

# WEED CONTROL IN ONION WITH POSTEMERGENCE HERBICIDES

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## Introduction

Weed control is essential for the production of marketable onions. Weed control in onions is difficult compared to many crops because of the lack of a complete crop canopy and limited herbicide options. Valor (flumioxazin) and Nortron (ethofumesate) are two experimental herbicides that have been evaluated for use in onions in past research trials. Trials were conducted this year to determine the benefits of using these experimental herbicides in postemergence herbicide combinations and compare performance to registered herbicide combinations.

## Methods

### *General Procedures*

Trials were conducted at the Malheur Experiment Station to evaluate experimental and registered herbicides for weed control and onion tolerance. Trials were conducted 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 replications. 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 and postemergence grass herbicides were applied at 20 gal/acre at 30 psi and postemergence treatments were applied at 40 gal/acre at 30 psi. All plots were treated with a preemergence application of Roundup (glyphosate) at 0.75 lb ai/acre plus Prowl (pendimethalin) at 1.0 lb ai/acre on April 11 and a postemergence application of Poast (sethoxydim) at 0.29 lb ai/acre plus crop oil concentrate (COC) (1.0% v/v) 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).

### ***Postemergence Valor Combinations***

Valor and Goal (oxyflurofen) were applied in combinations with Buctril (bromoxynil) to evaluate weed control and onion tolerance. Buctril, Goal, and Valor were evaluated at two rates. Comparisons of Goal or Valor with Buctril included several combinations of herbicides and rates. Additional treatments included a split application of Valor applied to two-leaf and again to three-leaf onions, and a comparison of Buctril plus Valor treatments following preemergence applications of Roundup, Prowl, and Dacthal (DCPA).

### ***Addition of Nortron to Postemergence Treatments***

This trial was conducted to determine if the addition of Nortron to postemergence herbicide applications would improve weed control. Each treatment was applied without Nortron or with Nortron added to the two-leaf and three-leaf applications at either 0.25 or 0.5 lb ai/acre. One treatment evaluated Outlook (dimethenamid-P) applied in the two-leaf application and Nortron applied in the three-leaf application.

## **Results and Discussion**

Preemergence herbicides worked fairly well due to rainfall events in April. Adequate rainfall also ensured that weeds were actively growing when postemergence treatments were applied.

### ***Postemergence Valor Combinations***

On June 30, treatments with Buctril alone applied to two-leaf onions had among the least onion injury, while combinations of Buctril with either Goal or Valor had among the greatest injury (Table 1). By July 14, no onion injury was observed. On August 14, pigweed control was improved by the addition of Valor (0.094 lb ai/acre) to Buctril at the low rate (0.125 lb ai/acre) (Table 1). The lower rate of Valor (0.063 lb ai/acre) did not significantly increase pigweed control when added to the low rate of Buctril. Similar trends were apparent for Goal where pigweed control was improved by the high rate (0.25 lb ai/acre) but not the low rate (0.125 lb ai/acre) when added to the low rate of Buctril. Valor (0.094 lb ai/acre) added to Buctril (0.25 lb ai/acre) increased pigweed control, while the addition of Goal at any rate did not significantly improve the control achieved with Buctril at the high rate alone. All treatments provided 88 percent or greater common lambsquarters control. When Buctril was applied at 0.125 lb ai/acre, the addition of Valor significantly increased hairy nightshade control. Hairy nightshade control was increased with the addition of the high rate of Goal, but not the low rate. The addition of Valor or Goal to Buctril (0.25 lb ai/acre) did not provide a significant increase in hairy nightshade control. Buctril (0.125 lb ai/acre) applied alone at the two-leaf onion timing produced more medium onions than any other treatment. Onion yields were related to weed control, with treatments providing less weed control having among the lowest yields and treatments providing the highest weed control producing among the greatest yields. The addition of Valor or Goal to Buctril tended to increase pigweed and hairy nightshade control and resulted in improved yields.

### ***Addition of Nortron to Postemergence Treatments***

Nortron or Outlook did not increase onion injury when added to any of the postemergence treatments (Table 2). The addition of Nortron (0.25 lb ai/acre) to Buctril applied to two-leaf onions significantly improved pigweed control. The addition of Nortron at the higher rate (0.5 lb ai/acre) improved both pigweed and hairy nightshade control. The higher Nortron rate improved hairy nightshade control compared to the lower rate. The addition of Goal with Buctril at the two-leaf application improved pigweed control compared to Buctril alone. The addition of Nortron (0.25 and 0.5 lb ai/acre) to Buctril plus Goal applied at the two-leaf application did not affect pigweed control, but significantly improved hairy nightshade control. Common lambsquarters control was 99 percent or greater with all treatments. There were few differences among treatments for onion yield; the treatment with Buctril alone applied at two-leaf onions had among the lowest super colossal yield (Table 3). This research suggests that the addition of Nortron to postemergence herbicide applications may improve weed control without injuring onions. The registration of Nortron for use in onions depends on the residue package submitted by the IR-4 program being reviewed by the U.S. Environmental Protection Agency.

Table 1. Onion injury, weed control, and yield from Goal or Valor combinations with Buctril, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Treatment	Rate	Timing*	Injury		Weed control†		Onion yield					
			6-30	Pigweed	Common lambquarters	Hairy nightshade	Small	Medium	Jumbo	Colossal	S. Colossal	Marketable
	lb ai/acre	Leaf	----- % -----				----- cwt/acre -----					
Untreated	--	--	0	0	0	0	12	0	0	0	0	0
Hand-Weeded	--	--	0	95	98	96	3	17	610	413	76	1116
Roundup + Prowl Buctril	0.75 + 1.0 0.125	PRE 2-leaf	1	81	100	47	5	57	657	302	34	1051
Buctril + Goal Goal	0.25 + 0.125 0.25	3-leaf 4-leaf										
Roundup + Prowl Buctril	0.75 + 1.0 0.25	PRE 2-leaf	4	83	100	79	4	12	665	352	47	1076
Buctril + Goal Goal	0.25 + 0.125 0.25	3-leaf 4-leaf										
Roundup + Prowl Buctril + Valor	0.75 + 1.0 0.125 + 0.063	PRE 2-leaf	5	86	99	90	3	16	683	298	46	1043
Buctril + Goal Goal	0.25 + 0.125 0.25	3-leaf 4-leaf										
Roundup + Prowl Buctril + Valor	0.75 + 1.0 0.125 + 0.094	PRE 2-leaf	11	97	99	91	5	12	639	408	81	1140
Buctril + Goal Goal	0.25 + 0.125 0.25	3-leaf 4-leaf										
Roundup + Prowl Buctril + Valor	0.75 + 1.0 0.25 + 0.063	PRE 2-leaf	8	92	100	92	4	20	601	443	60	1124
Buctril + Goal Goal	0.25 + 0.125 0.25	3-leaf 4-leaf										
Roundup + Prowl Buctril + Valor	0.75 + 1.0 0.25 + 0.094	PRE 2-leaf	9	98	100	92	3	13	579	428	81	1100
Buctril + Goal Goal	0.25 + 0.125 0.25	3-leaf 4-leaf										
Roundup + Prowl Buctril + Goal	0.75 + 1.0 0.125 + 0.125	PRE 2-leaf	1	86	100	63	3	20	619	345	51	1035
Buctril + Goal Goal	0.25 + 0.125 0.25	3-leaf 4-leaf										

Table 1. (continued) Onion injury, weed control, and yield from Goal or Valor combinations with Buctril, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Treatment	Rate	Timing*	Injury		Weed control†		Onion yield					
			5-24	Pigweed	Common lambsquarters	Hairy nightshade	Small	Medium	Jumbo	Colossal	S. Colossal	Marketable
Roundup + Prowl	0.75 + 1.0	PRE	6	92	98	91	3	9	648	455	71	1183
Buctril + Goal	0.125 + 0.25	2-leaf										
Buctril + Goal	0.25 + 0.125	3-leaf										
Goal	0.25	4-leaf										
Roundup + Prowl	0.75 + 1.0	PRE	8	90	100	91	5	9	619	461	81	1170
Buctril + Goal	0.25 + 0.125	2-leaf										
Buctril + Goal	0.25 + 0.125	3-leaf										
Goal	0.25	4-leaf										
Roundup + Prowl	0.75 + 1.0	PRE	11	88	100	88	5	13	621	433	104	1170
Buctril + Goal	0.25 + 0.25	2-leaf										
Buctril + Goal	0.25 + 0.125	3-leaf										
Goal	0.25	4-leaf										
Roundup + Prowl	0.75 + 1.0	PRE	11	93	100	98	3	13	680	376	70	1139
Buctril + Valor	0.125 + 0.047	2-leaf										
Buctril + Valor	0.25 + 0.047	3-leaf										
Goal	0.25	4-leaf										
Roundup + Prowl + Dacthal	0.75 + 0.6 + 7.5	PRE	6	99	99	99	4	9	567	513	105	1194
Buctril + Valor	0.25 + 0.094	2-leaf										
Buctril + Goal	0.25 + 0.125	3-leaf										
Goal	0.25	4-leaf										
Roundup + Prowl + Dacthal	0.75 + 0.6 + 7.5	PRE	6	99	100	97	4	9	605	489	96	1200
Buctril + Valor	0.125 + 0.094	2-leaf										
Buctril + Goal	0.25 + 0.125	3-leaf										
Goal	0.25	4-leaf										
Roundup + Prowl + Dacthal	0.75 + 0.6 + 7.5	PRE	12	98	97	98	3	11	607	451	94	1163
Buctril + Valor	0.125 + 0.094	2-leaf										
Buctril + Goal	0.125 + 0.125	3-leaf										
Goal	0.25	4-leaf										
LSD (0.05)			6	10	3	19	4	24	93	114	41	115

\*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.

†Weed control ratings were taken August 14. Pigweed is a combination of redroot pigweed and Powell amaranth.

Table 2. Onion injury and weed control in response to adding Nortron to postemergence applications of Buctril and Goal, 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	8-14	6-30	8-14
	lb ai/acre	Leaf	----- % -----					
Untreated	--	--	-	-	-	-	-	-
Roundup + Prowl	0.75 + 1.0	PRE	10	97	88	100	94	83
Buctril	0.125	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	11	100	95	99	97	82
Buctril + Goal	0.125 + 0.125	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	10	99	94	100	98	81
Buctril + Nortron	0.125 + 0.25	2-leaf						
Buctril + Goal + Nortron	0.25 + 0.125 + 0.25	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	11	100	96	100	99	93
Buctril + Nortron	0.125 + 0.5	2-leaf						
Buctril + Goal + Nortron	0.25 + 0.125 + 0.5	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	10	100	94	100	98	92
Buctril + Goal + Nortron	0.125 + 0.125 + 0.25	2-leaf						
Buctril + Goal + Nortron	0.25 + 0.125 + 0.25	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	10	100	99	100	100	97
Buctril + Goal + Nortron	0.125 + 0.125 + 0.5	2-leaf						
Buctril + Goal + Nortron	0.25 + 0.125 + 0.5	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	10	100	98	100	100	99
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf						
Buctril + Goal + Nortron	0.25 + 0.125 + 0.25	3-leaf						
Goal	0.25	4-leaf						
LSD (0.05)			NS	2	5	NS	4	9

\*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 yield in response to adding Nortron to postemergence applications of Buctril and Goal, Malheur Experiment Station, Oregon State University, Ontario, OR, 2003.

Treatment	Rate	Timing*	Onion yield†					
			Small	Medium	Jumbo	Colossal	S. Colossal	Marketable
	lb ai/acre	Leaf	----- cwt/acre -----					
Untreated	--	--	13	0	0	0	0	0
Roundup + Prowl	0.75 + 1.0	PRE	6	21	715	410	32	1178
Buctril	0.125	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	4	10	713	419	116	1257
Buctril + Goal	0.125 + 0.125	2-leaf						
Buctril + Goal	0.25 + 0.125	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	5	15	710	469	61	1255
Buctril + Nortron	0.125 + 0.25	2-leaf						
Buctril + Goal + Nortron	0.25 + 0.125 + 0.25	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	7	15	655	511	65	1247
Buctril + Nortron	0.125 + 0.5	2-leaf						
Buctril + Goal + Nortron	0.25 + 0.125 + 0.5	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	5	7	670	526	94	1298
Buctril + Goal + Nortron	0.125 + 0.125 + 0.25	2-leaf						
Buctril + Goal + Nortron	0.25 + 0.125 + 0.25	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	5	11	707	423	79	1221
Buctril + Goal + Nortron	0.125 + 0.125 + 0.5	2-leaf						
Buctril + Goal + Nortron	0.25 + 0.125 + 0.5	3-leaf						
Goal	0.25	4-leaf						
Roundup + Prowl	0.75 + 1.0	PRE	5	18	665	474	95	1252
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf						
Buctril + Goal + Nortron	0.25 + 0.125 + 0.25	3-leaf						
Goal	0.25	4-leaf						
LSD (0.05)			7	14	104	147	45	112

\*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.

†Onions were harvested September 17 and 18.