

**BXN (BROMOXYNIL-TOLERANT) COTTON IN
THE CALIFORNIA PRODUCTION SYSTEM**
R. N. Vargas, S. Wright, B. Marsh and T. M. Duvall
University of California Cooperative Extension
Madera, Visalia and Bakersfield, CA

Abstract

Field studies were conducted between 1997 and 1999 to evaluate weed control efficacy and the tolerance of BXN cotton to bromoxynil applied over the top of cotyledon to 2 to 4 leaf cotton and post directed at layby. Bromoxynil provided 95 to 100 percent control of most annual broadleaf weeds tested including: Chinese thornapple (*Datura ferox*), black and hairy nightshade (*Solanum spp.*), common lambsquarters (*Chenopodium album L.*) and velvetleaf (*Abutilon theophrasti*). Best control was achieved with one application of bromoxynil at 1.0 lb. ai/A, but most weeds were also completely controlled with the 0.50 lb. ai/A rate. Control of pigweed (*Amaranthus spp.*) was erratic and poor to moderate at all rates tested. Control ranged from 15 to 80 percent, but when bromoxynil was tank mixed with any of the selective grass herbicides (*clethodim*, *fluazifop-p* or *sethoxydim*) control was reduced to completely unacceptable at 4 to 5 percent. There was no advantage in control of the above weed species when bromoxynil was applied in a tank mix with pyrithiobac sodium or MSMA. Control of annual morningglory (*Ipomea spp.*) has been slightly more difficult. Bromoxynil applied over the top to annual morningglory provided acceptable control for 35 days when followed by a post directed treatment. Either a single over the top or single later post directed treatment provided unacceptable control. At 90 days after treatment control was also unacceptable with an over the top followed by a post directed treatment. Best control was achieved when bromoxynil was applied to morningglory with 2 or fewer leaves and control was enhanced when tank mixed with MSMA.

Introduction

BXN tolerant cotton studies were conducted on a limited basis in 1997 and 1998 with extensive testing in 1999. In 1999, due to changes in the "One Quality Law" governed by the San Joaquin Valley Cotton Board, several thousand acres of Stoneville BXN-47 were commercially grown. Results of University studies, as well as grower experience, have indicated good to excellent control of most summer annual broadleaf weeds when bromoxynil is applied over the top of 2 to 4 leaf cotton to weeds no larger than the 4 to 6 leaf stage.

Materials and Methods

Uniform fields of Stoneville BXN 47 cotton, infested with various weed species, were divided into treatments and replicated three to four times in a randomized complete block design. Herbicides were applied early over the top of cotyledon to 2 to 4 leaf cotton and at layby when cotton was 12 to 16 nodes. At the time of application weed species were seedlings ranging from cotyledon to no more than the 6 leaf stage. Treatments were applied with either a CO₂ backpack sprayer or a tractor mounted sprayer delivering 20 to 22 GPA of spray solution at 30 psi using 8002 flat fan nozzles. A crop oil concentrate was applied with all treatments at 1% V/V. Evaluation of weed control efficacy and cotton tolerance were taken from 7 to 14 days after treatment and in some studies up to 90 days after treatment and at defoliation. In-season and final plant mapping data was collected for most studies and studies were harvested for yield and quality.

Discussion

No visual injury symptoms were noted when bromoxynil was applied either over the top or post directed separately or sequentially at all rates tested. In-season and final plant mapping data varied by location and year but no adverse effect was noted in all growth parameters measured including total number of nodes for both fruiting and vegetative branches, height, height to node ratio, percent bolls in first, second and third position nodes, retention in the bottom 5 fruiting branches, retention in the 95% zone and bolls per plant. There were no significant differences in lint yields when comparing rates of bromoxynil applied to Stoneville BXN 47. Injury symptoms were noted when bromoxynil was applied in combination with pyrithiobac sodium and MSMA, but symptoms were short lived and caused no adverse effects to cotton growth and development.

Evaluations for weed control indicted bromoxynil provided 95 to 100 percent control of most broadleaf annuals including Chinese thornapple, black and hairy nightshade, common lambsquarters and velvetleaf. Best control was achieved with one application of bromoxynil at 1.0 lb. ai/A, but most weeds were also completely controlled with the 0.5 lb. ai/A rate. There was no advantage in tank mixing bromoxynil with either pyrithiobac sodium or MSMA. Control of pigweed was erratic and poor to moderate at all rates tested with reduced control being exhibited when bromoxynil was applied tank mixed with selective grass herbicides.

Effective control of annual morningglory was achieved when bromoxynil was applied to morningglory at 2 leaves or less in size followed by a sequential application three weeks after the initial application and coupled with close cultivation. The 1.0 lb. ai/A rate provided better control than the 0.5 lb. ai/A rate up to defoliation. Best control was achieved with an

initial bromoxynil, MSMA tank mix application when morningglory was no larger than 2 leaves followed by an application of bromoxynil at 1.0 lb. ai/A approximately three weeks earlier. Control was considerably reduced when applied to morningglory greater than the 2 leaf stage.

Summary

BXN cotton, if properly managed and bromoxynil applications are made to small seedling weeds will provide California cotton growers with a viable weed management strategy for effective and economic weed control. Based on these studies most summer annual broadleaf weeds are effectively controlled with annual morningglory being much more difficult to provide season long effective control.

Table 1. Chinese thornapple Control with Stoneville BXN 47.

Treatment	lb/oz ai/A	Chinese Thornapple Control		
		7 DAT	14 DAT	21 DAT
1. Buctril	0.5 lb	100 a	97 a	97 a
2. Buctril	1.0 lb	100 a	100 a	100 a
3. Buctril	0.75 lb	99 a	95 a	100 a
4. Buctril + Staple	1.0 lb 1.0 oz	100 a	100 a	100 a
5. MSMA	1.5 lb	20 c	16 b	23 b
6. Buctril + MSMA	1.0 lb 1.5 lb	100 a	98 a	100 a
7. Staple	1.0 oz	32 b	96 a	100 a
8. Staple + MSMA	1.0 oz 1.5 lb	31 b	97 a	100 a
9. Control	–	0 d	0 c	0 c
lsd @ 5%		8.333	7.029	3.308
Percent CV		8.84	6.19	2.84

Note: All treatments included Agridex at 1% v/v

Table 2. Chinese thornapple Control with Stoneville BXN 47

Trt	lb/oz ai/A	HNR	Bolls per Plant	% Retention 95 % Zone	Yield lbs Seed Cotton per Acre
1. Buctril	0.5 lb	2.14	15	66	4285
2. Buctril	1.0 lb	2.22	15	70	4535
3. Buctril	0.75 lb	2.22	14	76	4362
4. Buctril + Staple	1.0 lb 1.0 oz	2.26	14	67	4070
5. MSMA	1.5 lb	2.21	15	67	4095
6. Buctril + MSMA	1.0 lb 1.5 lb	2.22	14	67	3862
7. Staple	1.0 oz	2.27	14	71	4612
8. Staple + MSMA	1.0 oz 1.5 lb	2.27	16	76	3890
9. Control	–	2.22	14	67	4105
lsd @ 5%		NS	NS	NS	NS
Percent CV		3.72	16.65	12.42	9.56

Note: All treatments included Agridex at 1% v/v

Table 3. Broadleaf Weed Control Stoneville BXN 47 Cotton

Trt	lb/oz ai/A	Nightshade Control		Lambsquarter	
		7 DAT	14 DAT	7 DAT	14 DAT
1. Buctril	0.5 lb	99 a	95 ab	100 a	100 a
2. Buctril	1.0 lb	99 a	98 ab	100 a	100 a
3. Buctril	0.75 lb	96 a	99 a	100 a	100 a
4. Buctril + Staple	1.0 lb 1.0 oz	100	99 a	97 a	100 a
5. MSMA	1.5 lb	16 c	22 d	10 bc	10 b
6. Buctril + MSMA	1.0 lb 1.5 lb	98 a	95 ab	100 a	98 a
7. Staple	1.0 oz	38 b	82 c	15 b	0 c
8. Staple + MSMA	1.0 oz 1.5 lb	39 b	90 bc	15 b	4 c
9. Prism	0.125 lb	0 d	0 e	0 d	0 c
10. Buctril + Prism	0.5 lb .125 lb	95 a	95 ab	100 a	100 a
11. Poast	0.188 lb	0 d	0 e	0 d	0 c
12. Buctril + Poast	0.5 lb 0.188 lb	100 a	96 ab	100 a	100 a
13. Fusilade	0.188 lb	12 c	0 e	2 d	0 c
14. Buctril + Fusilade	0.5 lb 0.188 lb	100 a	100 a	100 a	100 a
15. Control		0 d	0 e	0 d	0 c
16. MSMA + Prism	1.5 lb 0.125 lb	0 d	0 e	5 cd	0 c
lsd @ 5%		10.48	8.98	6.43	5.108
Percent CV		13.23	10.39	8.57	7.11

Note: All treatments included Agridex at 1% v/v

Table 4. Broadleaf Weed Control Stoneville BXN 47 Cotton

Trt	lb/o ai/A	Pigweed Control		Cotton Injury	
		7 DAT	14 DAT	7 DAT	14 DAT
1. Buctril	0.5 lb	28 cd	15 cd	0 d	0 c
2. Buctril	1.0 lb	30 c	80 ab	0 d	0 c
3. Buctril	0.75 lb	23 cd	67 b	0 d	0 c
4. Buctril + Staple	1.0 lb 1.0 oz	78 a	76 ab	31 b	5 c
5. MSMA	1.5 lb	30 c	30 c	25 c	15 b
6. Buctril + MSMA	1.0 lb 1.5 lb	65 b	87 a	24 c	20 ab
7. Staple	1.0 oz	63 b	65 b	39 a	20 ab
8. Staple + MSMA	1.0 oz 1.5 lb	70 ab	70 b	41 a	25 a
9. Prism	0.125 lb	0 e	0 d	0 d	0 c
10. Buctril + Prism	0.5 lb .125 lb	18 d	5 d	0 d	6 c
11. Poast	0.188 lb	0 e	0 d	0 d	0 c
12. Buctril + Poast	0.5 lb 0.188 lb	28 cd	4 d	0 d	0 c
13. Fusilade	0.188 lb	3 e	0 d	0 d	0 c
14. Buctril + Fusilade	0.5 lb 0.188 lb	24 cd	4 d	0 d	0 c
15. Control		0 e	0 d	0 d	0 c
16. MSMA + Prism	1.5 lb 0.125 lb	5 e	0 d	25 c	14 b
lsd @ 5%		12.30	16.58	4.245	7.444
Percent CV		29.81	37.00	25.78	80.01

Note: All treatments included Agridex at 1% v/v

Table 5. Morningglory Control with Stoneville BXN 47 Cotton

Trt	lb/oz ai	Morningglory Control Days after the June 22 application			
		7 DAT		16 DAT	At Defoliation
		≤1 leaf	≥2 leaf		
1. Buctril	0.5 lb	90	40	83	57
2. Buctril	1.0 lb	100	50	83	75
3. Buctril	0.75 lb	93	30	83	63
4. Buctril + Staple	1.0 lb 1.0 oz	98	47	80	75
5. MSMA	1.5 lb	97	20	67	75
6. Buctril + MSMA	1.0 lb 1.5 lb	100	60	95	90
7. Staple	1.0 oz	93	27	63	60
8. Staple + MSMA	1.0 oz 1.5 lb	100	27	77	75
lsd @ .05		NS	NS	14	NS
Percent CV @ .05		7.85	39.74	10.38	23.12

Note: All treatments included Agridex at 1% v/v
 All treatments received Buctril at 1 lb ai and Agridex as a directed application on July 8, 1999
 Morningglory Stage of Growth: cotyledon to 3 leaf at application

Table 6. Morningglory Control with Stoneville BXN 47 Cotton

Trt	lb/oz ai	HNR	Bolls per plant	% Retention 95% Zone	Seed Cotton per Acre
1. Buctril	0.5 lb	1.92	13.3	65	3864
2. Buctril	1.0 lb	1.84	10.8	68	3879
3. Buctril	0.75 lb	1.76	9.6	56	3272
4. Buctril + Staple	1.0 lb 1.0 oz	1.82	12.2	59	3591
5. MSMA	1.5 lb	1.67	10.7	56	3470
6. Buctril + MSMA	1.0 lb 1.5 lb	1.52	11.3	55	2879
7. Staple	1.0 oz	1.73	8.9	51	3515
8. Staple + MSMA	1.0 oz 1.5 lb	1.69	10.8	55	3258
lsd @ .05		NS	NS	NS	NS
Percent CV @ .05		7.24	18.94	16.03	10.77

Note: All treatments included Agridex at 1% v/v
 All treatments received Buctril at 1 lb ai and Agridex at 1 % over the top on July 8, 1999