

Layby Mexican Sprangletop Control with Select (Clethodim) and Antagonism Resulting From Staple (Pyriithiobac Sodium) and Select Tank Mixed

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Abstract

Late emerging summer annual grassy weeds such as Mexican sprangletop can stain cotton lint resulting in price discounts for color at harvest. Cyanizine (Bladex) is commonly applied layby for grassy weed, morningglory, and pigweed control, however use of this herbicide will be phased out by 2002 with rate reductions beginning in 1998. Clethodim (Select) herbicide was evaluated as an alternative to cyanizine for layby grassy weed control, plus the antagonistic effect of tank mixing Select with Staple herbicide was examined in Parker Valley, AZ during the 1997 cotton growing season.

Introduction

Mexican sprangletop is a summer annual grass weed that can become a serious problem in cotton grown throughout Arizona. Mexican Sprangletop reproduces by seed which falls from the flowering head at maturity in August or September. Sprangletop thrives in wet places such as irrigation ditches, ends of water runs, and around stand pipes where herbicides are not applied or degrade quickly or are leached below the seed depth. Late emerging summer grass weeds in contact with open or harvested cotton bolls can result in stained lint and price discounts for color. Late emerging annual summer grasses such as Mexican sprangletop are normally controlled with cultivation and selective grass herbicides such as clethodim (Prism or Select), cyanizine (Bladex or Cy-Pro), fluaziflop (Fusilade), Glyphosate (Roundup), and sethoxydim (Poast).

Cyanizine (Bladex 4L or Cy-Pro 4L) is commonly applied directed postemergence or at layby to control grassy weeds including Mexican sprangletop and broadleaf weeds including morningglory and pigweed. It is mostly soil applied with some foliar activity, systemic, and moves primarily with water and nutrients in the xylem. Applied to sensitive weeds, Cyanizine inhibits photosynthesis by binding to a protein in the electron transport system, thus effectively blocking energy transport and causing a build up of destructive high energy products. Layby application rates range from 0.8 to 1.6 lb a.i./acre (0.8-1.6 qt Bladex 4L/acre). Cyanizine does provide effective layby control of annual grasses, morningglory, and pigweed, however the sale and use of all cyanizine products will end in 2002 with annual rate reductions beginning in 1998.

Clethodim (Prism 0.94 EC or Select 2EC) is a relatively new herbicide that can be applied postemergence or layby to control many annual grass weeds including Mexican sprangletop. Its mode of action is similar to Poast, Assure, Fusilade, and Bugle. Foliar applied to sensitive grassy weeds, clethodim movement in the plant occurs in both the phloem with photosynthate and the xylem with water and nutrients. It inhibits the production of lipids which are important in the production of plant membranes. This results in death of the tissue within the growing points of plants. Clethodim should not be applied under stress conditions (more than 7 days following irrigation) or if rainfall

is expected within one hour. Application rate varies by weed stage and geographic area, ranging from 0.1 to 0.25 lb a.i./acre (6-16 oz Select 2EC/acre, up to 32 oz/year). A second application may be necessary 2 to 3 weeks after emergence of new growth. This material should not be tank mixed with Staple herbicide since antagonism may occur resulting in poor weed control.

Due to the current rate reductions and the eventual loss of cyanazine herbicides over the next three years, alternative herbicides need to be examined for layby weed control. Several herbicide options are currently available for grassy weed control in cotton, including clethodim (Select). Although the antagonistic effects of Staple tank mixed with Select are accepted as fact, very little data exist documenting how much grass control is sacrificed. A field experiment was conducted to compare the effectiveness of a cotton grower's standard layby application of cyanazine (1.2 qt Bladex 4L/acre) to clethodim (8 oz Select 2EC/acre) for Mexican sprangletop control. An additional treatment examined antagonistic effects of a tank mix of Select 2EC plus Staple (1.8 oz/acre) herbicides on Mexican sprangletop control.

Materials and Methods

A field experiment was conducted during 1997 in Parker Valley (located in southwestern La Paz County) to determine the effect of cyanazine (1.2 qt Bladex 4L/acre), clethodim (8 oz Select 2EC/acre), and a tank mix of cyanazine (8 oz Select 2EC/acre) plus Staple (1.8 oz/acre) herbicides on actively growing Mexican sprangletop in cotton applied post directed at layby. A fourth treatment consisted of an untreated (control) plot and all treatments were replicated four times in a randomized complete block experimental design. Layby herbicides were applied post directed at the base of cotton plants and in the furrow with an eight row John Deere Hi-Cycle Sprayer applying 10 gal/acre on July 16. Individual plots were 8 rows (25.3 feet) wide by the length of the irrigation run (1250 feet long).

Visual ratings of Mexican sprangletop control in 1996 were made at 2, 4, 6, 8, and 10 weeks after herbicide applications (WAA). Percent Mexican sprangletop cover resulting from regrowth from seed was also rated at 10 WAA. Visual ratings of weed control were on a rating system from 0 to 100 with 0 to 50 representing yellow and chlorotic symptoms, and 50 to 100 representing death and population reduction. Statistical analyses were performed on the data using ANOVA and the least significant difference Duncan's Multiple Range Test at the 0.05 level of probability when appropriate.

Results and Discussion

Mexican sprangletop control ranged from 10 to 25% at 2 weeks after application (WAA), 46 to 68% at 4 WAA, 59 to 86% at 6 WAA, 56 to 79% at 8 WAA, and 41 to 56% at 10 WAA with a single application of Bladex 4L, Select 2EC, or Select 2EC+Staple tank mixed (Table 1). Good weed control (79-86%) was observed up to 8 WAA at layby using 8 oz Select 2EC/acre. Bladex 4L at 1.2 qt/acre provided fair weed control (56-59%) up to 8 WAA at layby. Antagonistic effects of the Staple plus Select 2EC herbicide tank mix resulted in a 25 to 30% reduction in sprangletop control compared to Select 2EC applied alone at layby. By 10 WAA, Mexican sprangletop control was below average (41-56%), and no significant differences between the three herbicide treatments were observed due to sprangletop regrowth from seed.

Select 2EC provided good control of Mexican sprangletop for up to 8 weeks following application at layby. Select 2EC provided superior sprangletop control compared to Bladex 4L post directed at layby. Tank mixing Staple herbicide with Select 2EC resulted in sprangletop control comparable to Bladex 4L applied at layby. Nonetheless, based on the results of this study, a second application of Select 2EC would be necessary at 10 weeks after the initial application to provide season long Mexican sprangletop control through the cotton harvest.

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Table 1. Mexican sprangletop weed control evaluations from 2 to 10 weeks after post directed application (WAA) at layby (July 16) and sprangletop regrowth from seed in Parker Valley cotton.

Treatment	Formulation	Rate	Sprangletop Control					Sprangletop Reseeded
			2 WAA	4 WAA	6 WAA	8 WAA	10 WAA	10 WAA
		per acre	%	%	%	%	%	% cover
1. untreated	---	---	0 c	0 c	0 d	0 c	0 b	---
2. cyanizine	Bladex 4L	1.2 qt	15 ab	55 b	69 b	66 b	41 a	19 a
3. clethodim	Select 2EC	8.0 oz	25 a	68 a	86 a	79 a	56 a	23 a
4. clethodim	Select 2EC	8.0 oz +						
Staple	85 WSP	1.8 oz	10 bc	46 b	59 c	56 b	46 a	19 a

Means within columns followed by the same letter are not significantly different at the 0.05 level of probability according to Duncan's Multiple Range Test.