VOLUNTEER POTATO CONTROL IN ONIONS

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Introduction

Many producers raise onions in rotation with potatoes. Volunteer potatoes are extremely competitive with onions and are not effectively controlled with herbicides currently registered for use on onions. Volunteer potatoes can serve as hosts for late blight, verticillium wilt, viruses, and nematodes. Starane, a new herbicide registered for volunteer potato control in wheat and corn, may control volunteer potatoes effectively in onions. Starane was evaluated in combination with Buctril and Goal for volunteer potato control and for onion tolerance.

Procedures

A trial was established at the Malheur Experiment Station to evaluate Starane, Buctril, and Goal for volunteer potato control in onions. Potatoes were planted prior to onion seeding on March 28 and 29. Shepody potato tubers were cut and planted 6 in deep in the center two rows of each plot, with a spacing of one seed every 3 ft. Onions (cv. Vision, Petoseed) were planted at a 3.7-in spacing in double rows on 22-in beds on March 30. Plots were four rows wide by 30 ft long. Lorsban was applied on a 6-in band over each row at 3.7 oz per 1,000 ft of row. Onions were sidedressed with 210 lb N/acre as urea on June 15.

Annual weeds were controlled by applying Roundup (0.75 lb ai/acre) prior to onion emergence on April 16 and Buctril (0.20 lb ai/acre) plus Prowl (1.5 lb ai/acre) on April 26 when onions were at the flag-leaf stage and before the potatoes had emerged. Plots were maintained free of weeds other than volunteer potatoes by hand weeding. Herbicide treatments were applied with a CO_2-pressurized backpack sprayer calibrated to deliver 35 gpa at 30 psi. Herbicide combinations for volunteer potato control were applied on May 27, June 7, and June 17. At the first application, onions had two true leaves and potato plants were 6 in tall. At the second application, onions had four true leaves. The last application was to 6-leaf onions.

Insecticides and fungicides were applied for thrips and powdery mildew control as needed. Prior to onion harvest, potato tubers were dug, counted, and weighed from four plants in each plot on September 13 to determine the effect of the herbicide treatments on tuber production. Tubers were stored and evaluated for sprouting

January 19, 2000. Sprouting was evaluated by counting the number of tubers with sprouts < 0.25 in long, the number of tubers with sprouts > 0.25 in long, and the total number of sprouts. Tubers that were rotten were not evaluated. Tuber and sprout numbers were used to calculate the percent of tubers sprouting and the average number of sprouts per tuber.

Onion yield and grade were determined by harvesting the two center rows from each plot on September 24 and grading the onions by size on September 29.

Results And Discussion

Onion injury was evident within a few days following Starane applications (Table 1). Treatments containing Starane at rates above 0.25 lb ai/acre applied once, or multiple applications of lower rates, resulted in significant injury. As the season progressed, injury symptoms decreased. Treatments containing Goal rapidly burned back the potato foliage, but potato foilage regrew following each treatment. Starane treatments caused potato stunting and the stunting symptoms were persistent through the entire season. On July 7, volunteer potato control was greatest with a single application of Starane at 0.5 lb ai/acre, or three Starane applications at 0.125 lb ai/acre, or one application of Buctril plus Goal followed by Buctril plus Starane (0.5 lb ai/acre) followed by Buctril (83 to 84 percent). Buctril plus Goal was less effective (59 percent). Potato vines in untreated plots died back earlier than those receiving herbicide treatments, probably because of delayed maturity from the herbicide injury in treated plots.

Rotten tubers were prevalent in all plots because of the continued irrigation for onion growth after the potatoes had stopped growing. Tuber numbers and weight were variable, but many of the more effective treatments reduced the number of potato tubers and total weight. Differences in average weight per tuber were not significant. For some reason, more tubers were rotten in plots with poor volunteer potato control than in plots where control was good.

Evaluations of tuber sprouting (Table 2) demonstrated that sequential applications of Buctril plus Goal or Goal plus Starane, and the sequential applications of Starane (0.063 lb ai/acre) with Buctril, did not reduce the number of sprouting tubers compared to the untreated. For some reason, Starane (0.25 lb ai/acre) applied at the first timing also did not reduce the total percentage of tubers sprouting, even though a single application at the lower rate (0.125 lb ai/acre) did. All treatments, with the exception of Buctril plus Goal, reduced the percentage of tubers producing sprouts > 0.25 inch in length. So even though some treatments did not reduce the percentage of sprouted tubers, they may be effecting the vigor of the sprouts. Buctril plus Goal and Starane plus Goal were also the only treatments that did not reduce the average number of sprouts produced by each tuber as compared to the untreated check.

All treatments reduced the amount of small onions produced and increased jumbo and total onion yields compared to the untreated check (Table 3). Colossal onion yields

closely correlated with volunteer potato control, and the most effective treatments produced among the highest colossal onion yields. Even though the treatment of Buctril plus Goal followed by Buctril plus Starane had some of the highest injury early in the season, it had among the highest yields of any treatment. This demonstrates the competitiveness of volunteer potatoes and the effect they have on onion yield.

Conclusions

Onion injury was directly related to the rate of Starane and the number of times it was applied. Injury seemed to be transient and may be tolerable where volunteer potatoes are prevalent. In addition to reducing volunteer potato competition with onions, Starane also appeared to reduce tuber production and affect tuber viability. Additional trials with Starane are needed to further evaluate onion tolerance and the utility of Starane for general weed control in onions.

Table 1. Onion injury and volunteer potato control with postemergence herbicide treatments, Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Treatment	Rate	Timing†	Onion injury					Volunteer potato control				Tuber production per plant‡		
			5-29	6-14	6-25	7-7	7-12	6-25	7-7	7-12	7-19	Weight	Number	Weight/tuber
	lb ai/acre		----------%----------					----------%----------				grams	number	grams
Starane + Buctril Buctril	0.063 + 0.20 0.20	1 2,3	13	16	0	0	0	50	41	34	14	908	6	128
Starane + Buctril Buctril	0.063 + 0.20 0.20	1,2 3	13	23	3	0	0	59	57	55	13	566	5	125
Starane + Buctril	0.063 + 0.20	1,2,3	15	26	19	16	0	75	73	67	39	704	5	147
Starane + Buctril Buctril	0.125 + 0.20 0.20	1 2,3	16	15	1	0	0	55	54	48	13	537	5	109
Starane + Buctril Buctril	0.125 + 0.20 0.20	1,2 3	24	29	10	9	0	78	71	70	50	457	4	119
Starane + Buctril	0.125 + 0.20	1,2,3	34	29	29	20	11	88	84	85	75	272	3	94
Starane + Buctril Buctril	0.25 + 0.20 0.20	1 2,3	43	20	0	0	0	75	64	55	25	826	8	93
Starane + Buctril Buctril	0.5 + 0.20 0.20	1 2,3	50	19	3	3	4	85	83	78	76	296	3	84
Starane + Goal	0.063 + 0.12	1,2,3	4	20	23	9	0	60	50	34	0	911	7	145
Buctril + Goal	0.20 + 0.12	1,2,3	1	23	25	15	6	68	59	54	29	936	7	133
Buctril + Goal Buctril + Starane Buctril	0.20 + 0.12 0.20 + 0.5 0.20	1 2 3	0	49	16	19	13	85	84	86	83	278	4	81
Untreated			0	0	0	0	0	0	0	0	0	1138	8	171
LSD (0.05)			7	6	5	8	5	8	8	9	14	508	3	NS

†Treatments were applied on May 27 (1), June 6 (2), and June 17 (3).

‡Tubers were harvested from four plants in each plot on September 13.

Table 2. Volunteer potato sprouting after storage in response to postemergence herbicide treatments, Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Treatment	Rate	Timing†	Tuber‡				Average sprouts per tuber
			Number	With sprouts < 0.25 in long	With sprouts > 0.25 in long	Total sprouting	
	lb ai/acre		Number/plant		%-		No/tuber
Starane + Buctril Buctril	0.063 + 0.20 0.20	1 2,3	2.1	20	21	41	1.02
Starane + Buctril Buctril	0.063 + 0.20 0.20	1,2 3	1.7	37	21	58	1.13
Starane + Buctril	0.063 + 0.20	1,2,3	2.0	20	25	45	0.91
Starane + Buctril Buctril	0.125 + 0.20 0.20	1 2,3	1.6	21	5	26	0.64
Starane + Buctril Buctril	0.125 + 0.20 0.20	1,2 3	1.7	19	3	22	0.44
Starane + Buctril	0.125 + 0.20	1,2,3	1.3	17	0	17	0.17
Starane + Buctril Buctril	0.25 + 0.20 0.20	1 2,3	2.4	25	19	45	1.30
Starane + Buctril Buctril	0.5 + 0.20 0.20	1 2,3	1.1	3	0	3	0.03
Starane + Goal	0.063 + 0.12	1,2,3	1.7	42	22	64	1.51
Buctril + Goal	0.20 + 0.12	1,2,3	2.3	31	34	65	1.88
Buctril + Goal Buctril + Starane Buctril	0.20 + 0.12 0.20 + 0.5 0.20	1 2 3	2.8	3	3	6	0.06
Untreated			2.3	20	46	66	2.54
LSD (0.05)			NS	NS	20	33	1.03

†Treatments were applied on May 27 (1), June 6 (2), and June 17 (3).
‡Tubers were evaluated for sprouting on January 19, 2000.

Table 3. Onion yield and grade in response to volunteer potato competition and postemergence herbicide treatments, Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Treatment	Rate	Timing†	Onion yield‡				
			Small	Medium	Jumbo	Colossal	Total
	lb ai/acre		cwt/acre				
Starane + Buctril Buctril	0.063 + 0.20 0.20	1 2,3	13	47	576	104	740
Starane + Buctril Buctril	0.063 + 0.20 0.20	1,2 3	12	39	579	123	753
Starane + Buctril	0.063 + 0.20	1,2,3	7	32	641	191	871
Starane + Buctril Buctril	0.125 + 0.20 0.20	1 2,3	10	34	644	142	829
Starane + Buctril Buctril	0.125 + 0.20 0.20	1,2 3	5	28	726	200	959
Starane + Buctril	0.125 + 0.20	1,2,3	6	21	712	261	1,000
Starane + Buctril Buctril	0.25 + 0.20 0.20	1 2,3	11	38	658	123	829
Starane + Buctril Buctril	0.5 + 0.20 0.20	1 2,3	6	30	723	205	963
Starane + Goal	0.063 + 0.12	1,2,3	16	47	557	117	737
Buctril + Goal	0.20 + 0.12	1,2,3	8	27	628	205	867
Buctril + Goal Buctril + Starane Buctril	0.20 + 0.12 0.20 + 0.5 0.20	1 2 3	3	16	711	284	1,013
Untreated			26	55	336	48	465
LSD (0.05)			6	13	127	90	143

†Treatments were applied on May 27 (1), June 6 (2), and June 17 (3).
‡Onions were harvested on September 24.