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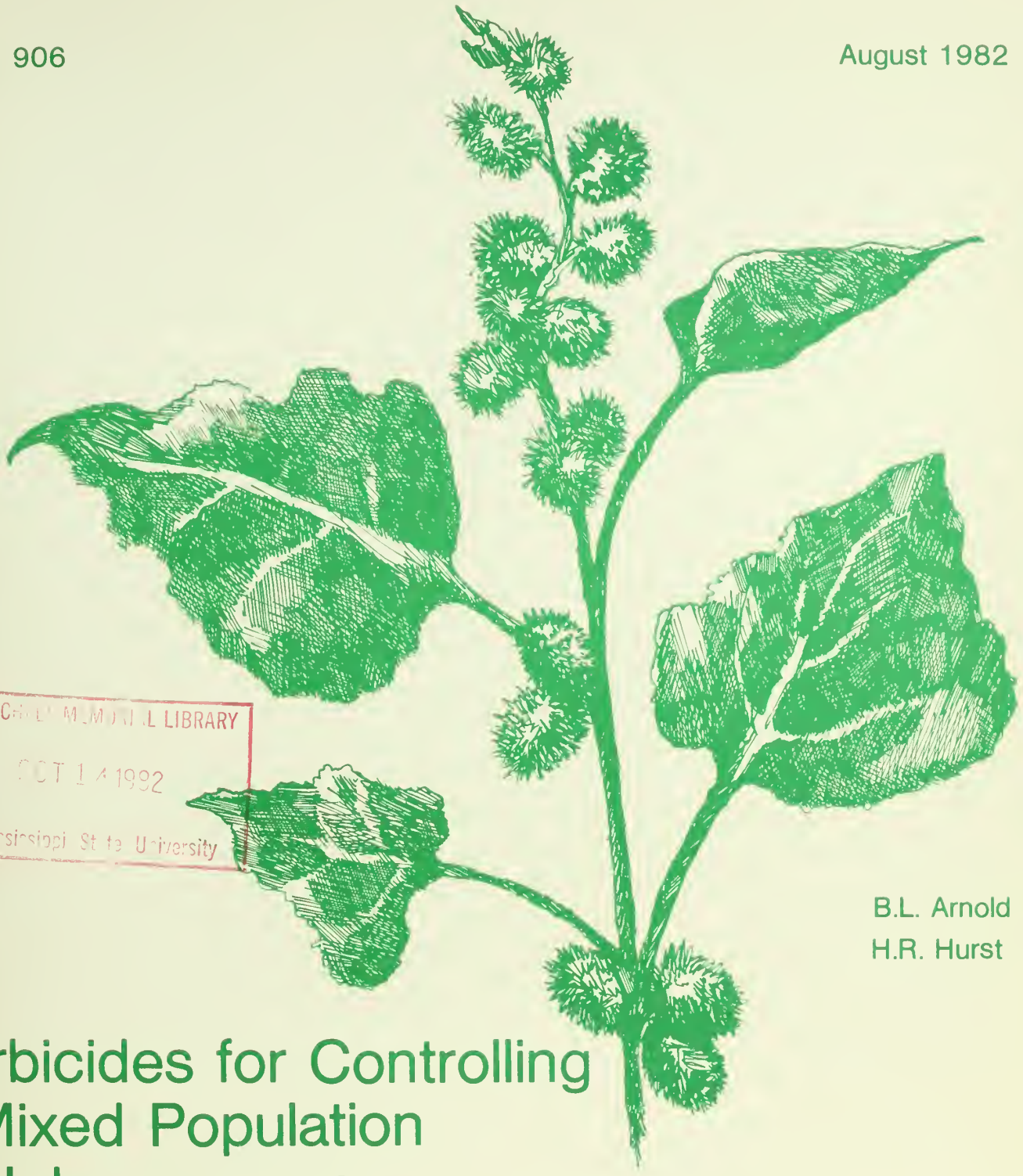

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Johnsongrass [*Sorghum halepense* (L.) Pers.] and common cocklebur (*Xanthium pennsylvanicum* Wallr.) are common problem weeds in soybean [*Glycine max* (L.) Merr.] fields (2,3). Dinitroaniline herbicides applied preplant at twice the rate (2X) labeled for annual grass control and glyphosate applied with the recirculating sprayer (RCS) have improved the control of rhizome johnsongrass in soybean fields (1,4). Applications of dinoseb, bentazon and mixtures of dinoseb and naptalam also have reduced common cocklebur in many fields, and the weed now can be controlled more effectively.

We report in this publication the results of a study of the effectiveness of selected herbicides for control of large, natural infestations of johnsongrass and common cocklebur in soybean fields.

Method and Materials

The three-year trial (1977-79) was conducted at the MAFES North Mississippi Branch on a silt loam soil (17.6% sand, 68.8% silt, 13.6% clay) with 1.4% organic matter and pH of 6.1. The design was a split plot with four replications.

Main plots were 16 rows (40 inches wide and 30 ft long), and the treatments were a check (no preplant herbicide) and preplant incorporated treatment with fluchloralin, profluralin, trifluralin or pendimethalin for johnsongrass control (Table 1). Each herbicide was broadcast at the 2x rate in fall 1976 and 1977 and incorporated by

Figure 1. BASALIN 1.5 lb/A 1976, 1977 Fall +0.75 lb/A 1979 Spring Preplant Incorporated. ROUNDUP in recirculating sprayer in mid-summer of 1977, 1978. Shows excellent control of Johnsongrass and no control of Cocklebur. Picture - July 17, 1979.

Figure 2. BASALIN (same as in 1 above). BASAGRAN 0.75 lb/A over-the-top early-season 1977, 1978, 1979 and repeated if needed. Shows fair control of Johnsongrass and excellent control of Cocklebur. Picture - July 17, 1979.

disking twice soon thereafter, and beds were formed in March 1977 and 1978. Bedded rows were prepared in 1979 before applying each herbicide and incorporating 2 inches deep with a power-driven rotary tiller. Each main plot received the same preplant treatment each year.

Subplots were four 40-inch wide by 30-ft long rows on each main plot, and treatments were post-

plant herbicide applications. T
postplant herbicides were appli
either singly or in sequenti
programs for control of johnso
grass and/or cocklebur (Table 1

'Forrest' soybeans were plant

Table 1. Preplant treatment with superimposed postplant treatments for control of common cocklebur and johnsongrass in soybeans in herbicide trials at the MAFES North Mississippi Branch, 1977-79.

Main Plot Preplant Treatments				Postplant Treatments of Each Main Plot					
Herbicides	lbs ai/ acre	Broadcast and incorporated Date	Method	Herbicides	lbs ai/ acre	Date	Method	Weed	Stage
		Fall 1976				1977			
A. Fluchloralin (Basalin 4E)	1.50	11-5	Disk harrow 4 inches deep	a. Metriflufen + surfactant (HOE 29152 3E)	0.75	6-10	OT[1/]	JG[3/]	12-15"
B. Profluralin (Tolban 4E)	1.50	11-5	Disk harrow 4 inches deep	b. Bentazon (Basagran 4E)	0.75	6-10	OT	CB[4/]	3-5"
				Chlordimedon (BAS 9021 75W)	1.00	6-20	OT	JG	12-15"
				Bentazon	0.75	6-29	OT	CB	10-15"
C. Trifluralin (Treflan 4E)	1.50	11-5	Disk harrow 4 inches deep	c. Bentazon	0.75	6-10	OT	CB	3-5"
				Metriflufen + surfactant	0.75	6-20	OT	JG	12-15"
				Bentazon	0.75	6-29	OT	CB	10-15"
D. Pendimethalin (Prowl 4E)	1.50	11-5	Disk harrow 4 inches deep	d. Bentazon	0.75	6-10	OT	CB	3-5"
				Bentazon	0.75	6-29	OT	CB	10-15"
E. None (check)	--	--	---						
		Fall 1977				1978			
A. Fluchloralin	1.50	10-14	Disk harrow 4 inches deep	a. Glyphosate (Roundup 4E)	1.00	7-6	RCS[2/]	JG	30-40"
B. Profluralin	1.50	10-14	Disk harrow 4 inches deep	b. Bentazon	0.75	6-12	OT	CB	4"
				Bentazon	0.75	6-28	OT	CB	4"
				Glyphosate	1.50	7-6	RCS	JG	30-40"
C. Trifluralin	1.50	10-14	Disk harrow 4 inches deep	c. Naptalam + Dinoseb (Dyanap 3E)	2.25	5-29	OT	-	SB[5/] cracking
				Bentazon	0.75	6-12	OT	CB	4"
				Bentazon	0.75	6-28	OT	CB	4"
				Glyphosate	1.50	7-6	RCS	JG	30-40"
D. Pendimethalin	1.50	10-14	Disk harrow 4 inches deep	d. Bentazon	0.75	6-12	OT	CB	4"
				Bentazon	0.75	6-28	OT	CB	4"
E. None (check)	--	--	---						
		Spring 1979				1979			
A. Fluchloralin	0.75	6-12	Power incorporator 2 inches deep	a. Glyphosate	1.50	7-25	RCS	JG	24-30"
B. Profluralin	0.75	6-12	Power incorporator 2 inches deep	b. Bentazon	0.75	7-2	OT	CB	1-5"
				Glyphosate	1.50	7-25	RCS	JG	24-30"
C. Trifluralin	0.75	6-12	Power incorporator 2 inches deep	c. Naptalam + Dinoseb	4.50	6-18	OT	-	SB cracking
				Bentazon	0.75	7-2	OT	CB	1-5"
				Glyphosate	1.50	7-25	RCS	JG	24-30"
D. Pendimethalin	0.75	6-12	Power incorporator 2 inches deep	d. Bentazon	0.75	7-2	OT	CB	1-5"
E. None (check)	--	--	---						

1/ over-the-top

2/ recirculating sprayer

3/ johnsongrass

4/ cocklebur

5/ soybeans

each year. Recommended seedbed preparation, fertilization and other production practices were used. Row middles were clean cultivated.

Weeds on a preselected row on the main plot that was not treated preplant with herbicides (check) were counted three weeks after planting each year (Table 2). Injury to soybeans by the herbicides was determined by .inspection, and effectiveness of the herbicides for control of weeds was rated on a scale of 0 = no control to 100 = complete kill. Mid-season evaluations of weed control were made in June or early July, and late-season ratings were made in September.

Johnsongrass plants on a 1-ft by 3-ft area selected randomly from an inside row of each subplot were counted on June 4, 1980 to determine the long-term benefits of repeated use of the herbicide programs used in the trial.

The two center rows of each subplot were combine harvested for yield determination.

Results

Seedling johnsongrass and cocklebur were the most numerous weeds on the untreated control three weeks after planting in 1977, but seedling johnsongrass plants far outnumbered other weed species three weeks after the control was planted in 1978 and 1979 (Table 2). Occasional large crabgrass and redroot pigweed plants also were observed each year.

Johnsongrass control

Mid-season johnsongrass control of the main plots did not differ by treatment ($P < .05$) in 1977 and 1978, and late-season control did not differ by treatment in 1977. Mid-season control in 1979 was significantly better with all preplant herbicides than for the untreated check, and fluchloralin was better than pendimethalin. Late-season control in 1978 did not differ by herbicide treatment, but pendimethalin was not better than the check. Johnsongrass control in late-season in 1979 was better with fluchhloralin, profluralin and trifluralin than with pendimethalin, and pendimethalin was no better than the check. The three-year average mid-season and late-season johnsongrass control did not differ by herbicide treatment, but pendimethalin was not better than the check.

Soybeans were not injured by any preplant herbicide in any year, and the 1977, 1979 and three-year average yields did not differ by main-plot treatment. Yields did not differ by herbicide treatment in 1978 (a very dry year), but yields from fluchloralin- and pendimethalin-treated plots were no better than the check.

Control of common cocklebur was not affected by any preplant herbicide in any year. Postplant applications of bentazon gave such excellent control of common cocklebur that this plant did not compete with soybeans. Naptalam + dinoseb (2.25 lbs ai/acre) applied to soybeans at cracking in 1978 gave poor cocklebur control. Excellent cocklebur control was ob-

Figure 3. BASALIN (same as in 1 above). BASAGRAN (same as in 2 above). ROUNDUP (same as in 1 above). Shows excellent control of both Johnsongrass and Cocklebur.
Picture - July 17, 1979.

Table 2. Weeds per square foot of row on main plots that were not treated with preplant herbicides in trials at the MAFES North Mississippi Branch, by weed species and year, 1977-79.

Weed species	Year		
	1977	1978	1979
	Number		
Seedling johnsongrass	4.0	11.8	6.7
Rhizome johnsongrass	1/	1.4	0.9
Common cocklebur	4.1	2.3	1.9
Annual morningglory 2/	1.5	0.7	2.1

1/ Not determined.

2/ Entireleaf 50% and pitted 50%.

tained with naptalam + dinoseb applied at 4.5 lb ai/acre in 1979, but a later application of bentazon was necessary because of newly germinated weeds. Yields in 1979 were highest following postplant treatment with naptalam + dinoseb followed by two applications of bentazon and one application of glyphosate, but not significantly higher than when two applications of bentazon were followed by one application of glyphosate (Table 2).

Mid-season control of johnsongrass with postplant herbicides was best in two of the three years with metriflufen followed by glyphosate but differed significantly ($P < .05$) from Treatment c (Table 3) only in 1979. Late-season johnsongrass control was best each year with metriflufen followed by glyphosate but did not differ ($P > .05$) from Treatment c in 1977 and 1978 and Treatment b in 1979.

The effectiveness of postplant herbicides for control of johnsongrass and cocklebur was reflected in soybean yields each year (Table 3). Yields were highest when johnsongrass and cocklebur both were controlled (Treatments b and c).

Counts of rhizome johnsongrass plants after application of each preplant herbicide to the same plots for three years were lowest for fluchloralin and profluralin (Table 4). Rhizome johnsongrass counts after three years were lowest for postplant Treatments a and b but were not significantly lower than for Treatment c.

Our results indicate that a johnsongrass population of 52,200 to 154,200 plants/acre and a common cocklebur population of 24,800 to 53,500 plants/acre are about equally competitive with soybeans and that realization of maximum soybean yields requires a program for control of all weeds that are expected to be a problem in a soybean field. Additional benefits can be expected to accrue from repeated use of effective herbicide programs for control of johnsongrass where soybeans are grown in continuous rotation in fields with heavy infestations of johnsongrass.

Figure 4. ROUNDUP (same as in 1 above). Shows fair control of Johnsongrass and no control of Cocklebur.
Picture - July 17, 1979.

Figure 5. BASAGRAN (same as in 2 above). ROUNDUP (same as in 1 above). Shows fair control of Johnsongrass and excellent control of Cocklebur.
Picture - July 17, 1979

Table 3. Johnsongrass control and soybean yield after application of preplant and postplant herbicides, MAFES North Mississippi Branch, 1977-79.

Main plot preplant treatments[2/]	Johnsongrass control[1/] Mid-Season 1977	1978	1979	$\bar{X}$	Late-Season 1977	1978	1979	$\bar{X}$	Yield 1977	1978	1979	$\bar{X}$
	% Johnsongrass control								bu/acre			
A. Fluchloralin	76 a	79 a	91 a	82 a	66 a	76 a	90 a	80 a	16.3 a	11.8 ab	34.6 a	20.9 a
B. Profluralin	74 a	88 a	84 ab	83 a	72 a	86 a	89 a	83 a	16.8 a	13.9 a	35.0 a	21.9 a
C. Trifluralin	69 a	73 a	82 ab	75 a	59 a	69 a	90 a	77 a	18.4 a	14.5 a	35.1 a	22.7 a
D. Pendimethalin	60 a	67 a	64 b	63 ab	58 a	61 ab	77 b	68 ab	14.5 a	11.5 ab	35.6 a	20.5 a
E. None	63 a	57 a	13 c	34 b	51 a	25 b	65 b	47 b	16.6 a	9.5 b	28.8 a	18.3 a
Subplot postplant treatments[3/]												
	% Johnsongrass control								bu/acre			
a. Metriflufen + surfactant, 1977; glyphosate, 1978 and 1979	94 a	85 a	90 a	87 a	90 a	79 a	94 a	89 a	14.0 b	9.7 b	29.4 c	17.7 b
b. Bentazon, chlordimedon, bentazon, 1977; bentazon, bentazon, glyphosate, 1978; bentazon, glyphosate, 1979	73 b	67 b	72 b	69 c	54 b	61 b	93 a	76 b	18.2 a	13.6 a	35.9 a	22.6 a
c. Bentazon, metriflufen + surfactant, bentazon, 1977; naptalam + dinoseb, bentazon, bentazon, glyphosate, 1978; naptalam + dinoseb, bentazon, glyphosate, 1979	90 a	87 a	74 b	78 b	85 a	73 a	87 b	81 b	19.5 a	15.2 a	37.3 a	24.0 a
d. Bentazon, bentazon, 1977 and 1978; bentazon, 1979	18 c	50 c	36 c	34 d	17 c	45 c	44 c	30 c	14.4 b	10.3 b	32.7 b	19.1 b

1/ Determined visually: 100% = complete kill.

2/ Results are averages of the four postplant treatments applied to each preplant treatment each year. Means with the same letter in a column do not differ ($P < .05$) according to DMRT.

3/ Results are averages of the four preplant treatments after each postplant treatment each year. Means with the same letter in a column do not differ ($P < .05$) according to DMRT.

Table 4. Johnsongrass infestation after three years of trials for control of johnsongrass and common cocklebur in scybeans, by herbicide treatments MAFES, North Mississippi Branch.

Main plot preplant treatments[1/]	Rhizome johnsongrass[2/]
	---No. plants/row ft--
A. Fluchloralin	0.18 b
B. Profluralin	0.15 b
C. Trifluralin	0.57 ab
D. Pendimethalin	0.40 ab
E. None (Check)	0.80 a
Subplot postplant treatments	
a. Metriflufen + surfactant, 1977; glyphosate, 1978 and 1979	0.25 b
b. Bentazon, chlordimedon, bentazon, 1977; bentazon, bentazon, glyphosate, 1978; bentazon, glyphosate, 1979	0.28 b
c. Bentazon, metriflufen + surfactant, bentazon, 1977; naptalam + dinoseb, bentazon, bentazon, glyphosate, 1978; naptalam + dinoseb, bentazon, glyphosate, 1979	0.34 b
d. Bentazon, bentazon, 1977 and 1978; bentazon, 1979	0.81 a

1/ Means in a treatment group followed by the same letter do not differ (P .05) according to DMRT.

2/ Based on three counts made June 4, 1980 from a 1-ft by 3-ft area centered on an inside row of each subplot.

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