

# PREEMERGENCE HERBICIDES FOR WEED CONTROL IN ONION

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## Introduction

Weed control is essential for the production of marketable onions. Only a few herbicides are registered for preemergence application in onion. Effective preemergence herbicides can control weeds as they germinate and reduce the size and number of weeds that are present when onions are large enough to tolerate postemergence herbicide applications. This research evaluated registered and experimental herbicides for preemergence weed control in onion.

## Methods

### ***General Procedures***

Trials were conducted at the Malheur Experiment Station under furrow irrigation. On March 28, onions (cv. 'Vaquero', Sunseeds, Parma, ID) were planted at a 3.7-inch spacing in double rows on 22-inch beds. Plots were four rows wide and 27 ft long and arranged in a randomized complete block design with four replicates. Lorsban was applied in a 6-inch band over each row at 3.7 oz/1,000 ft of row. Onions were sidedressed with 117 lb N, 72 lb P, 111 lb Sulfate, 114 lb S, 6 lb Zn, and 1 lb B/acre on June 3. Registered insecticides and fungicides were applied for thrips and downy mildew control.

Herbicide treatments were applied with a CO<sub>2</sub>-pressurized backpack sprayer. Preemergence applications were applied at 20 gal/acre at 30 psi and postemergence treatments were applied at 40 gal/acre at 30 psi. All plots received Poast (sethoxydim) at 0.29 lb ai/acre plus crop oil concentrate (COC) (1.0% v/v) applied postemergence at 20 gal/acre and 30 psi on June 6. Weed control and onion injury were evaluated throughout the season. Onions were harvested September 17 and 18 and graded by size on September 23-25.

Data were analyzed using analysis of variance and means were separated using a protected least significant difference (LSD) at the 5 percent level (0.05).

### ***Preemergence Dacthal and Prowl***

Preemergence-applied Prowl (pendimethalin) was compared to Dacthal (DCPA) 75 WP (a dry formulation) and Dacthal 6F (a liquid formulation). Combinations of Prowl plus Dacthal in two different ratios were also compared. Postemergence applications following preemergence Prowl and Dacthal combinations were similar with the

exception of a comparison of Buctril (bromoxynil) plus Goal (oxyflurofen) to Buctril plus Valor (flumioxazin) applied to two-leaf onions.

### ***Comparison of Preemergence Prowl, Nortron, and Outlook***

Preemergence applications of Prowl, Nortron (ethofumesate), and Outlook (dimethenamid-P) in combination with Roundup (glyphosate) were evaluated for weed control and onion tolerance. Each product was evaluated at two rates. Combinations of Prowl with Nortron or Outlook were also evaluated. Preemergence treatments with soil-active herbicides were compared to plots where only Roundup was applied preemergence.

## **Results and Discussion**

### ***Preemergence Dacthal and Prowl***

Preemergence Prowl gave greater than 89 percent control of all weed species and was more effective on nightshade than Dacthal alone (Table 1). There were no differences in weed control efficacy between the two Dacthal formulations. Certain combinations of Prowl plus Dacthal increased pigweed control compared to Dacthal alone but were not more effective than Prowl alone. Plots treated with Dacthal alone had reduced colossal, super colossal, and marketable onion yields compared to plots treated with Prowl alone or in combination with Dacthal (Table 2). The reduced yields were caused by weed competition.

### ***Comparison of Preemergence Prowl, Nortron, and Outlook***

Preemergence treatments were effective because of timely rain. No onion injury was observed from preemergence treatments (Table 3). Preemergence Prowl was most effective in controlling pigweed and hairy nightshade compared to Outlook or Nortron. Prowl significantly improved common lambsquarters control compared to Roundup alone. High rates of Outlook and Nortron gave lambsquarters control similar to Prowl but were not greater than Roundup alone or lower rates of Outlook or Nortron. Outlook did not increase hairy nightshade control compared to Roundup alone. Nortron increased nightshade control 45-60 percent and Prowl increased control 75-83 percent compared to Roundup alone. In past trials at the Malheur Experiment Station, Prowl has been much weaker on hairy nightshade. Preemergence Outlook did not increase marketable onion yields compared to Roundup alone (Table 4). In general, both Nortron and Prowl increased marketable onion yields compared to Outlook or Roundup alone.

Table 1. Onion injury and weed control in response to preemergence Dacthal and Prowl and different postemergence herbicide treatments, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Treatment	Rate	Timing*	Weed control							
			Injury		Pigweed†		Common lambsquarters		Hairy nightshade	
			6-30	6-30	8-14	6-30	8-14	6-30	8-14	
	lb ai/acre	Leaf	----- % -----							
Untreated	--	--	-	-	-	-	-	-	-	
Roundup + Prowl	0.75 + 1.0	PRE	5	100	90	100	100	99	89	
Buctril + Goal	0.125 + 0.125	2-leaf								
Buctril + Goal	0.25 + 0.125	3-leaf								
Goal	0.25	4-leaf								
Roundup + Dacthal 75 WP	0.75 + 7.5	PRE	5	94	83	98	90	78	45	
Buctril + Goal	0.125 + 0.125	2-leaf								
Buctril + Goal	0.25 + 0.125	3-leaf								
Goal	0.25	4-leaf								
Roundup + Dacthal 6F	0.75 + 7.5	PRE	5	98	81	99	92	78	54	
Buctril + Goal	0.125 + 0.125	2-leaf								
Buctril + Goal	0.25 + 0.125	3-leaf								
Goal	0.25	4-leaf								
Roundup + Prowl + Dacthal	0.75 + 0.75 + 5.6	PRE	5	100	90	100	100	93	90	
Buctril + Goal	0.125 + 0.125	2-leaf								
Buctril + Goal	0.25 + 0.125	3-leaf								
Goal	0.25	4-leaf								
Roundup + Prowl + Dacthal	0.75 + 0.6 + 3.8	PRE	5	100	97	100	100	95	84	
Buctril + Goal	0.125 + 0.125	2-leaf								
Buctril + Goal	0.25 + 0.125	3-leaf								
Goal	0.25	4-leaf								
Roundup + Prowl + Dacthal	0.75 + 0.75 + 5.6	PRE	5	100	97	100	99	100	97	
Buctril + Valor	0.125 + 0.063	2-leaf								
Buctril + Goal	0.25 + 0.125	3-leaf								
Goal	0.25	4-leaf								
Roundup + Prowl + Dacthal	0.75 + 0.6 + 3.8	PRE	6	100	95	100	100	98	96	
Buctril + Valor	0.125 + 0.063	2-leaf								
Buctril + Goal	0.25 + 0.125	3-leaf								
Goal	0.25	4-leaf								
LSD (0.05)			NS	4	9	2	9	5	22	

\*Preemergence (PRE) treatment applied on April 11, two-leaf (2-leaf) on May 16, three-leaf (3-leaf) on May 27, and four-leaf (4-leaf) on June 9.

†Pigweed is a combination of redroot pigweed and Powell amaranth

Table 2. Onion yield in response to preemergence Dacthal and Prowl and different postemergence herbicide treatments, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Treatment	Rate lb ai/acre	Timing* Leaf	Onion yield					
			Small	Medium	Jumbo	Colossal	S. Colossal	Marketable
			cwt/acre					
Untreated	--	--	14	0	0	0	0	14
Roundup + Prowl	0.75 + 1.0	PRE	4	10	651	551	106	1322
Buctril + Goal	0.125 + 0.125	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
Roundup + Dacthal 75 WP	0.75 + 7.5	PRE	8	22	763	254	23	1070
Buctril + Goal	0.125 + 0.125	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
Roundup + Dacthal 6F	0.75 + 7.5	PRE	6	22	794	272	22	1116
Buctril + Goal	0.125 + 0.125	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl + Dacthal	0.75 + 0.75 + 5.6	PRE	5	12	704	497	125	1343
Buctril + Goal	0.125 + 0.125	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl + Dacthal	0.75 + 0.6 + 3.8	PRE	3	14	740	463	59	1279
Buctril + Goal	0.125 + 0.125	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl + Dacthal	0.75 + 0.75 + 5.6	PRE	0	14	622	521	94	1253
Buctril + Valor	0.125 + 0.063	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl + Dacthal	0.75 + 0.6 + 3.8	PRE	1	15	674	555	82	1326
Buctril + Valor	0.125 + 0.063	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
LSD (0.05)			5	14	106	138	63	123

\*Preemergence (PRE) treatment applied on April 11, two-leaf (2-leaf) on May 16, three-leaf (3-leaf) on May 27, and four-leaf (4-leaf) on June 9.

Table 3. Onion injury and weed control in response to preemergence Outlook, Nortron, and Prowl, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Treatment	Rate	Timing*	Weed control							
			Injury		Pigweed <sup>†</sup>		Common lambsquarters		Hairy nightshade	
			6-30	6-30	8-14	6-30	8-14	6-30	8-14	
	lb ai/acre	Leaf	----- % -----							
Untreated	--	--	-	-	-	-	-	-	-	
Roundup	0.75	PRE	10	80	71	86	88	65	18	
Buctril + Goal	0.125 + 0.125	2-leaf								
Buctril + Goal	0.25 + 0.125	3-leaf								
Goal	0.25	4-leaf								
Roundup + Outlook POST Program	0.75 + 0.66 same	PRE 2, 3, 4-leaf	10	86	74	89	88	77	37	
Roundup + Outlook POST Program	0.75 + 0.84 same	PRE 2, 3, 4-leaf	10	89	80	86	96	75	14	
Roundup + Nortron POST Program	0.75 + 1.0 same	PRE 2, 3, 4-leaf	10	85	80	91	88	84	63	
Roundup + Nortron POST Program	0.75 + 2.0 same	PRE 2, 3, 4-leaf	10	91	76	98	98	95	78	
Roundup + Prowl POST Program	0.75 + 1.0 same	PRE 2, 3, 4-leaf	10	100	96	100	100	99	93	
Roundup + Prowl POST Program	0.75 + 1.5 same	PRE 2, 3, 4-leaf	10	100	99	100	100	100	100	
Roundup + Prowl + Nortron POST Program	0.75 + 1.0 + 1.0 same	PRE 2, 3, 4-leaf	10	100	98	100	100	100	100	
Roundup + Prowl + Outlook POST Program	0.75 + 1.0 + 0.84 same	PRE 2, 3, 4-leaf	10	100	98	100	100	100	99	
LSD (0.05)			NS	5	8	4	11	6	22	

\*Preemergence (PRE) treatment applied on April 11, two-leaf (2-leaf) on May 16, three-leaf (3-leaf) on May 27, and four-leaf (4-leaf) on June 9.

<sup>†</sup>Pigweed is a combination of redroot pigweed and Powell amaranth

Table 4. Onion yield in response to preemergence Outlook, Nortron, and Prowl, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Treatment	Rate	Timing*	Onion yield					
			Small	Medium	Jumbo	Colossal	S. Colossal	Marketable
			cwt/acre					
	lb ai/acre	Leaf						
Untreated	--	--	16	0	0	0	0	16
Roundup	0.75	PRE	15	88	624	85	3	815
Buctril + Goal	0.125 + 0.125	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
Roundup + Outlook	0.75 + 0.66	PRE	9	62	706	187	12	976
POST Program	same	2, 3, 4-leaf						
Roundup + Outlook	0.75 + 0.84	PRE	6	50	697	151	6	910
POST Program	same	2, 3, 4-leaf						
Roundup + Nortron	0.75 + 1.0	PRE	4	151	772	243	16	1188
POST Program	same	2, 3, 4-leaf						
Roundup + Nortron	0.75 + 2.0	PRE	5	48	675	348	41	1117
POST Program	same	2, 3, 4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	7	21	734	372	68	1201
POST Program	same	2, 3, 4-leaf						
Roundup + Prowl	0.75 + 1.5	PRE	5	15	794	351	55	1221
POST Program	same	2, 3, 4-leaf						
Roundup + Prowl + Nortron	0.75 + 1.0 + 1.0	PRE	3	13	799	368	35	1218
POST Program	same	2, 3, 4-leaf						
Roundup + Prowl + Outlook	0.75 + 1.0 + 0.84	PRE	4	18	806	381	53	1262
POST Program	same	2, 3, 4-leaf						
LSD (0.05)			7	129	193	170	47	192

\*Preemergence (PRE) treatment applied on April 11, two-leaf (2-leaf) on May 16, three-leaf (3-leaf) on May 27, and four-leaf (4-leaf) on June 9.