Factors affecting the response of cotton to preplant applications of EPTC (EPTAM) and butylate (Sutan +)

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ABSTRACT

Research was conducted at Maricopa, AZ with EPTC (S-ethyl dipropyl carbamothioate) (1.0 lb/a) and butylate (S-ethyl bis(2-methylpropyl)carbamothioate) (2.0 and 3.0 lb/a) in 1986 and 1987 to measure the response of cotton to preplant application methods. Butylate and EPTC were applied as either a preplant incorporated or preharrow treatments. The greatest injury to cotton and poorest weed control resulted when butylate or EPTC were applied on flat ground and incorporated to a depth of 2 inches or 4 to 6 inches. Adequate weed control and minimal injury to cotton was observed when these two thiocarbamates were applied preharrow.

INTRODUCTION

Cotton acreage in Arizona infested with purple nutsedge (Cyperus rotundus) has been increasing due to the lack of an effective herbicide and reduced competition from other weeds. The thiocarbamate herbicides do provide preemergence control of purple nutsedge, but past research has shown marginal safety to cotton. The heaviest flushes of purple nutsedge occur at 52-55 degree F. soil temperatures and thus coincide with cotton planting. High populations of purple nutsedge emerging with cotton can reduce stand and quality. Cotton stands established in the absence of purple nutsedge seem to effectively compete with late emerging purple nutsedge. However, significant losses in crop quality may occur (grassy bales). It is imperative to minimize losses from purple nutsedge by controlling it early.

Arizona cotton growers may cultivate 4 to 5 times prior to the first postemergence irrigation. This does not control weeds in the seed row and depletes soil moisture. With rising populations of purple nutsedge, growers are willing to risk some crop injury if a herbicide can reduce early competition from purple nutsedge and limit increases in populations. Research is underway at the University of Arizona in cooperation with several growers to identify production practices which influence the selectivity of the thiocarbamates.

MATERIALS AND METHODS

Field tests were conducted at Maricopa, AZ in 1986 and 1987 on a sandy clay loam soil to determine if method of application influenced weed control and cotton selectivity. Butylate (2 and 3 lb ai/A) and EPTC (1 lb/a) were applied to flat ground and immediately, thoroughly incorporated to a depth of 2 in., or 4 to 6 inches (PPI 2 in., PPI 4-6 in.) on April 8, 1986 and on March 19, 1987. An 80 in. wide Befco rotary tiller (Befco, Inc., P. O. box 6036 Rocky Mount, NC 27801) was used for incorporation, making two passes per plot. Beds were formed and shaped with a rotary mulcher. These same treatments were also applied preharrow (PH), ie. over shaped beds, and shallowly incorporated with a rolling cultivator (April 23, 1986 and April 8, 1987). In 1986, cotton variety DP 61 was planted on April 25, at a rate of 14 lbs/a. Cotton variety DP 90 was planted April 17, 1987. All herbicides were applied with a tractor mounted sprayer in 20 gallons of water per acre. Individual plots were 13.3 ft wide (4 rows), 40 ft long, and were arranged in a randomized complete block design with 4 replications. Parameters measured in each test included: cotton stand per 10 ft of row, wright groundcherry control (Physalis wrightii), palmer's amaranth control (Amaranthus palmeri) and seedcotton yield.

RESULTS AND DISCUSSION

There was a significant difference in affects of treatments depending on year of application. Thus, results from each year are discussed independently.

1986. Reductions in cotton stand were greatest when either EPTC or butylate were applied on flat ground and incorporated. Deep incorporation (4-6 in.) of butylate caused a 22% greater reduction in cotton stand than 2 in. incorporation. Cotton stand was not reduced when these same treatments were applied PH. Highest yields and better weed control were obtained with PH applications (see Table 1).

1987. Cotton stand was more variable in 1987 than in 1986, and no stand reductions were measured at the first evaluation. PH applications showed little impact on cotton stand (see Table 2). The only significant stand reductions occurred where 3.0 lb/a butylate was applied on flat ground. EPTC did not reduce stand or yield in 1987 regardless of type of incorporation.

Both thiocarbamates provided best weed control when applied PH, but EPTC applied PH did not control wright groundcherry.

SUMMARY

Both EPTC and butylate have the potential to reduce cotton stands, especially if applied and incorporated on flat ground. PH applications show the most promise as a means of using thiocarbamates as preemergence cotton herbicides. The extent of thiocarbamate injury appears to vary by year and possibly by the cotton variety involved.

Table 1. 1986 cotton and weed response to EPTC and butylate applied preplant and incorporated at 2 in and 4-6 in (PPI) compared to a preharrow (PH) application.

Herbicide	Rate	Application Method	Stand 5/5	Stand 5/27	Weed control Pa	Weed control Gc	Seed cotton
	(lb/a)		(pl./10 ft)		---%---		(lb/a)
butylate	2.00	PPI (2 in)	47	29	60	99	3300
butylate	2.00	PPI (4-6 in)	44	15	50	95	1730
butylate	2.00	PH	52	52	97	99	4760
butylate	3.00	PPI (2 in)	37	19	70	97	3100
butylate	3.00	PPI (4-6 in)	46	6	40	94	1220
butylate	3.00	PH	53	51	96	98	4730
EPTC	1.00	PPI (2 in)	49	40	90	98	3280
EPTC	1.00	PPI (4-6 in)	44	38	20	97	2020
EPTC	1.00	PH	63	65	87	99	4230
trifluralin prometryn	0.75 1.60	PPI (4-6 in)	59	58	99	94	4940
LSD (p=0.05)			(7)	(9)	(25)	(6)	(1270)

Table 2. 1987 Cotton and weed response to EPTC and butylate applied preplant and incorporated at 2 in and 4-6 in (PPI) compared to a preharrow (PH) application.

Herbicide	Rate	Application Method	Stand 4/29	Stand 5/22	Weed control Pa	Weed control Gc	Seed cotton
	(lb/a)		(pl./10 ft)		---%---		(lb/a)
butylate	2.00	PPI (2 in)	36	26	71	51	4150
butylate	2.00	PPI (4-6 in)	43	32	58	40	4450
butylate	2.00	PH	40	38	74	78	4430
butylate	3.00	PPI (2 in)	39	22	58	69	3510
butylate	3.00	PPI (4-6 in)	34	18	64	65	3430
butylate	3.00	PH	39	39	90	88	4300
EPTC	1.00	PPI (2 in)	39	36	70	44	4950
EPTC	1.00	PPI (4-6 in)	38	34	44	60	5130
EPTC	1.00	PH	42	40	97	11	5310
trifluralin prometryn	0.75 1.60	PPI (4-6 in)	40	37	97	99	5300
LSD (p=0.05)			(16)	(14)	(29)	(37)	(1030)