.

3. Lasso (alachlor) + Lorox (linuron), 1.5 + 1 lb/A or 1.5 qt EC + 2 lb/A WP. The addition of Lorox to Lasso provides effective control of many large-seeded broadleaf weeds not controlled by Lasso alone. Satisfactory control of velvetleaf, smartweed, sunflower, and other broadleaf weeds is usually obtained with this mixture.

4. Lasso (alachlor) + Maloran or Bromex (chlorbromuron), 1.5 + 1.5 lb/A or 1.5 qt EC + 3 lb/A WP. This combination should provide broad spectrum control of grass and broadleaf weeds including the large-seeded broadleaf weeds.

5. Lasso (alachlor) + Sencor or Lexone (metribuzin), 1.5 + 0.38 lb/A or 1.5 qt EC + 0.75 lb/A WP. This combination is similar to Lasso + Lorox and Lasso + Maloran in weed species controlled. Soybean injury may occur with any of these three herbicide mixtures

when the soil texture changes within a field. Follow label instructions for rates to use on coarser textured, low organic matter soils.

OTHER CONSIDERATIONS

"Piggyback" or Overlay Herbicide Applications

This concept of soybean weed control refers to the practice of applying separate or split herbicide applications. After a preplant herbicide has been applied, primarily to control grassy weeds, a preemergence herbicide is applied in a band or broadcast to provide more specific broadleaf weed control. Treflan is an example of a preplant herbicide which may be used. Amiben, Lorox, Maloran or Bromex, and Sencor or Lexone would be examples of possible preemerge "piggyback" herbicides to use. Check to see which "piggyback" or overlay herbicide combinations are registered.

Broadcast Versus Band Herbicide Application

Farm operators who choose to use a preemergence herbicide at planting time must decide whether to broadcast or band apply the herbicide. A band applied herbicide supplemented with row-middle cultivation will generally give satisfactory weed control at reduced costs.

A Nebraska study (Table 6) showed that a 14-inch herbicide band was the minimum width used which consistently maintained soybean yield when supplemented with cultivation. Use of a wider herbicide band or a broadcast herbicide application did not produce any more soybean crop value because of increased herbicide cost. Use of a 14-inch herbicide band reduces herbicide cost 2/3 on 40-inch rows or 1/2 on 30-inch rows as compared to broadcasting.

Effect of Weeds on Combine Efficiency

Competition of weeds with the crop not only reduces yields but also effects combine efficiency. Research (Table 7) showed that harvesting losses were greater where broadleaf weeds predominated compared with grass weeds. Grass weeds are shorter and more dense in growth habit and help to cushion the soybean stalk against vibration caused by the combine cutter bar. Weeds in soybeans will also increase harvest time and combine repair requirements.

Table 6. Influence of herbicide band width on soybean yields at Concord, Nebraska during 1969, 1970, and 1971.

Weed control and Amiben treatments	*No. of cult*	*Soybean yield bu/A*	*Cult cost[a] $*	*Amiben cost[b] $*	*Crop value minus weed control cost[c] $*
Weedy check	1	23	----	----	70.20
Handweed	1	36	----	----	----
7-inch band	1	28	1.45	3.28	80.47
14-inch band	1	34	1.45	6.70	92.35
21-inch band	1	33	1.45	9.98	88.77
Broadcast	1	37	1.45	14.25	94.10
Broadcast	0	32	----	14.25	81.65

[a] *Cultivation cost used was $1.45/A from EC 70-806, "Farm Custom Rates Paid in Nebraska."*

[b] *Herbicide costs figured on basis of Amiben at $9.50/gallon.*

[c] *Average soybean value at $3.00/Bu for 3 year period 1969-1971.*

Table 7. Effect of kind of weed population present on soybean harvest losses at Lincoln, Nebraska during 1969, 1970, and 1971.

Kind of weeds present	*Weed yields lb/A*	*Combine soybean yield bu/A*	*Soybean harvest losses bu/A*	*Total soybean yield bu/A*
Grass	1480	20.4	2.5	22.9
Broadleaf	1200	23.7	3.4	27.1

Close-drilled Soybeans

Narrow row or solid-stand soybeans generally produce higher yields than do soybeans grown in 40-inch rows (Table 2). In addition to better utilization of light, mineral nutrients, and water, close-drilled soybeans do not expose the soil to as much wind or water erosion as do wider row spacings.

Effective and dependable soybean weed control by cultural and chemical methods could eliminate our present day dependence on

the cultivator and permit soybean production in solid seedings. The deterrent in the past has been that several large-seeded broadleaf weeds have not been controlled by commonly used soybean herbicides. Major escapes among this group are common cocklebur, velvetleaf, jimsonweed, morningglory, smartweed, sunflower, and ragweed.

Several new additions to the soybean herbicide arsenal provide the needed control of large-seeded broadleaf weeds. Sencor or Lexone and Maloran or Bromex now have label clearance for use on soybeans. Lorox is an established herbicide which controls these broadleaf weeds. Recent Nebraska research (Table 8) has demonstrated that herbicide mixtures of Sencor or Lexone, Maloran or Bromex, and Lorox with grass killing herbicides gave excellent control of most annual weeds in soybeans.

Table 8. Weed and soybean yields in velvetleaf infested soybeans grown in 30-inch rows at Lincoln, Nebraska during 1972.

Weed control treatment	*Herbicide rate lb/A a.i.*	*Weed yield lb/A*	*Soybean yield bu/A*
Amiben + Sencor	1.5 + 0.33	170	28
Lasso + Lorox	1.5 + 1	820	24
Lasso + Maloran	1.5 + 1.5	200	26
Lasso + Sencor	1.5 + 0.33	70	33
Preforan + Sencor	2 + 0.33	240	29
Treflan + Sencor	0.5 + 0.33	240	28
Sencor	0.5	40	28
Weedy check	--	2650	13

Close-drilled soybean culture depends on reliable and effective weed control every year; otherwise crop yield is severely reduced. Therefore, a "back up" weed control program is needed in case rotary hoeing or the preplant or preemergence herbicides fail to control large-seeded broadleaf weeds.

A new candidate for this postemergence weed control job is Basagran. Basagran controls most problem broadleaf weeds selectively in soybeans when applied to small weeds. Nebraska research data (Table 9) indicates that Basagran may provide the needed "back up" when other weed control measures have been less than satisfactory.

Table 9. Amsoy soybean yields as affected by preemergence and postemergence herbicides and rotary hoeing for weed control when grown in 15-inch rows at Lincoln, Nebraska during 1972.

		Soybean yield bu/A			
Preemergence weed control treatment	*Herbicide rate lb/A a.i.*	*No rotary hoe: No post trt.*	*1 rotary hoe: No post trt.*	*No rotary hoe: Basagran*[a/]	*1 rotary hoe: Basagran*
None	--	22	33	29	44
Handweeded	--	50	48	46	52
Amiben + Sencor	1.25 + 0.33	45	44	48	50
Lasso + Lorox	1.25 + 1	50	46	47	49
Lasso + Sencor	1.25 + 0.33	48	48	48	47
Preforan + Sencor	2 + 0.33	48	47	48	50

[a/] *Basagran was applied postemergence (post) at 0.75 lb/A when velvetleaf was in the 4 leaf stage.*

Soybean production practices are expected to change rapidly in the immediate future due to recent developments in integrated weed control systems. One change will be an increase in narrow row soybeans which will increase yields, reduce production costs, reduce labor requirements, and provide more protection of the soil from wind and water erosion.