

Timing of Postemergence Herbicides for Onion Weed Control

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Abstract

Bromoxynil (Buctril®) at 0.063, 0.094, and 0.125 lb AI/A was completely safe on onions treated at the early first true leaf stage of growth. Onions did not exhibit visual injury at 12 days after treatment (DAT) and height was not different from the untreated at 45 DAT. Melilotus officinalis (yellow sweetclover) was only marginally controlled by both Buctril and oxyfluorfen (Goal®). Goal provided better weed control with an earlier application timing at 0.063 lb AI/A than the later application at 0.25 lb AI/A. All herbicide treated onions yielded higher than the untreated. A rate response was observed for Buctril and Goal where onion yields were higher for the higher rates of application. Results indicate that the POST herbicides at lower than typical use rates were safe when applied to onions at an early timing. Effective weed control of some weeds was observed but yellow sweetclover was not adequately controlled.

Introduction

Postemergence (POST) herbicide use is minimal for onion weed control in Arizona because of the potential for crop phytotoxicity. Buctril and Goal are highly effective POST herbicides for many of the problem annual broadleaved weeds. Limitations of POST herbicides for use in onions is that onions must be at the 2-leaf stage of growth when many weeds would already be beyond the stage for effective control. Buctril and Goal tend to cause a burning of the treated onion foliage that is not acceptable to many growers. Onions generally recover and continue to grow tops with a normal appearance and produce normal and mature bulbs for harvest. Buctril is labeled for use at the 0.25 to 0.375 lb AI/A rate and Goal is labeled at a range of 0.125 to 0.25 lb AI/A. Studies were conducted to evaluate and determine the efficacy and safety of lower than labeled rates and timing of applications of Buctril and Goal for onion weed control.

Materials and Methods

Two small plot field tests were conducted at the University of Arizona Maricopa Agricultural Center, Maricopa, AZ. For both tests, the land was prepared per typical cultural tillage practices and conventional 40-inch beds were mulched and shaped followed by planting two seedlines per bed on 23 November 1997. In test 1, onion cv. Phoenix and Henry's Special were planted, each on two beds and in test 2, Henry's Special was planted. No preemergence herbicide was used to control weeds in the tests. For test 1, the herbicide treatment plots consisted of four beds (2 beds of each variety) measuring 25 ft long and each treatment was replicated three times in a randomized complete block design.

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The plots in test 2 consisted of two beds measuring 20 ft long and each treatment replicated three times in a randomized complete block design. The POST herbicide treatments were applied using a CO₂ backpack sprayer equipped with a hand-held boom with four flat fan 8002 nozzle tips. The herbicides were delivered in 23 gpa water that was pressurized to 35 psi. Test 1 was treated on 09 January 1998 when the emerged onions exhibited the flag-leaf and the first true leaf. London rocket (*Sisymbrium irio*) was at the 2-4 leaf stage and measured about 1-inch in diameter, sowthistle (*Sonchus oleraceus*) was at the cotyledon to 2-leaf stage, and yellow sweetclover (*Melilotus officinalis*) was at the 1-leaf stage. The weather conditions at the time of applications was clear skies with no wind and air temperature at 46°F. The weather on the day before applications was cloudy. Test 2 applications were initiated on 13 January when the onions had a flag-leaf and 1-true leaf. The weather was mostly clear with few scattered clouds, minimal breeze, and air temperature at 62°F. Weeds present included small London rocket, sowthistle, clover, and few lambsquarters (*Chenopodium album*), and cheeseweed (*Malva* spp). The second late applications were made on 02 February when the onions had two true leaves. The larger weeds ranged from 4 to 12 leaf stages. The weather was clear, calm, and 58°F. Visual crop injury ratings, crop height, and weed control were measured after treatment applications at various intervals and onions were harvested in test 2 on 15 May.

Results and Discussion

Test 1. Buctril at 0.063, 0.094, and 0.125 lb AI/A were completely safe on onions treated at the early first true leaf stage of growth (Table 1). Onion cv. Phoenix and Henry's Special did not exhibit visual injury at 12 days after treatment (DAT) and height was not different from the untreated at 45 DAT. Buctril at 0.063 lb AI/A gave marginally acceptable weed control of London rocket (*Sisymbrium irio*), sweetclover (*Melilotus officinalis*) and good control of sowthistle (*Sonchus oleraceus*). Weed control improved slightly at the higher rates. All rates appeared to be equally effective when applied on the very small weeds. Season-long weed control diminished near the end of the growing season demonstrating that subsequent weed emergence required additional treatment.

Test 2. Buctril and Goal were applied early (1-leaf stage onion) or late (2-leaf stage onion) and injury was not observed for the early applications of Goal at 0.063 or 0.125 lb AI/A (Table 2). Buctril at 0.094 lb AI/A exhibited slight injury at only 3% and the higher rate of 0.125 lb AI/A exhibited no injury. The late applications of Buctril and Goal caused slight but acceptable injury at the typical use rates. Onion plant height measurements indicated that the late application of Buctril at 0.125 lb AI/A or higher and Goal at 0.125 lb AI/A or higher reduced height relative to the untreated check. Buctril at 0.094 lb AI/A gave nearly acceptable London rocket control and good control of sowthistle (Table 3). Sweetclover was only marginally controlled by both Buctril and Goal. Goal caused slightly more burning of the clover but it recovered at later ratings. Goal provided better weed control with an earlier application timing at 0.063 lb AI/A than the later application at 0.25 lb AI/A.

Onion yields were highest for Buctril and Goal treatments applied at the highest rates at the later timing. All herbicide treated onions yielded higher than the untreated. A rate response was observed for Buctril and Goal where onions yields were higher for the higher rates of application. The earlier applications of Buctril treated onions yielded similar or slightly higher than the later treated onions at the 0.094 and 0.125 lb AI/A rates. Earlier applications of Goal at the 0.063 or 0.125 lb AI/A rates gave slightly higher yields than the later date treatments.

Results indicate that the POST herbicides at lower than typical use rates may be safe when applied to onions at an early timing. Effective weed control of some weeds was observed but sweetclover was not adequately controlled. Early applications may remove early emerging weeds that are competitive with the emerging onions but subsequent weed control is necessary for later emerging weeds.

Table 1. Early application of Buctril for onion weed control. (Umeda, Gal, and Strickland)

Treatment	Rate (lb AI/A)	<u>Onion Injury</u>				<u>Weed Control</u>				
		Phoenix		Henry Spc.		<u>SSYIR</u>		<u>MEUOF</u>		<u>SONOL</u>
		21 Jan	23 Feb	21 Jan	23 Feb	21 Jan	24 Apr	21 Jan	24 Apr	21 Jan
	----- % -----		inches			----- % -----				
Untreated check		0	0	3.7	4.1	0	0	0	0	0
Buctril	0.063	0	0	3.9	4.0	85	33	80	17	92
Buctril	0.094	0	0	4.1	4.1	92	63	85	17	93
Buctril	0.125	0	0	4.0	4.0	99	72	88	33	99
LSD (p=0.05)				0.35	0.76	5.0	40.1	10.0	37.2	4.7

Buctril applied on 09 Jan 1998.

Onions growth stage at flag leaf plus early first true leaf emergence.

Onion injury = average height of plants per plot

SSYIR = *Sisymbrium irio* (London rocket), MEUOF = *Melilotus officinalis* (yellow sweetclover), SONOL = *Sonchus oleraceus* (sowthistle)

Table 2. Timing of applications of postemergence herbicides for onion weed control. (Umeda, et al)

Treatment	Rate (lb AI/A)	Timing	<u>Onion Injury</u>			<u>Yield</u>
			21 Jan	17 Feb	23 Feb	15 May
			%		ht (in)	lb/plot
Untreated check			0	0	3.9	1.1
Buctril	0.094	early	3	0	4.2	1.6
Buctril	0.125	early	0	0	4.0	2.8
Buctril	0.094	late		0	4.3	1.7
Buctril	0.125	late		3	4.1	1.9
Buctril	0.25	late		12	3.6	3.0
Goal	0.063	early	0	0	4.5	2.4
Goal	0.125	early	0	0	4.6	3.1
Goal	0.063	late		0	3.9	2.2
Goal	0.125	late		5	3.7	2.9
Goal	0.25	late		10	3.8	4.2
LSD (p=0.05)					0.46	1.27

Applications made on: early - 13 Jan 1998; late - 02 Feb 1998

Table 3. Timing of applications of postemergence herbicides for onion weed control. (Umeda, et al)

Treatment	Rate (lb AI/A)	Timing	Weed Control								
			<u>SSYIR</u>			<u>SONOL</u>			<u>MEUOF</u>		
			21 Jan	17 Feb	24 Apr	21 Jan	17 Feb	24 Apr	21 Jan	17 Feb	24 Apr
			-----%-----								
Untreated check			0	0	0	0	0	0	0	0	0
Buctril	0.094	early	82	85	17	93	92	58	77	77	33
Buctril	0.125	early	96	95	77	99	95	93	82	72	40
Buctril	0.094	late		77	67		83	82		73	0
Buctril	0.125	late		77	67		87	90		73	0
Buctril	0.25	late		82	70		92	90		77	17
Goal	0.063	early	96	83	43	99	92	96	90	73	0
Goal	0.125	early	96	87	40	99	93	95	90	72	17
Goal	0.063	late		77	63		88	88		77	17
Goal	0.125	late		82	50		92	95		80	17
Goal	0.25	late		82	33		95	96		87	68
LSD (p=0.05)			2.1	6.5	36.8	2.4	6.7	28.8	8.7	10.2	38.6

Applications made on: early - 13 Jan 1998; late - 02 Feb 1998

SSYIR = *Sisymbrium irio* (London rocket), MEUOF = *Melilotus officinalis* (yellow sweetclover), SONOL = *Sonchus oleraceus* (sowthistle)