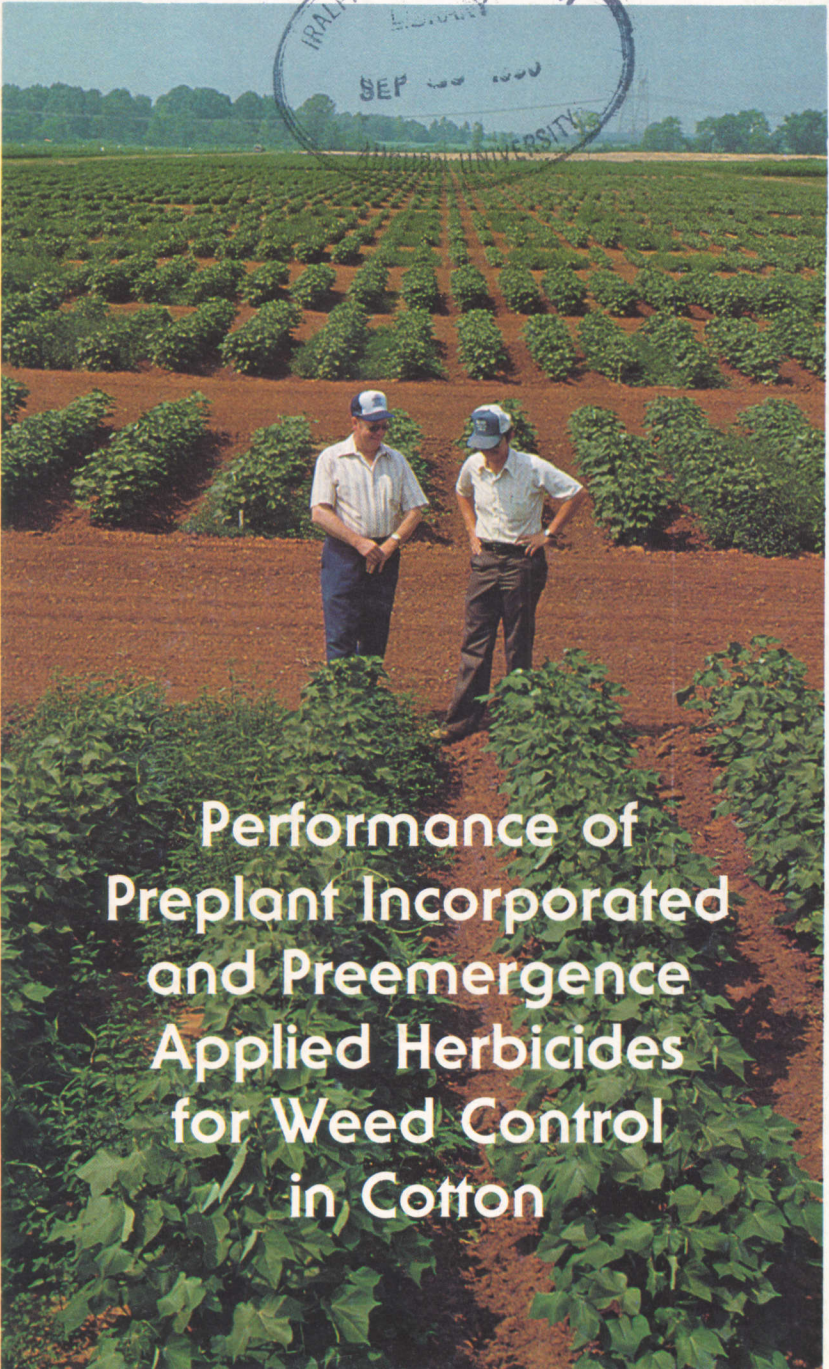
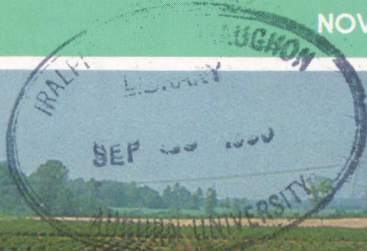




ALABAMA AGRICULTURAL EXPERIMENT STATION
AUBURN UNIVERSITY

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**Performance of
Preplant Incorporated
and Preemergence
Applied Herbicides
for Weed Control
in Cotton**

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Information contained herein is available to all without regard to race, color, sex, or national origin.

Performance of Preplant Incorporated and Preemergence Applied Herbicides for Weed Control in Cotton

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INTRODUCTION

AVAILABLE LITERATURE INDICATES that interest in agricultural weed control prior to 1500 AD was minimal. Weed control was either incidental to tillage for seedbed preparation or achieved by hand weeding. Often weeds were allowed to grow with the crop and separated out at harvest.

A few inorganic herbicides became available during the 1800's and early 1900's. Research with organic herbicides began during the 1890's and accelerated in the early 1940's. 2,4-D was discovered and made available between 1942 and 1944; soon after, weed control through herbicides became an established agricultural practice. The number of herbicides in general use in the United States increased from approximately 15 in 1940, to 25 in 1950, to 100 in 1969, and 160 in 1982. Today, herbicides account for 60 to 70 percent of the multi-million dollar pesticide market in the United States.

The Alabama Agricultural Experiment Station has evaluated hundreds of chemicals for weed control in cotton over the past 15 years. Several of these compounds have been successfully developed into marketable herbicides; however, the majority were proven unacceptable for one reason or another.

The purpose of this bulletin is to provide results of a comparative evaluation that was made of the performance of

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²The authors acknowledge the assistance of W. B. Webster and the late John Boseck, of the Tennessee Valley Substation, in this project.

preemergence and preplant incorporated applied herbicides used in cotton production in Alabama.

MATERIALS AND METHODS

Trials were conducted on a Decatur clay loam at the Tennessee Valley Substation, near Belle Mina, over an 8-year period. Weeds predominant in the area are listed in table 1. The test site was turned with a moldboard plow during the winter months; seedbeds were subsequently prepared in March and early April. Stoneville 213 cotton was planted between April 10 and April 20. Eleven herbicides registered for either preplant incorporated and/or preemergence application in cotton were evaluated for a minimum of 3 years each, table 2. Treatments were applied to plots four rows wide and 20 feet long, and replicated four times. Several rates of each herbicide, including the manufacturer's suggested range, were evaluated. All herbicides were broadcast applied in 15 to 18 gallons of water per acre via a tractor-mounted compressed air sprayer. Preplant incorporated treatments were incorporated

TABLE 1. WEEDS PREVALENT AT THE TENNESSEE VALLEY SUBSTATION WHERE COTTON HERBICIDES WERE EVALUATED ON A DECATUR CLAY LOAM

Weed	Type
Large crabgrass (<i>Digitaria sanguinalis</i>)	annual grass
Goosegrass (<i>Eleusine indica</i>)	annual grass
Fall panicum (<i>Panicum dichotomiflorum</i>)	annual grass
Redroot pigweed (<i>Amaranthus retroflexus</i>)	annual small seeded broadleaf
Pitted morningglory (<i>Ipomoea lacunosa</i>)	annual large seeded broadleaf
Prickly sida (<i>Sida spinosa</i>)	annual large seeded broadleaf

TABLE 2. HERBICIDES EVALUATED FOR WEED CONTROL IN COTTON AT THE TENNESSEE VALLEY SUBSTATION, 1972-80

Herbicide	Chemical class	Manufacturer
Preplant incorporated treatments		
Dinitramine (Cobex 2EC) ¹	dinitroaniline	U. S. Borax
Fluchloralin (Basalin 4EC)	dinitroaniline	BASF Wyandotte
Pendimethalin (Prowl 4EC)	dinitroaniline	American Cyanamid
Profluralin (Tolban 4EC) ²	dinitroaniline	Ciba-Geigy
Trifluralin (Treflan 4EC)	dinitroaniline	Elanco
Preemergence treatments		
Cyanazine (Bladex 80WP)	triazine	Shell
Diuron (Karmex 80WP)	substituted urea	DuPont
Fluometuron (Cotoran 80WP)	substituted urea	Ciba-Geigy
Norflurazon (Zorial 80WP)	unclassified	Sandoz
Perfluidone (Destun 50WP)	unclassified	3M
Prometryn (Caparol 80WP)	triazine	Ciba-Geigy

¹U. S. Borax terminated the production of dinitramine in 1978.

²Ciba-Geigy has terminated the production of profluralin; it will be available only until existing supplies are exhausted.

by tilling twice with a Lely-Rotera®, a horizontal action type tiller. Two of the four rows in each plot were cultivated. The remaining two rows were left uncultivated such that any weed control achieved would be due solely to the herbicide. Check plots without any weed control were included. Fertilization and insect control measures were determined by soil test recommendations and field scouting, respectively.

Cotton injury and control of grasses and broadleaf weeds were visually rated 6 to 8 weeks, and again 3 months after application. Cotton was mechanically harvested two or three times and the cumulative yields reported in pounds of seed cotton per acre.

RESULTS

Preplant Incorporated Applied Treatments

Dinitramine (Cobex 2EC). Excellent control of early season grasses was achieved in 3 out of 4 years with 0.5 pound per acre, the lowest rate tested, table 3. During the same years this

TABLE 3. INFLUENCE OF DINITRAMINE (COBEX 2EC) APPLIED PREPLANT INCORPORATED ON WEED CONTROL, INJURY, AND YIELD OF COTTON

Rate, lb. active/acre	Weed control ¹ and injury ratings ²						Yield of seed cotton/acre	
	Grass control		Broadleaf control		Crop injury		Cult.	Uncult.
	Early	Late	Early	Late	Early	Late		
1973								
0.50	96	90	85	38	0	0	2,271	1,820
1.00	99	99	96	60	14	8	1,727	1,462
2.00	100	98	100	95	53	47	1,315	1,486
Check	0	0	0	0	0	0	1,486	272
1974								
0.50	100	98	84	0	0	0	—	—
0.75	100	100	96	0	10	11	—	—
1.50	100	99	100	10	23	23	—	—
Check	0	0	0	0	0	0	—	—
1975								
0.50	100	50	86	0	0	0	1,812	—
0.75	99	75	80	20	0	0	2,201	—
1.50	100	70	93	24	0	0	1,983	—
Check	0	0	0	0	0	0	2,294	—
1976								
0.50	95	25	56	0	5	0	840	794
0.75	95	38	94	25	0	0	1,307	1,315
1.00	100	100	93	38	10	0	1,245	1,346
2.00	100	100	96	64	44	0	747	560
Check	25	0	25	0	0	0	1,221	723

¹Ratings of 80 or above are generally considered commercially acceptable.

²0-39 = none to slight, 40-69 = moderate, 70-99 = severe, 100 = death.

rate generally provided satisfactory control of early season broadleaf and late season grass weeds. In 1974, comparable control of the late season grasses required 1.0 pound; late germinating broadleaf weeds were not controlled even with 2.0 pounds per acre, the highest rate tested. Substantial cotton injury frequently occurred with rates in excess of 0.75 pound per acre. Yields of uncultivated plots were generally lower than the cultivated plots, suggesting yield loss due to competition from uncontrolled broadleaf weeds.

Fluchloralin (Basalin 4EC). Excellent early season grass control was obtained in 1974 and 1975 with rates as low as 0.75 pound per acre, table 4. The minimal rate needed to obtain satisfactory control of late germinating grasses was erratic, 0.75 pound in 1974 and 4.0 pounds in 1975. Control of early season broadleaf weeds could be consistently obtained with rates equal to, or greater than, 2.0 pounds. However, late germinating broadleaf weeds were not controlled with 4 pounds per acre, the highest rate tested. Substantial cotton injury was observed with 2.0- and 4.0-pound rates in 1974 and 1975, respectively. In general, yields for the cultivated plots were higher than the uncultivated plots.

TABLE 4. INFLUENCE OF FLUCHLORALIN (BASALIN 4EC) APPLIED PREPLANT INCORPORATED ON WEED CONTROL, INJURY, AND YIELD OF COTTON

Rate, lb. active/acre	Weed control ¹ and injury ratings ²						Yield of seed cotton/acre	
	Grass control		Broadleaf control		Crop injury		Cult.	Uncult.
	Early	Late	Early	Late	Early	Late		
1974								
0.75	100	98	65	0	0	0	2,497	863
1.00	100	100	65	0	0	0	2,030	521
2.00	100	100	88	0	3	10	1,843	980
4.00	100	100	96	36	59	43	1,384	1,121
Check	0	0	0	0	0	0	1,384	15
1975								
0.75	98	20	70	0	0	0	2,014	1,835
1.00	100	0	60	0	0	0	2,186	1,626
2.00	100	70	93	78	5	0	2,256	2,240
4.00	99	100	83	68	19	0	1,851	1,579
Check	0	0	0	0	0	0	2,294	630
1976								
1.50	100	100	28	0	0	6	778	303
3.00	98	75	81	0	0	5	840	646
Check	44	0	0	0	0	0	708	0

¹Ratings of 80 or above are generally considered commercially acceptable.

²0-39 = none to slight, 40-69 = moderate, 70-99 = severe, 100 = death.

TABLE 5. INFLUENCE OF PENDIMETHALIN (PROWL 4EC) APPLIED PREPLANT INCORPORATED ON WEED CONTROL, INJURY, AND YIELD OF COTTON

Rate, lb. active/acre	Weed control ¹ and injury ratings ²						Yield of seed cotton/acre	
	Grass control		Broadleaf control		Crop injury		Cult.	Uncult.
	Early	Late	Early	Late	Early	Late		
							<i>Lb.</i>	<i>Lb.</i>
1974								
0.75	100	98	86	39	0	0	2,924	1,851
1.00	100	100	95	59	0	5	2,279	2,022
2.00	100	99	100	99	32	23	1,703	2,123
4.00	100	100	100	100	66	49	1,894	1,501
Check	0	0	0	0	0	0	1,657	31
1975								
0.75	96	20	66	0	0	0	2,294	—
1.00	96	43	63	23	0	0	2,326	—
2.00	100	93	93	35	0	0	2,271	—
4.00	100	95	99	93	5	0	2,224	—
Check	0	0	0	0	0	0	1,921	—
1976								
0.75	98	75	68	23	0	0	1,268	1,556
1.00	95	50	81	25	3	0	1,330	1,307
2.00	74	73	73	68	5	0	1,229	1,097
4.00	100	95	98	85	20	0	521	887
Check	25	0	0	0	0	0	1,221	723

¹Ratings of 80 or above are generally considered commercially acceptable.

²0-39 = none to slight, 40-69 = moderate, 70-99 = severe, 100 = death.

Pendimethalin (Prowl 4EC). Satisfactory control of early season grass weeds was achieved with 0.75 pound per acre, the lowest rate tested, table 5. In 1976, 2.0 pounds per acre resulted in unsatisfactory weed control, which appears to have been an anomalous situation since lower rates gave superior control. Late season grass control was excellent with all rates tested in 1974, with 2.0- and 4.0-pound rates in 1975, and with 4.0 pounds per acre in 1976. In all years of the study, acceptable early season broadleaf weed control was obtained with rates equal to, or greater than, 1.0 pound per acre. Rates of 2.0 to 4.0 pounds extended the control of broadleaf weeds into late in the season. However, these higher rates were marginal in terms of crop safety. Substantial cotton injury was observed at the 2.0- and 4.0-pound rates in 1974 and 1976, respectively. Uncultivated plot yields were generally lower than cultivated plot yields, suggesting that additional weed control measures may have been warranted.

Trifluralin (Treflan 4EC). Early season grass weeds were controlled with 0.5 pound per acre, the lowest rate tested, table 6. Acceptable late season grass control was achieved in most years with rates as low as 1.0 pound. Treflan was less

TABLE 6. INFLUENCE OF TRIFLURALIN (TREFLAN 4EC) APPLIED PREPLANT INCORPORATED ON WEED CONTROL, INJURY, AND YIELD OF COTTON

Rate, lb. active/acre	Weed control ¹ and injury ratings ²						Yield of seed cotton/acre	
	Grass control		Broadleaf control		Crop injury		Cult.	Uncult.
	Early	Late	Early	Late	Early	Late		
1973							<i>Lb.</i>	<i>Lb.</i>
0.50	85	89	38	39	0	0	2,699	1,377
1.00	99	95	33	43	0	0	2,240	1,587
2.00	99	96	63	34	19	13	2,054	1,657
4.00	100	100	88	83	62	53	1,525	1,742
Check	0	0	0	0	0	0	1,486	272
1974								
0.75	100	98	25	0	0	3	—	—
1.00	100	100	64	0	0	9	—	—
2.00	100	99	88	0	23	20	—	—
4.00	100	100	93	13	45	53	—	—
Check	0	0	0	0	0	0	—	—
1975								
0.75	99	70	76	0	0	0	2,069	1,641
1.00	96	75	74	0	5	0	2,115	1,610
2.00	100	75	75	8	0	0	2,155	1,820
4.00	100	48	91	46	56	9	1,315	1,175
Check	0	0	0	0	0	0	2,294	1,073
1975								
0.50	91	50	44	25	0	0	1,322	965
0.75	98	49	43	15	0	0	1,214	895
1.00	98	70	83	25	3	0	1,284	1,198
2.00	99	90	94	33	26	0	840	1,394
4.00	100	100	98	65	55	3	467	646
Check	25	0	25	0	0	0	1,221	723

¹Ratings of 80 or above are generally considered commercially acceptable.²0-39 = none to slight, 40-69 = moderate, 70-99 = severe, 100 = death.

TABLE 7. INFLUENCE OF PROFLURALIN (TOLBAN EC) APPLIED PREPLANT INCORPORATED ON WEED CONTROL, INJURY, AND YIELD OF COTTON

Rate, lb. active/acre	Weed control ¹ and injury ratings ²						Yield of seed cotton/acre	
	Grass control		Broadleaf control		Crop injury		Cult.	Uncult.
	Early	Late	Early	Late	Early	Late		
1974							<i>Lb.</i>	<i>Lb.</i>
0.75	100	95	19	0	0	0	2,357	575
1.00	100	98	29	0	0	5	2,100	816
2.00	100	100	58	0	0	0	1,952	1,034
4.00	100	98	93	0	19	17	1,781	1,065
Check	0	0	0	0	0	0	1,384	15
1975								
0.75	98	50	63	0	0	0	2,201	1,844
1.00	95	50	63	0	0	0	2,186	1,729
2.00	99	50	86	0	0	0	2,077	1,743
4.00	99	97	93	63	36	6	1,548	1,774
Check	0	0	0	0	0	0	2,294	630
1976								
0.75	93	50	48	0	0	0	1,462	1,003
1.00	98	50	68	0	3	0	1,431	1,283
2.00	98	73	69	25	5	0	1,283	1,198
4.00	100	100	86	58	25	0	879	1,105
Check	25	0	25	0	0	0	1,221	723

¹Ratings of 80 or above are generally considered commercially acceptable.²0-39 = none to slight, 40-69 = moderate, 70-99 = severe, 100 = death.

effective in the control of broadleaf weeds. Acceptable control required rates equal to, or greater than, 1.0 pound per acre, and even then control was restricted to small seeded broadleaf weeds. Morningglory and prickly sida were not controlled at rates that were noninjurious to cotton. Substantial cotton injury resulted from rates of 2.0 pounds per acre and above. Cultivated plot yields were greater than uncultivated plot yields, reflecting the yield loss due to competition from uncontrolled broadleaf weeds.

Profluralin (Tolban 4EC). Results were similar to trifluralin (Treflan) in that early season grass control was excellent even at rates as low as 0.5 pound per acre, table 7. Broadleaf weed control was poor. As with Treflan, only early season small seeded species could be controlled at rates that did not injure cotton (less than 4.0 pounds per acre).

Preemergence Applied Treatments

Cyanazine (Bladex 80WP). Excellent control of early season grass and small seeded broadleaf weeds was achieved at rates equal to, or greater than, 1.5 pounds per acre, table 8. However, control of late season grasses and broadleaf weeds was

TABLE 8. INFLUENCE OF CYANAZINE (BLADEX 80WP) APPLIED PREEMERGENCE ON WEED CONTROL, INJURY, AND COTTON YIELDS

Rate, lb. active/acre	Weed control ¹ and injury ratings ²						Yield of seed cotton/acre	
	Grass control		Broadleaf control		Crop injury		Cult.	Uncult.
	Early	Late	Early	Late	Early	Late		
							<i>Lb.</i>	<i>Lb.</i>
1974								
0.75	76	10	80	18	0	0	2,403	1,252
1.50	98	33	96	59	8	0	2,738	2,131
2.00	100	43	99	81	9	0	2,349	2,240
3.00	100	71	100	68	26	10	2,007	1,727
Check	0	0	0	0	0	0	2,403	280
1975								
1.25	75	0	53	0	0	0	1,906	—
Check	0	0	0	0	0	0	2,294	—
1976								
1.00	23	13	48	0	8	4	801	8
1.20	63	25	50	0	6	3	755	163
1.50	73	50	78	0	11	0	934	288
2.00	99	50	83	0	4	0	848	249
3.00	98	25	93	0	35	4	537	475
Check	0	48	0	0	0	0	1,097	—

¹Ratings of 80 or above are generally considered commercially acceptable.
²0-39 = none to slight, 40-69 = moderate, 70-99 = severe, 100 = death.

erratic even at the higher rates tested. The short soil persistence of this compound limits weed control to a limited period subsequent to application.

Diuron (Karmex 80WP). Rates equal to, or greater than, 1.0 pound per acre provided satisfactory control of early season grass weeds, table 9. Control of late season grasses generally required 2.0 pounds, and even at this higher rate control was erratic. Only rates equal to, or greater than, 3.0 pounds per acre consistently provided acceptable control of late season broadleaf weeds. However, during one year these rates resulted in substantial crop injury. Uncultivated plots were generally lower in yield than cultivated plots.

TABLE 9. INFLUENCE OF DIURON (KARMEX 80WP) APPLIED PREEMERGENCE ON WEED CONTROL, INJURY, AND YIELD OF COTTON

Rate, lb. active/acre	Weed control ¹ and injury ratings ²						Yield of seed cotton/acre	
	Grass control		Broadleaf control		Crop injury		Cult.	Uncult.
	Early	Late	Early	Late	Early	Late		
							<i>Lb.</i>	<i>Lb.</i>
1971								
0.50	0	0	0	0	0	0	2,897	253
1.00	66	0	50	0	0	0	3,402	700
2.00	89	0	89	0	0	0	3,597	1,536
3.00	100	64	98	38	3	0	3,694	2,216
Check	0	0	0	0	0	0	2,751	155
1972								
1.00	98	49	95	70	0	0	4,006	3,376
2.00	100	99	100	100	0	0	4,045	3,881
3.00	100	100	100	96	11	0	3,835	3,920
Check	0	0	0	0	0	0	3,780	462
1973								
1.00	96	23	95	0	15	0	3,073	2,178
2.00	100	70	100	45	36	9	3,026	2,443
3.00	100	56	100	56	70	39	1,851	1,960
Check	0	0	0	0	0	0	2,341	1,789
1975								
1.00	93	86	78	65	0	0	2,333	—
2.00	100	100	96	89	0	0	2,170	—
Check	0	0	0	0	0	0	2,326	—

¹Ratings of 80 or above are generally considered commercially acceptable.

²0-39 = none to slight, 40-69 = moderate, 70-99 = severe, 100 = death.

Fluometuron (Cotoran 80WP). Acceptable control of early season grass and broadleaf weeds was achieved at rates equal to, or greater than, 1.5 pounds per acre, table 10. Control of late season grass weeds required at least 2.0 pounds, and even at this higher rate control was erratic. Cotton injury was minimal at rates less than 4 pounds per acre. At rates above 1.5 pounds,

TABLE 10. INFLUENCE OF FLUOMETURON (COTORAN 80WP) APPLIED PREEMERGENCE ON WEED CONTROL, INJURY, AND YIELD OF COTTON

Rate, lb. active/acre	Weed control ¹ and injury ratings ²						Yield of seed cotton/acre	
	Grass control		Broadleaf control		Crop injury		Cult.	Uncult.
	Early	Late	Early	Late	Early	Late		
1975							<i>Lb.</i>	<i>Lb.</i>
1.40	91	65	96	70	15	9	2,303	1,291
1.60	97	71	98	94	0	0	2,240	1,766
1.80	90	69	93	88	0	0	2,287	1,680
2.00	96	78	98	89	0	0	2,116	1,952
4.00	100	100	100	100	11	3	1,416	1,222
Check	—	0	0	0	0	0	—	—
1976								
1.00	61	0	90	59	0	3	1,384	545
1.50	80	0	95	83	0	0	1,276	1,027
2.00	91	0	96	75	0	3	1,190	949
3.00	100	46	100	95	0	0	1,291	1,595
Check	0	0	0	0	0	0	1,369	0
1977								
1.50	100	95	98	96	0	0	2,188	2,156
3.00	100	100	100	99	14	9	1,993	2,091
Check	0	0	0	0	0	0	2,058	784
1978								
1.00	95	59	94	87	0	0	2,287	2,482
1.50	100	96	99	87	0	0	2,156	2,222
2.00	99	100	100	93	0	0	2,222	2,581
Check	0	0	0	0	0	0	2,614	686

¹Ratings of 80 or above are generally considered commercially acceptable.

²0-39 = none to slight, 40-69 = moderate, 70-99 = severe, 100 = death.

TABLE 11. INFLUENCE OF NORFLURAZON (ZORIAL 80WP) APPLIED PREEMERGENCE ON WEED CONTROL, INJURY, AND YIELD OF COTTON

Rate, lb. active/acre	Weed control ¹ and injury ratings ²						Yield of seed cotton/acre	
	Grass control		Broadleaf control		Crop injury		Cult.	Uncult.
	Early	Late	Early	Late	Early	Late		
1974							<i>Lb.</i>	<i>Lb.</i>
1.00	99	84	50	0	0	0	3,461	2,862
1.50	100	96	98	70	0	0	—	2,162
3.00	100	100	100	100	0	0	3,539	3,445
4.00	100	100	100	100	10	0	3,204	3,185
Check	0	0	0	0	0	0	2,403	280
1975								
1.50	94	0	88	0	0	0	2,053	—
Check	0	0	0	0	0	0	2,294	—
1976								
1.00	—	93	70	45	4	8	1,245	887
1.50	—	73	94	63	10	0	778	775
3.00	—	75	98	65	21	4	336	498
Check	—	0	0	0	0	0	1,167	1,120
1977								
1.50	100	100	95	91	0	0	2,124	1,928
2.00	100	97	95	84	0	0	2,222	1,830
Check	0	0	0	0	0	0	2,058	784

¹Ratings of 80 or above are generally considered commercially acceptable.

²0-39 = none to slight, 40-69 = moderate, 70-99 = severe, 100 = death.

the uncultivated plot yields were similar to the cultivated yields, indicating effective weed control and little response to cultivation.

Norflurazon (Zorial 80WP). Control of early and late season grasses was acceptable with 1.0 pound per acre, the lowest rate tested, table 11. Control of early season broadleaf weeds was achieved with rates equal to, or greater than, 1.5 pounds. Control of late season broadleaf weeds varied considerably between years. Cotton injury was similarly variable. Yields of the uncultivated plots were generally lower than the cultivated plot yields, suggesting that additional weed control may have been beneficial.

Perfluidone (Destun 50WP). Early season grass control was excellent with 1.5 pounds per acre, the lowest rate tested, table 12. Acceptable control of late season grasses was

TABLE 12. INFLUENCE OF PERFLUIDONE (DESTUN 50WP) APPLIED PREEMERGENCE ON WEED CONTROL, INJURY, AND YIELD OF COTTON

Rate, lb. active/acre	Weed control ¹ and injury ratings ²						Yield of seed cotton/acre	
	Grass control		Broadleaf control		Crop injury		Cult.	Uncult.
	Early	Late	Early	Late	Early	Late		
							<i>Lb.</i>	<i>Lb.</i>
1974								
1.50	95	66	81	33	3	8	2,038	1,361
2.00	98	73	65	19	10	14	1,540	754
2.50	100	96	88	43	6	6	2,007	1,384
3.00	99	98	90	24	14	25	1,836	1,081
6.00	100	91	99	83	26	40	1,703	1,657
Check	0	0	0	0	0	0	2,403	280
1975								
1.50	74	59	48	0	0	0	1,571	622
2.00	80	43	34	0	16	10	1,229	459
3.00	88	76	71	23	23	18	1,213	887
4.00	91	73	81	45	28	28	957	731
Check	0	0	0	0	0	0	2,326	624
1976								
1.50	91	13	43	0	10	5	451	48
2.00	96	25	58	0	9	6	428	31
3.00	96	20	59	0	26	10	350	86
4.00	98	25	89	0	20	16	381	140
Check	0	0	0	0	0	0	1,167	16
1977								
1.50	97	100	61	17	0	0	1,960	784
2.00	95	84	79	0	5	0	1,699	980
3.00	100	100	90	33	11	4	1,470	849
4.00	100	97	95	70	15	25	1,176	980
Check	0	0	0	0	0	0	2,058	784

¹Ratings of 80 or above are generally considered commercially acceptable.

²0-39 = none to slight, 40-69 = moderate, 70-99 = severe, 100 = death.

achieved at rates equal to, or greater than, 2.5 pounds in all years except 1976. Control of early season broadleaf weeds was erratic. Acceptable control was achieved with only 1.5 pounds in 1974; whereas in 1975, 1976, and 1977, comparable control required 3.0 to 4.0 pounds. Late germinating broadleaf weeds could not be controlled at rates less than 6.0 pounds. This rate is impractical since cotton was consistently injured at rates in excess of 3.0 pounds per acre.

Prometryn (Caparol 80WP). Control of early season grasses was excellent at all rates equal to, or greater than, 2.0 pounds per acre, table 13. Consistent control of the late season grasses and broadleaf weeds required rates of 3.0 pounds. Unfortunately, these rates resulted in crop injury during some of the test years. Uncultivated plot yields were generally lower than cultivated plots.

TABLE 13 INFLUENCE OF PROMETRYN (CAPAROL 80WP) APPLIED PREEMERGENCE ON WEED CONTROL, INJURY, AND YIELD OF COTTON

Rate, lb. active/acre	Weed control ¹ and injury ratings ²						Yield of seed cotton/acre	
	Grass control		Broadleaf control		Crop injury		Cult.	Uncult.
	Early	Late	Early	Late	Early	Late		
							<i>Lb.</i>	<i>Lb.</i>
1970								
1.0	85	13	93	88	30	3	2,096	972
2.0	91	50	95	76	71	36	1,342	739
3.0	99	91	99	95	85	56	684	933
6.0	100	100	100	100	89	75	665	875
Check	0	0	0	0	0	0	2,080	97
1971								
1.0	53	0	58	0	0	0	3,617	253
2.0	93	0	100	23	0	0	3,714	1,711
3.0	98	41	99	43	0	8	3,636	2,625
6.0	100	96	100	96	3	0	3,597	3,461
Check	0	0	0	0	0	0	2,751	155
1972								
2.0	100	95	100	99	0	0	4,013	3,881
3.0	100	99	98	99	0	0	3,982	3,819
6.0	100	100	100	100	3	0	3,726	3,625
Check	0	0	0	0	0	0	3,780	462

¹Ratings of 80 or above are generally considered commercially acceptable.
²0-39 = none to slight, 40-69 = moderate, 70-99 = severe, 100 = death.

Control of Selected Weed Species with Preemergence Applied Herbicides

Perfluidone, fluometuron, and norflurazon provided excellent control of early season crabgrass, table 14. However, all herbicides were ineffective on late germinating crabgrass.

TABLE 14. LOWEST RATE REQUIRED OF EACH HERBICIDE TO CONTROL EARLY AND LATE SEASON GRASS AND BROADLEAF WEEDS

Herbicide and year	Lowest rate required to control			
	Grass weeds		Broadleaf weeds	
	Early	Late	Early	Late
	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>
PREPLANT INCORPORATED				
Dinitramine (Cobex 2EC)				
1973	0.50	0.50	0.50	2.00
1974	.50	.50	.50	— ¹
1975	.50	— ¹	.50	— ¹
1976	.50	1.00	.75	— ¹
Fluchloralin (Basalin 4EC)				
1974	.75	.75	2.00	— ¹
1975	.75	4.00	2.00	— ¹
1976	1.50	1.50	3.00	— ¹
Pendimethalin (Prowl 4EC)				
1974	.75	.75	.75	2.00
1975	.75	2.00	2.00	4.00
1976	.75	4.00	1.00	4.00
Profluralin (Tolban 4EC)				
1974	.75	.75	4.00	— ¹
1975	.75	4.00	2.00	— ¹
1976	.75	4.00	4.00	— ¹
Trifluralin (Treflan 4EC)				
1973	.50	.50	4.00	4.00
1974	.50	.75	2.00	— ¹
1975	.50	— ¹	4.00	— ¹
1976	.50	2.00	1.00	— ¹
PREEMERGENCE				
Cyanazine (Bladex 80WP)				
1974	1.50	— ¹	.75	— ¹
1976	2.00	— ¹	2.00	— ¹
Diuron (Karmex 80WP)				
1971	2.00	— ¹	2.00	— ¹
1972	1.00	2.00	1.00	2.00
1973	1.00	— ¹	1.00	— ¹
1975	1.00	1.00	2.00	2.00
Fluometuron (Cotoran 80WP)				
1975	1.40	4.00	1.40	1.60
1976	1.50	— ¹	1.00	1.50
1977	— ¹	1.50	1.50	1.50
1978	1.00	1.50	1.00	1.00
Norflurazon (Zorial 80WP)				
1974	1.00	1.00	1.50	3.00
1976	— ²	1.00	1.50	— ¹
1977	1.50	1.50	1.50	1.50
Perfluidone (Destun 50WP)				
1974	1.50	2.50	1.50	6.00
1975	2.00	— ¹	4.00	— ¹
1976	1.50	— ¹	4.00	— ¹
1977	1.50	1.50	3.00	— ¹
Prometryn (Caparol 80WP)				
1970	1.00	3.00	1.00	1.00
1971	2.00	6.00	2.00	6.00
1972	2.00	2.00	2.00	2.00

¹Acceptable control was not achieved with the rates tested.²Data not taken.

Cyanazine, perfluidone, and norflurazon were highly effective for early season goosegrass control. All evaluated herbicides were effective for early season fall panicum control. Perfluidone, fluometuron, and norflurazon were highly effective in early season pigweed control, but only fluometuron provided excellent late season pigweed control. Fluometuron was the only herbicide that provided acceptable early and late morningglory control. All herbicides provided acceptable control of early season prickly sida; however, only fluometuron provided acceptable late season control.

SUMMARY

Preplant Incorporated

All preplant incorporated herbicides provided excellent control of early season grasses at all rates evaluated, table 14. In addition, trifluralin and dinitramine provided excellent late season grass control at rates of 1.0 pound or more. Fluchloralin, pendimethalin, and profluralin were generally effective in controlling later germinating grasses at rates above 2.0 pounds per acre. Dinitramine in 3 out of 4 years provided excellent control of early season broadleaf weeds at 0.50 pound. Pendimethalin also provided effective early season broadleaf control above 0.75 pound. At rates above 2.0 pounds, trifluralin and fluchloralin were also effective on early season broadleaf weeds. Comparable control with profluralin generally required higher rates. In 2 out of 3 years, only the high rate (4.0 pounds) of pendimethalin provided effective late season broadleaf weed control. It is important to note that all rates were equally effective on pigweeds and other small seeded broadleaf weeds.

Preemergence

Cotton stands were not consistently affected with any of the herbicides evaluated when used at the labeled rates. High rates did reduce stands in certain years. Yields from cultivated plots were reduced at these high rates. The only herbicide to consistently reduce yields at all rates was perfluidone.

Acceptable control of early season grasses was consistently achieved with a minimal rate of all preemergence herbicides tested. Invariably, higher rates were required to control late season grasses. With the exception of perfluidone, all her-

TABLE 15. EFFICACY OF SELECTED PREEMERGENCE HERBICIDES ON SIX WEED SPECIES

Herbicide, rate/acre	Percent control by weed species ¹											
	Crabgrass		Goosegrass		Fall panicum		Pigweed		Morningglory		Prickly sida	
	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late
Cyanazine, 1.5 lb. (Bladex 80WP)	77 ²	33	82	—	85	—	74	16	43	24	82	28
Perfluidone, 3.0 lb. (Destun 50 WP) . . .	97	41	97	—	97	—	84	50	74	8	80	7
Fluometuron, 1.5 lb. (Cotoran 80WP) . .	96	54	73	—	98	83	100	99	94	80	98	80
Norflurazon, 1.5 lb. (Zorial 80WP)	97	33	100	—	100	—	99	61	78	53	97	69
Check	0	0	0	—	0	0	0	0	0	0	0	0

¹Average for 1975, 1976, and 1977.

²0 = no control or injury; 100 = complete control.

bicides at rates of 1 to 2 pounds per acre provided acceptable control of early season broadleaf weeds. In 2 out of 4 years, 4.0 pounds of perfluidone was required for acceptable control. Fluometuron and norflurazon were the most effective preemergence treatments available for the control of late season broadleaf weeds. Although results were variable, both of these herbicides frequently provided acceptable control with 1.5 to 3.0 pounds. Diuron and prometryn also provided acceptable control if high rates were used. However, these rates were often injurious to the cotton.

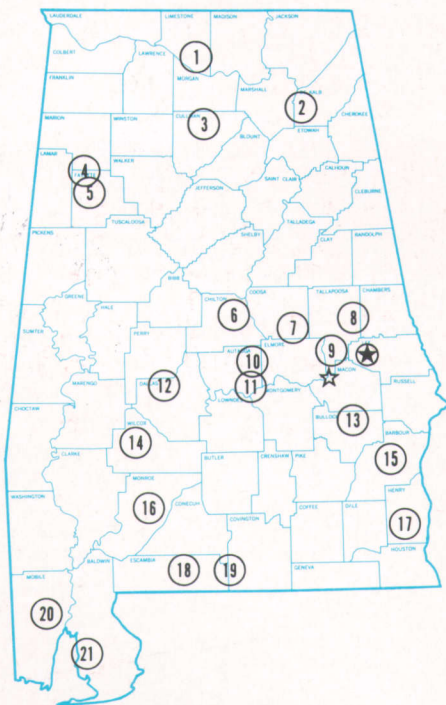
Visual ratings averaged for 1975-77 for six weed species indicated that fluometuron at the 1.5-pound rate provided effective early and late control of all weeds except late crabgrass, Table 15. Perfluidone at 3.0 pounds and norflurazon at 1.5 pounds per acre provided effective early season control of goosegrass, fall panicum, and prickly sida. Ineffective late season weed control was observed with cyanazine.

Only the highest rate of all the herbicides evaluated consistently reduced cultivated yields when compared to the check. With the exception of fluometuron in some years, all uncultivated yields were consistently lower than cultivated plots, indicating that a single herbicide application did not provide season-long weed control.

The preplant incorporated and preemergence applied herbicides discussed in this publication provide acceptable control of a number of grass and broadleaf weeds without substantial damage to cotton. A combination of cultivation and herbicides is an effective, economical approach for weed control in cotton.

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Research Unit Identification

- ★ Main Agricultural Experiment Station, Auburn.
- ☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Chilton Area Horticulture Substation, Clanton.
7. Forestry Unit, Coosa County.
8. Piedmont Substation, Camp Hill.
9. Plant Breeding Unit, Tallassee.
10. Forestry Unit, Autauga County.
11. Prattville Experiment Field, Prattville.
12. Black Belt Substation, Marion Junction.
13. The Turnipseed-Ikenberry Place, Union Springs.
14. Lower Coastal Plain Substation, Camden.
15. Forestry Unit, Barbour County.
16. Monroeville Experiment Field, Monroeville.
17. Wiregrass Substation, Headland.
18. Brewton Experiment Field, Brewton.
19. Solon Dixon Forestry Education Center,
Covington and Escambia counties.
20. Ornamental Horticulture Field Station, Spring Hill.
21. Gulf Coast Substation, Fairhope.