Preemergence Herbicide Combinations for Onion Weed Control

K. Umeda and D. MacNeil

Abstract

Most herbicides applied alone preemergence (PREE) caused minimal crop injury (<10%) when furrow irrigated. Pendimethalin (Prowl) applied at 0.5 lb AI/A plus bensulide (Prefar) at 6.0 lb AI/A under sprinkler irrigation in Tolleson caused crop injury that was highly unacceptable and the crop stand was severely reduced. Onion yields were significantly reduced for the Prowl plus Prefar treatments. Prowl at 0.25 or 0.5 lb AI/A alone provided very good (>90%) weed control of all weeds. Combination treatments of Prowl plus other herbicides provided very good weed control but did not offer enhanced control of weeds already controlled by Prowl alone. The combinations of ethofumesate (Nortron) with metolachlor (Dual) or dimethenamid (Frontier) gave improved weed control compared to when either was applied alone.

Introduction

The impending of loss of DCPA (Dacthal**7**) has provided cause to seek new or alternative chemistries for preemergence (PREE) weed control in onions. Dry bulb onions require a long period of time from seeding to stand establishment during the fall season. Weed competition from summer and winter annuals can significantly impinge on establishing a successful onion crop stand. Dacthal is the only reliable product that offers broadspectrum weed control and it is often supplemented by cultivation and hand-hoeing. Several soil-applied herbicides have been investigated for potential use in onions during the past few years. The herbicides have been evaluated alone and in combinations to develop a broader understanding of effective weed control and crop safety. These field tests were conducted to continue the evaluation process on a wider weed spectrum on varied onion growing conditions, refine the rates of application, and determine the safety on onions.

Materials and Methods

Two small plot field tests were conducted at the University of Arizona Maricopa Agricultural Center (MAC), Maricopa, AZ and in a commercial onion field in Tolleson, AZ. The tests were established in a randomized complete design with three replicates. The treatment plots consisted of two conventional 40-inch beds measuring 25 ft in length. At MAC, the beds were listed, shaped, and then onion cv. Desex was planted with two seedlines per bed on 30 October 1998. Furrow irrigation was used throughout the season at MAC. At Tolleson, onion cv. Granex 33 was planted nine seedlines per bed on 06 Nov. Solid set sprinkler irrigation was used to establish the onion stand and then furrow irrigation was used. All of the herbicide treatments were applied using a hand-held boom fitted with four flat fan 8002 nozzle tips that were spaced 20 inches apart. The sprays were pressurized with a CO_2 backpack sprayer that delivered 20 gpa water at 30 psi. At MAC, the herbicides were applied on 30 Oct when the air temperature was 80°F and cloudy with the dry soil temperature at 72°F.

This is a part of the University of Arizona College of Agriculture 1999 Vegetable Report, index at http://ag.arizona.edu/pubs/crops/az1143/

Herbicides were applied immediately after planting at Tolleson when the air temperature was 80°F, clear, slight breezes at less than 3 mph, and the soil surface dry. The onions were evaluated for herbicide tolerance during the growing season and weed control was evaluated at intervals after herbicide applications.

Results and Discussion

Herbicides applied alone PREE caused minimal crop injury (<10%) at MAC under furrow irrigation (Table 1). No injury was observed for Frontier or the low rate of Nortron applied on onions. Most of the PREE combination herbicide treatments also caused minimal crop injury. Prowl at 0.25 lb AI/A plus Prefar combination treatments caused marginally acceptable onion injury and injury increased for Prowl applied at 0.5 lb AI/A plus Prefar at 6.0 lb AI/A. Under sprinkler irrigation in Tolleson, crop injury was highly unacceptable for Prowl plus Prefar and Prefar plus Ramrod treatments and the crop stand was severely reduced. Onion yields were significantly reduced for the Prowl plus Prefar treatments. Onion yields for all of the other herbicide combination treatments were comparable to the untreated check or the Dacthal treated onions.

At MAC, Prowl at 0.25 or 0.5 lb AI/A alone provided very good (>90%) weed control of all weeds in the test site (Table 2). Dacthal was nearly comparable to Prowl except that yellow sweetclover was not adequately controlled. Prefar at 4.0 lb AI/A did not sufficiently control sweetclover, knotweed, and London rocket and the higher rate only slightly better acceptable weed control. Dual, Frontier, Nortron, and Ramrod were weak in controlling knotweed. Combination treatments of Prowl plus other herbicides provided very good weed control but did not offer enhanced control of weeds already controlled by Prowl alone. The combinations of Nortron with Dual or Frontier gave improved weed control compared to when either was applied alone at MAC. The Nortron combinations did not appear to give adequate control of sweetclover or cheeseweed at Tolleson. Nortron plus Prowl nearly provided acceptable weed control compared to the other combinations that were safe on onions.

Acknowledgments

The cooperation of Rousseau Farming Company is gratefully acknowledged for allowing the small plot field testing to be conducted within their commercial onion field.

Table 1. Preemergence herbicide combinations for onion weed control. (Umeda and MacNeil)

Treatment	Rate lb AI/A	Onion Injury MAC 03 Feb %	Tolleson 28 Jan No./ft	Tolleson 25 Mar Height (in)		Yield lb/plot
Untreated check		0	0	34.0	5.4	25.4	96.2
Dacthal	9.00	2	10	37.3	5.1	24.1	102.3
Prowl	0.25	5					
Prowl	0.50	2					
Prefar	4.00	10					
Prefar	6.00	8					
Dual	1.0	2					
Frontier	0.5	0					
Nortron	1.0	0					
Nortron	2.0	5					
Ramrod	4.0	3					
Prowl + Prefar	0.25 + 4.0	18	47	27.3	5.2	23.2	73.4
Prowl + Prefar	0.25 + 6.0	18	48	20.0	4.0	21.7	61.5
Prowl + Prefar	0.5 + 6.0	22	68	20.0	3.9	21.6	64.8
Prowl + Dual	0.25 + 1.0	5	8	35.0	6.1	23.7	99.3
Prowl + Nortron	0.25 + 1.0	8	18	36.3	5.5	23.8	97.5
Prowl + Ramrod	0.25 + 4.0	3	15	31.7	5.5	24.0	98.2
Prefar + Dual	4.0 + 1.0	10	18	36.3	4.9	23.0	93.9
Prefar + Ramrod	4.0 + 4.0	2	28	28.7	5.0	23.4	91.4
Nortron + Dual	1.0 + 1.0	5	7	37.0	6.1	23.6	94.0
Nortron + Frontier	1.0 + 0.5	0	8	34.3	6.1	23.9	101.7
LSD (p=0.05)		11.8	18.7	15.4	1.6	1.9	17.7

MAC onions planted 29 Oct 1998 and treated 30 Oct 1998.
Tolleson onions planted and treated 06 Nov 1998.
No./ft = average number plants/ft of 9 seedlines, Height = average ht. of 5 plants/plot,
Yield = average weight of all onions harvested in 5 ft of row/plot on 10 May 1999.

Table 2. Preemergence herbicide combinations for onion weed control. (Umeda and MacNeil)

Treatment	Rate	Weed Control (%)								
	lb AI/A	MAC						Tolleson		
		POLAV	CHEPR	MALPA	SONOL	MEUOF	SSYIR	MEUOF	SSYIR	MALPA
Untreated check		0	0	0	0	0	0	0	0	0
Dacthal	9.00	98	99	93	98	83	96	40	99	89
Prowl	0.25	99	96	98	93	90	93			
Prowl	0.50	99	99	98	99	95	94			
Prefar	4.00	78	98	91	95	83	83			
Prefar	6.00	85	98	90	88	82	85			
Dual	1.0	70	87	92	92	88	90			
Frontier	0.5	77	90	86	85	85	87			
Nortron	1.0	78	91	95	95	90	88			
Nortron	2.0	82	90	92	93	93	90			
Ramrod	4.0	83	88	87	90	83	87			
Prowl + Prefar	0.25 + 4.0	98	98	98	95	90	93	77	96	96
Prowl + Prefar	0.25 + 6.0	99	99	98	98	88	90	70	99	99
Prowl + Prefar	0.5 + 6.0	99	99	94	99	90	96	91	96	98
Prowl + Dual	0.25 + 1.0	98	98	95	95	88	94	55	99	96
Prowl + Nortron	0.25 + 1.0	99	99	96	96	96	90	83	99	91
Prowl + Ramrod	0.25 + 4.0	98	99	98	91	87	83	72	99	96
Prefar + Dual	4.0 + 1.0	88	96	95	93	88	90	17	99	53
Prefar + Ramrod	4.0 + 4.0	90	98	91	95	82	80	28	61	0
Nortron + Dual	1.0 + 1.0	83	96	96	94	93	96	57	99	60
Nortron + Frontier	1.0 + 0.5	88	95	98	98	91	88	80	99	47
LSD (p=0.05)		12.2	6.3	9.9	7.5	10.3	10.4	49.6	27.8	43.5

Onions planted at MAC on 29 Oct 1998, herbicides applied on 30 Oct. Rated on 03 Feb 1999.
Onions planted and treated at Tolleson on 06 Nov 1998. Rated on 28 Jan 1999.
POLAV = *Polygonum aviculare* (knotweed), CHEPR = *Chenopodium desiccatum* (narrowleaf lambsquarters),
MALPA = *Malva parviflora* (cheeseweed), SONOL = *Sonchus oleraceus* (sowthistle),
MEUOF = *Melilotus officinalis* (yellow sweetclover), SSYIR = Sisymbrium irio (London rocket)