

I. COTTON PRODUCTION: Weed Control

PREPLANTING APPLICATIONS OF PROMETRYNE IN COTTON

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During the past few years there has been increasing interest in preplanting applications of prometryne (Caparol) for controlling annual broadleaf weeds in cotton. During 1968 prometryne was applied preplanting to 152 plots in nine experiments at the Cotton Research Center and Marana Experiment Farm. Prometryne was usually combined with another herbicide to control both broadleaf and grass weeds. Four experiments are described in this paper. Experiments 1 and 2 were to determine the effects of rates of prometryne and methods of applications on cotton and broadleaf weeds. Experiments 3 and 4 were to determine the effects of combinations of prometryne or diuron (Karmex) with trifluralin (Treflan) on cotton and weeds.

Experiment 1. Four rates and two methods of application of prometryne with Bensulide at the Cotton Research Center.

On March 6, prometryne at rates of 2, 3, 4, or 5-pounds per acre was applied to the soil surface, with and without additional incorporation by disking, before furrowing (listing) for the preplanting irrigation. All prometryne treatments were combined with 1 1/2 pounds per acre of bensulide (Prefar) incorporated by disking before furrowing. Treatments were replicated four times on four-row plots 43 feet long. Deltapine 16 cotton was planted in moist soil under a dry mulch on March 28.

The soil (surface 4-inches) contained 36% sand, 42% silt, 22% clay, and 1% organic matter. Weeds present included browntop panicum, Wright groundcherry, and carelessweed (Palmer amaranth). After cotton emerged, 10-foot sections of row were marked in each plot and the number of living cotton plants counted each week until thinning. Cotton was cultivated three times with a sectioned, rolling cultivator. Prior to harvest, the percent control of broadleaf (Bl) and grass (Gr) weeds was estimated. The center rows of each plot were machine-harvested in October.

Cotton emergence was not affected by herbicide treatments. Within two weeks of emergence preplanting applications of prometryne caused temporary discoloration of the foliage and reduced cotton stands by 8% (Table 1). The effects of prometryne on cotton seedlings were greatest when prometryne was not incorporated by disking. Herbicide injury to cotton seedlings was greatest on tow alternate rows compacted by the tractor tires during furrowing before the preplanting irrigation. Front and rear tractor wheels spaced 80 inches apart ran directly over alternate planting rows.

Cotton plants appeared normal within two months after emergence. Early-season weed control was 100% with all treatments. In July, many groundcherry seedlings emerged on all treatments and by September some weeds were larger than the cotton. Annual grass weeds were controlled until harvest but groundcherry control averaged only 60% with no difference in rate of prometryne or

method of application. The groundcherry plants were destroyed by drying and defoliation and did not interfere with machine-harvest. No herbicide treatment affected the yield of seed cotton.

Experiment 2. Four rates and two methods of application of prometryne with bensulide at Marana.

On February 26, the same treatments as in Experiment 1 were made at Marana. In April, Stoneville 213 cotton was planted in moist soil under a dry mulch. The soil contained 34% sand, 43% silt, 23% clay and 1% organic matter. Weeds present were woolly morningglory, Wright groundcherry, carelessweed, red sprangletop, and Mexican sprangletop. After emergence the growth of cotton was observed at weekly intervals. Cotton was cultivated three times. Prior to harvest the percent weed control was estimated. The center rows of each plot were machine-harvested in October.

Cotton emergence was normal with all treatments. Two to three weeks after emergence temporary foliage discoloration and reduced stands were observed (Table 2). The effects on seedlings were greatest when the herbicide was not incorporated by disking. Cotton seedling injury was most severe on three adjacent rows which corresponded to the rows compacted by the three-wheel tractor during furrowing for the preplanting irrigation. Early-season weed control was complete with all treatments. Many morningglory emerged on all treatments but only one plot treated with the lowest rate of prometryne had any morningglory survive till harvest. Three to five pounds per acre of prometryne applied before furrowing reduced cotton yields. When prometryne was incorporated by disking before furrowing only the highest rate reduced yields.

Experiment 3. Preplanting applications of prometryne or diuron with trifluralin at the Cotton Research Center.

On March 5, trifluralin at 3/4 pounds per acre, trifluralin with 2, 3, or 4 pounds per acre of prometryne or diuron, and 2 pounds per acre of diuron were applied to the soil surface and incorporated by disking before furrowing for the preplanting irrigation at the Cotton Research Center. This experiment was managed similar to Experiment 1. The soil contained 31% sand, 45% silt, 24% clay and 1% organic matter.

Cotton emergence was normal with all treatments. Trifluralin caused temporary stunting of cotton seedlings. Within two weeks all treatments containing diuron reduced cotton stands 27 to 62% (Table 3). Diuron combined with trifluralin was less injurious to cotton than diuron alone. The pattern of increased injury to cotton where tractor wheels compacted and depressed treated soil, observed in Experiment 1 with prometryne, was evident with trifluralin and diuron. Early-season control was good with all treatments. In July, many groundcherry seedlings emerged on plots treated with trifluralin or prometryne and trifluralin. By September many groundcherry were larger than the cotton. Weed control was not satisfactory at harvest where diuron treatments had reduced cotton stands and crop competition did not maintain late-season control. Diuron treatments which greatly reduced stands also reduced yields. Yield reductions were greatest on rows compacted by tractor wheels.

Experiment 4. Preplanting applications of prometryne or diuron with trifluralin at Marana.

On February 26, trifluralin at 3/4 pounds per acre, trifluralin with 2, 3, or 4 pounds per acre of diuron or 3 or 4 pounds per acre of prometryne, and 2 pounds per acre of prometryne were applied to the soil surface and incorporated by disking before furrowing for the preplanting irrigation at Marana. This experiment was managed similar to Experiment 2. The soil contained 38% sand, 39% silt, 23% clay, and 1% organic matter.

Cotton emergence was normal with all treatments. Within two weeks 40 to 80% of the seedlings treated with diuron were dead (Table 4). Four pounds per acre of prometryne caused temporary stunting and a slight reduction of cotton stands. Cotton seedling injury was again related to compacting the soil with tractor wheels after the herbicide applications. Many morningglory seedlings emerged on all treatments after the early irrigations, but only the trifluralin and trifluralin plus 4 pounds per acre of diuron treatments had morningglory present at harvest. Diuron treatments which reduced stands also reduced yields of seed cotton.

Summary

Preplanting applications of prometryne before furrowing for the preplanting irrigation for control of broadleaf weeds in cotton were evaluated at two locations. Temporary foliage discoloration and some reductions of cotton stands resulted from prometryne treatments but prometryne was less injurious to cotton than diuron. Incorporation of prometryne by disking before furrowing reduces its effects on cotton. Herbicide injury to cotton seedling was greatest on rows where tractor wheels compacted soil during furrowing before the preplanting irrigation.

Preplanting application gave early-season control of broadleaf weeds. During July, groundcherry seedlings emerged at the Cotton Research Center and were not controlled by even the highest rates of prometryne. Yields of cotton were not reduced by preplanting applications of 2 pounds per acre of prometryne. Higher rates of prometryne reduced cotton yields in one experiment. Although preplanting applications of prometryne gave early-season control of annual broadleaf weeds, they did not give full-season control.

Table 1

Effects of Preplanting Applications of Prometryne and Bensulide on Cotton Stands, Weed Control and Cotton Yield at the Cotton Research Center

Prometryne Treatment		Cotton Stands Seedling per Foot of Row		Weed Control Percent Estimated Sept. 25, 1968		Yield of Cotton as Percent of Test Average ¹
Method	lb/A	4/17	5/1	Bl	Grass	
Prefurrow	2	3.4	3.4	62	100	106
Prefurrow	3	3.8	3.3	63	100	100
Prefurrow	4	3.6	3.2	54	100	98
Prefurrow	5	3.9	3.5	59	100	98
Prefurrow, disked in	2	3.3	3.3	42	100	103
Prefurrow, disked in	3	3.3	2.9	60	100	97
Prefurrow, disked in	4	3.6	3.2	58	100	102
Prefurrow, disked in	5	3.5	3.4	70	100	102

¹ Yield of seed cotton on the test averaged 3,270 lb/A.

Table 2

Effects of Preplanting Applications of Prometryne and Bensulide on Cotton Seedlings, Weed Control, and Cotton Yield at Marana

Prometryne Treatment		Cotton Seedlings May	Weed Control Percent Estimated Sept. 27, 1968		Yield of Cotton as Percent of Test Average ¹
Method	lb/A		Bl	Grass	
Prefurrow	2	Stands reduced	100	100	118a
Prefurrow	3	Stands reduced	100	100	96 b
Prefurrow	4	Stands reduced	100	100	94 b
Prefurrow	5	Stands reduced	100	100	73 c
Prefurrow, disked in	2	Discolored	98	100	116a
Prefurrow, disked in	3	Discolored	100	100	115a
Prefurrow, disked in	4	Discolored	100	100	101ab
Prefurrow, disked in	5	Stands reduced	100	100	87 bc

¹ Yield of seed cotton on the test averaged 2,880 lb/A. Values followed by the same letter are not significantly different.

Table 3

Effects of Preplanting Applications of Prometryne
or Diuron with Trifluralin on Cotton Stands, Weed Control
and Cotton Yield at the Cotton Research Center

Treatment		Cotton Stands Seedlings Per Foot of Row		Weed Control Percent Estimated Sept. 25, 1968		Yield of Cotton as Percent of Test Average ¹
Herbicide lb/A	Herbicide lb/A	4/17	5/1	Bl	Gr.	
--	Trifluralin 3/4	3.5	3.4	78	100	110a
Prometryne 2	Trifluralin 3/4	2.9	2.7	81	97	115a
Prometryne 3	Trifluralin 3/4	3.3	3.1	94	100	115a
Prometryne 4	Trifluralin 3/4	3.1	2.9	90	100	116a
Diuron 2	--	3.3	2.4	90	81	89 b
Diuron 2	Trifluralin 3/4	3.5	2.3	100	100	110a
Diuron 3	Trifluralin 3/4	3.5	1.2	92	95	79 bc
Diuron 4	Trifluralin 3/4	2.9	1.1	84	90	65 c

¹ Yield of seed cotton on the test averaged 3,070 lb/A. Values followed by the same letter are not significantly different.

Table 4

Effects of Preplanting Applications of Prometryne
or Diuron with Trifluralin on Cotton Stands, Weed Control,
and Cotton Yield at Marana

Treatment		Cotton Stands	Weed Control Percent Estimated Sept. 27, 1968		Yield of Cotton as Percent of Test Average ¹
Herbicide lb/A	Herbicide lb/A	May	Bl	Gr	
--	Trifluralin 3/4	Normal	85	100	132a
Prometryne 2	--	Normal	100	100	125a
Prometryne 3	Trifluralin 3/4	Normal	100	100	123ab
Prometryne 4	Trifluralin 3/4	Reduced 10%	100	100	114ab
Diuron 2	Trifluralin 3/4	Reduced 40%	100	100	83 bcd
Diuron 3	Trifluralin 3/4	Reduced 50%	100	100	73 cd
Diuron 4	Trifluralin 3/4	Reduced 80%	75	100	52 d

¹ Yield of seed cotton on the test averaged 2,330 lb/A. Values followed by the same letter are not significantly different.