

# SOIL-ACTIVE HERBICIDE APPLICATIONS FOR WEED CONTROL IN ONION

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## Introduction

The use of soil-active herbicides applied preemergence or postemergence can reduce the number and size of weeds in onions. Evaluating the best time to apply soil-active herbicides and the most effective combinations may help onion producers achieve greater weed control. In addition, the combination of postemergence fungicides with postemergence herbicides has the potential to increase onion injury. Testing these types of combinations can reduce the probability of large scale problems when growers begin using new products. This trial was conducted to evaluate the effect of different application timings of Prowl H<sub>2</sub>O<sup>®</sup> (pendimethalin) and Outlook<sup>®</sup> (dimethenamid-P) on onion injury and weed control and to evaluate different application timings for Pristine<sup>®</sup> (pyraclostrobin + boscalid), a new fungicide, in combination with postemergence herbicides.

## Materials and Methods

A trial was conducted at the Malheur Experiment Station under furrow irrigation. On March 31, onions (cv. 'Vaquero', Nunhems, Parma, ID) were planted at 3.7-inch spacing in double rows on 22-inch beds. Plots were 4 rows wide and 27 ft long and arranged in a randomized complete block design with 4 replicates. Lorsban<sup>®</sup> was applied in a 6-inch band over each double row at 3.7 oz/1,000 ft of row. Onions were sidedressed with 150 lb nitrogen, 50 lb phosphorus, 30 lb potassium, 30 lb sulfate, 8 lb zinc, 5 lb manganese, 1 lb copper, and 2 lb boron/acre on June 7. Registered insecticides and fungicides were applied for thrips and downy mildew control.

All plots were treated with Roundup<sup>®</sup> (glyphosate) preemergence. Outlook was applied preemergence (PRE) alone and in combination with Prowl H<sub>2</sub>O or in combination with Prowl H<sub>2</sub>O at flag-leaf onions or following preemergence applications of Prowl H<sub>2</sub>O. Postemergence treatments consisted of two sequential postemergence applications of Buctril<sup>®</sup> (bromoxynil) plus Goal<sup>®</sup> (oxyfluorfen) and a final postemergence application of Goal. Pristine was applied in combination with Buctril plus Goal to four-leaf onions or in combination with Goal to six-leaf onions or at both application timings. Treatments were applied with a CO<sub>2</sub>-pressurized backpack sprayer. Preemergence and flag-leaf applications were applied at 20 gal/acre at 30 psi. All other postemergence applications were applied at 40 gal/acre at 30 psi. Preemergence treatments were applied on April 12. Applications to flag-, two-, four-, and six-leaf onions were made on April 26, May

21, June 4, and June 15, respectively. All plots received Poast<sup>®</sup> (sethoxydim) at 0.29 lbs ai/acre plus crop oil concentrate (COC) (1 qt/acre) on May 24 to control grasses. Weed control and onion injury were evaluated throughout the season. Onions were harvested September 13-14 and were graded by size on September 14-15.

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).

## Results and Discussion

Rainfall activated preemergence treatments and postemergence treatments were effective because weeds were actively growing at the time that the herbicides were applied. Outlook applied alone preemergence provided less control of common lambsquarters, hairy nightshade, kochia, and barnyardgrass compared to other treatments (Table 1). Prowl H<sub>2</sub>O applied either preemergence or to flag-leaf onions was more effective than Outlook alone and there was no increase in weed control from additions of Outlook to treatments that contained Prowl H<sub>2</sub>O. However, in past trials and in commercial fields with yellow nutsedge, Outlook has provided definite benefits.

On May 28, in all but one instance, treatments with Outlook applied to two-leaf onions in combination with Buctril and Goal had greater injury than treatments that did not combine Outlook with Buctril and Goal (Table 2). There were fewer differences in injury among treatments on June 13. By July 11, there was no visible onion injury for any treatment (data not shown).

Because weed control was less, onions grown with Outlook alone preemergence had lower total and marketable yields compared to all other treatments except Prowl H<sub>2</sub>O applied to flag-leaf onions followed by Outlook plus Buctril and Goal applied to two-leaf onions (Table 2). Even though treatments where Outlook was combined with Buctril and Goal applied postemergence caused increased onion injury, onion yields were not reduced.

Conditions were ideal in 2005 for soil-applied herbicides to control weeds. In years where conditions are drier, we would expect more differences among these types of herbicide treatments.

The addition of Pristine to postemergence herbicide applications did not increase onion injury or affect weed control.

Table 1. Weed control in onion in response to different application timings of Outlook<sup>®</sup>, Prowl H<sub>2</sub>O<sup>®</sup>, and Pristine<sup>®</sup>, Malheur Experiment Station, Oregon State University, Ontario, OR, 2005.

Treatment	Rate*	Timing <sup>†</sup>	Weed control <sup>‡</sup>				
			Pigweed <sup>§</sup>	Common lambsquarters	Hairy nightshade	Kochia	Barnyard-grass
	lb ai or ae/acre	Leaf	-----%-----				
Untreated	--	--	--	--	--	--	--
Roundup + Outlook	0.75 + 0.84	PRE	94	72	64	94	89
Buctril + Goal	0.125 + 0.125	2-leaf					
Buctril + Goal	0.25 + 0.125	4-leaf					
Goal	0.25	6-leaf					
Roundup	0.75	PRE	96	97	93	100	98
Prowl H <sub>2</sub> O	1.0	flag					
Buctril + Goal	0.125 + 0.125	2-leaf					
Buctril + Goal	0.25 + 0.125	4-leaf					
Goal	0.25	6-leaf					
Roundup	0.75	PRE	100	98	100	100	97
Prowl H <sub>2</sub> O + Outlook	1.0 + 0.84	flag					
Buctril + Goal	0.125 + 0.125	2-leaf					
Buctril + Goal	0.25 + 0.125	4-leaf					
Goal	0.25	6-leaf					
Roundup	0.75	PRE	91	94	91	100	96
Prowl H <sub>2</sub> O	1.0	flag					
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf					
Buctril + Goal	0.25 + 0.125	4-leaf					
Goal	0.25	6-leaf					
Roundup + Prowl H <sub>2</sub> O	0.75 + 1.0	PRE	100	99	100	100	97
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf					
Buctril + Goal	0.25 + 0.125	4-leaf					
Goal	0.25	6-leaf					
Roundup	0.75	PRE	100	99	100	99	98
Prowl H <sub>2</sub> O	1.0	flag					
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf					
Buctril + Goal + Pristine	0.25 + 0.125 + 18.5 oz	4-leaf					
Goal	0.25	6-leaf					
Roundup	0.75	PRE	99	97	100	100	99
Prowl H <sub>2</sub> O	1.0	flag					
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf					
Buctril + Goal	0.25 + 0.125	4-leaf					
Goal + Pristine	0.25 + 18.5 oz	6-leaf					
Roundup	0.75	PRE	100	98	100	100	99
Prowl H <sub>2</sub> O	1.0	flag					
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf					
Buctril + Goal + Pristine	0.25 + 0.125 + 18.5 oz	4-leaf					
Goal + Pristine	0.25 + 18.5 oz	6-leaf					
Roundup + Prowl H <sub>2</sub> O + Outlook	0.75 + 1.0 + 0.84	PRE	100	97	99	100	99
Buctril + Goal	0.125 + 0.125	2-leaf					
Buctril + Goal	0.25 + 0.125	4-leaf					
Goal	0.25	6-leaf					
LSD (0.05)			NS	6	10	4	5

\*Roundup rates are in lb ae/acre and all other herbicides are lb ai/acre.

<sup>†</sup>Preemergence (PRE) treatments were applied on April 12, flag-leaf (flag) on April 26, two-leaf (2-leaf) on May 21, four-leaf (4-leaf) on June 4, and six-leaf (6-leaf) on June 15.

<sup>‡</sup>Weed control was evaluated on September 8.

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

Table 2. Onion injury and yield in response to different application timings of Outlook<sup>®</sup>, Prowl H<sub>2</sub>O<sup>®</sup>, and Pristine<sup>®</sup>, Malheur Experiment Station, Oregon State University, Ontario, OR, 2005.

Treatment	Rate*	Timing <sup>†</sup>	Onion injury		Onion yield <sup>‡</sup>	
			5-28	6-13	Total	Marketable
	lb ai or ae/acre	Leaf	-----%		-----cwt/acre-----	
Untreated	--	--	--	--	4	0
Roundup + Outlook	0.75 + 0.84	PRE	25	19	752	735
Buctril + Goal	0.125 + 0.125	2-leaf				
Buctril + Goal	0.25 + 0.125	4-leaf				
Goal	0.25	6-leaf				
Roundup	0.75	PRE	26	15	884	877
Prowl H <sub>2</sub> O	1.0	flag				
Buctril + Goal	0.125 + 0.125	2-leaf				
Buctril + Goal	0.25 + 0.125	4-leaf				
Goal	0.25	6-leaf				
Roundup	0.75	PRE	27	16	857	849
Prowl H <sub>2</sub> O + Outlook	1.0 + 0.84	flag				
Buctril + Goal	0.125 + 0.125	2-leaf				
Buctril + Goal	0.25 + 0.125	4-leaf				
Goal	0.25	6-leaf				
Roundup	0.75	PRE	31	16	804	789
Prowl H <sub>2</sub> O	1.0	flag				
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf				
Buctril + Goal	0.25 + 0.125	4-leaf				
Goal	0.25	6-leaf				
Roundup + Prowl H <sub>2</sub> O	0.75 + 1.0	PRE	38	21	868	862
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf				
Buctril + Goal	0.25 + 0.125	4-leaf				
Goal	0.25	6-leaf				
Roundup	0.75	PRE	37	16	876	869
Prowl H <sub>2</sub> O	1.0	flag				
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf				
Buctril + Goal + Pristine	0.25 + 0.125 + 18.5 oz	4-leaf				
Goal	0.25	6-leaf				
Roundup	0.75	PRE	39	21	867	858
Prowl H <sub>2</sub> O	1.0	flag				
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf				
Buctril + Goal	0.25 + 0.125	4-leaf				
Goal + Pristine	0.25 + 18.5 oz	6-leaf				
Roundup	0.75	PRE	40	20	875	869
Prowl H <sub>2</sub> O	1.0	flag				
Buctril + Goal + Outlook	0.125 + 0.125 + 0.84	2-leaf				
Buctril + Goal + Pristine	0.25 + 0.125 + 18.5 oz	4-leaf				
Goal + Pristine	0.25 + 18.5 oz	6-leaf				
Roundup + Prowl H <sub>2</sub> O + Outlook	0.75 + 1.0 + 0.84	PRE	29	20	892	884
Buctril + Goal	0.125 + 0.125	2-leaf				
Buctril + Goal	0.25 + 0.125	4-leaf				
Goal	0.25	6-leaf				
LSD (0.05)			7	4	85	94

\*Roundup rates are in lb ae/acre and all other herbicides are lb ai/acre.

<sup>†</sup>Preemergence (PRE) treatments were applied on April 12, flag-leaf (flag) on April 26, two-leaf (2-leaf) on May 21, four-leaf (4-leaf) on June 4, and six-leaf (6-leaf) on June 15.

<sup>‡</sup>Onions were harvested on September 13 and 14.