11-1-1981

Control of sicklepod (Cassia obtusifolia L.) in soybeans

Carl H. Hovermale

Harold R. Hurst

Bulletin 898 November 1981

Control of Sicklepod (*Cassia obtusifolia* L.) in Soybeans

C. H. Hovermale • H. R. Hurst

MAFES MISSISSIPPI AGRICULTURAL & FORESTRY EXPERIMENT STATION
R. RODNEY FOIL, DIRECTOR MISSISSIPPI STATE, MS 39762

Mississippi State University
James D. McComas, President Louis N. Wise, Vice President

AUTHORS

C. H. Hovermale, assistant agronomist, MAFES South Mississippi Branch

H. R. Hurst, plant physiologist and weed control project leader, MAFES Delta Branch

Control of Sicklepod (*Cassia obtusifolia* L.) in Soybeans

Sicklepod (*Cassia obtusifolia* L.) has progressed in 20 years from a troublesome weed along the Gulf coast of Mississippi, Louisiana, Alabama and Georgia to a primary production problem that is spreading northward at an alarming rate. This weed has been present for many years, but the combination of crops and cropping practices followed did not permit it to become a problem.

Conditions for the growth and spread of sicklepod became favorable when soybeans became a popular crop. Sicklepod is a very aggressive legume that does not nodulate and will attain a height of 6 to 8 ft and a basal stem diameter of up to 1/2 inch under favorable conditions. It will take over a soybean field.

Sicklepod is a prolific seed producer, and yields of up to 1000 lbs/acre have been reported (1). One pound contains about 3000 seed with about 15% germination the first year, and one year of seed production at only 500 lbs/acre provides almost 1/4 million viable seed. Control of the weed is very difficult after two years.

Sicklepod in corn or pasture can be controlled easily with phenoxy herbicides. However, the phenoxy herbicides are phytotoxic to soybeans, and control of sicklepod in soybeans can be accomplished only by a program of preplant incorporated and/or preemergence applications of herbicides followed by timely applications of postemergence herbicides.

Postemergence herbicides can be applied over-the-top of soybeans or directed to spray weeds with minimal contact of herbicides with soybean plants---preferably less than the lower 1/4 of the plant. Both methods were used in the study reported herein.

Materials and Methods

Studies were conducted at the MAFES South Mississippi Branch in 1978, 1979 and 1980. Soil in the test area is a sandy loam with CEC of 5.0, organic content of 1% and pH of 6.0.

Main plots were treatments with combinations of herbicides applied preplant incorporated or preemergence, plus a cultivated check, a hand-hoed check and a weedy check, and combinations of herbicides were applied over-the-top or post directed to one half of each main plot (Tables 1, 2 and 3).

Bragg soybeans were planted May 17, 1978, June 8, 1979 and June 20, 1980. All preplant and/or preemergence herbicides were applied on the day of planting. Row widths were 40 inches in 1978 and 1979, 30 inches in 1980.

Preplant, preemergence and over-the-top herbicides were applied in 20 gal water with a tractor-mounted sprayer. Directed postemergence herbicides were applied with commercial fender equipment in 1978 and 1979, and a slide applicator built by station personnel was used in 1980. The preplant herbicides were incorporated with a 12-ft disc followed by a mulcher/packer.

The trials were harvested with a four-row John Deere combine, and yields were adjusted for foreign matter and to 13% moisture.

Results

Yields from plots treated with herbicides applied preplant incorporated or preemergence without follow-up post treatments were higher (with a few exceptions) than yields from the weedy check (Table 4). Weeds were controlled more effectively and soybean yields were higher (with few exceptions) on plots where post directed or over-the-top herbicide applications were superimposed on the preplant incorporated or preemergence treatments than on plots where only preplant incorporated or preemergence herbicides were applied.

Post directed applications of metribuzin plus surfactant gave good contact control and demonstrated potential for suppression of sicklepod emergence when climatic conditions were favorable but did not give good control of grasses more than 2 to 3 inches tall. Effectiveness of post directed applications of linuron plus surfactant was about equal to that of metribuzin plus surfactant, but linuron was slightly more

effective than metribuzin on larger grasses. Paraquat also gave excellent sicklepod kill and was the only material that killed large sicklepod and grasses, but only when adequate coverage was obtained. However, paraquat must be applied carefully to avoid the girdling or weakening of soybean stems that occurs when the material is deposited too far above ground level. Drift problems with paraquat also have been reported.

Table 1. Design of a herbicide trial for control of sicklepod in soybeans, MAFES South Mississippi Branch, 1978.

		Treatments				
1	A*	Trifluralin 4E	(.5 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre I***
	B**	Chloroxuron 50W	(.5 lb a.i./A)	+ NPO	(1 gal/A)	Post D****
2	A	Pendimethalin 4E	(.5 lb a.i./A)	+ Metribuzin 4	(.375 lb a.i./A)	Pre I
	B	Chloroxuron 50W	(.5 lb a.i./A)	+ NPO	(1 gal/A)	Post D
3	A	Pendimethalin 4E	(.5 lb a.i./A)	+ Metribuzin 4L	(.25 lb a.i./A)	Pre I
	B	Linuron 50W	(.5 lb a.i./A)	+ Surfactant	(.5%)	Post D
4	A	Alachlor 4E	(2.0 lb a.i./A)	+ Metribuzin 4 L	(.25 lb a.i./A)	Pre E*****
	B	Chloroxuron 50W	(.5 lb a.i./A)	+ NPO	(1 gal/A)	Post D
5	A	Alachlor 4E	(2.0 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	B	Chloroxuron 50W	(.5 lb a.i./A)	+ NPO	(1 gal/A)	Post D
6	A	Alachlor 4E	(2.5 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	B	Chloroxuron 50W	(.5 lb a.i./A)	+ NPO	(1 gal/A)	Post D
7	A	Alachlor 4E	(2.5 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	B	Paraquat 2 CL	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D
8	A	Alachlor 4E	(2.5 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	B	Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.5%)	Post D
9	A	Alachlor 4E + cultivation	(2.5 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	B	Chloroxuron 50W	(.5 lb a.i./A)	+ NPO	(1 gal/A)	Post D
10	A	Pendimethalin 4E + Metribuzin 4L	(.5 lb a.i./A) (.25 lb a.i./A)	+ Metribuzin 4L	(.25 lb a.i./A)	Pre I Pre E
	B	Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D
11	A	Cultivate				
	B	Chloroxuron 50W	(.5 lb a.i./A)	+ NPO	(1 gal/A)	Post D
12	A	Hand Hoed				
	B	Chloroxuron 50W	(.5 lb a.i./A)	+ NPO	(1 gal/A)	Post D
13	A	Weedy Check				
	B	Chloroxuron 50W	(.5 lb a.i./A)	+ NPO	(1 gal/A)	Post D

*Preplant incorporated or preemergence treatment of each main plot.
**Post directed treatment of one half of each main plot.
***Preplant incorporated
****Post directed
*****Preemergence

Discussion

Metribuzin (Sencor® or Lexone®) was included in each preplant incorporated and preemergence treatment because of its effectiveness against sicklepod, but the highest rate of metribuzin that can be applied to coarse-textured, low-organic matter soils is 0.5 lb ai/acre, a rate that gives control of sicklepod for only four to six weeks. Soybeans grown on 30- and 40-inch rows do not develop enough canopy to shade the row middles after only four to six weeks after planting, and sicklepod will develop and compete aggressively with them for nutrients, light and moisture. Therefore, post emergence applications of herbicides are required for sicklepod, and it is imperative that these applications be made while the sicklepod plants are young and tender.

Control of sicklepod for four to six weeks enables soybeans to reach a height of 8 to 12 inches before emerging sicklepod plants reach a height of 2 to 5 inches. This height differential is critical because the herbicides registered for post treatment generally call for soybeans to be 8 to 12 inches tall and weeds to be 1 to 3 inches tall.

Table 2. Design of a herbicide trial for control of sicklepod in soybeans, MAFES South Mississippi Branch, 1979.

		Treatments			
1	A* Trifluralin 4E	(.5 lb a.i./A)	+ Metribuzin 4L	(.375 lbs a.i./A)	Pre I***
	B** Toxaphene 6E	(2.0 lb a.i./A)			OT****
2	A Pendimethalin 4E	(.5 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre I
	B Toxaphene 6E	(1.0 lb a.i./A)	+ Bentazon 4E	(.75 lb ai.i/A)	OT
3	A Pendimethalin 4E	(.75 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre I
	B Linuron 50W	(.5 lb a.i./A)	+ Surfactant	(.25%)	Post D*****
4	A Alachlor 4E	(2.0 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E******
	B Toxaphene 6E	(1.0 lb a.i./A)	+ Acifluorfen 2S	(.375 lb a.i./A)	OT
5	A Alachlor 4E	(2.0 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	B Toxaphene 6E	(1.0 lb a.i./A)	+ Mefluidide 2S	(.25 lb a.i./A)	
	+ Surfactant	(.25%)			OT
6	A Alachlor 4E	3.0 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	B Bentazon 4E	(.5 lb a.i./A)	+ Mefluidide 2S	(.25 lb a.i./A)	
	+ Surfactant	(.25%)			OT
7	A Alachlor 4E	(2.0 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	B Paraquat 2 CL	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D
8	A Alachlor 4E	(2.5 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	B Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.25%)	OT
9	A Alachlor 4E	(.25 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	+ cultivation				
	B Linuron 50W	(.5 lb a.i./A)	+ Surfactant	(.25%)	Post D
10	A Pendimethalin	(.5 lb a.i./A)	+ Metribuzin 4L	(.25 lb a.i./A)	Pre I
	+Metribuzin 4L	(.25 lb a.i./A)			Pre E
	B Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D
11	A Cultivate				
	B Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D
12	A Hand Hoed				
	B Linuron 50W	(.5 lb a.i./A)	+ Surfactant	(.25%)	Post D
13	A Weedy Check				
	B Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D

*Preplant incorporated or preemergence treatment of each main plot.
**Post directed or over-the-top treatments of one half of each main plot.
***Preplant incorporated
****Over-the-top treatment of 1- to 5-inch tall sicklepod.
*****Post directed
******Preemergence

Conclusions

Over-the-top treatments for sicklepod have a place in soybean production, but there are problems. Over-the-top treatments (toxaphene plus bentazon and toxaphene plus Dyanap® excepted) increased soybean yields but not nearly as much as did the post directed treatments. Timing of over-the-top treatments is more critical than for post directed treatments because sicklepod plants must be less than 2 inches tall for dependable kill. Also, over-the-top treatments are weed specific; i.e., they kill sicklepod but do not kill other broadleaf weeds in some instances and are in no way detrimental to grasses. They also can suppress soybean growth and yield.

The combination of treatments that gave the most consister control of sicklepod in these trial was the preplant incorporation pendimethalin (0.5 lb ai/acre) plu metribuzin (0.25 lb ai/acre) follov ed by a preemergence applicatio of metribuzin (0.25 lb ai/acre) and post directed application o metribuzin (0.25 lb ai/acre).

Table 3. Design of a herbicide trial for control of sicklepod in soybeans, MAFES South Mississippi Branch, 1980.

1	A*	Pendimethalin 4E	(.5 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A	Pre I***
	B**	Toxaphene 8E	(3.0 lb a.i./A)			OT****
2	A	Pendimethalin 4E	(.5 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre I
	B	Toxaphene 8E	(1.0 lb a.i./A)	+ Dynap 3E	(1.5 lb a.i./A)	OT
3	A	Alachlor 4E	(2.0 lb a.i./A)	+ Metribuzin 4L	(.5 lb a.i./A)	Pre E*****
	B	Linuron 50W	(.5 lb a.i./A)	+ Surfactant	(.25%)	Post D******
4	A	Alachlor 4E	(2.0 lb a.i./A)	+ Metribuzin 4L	(.25 lb a.i./A)	Pre E
	B	Toxaphene 8E	(1.0 lb a.i./A)	+ Dynap 3E	(1.5 lb a.i./A)	OT
5	A	Alachlor 4E	(2.0 lb a.i./A)	+ Metribuzin 4L	(.5 lb a.i./A)	Pre E
	B	Toxaphene 8E	(3.0 lb a.i./A)			OT
6	A	Metolachlor 6E	(2.0 lb a.i./A)	+ Metribuzin 4L	(.5 lb a.i./A)	Pre E
	B	Toxaphene 8E	(3.0 lb a.i./A)			OT
7	A	Alachlor 4E	(2.5 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre
	B	Paraquat 2 CL	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D
8	A	Alachlor 4E	(.25 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	B	Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.25 %)	Post D
9	A	Alachlor 4E + cultivation	(2.5 lb a.i./A)	+ Metribuzin 4L	(.375 lb a.i./A)	Pre E
	B	Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D
10	A	Pendimethalin 4E + Metribuzin 4L	(.5 lb a.i./A) (.25 lb a.i./A)	+ Metribuzin 4L	(.25 lb a.i./A)	Pre I Pre E
	B	Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D
11	A	Cultivate				
	B	Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D
12	A	Hand Hoed				
	B	Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D
13	A	Weedy Check				
	B	Metribuzin 4L	(.25 lb a.i./A)	+ Surfactant	(.25%)	Post D

*Preplant incorporated or preemergence of each main plot
**Post directed or over-the-top treatment of one half of each main plot
***Preplant incorporated
****Over-the-top treatment of 1- to 5-inch tall sicklepod.
*****Preemergence
******Post directed

Table 4. Yield of soybeans in herbicide trials for control of sicklepod,by year and by treatment, MAFES South Mississippi Branch, 1978, 1979 and 1980[1].

Main Plots	Yield							
	1978		1979		1980		1978-80 Av.	
	A*	B**	A*	B**	A*	B**	A*	B**
	bu/a							
1	35.9	40.8	24.2	28.7	19.8	20.9	-***	-
2	36.2	39.9	26.5	25.1	17.2	13.0	-	-
3	24.2	30.5	20.7	27.3	21.0	24.0	22.0	27.3
4	32.0	43.2	23.2	27.4	19.1	19.2	-	-
5	39.6	45.8	21.2	27.2	19.8	24.9	-	-
6	37.2	45.8	21.4	27.0	23.7	27.0	-	-
7	33.6	44.2	25.8	25.7	21.7	23.5	27.0	31.2
8	39.2	41.5	26.3	38.3	23.8	25.5	29.8	35.1
9	26.7	36.0	29.7	35.3	23.6	23.2	-	-
10	39.8	50.0	27.8	35.0	24.4	26.9	30.7	37.3
11	35.2	27.4	24.4	20.9	12.3	14.9	21.3	23.7
12	40.7	42.9	28.3	39.7	19.7	17.7	29.6	33.4
13	19.0	39.7	23.4	26.4	13.3	14.1	18.5	26.7
Av	33.8[b]	40.6[a]	24.8[b]	29.5[a]	20.0[b]	21.2[a]		

[1]Key yields to treatments by referring to Tables 1, 2 and 3. For example, the 27.4 bu/acre on line four under 1979 B resulted from Alachlor 4E at 2.0 lbs a.i./acre + metribuzin 4L at .375 lb a.i./acre applied preemergence followed by over-the-top application of Toxaphene 6E at 1.0 lbs a.i./acre plus Acifluorfen 2S at .375 lbs a.i./acre.

*Preplant incorporated or preemergence treatment of each main plot.

**Post directed or over-the-top treatments of one half of each main plot.

***Blank (-) indicates same treatment not applied each year.

Literature Cited

1. Worsham, A. D. and H. G. Small, Jr. 1968. "Soybean Weed Control on Farm Tests in North Carolina in 1967." *Proc. South. Weed Conf.* 21: 92-99.

Mention of a trademark or proprietary product does not constitute a guarantee or warranty of the product by the Mississippi Agricultural and Forestry Experiment Station and does not imply its approval to the exclusion of other products that also may be suitable.