Weed Control Programs in Mint Based on Spring Applied Herbicides to Minimize Rotational Restrictions

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Abstract

Weed control options in mint, based upon spring application with minimum crop restrictions were tested in Central Oregon in 2012. Treatments were applied in two sequential applications due to a lack of residual weed control of the tested herbicides. Treatment evaluations were limited to crop injury because weed pressure in the experimental plots was low. The highest level of crop injury observed 15 days after the last application included treatment with bromoxynil as the sole broadleaf control her

bicide or when tank mixed with clopyralid. Using a lower rate in the second application helped reduced crop injury; nevertheless injury was between 11 and 20 percent after the last application. At mint harvest, a significant crop injury persisted with bromoxynil applied at sequential rates of 1.5 and 1.0 pints per acre, and two applications of bromoxynil at 1.0 pint per acre tank mixed with clopyralid at 0.3 pints per acre, as reflected by the reduction in fresh weight harvested.

Introduction

The sequence in a crop rotation can be affected by residual effects of herbicides used in the previous crop (Ramson et al. 2002). Weed control programs for mint in central Oregon usually include herbicides that provide residual control such as clomazone (Command 3ME®), terbacil (Sinba®r), sulfentrazone (Spartan®) and flumioxazin (Chateau®), diuron (Karmex®), oxyfluorfen (Goal 2XL®) and napronamide (Devrinol®) (Pacific Northwest Weed Management Handbook 2011). As a consequence of herbicide carry over, planting options after a mint harvest are restricted. The potential for injury in the following crop increases if local environmental conditions such as drought and below average temperatures are present, slowing herbicide breakdown. Therefore, it is important to evaluate weed control programs based on spring applications capable of providing good weed control with limited residual effects providing flexibility and crop safety to the crop rotation. Herbicides currently labeled for mint that meet these requirements include bromoxynil (Buctril®), bentazon (Basagran®), clopyralid (Stinger®), clethodim (Select Max®), sethoxydim (Poast®) and quizalofop (Assure II®) (Pacific Northwest Weed Management Handbook 2011). None of these herbicides would work as a "stand alone" program due to the lack of residual control, making a second sequential application necessary. The objective of this study was to evaluate weed control programs in central Oregon mint, based upon spring application of herbicide to minimize crop rotation restrictions.

Materials and Methods

A field study was conducted in Jefferson County, Oregon during 2012, in an irrigated mint field belonging to Mr. Jim Kaiser. The study design was a randomized complete block with four replications. Plot size was 10 feet wide by 30 feet long. Herbicides were applied with a backpack sprayer calibrated to deliver 20 gallons of spray solution per acre at 40 psi pressure using XR

8002 Teejet® nozzles. Application dates, environmental conditions, crop stage, and weed size are detailed in Table 1. Herbicide efficacy and crop injury were evaluated 15 days after each application. Plots were mechanically harvested, and the fresh weight of a 60 square foot section was recorded.

Results and Discussion

Herbicide applications were delayed as relatively low temperatures during the spring delayed crop and weed growth. Post application evaluations were limited to crop injury because the weed pressure on the field was very low. Treatments including bromoxynil alone or combined with clopyralid resulted in the highest crop injury, ranging from 9 to 16 percent after the first application and from 11 to 20 percent after the second (Table 2). Lowering the rate of bromoxynil in the second application, when applied alone or with clopyralid, helped reduced the mint injury observed 15 days after the last application. Mint plants seemed to have recovered from the initial herbicide injury by the time of crop harvest. Nevertheless, crop injury caused by bromoxynil applied at sequential rates of 1.5 and 1.0 pints per acre, and two applications of bromoxynil at 1 pint per acre tank mixed with clopyralid at 0.3 pint per acre was significant enough to affect the fresh weight of the plants when compared to the untreated check. Crop injury of bromoxynil when tank mixed with bentazon was relatively low, suggesting a possible antagonism between these two herbicides. The control efficacy of this combination should be tested in the future to verify this assumption. The study will be repeated in the 2013 growing season in order to confirm trends observed this year and to include weed control efficacy of the treatments.

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References

Ransom, C. V., C. A. Rice, and J. K. Ishida. 2002. Rotational Crop Response to Wheat Herbicide Carryover. Oregon State University Agricultural Experiment Station, Special Report 1038: 248-251.

Pacific Northwest Weed Management Handbook. 2011. First Quarter Edition. A Pacific Northwest Extension Publication.

Table 1. Application dates, environmental conditions, crop stage and weed size for both application timings

	A	B
Application Date	7/2/2012	7/13/2012
Time of Day	9 AM	8 AM
Air temperature	61	62
Relative Humidity	73	69
Wind Speed	3	3
Wind Direction	N	NW
Crop Stage	22"	24"
Weeds Heights	2-3"	3-4"

Table 2. Percent crop injury 15 days after first application, second application and harvested fresh weight (lbs/a) for individual treatments.

				% Injury[2] 15 DAA$_1$		% Injury 15 DAA$_2$		Fresh Weight[3] (lbs/a)	
Trt	Treatment[1]	Rate (pt/acre)	Application time						
1	Bentazon	4	A	1	C	1	d	28732	ab
	Quizalofop	0.8	A						
	Bentazon	4	B						
2	Bentazon	4	A	0	C	1	d	30292	ab
	Quizalofop	0.8	A						
	Bentazon	2	B						
3	Bromoxynil	1.5	A	16	A	16	ab	29821	ab
	Quizalofop	0.8	A						
	Bromoxynil	1.5	B						
4	Bromoxynil	1.5	A	15	A	11	c	24666	b
	Quizalofop	0.8	A						
	Bromoxynil	1	B						
5	Bentazon	4	A	2	C	3	d	25569	ab
	Bromoxynil	1.5	A						
	Quizalofop	0.8	A						
	Bentazon	4	B						
	Bromoxynil	1.5	B						
6	Bentazon	4	A	1	C	4	d	28114	ab
	Bromoxynil	1.5	A						
	Quizalofop	0.8	A						
	Bentazon	2	B						
	Bromoxynil	1	B						
7	Clopyralid	0.3	A	9	B	20	a	23159	b
	Bromoxynil	1.5	A						
	Quizalofop	0.8	A						
	Bromoxynil	1.5	B						
8	Clopyralid	0.3	A	11	B	13	bc	27261	ab
	Bromoxynil	1.5	A						
	Quizalofop	0.8	A						
	Bromoxynil	1	B						
9	Untreated Check			0	C	0	d	34794	a
	LSD (P=.05)			4		4		6170	

[1]All treatments included crop oil concentrate at 1 % v/v

[2]Abbreviations: DAA_1, Days after first application, DAA_2, Days after second application

[3]Means followed by different letters are significantly different at p= 0.05