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 on spring applications with minimal crop restrictions were tested in central Oregon in 2013. 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 was observed 7 days after the last application in all treatments that included Bromoxynil, a herbicide for broadleaf control. Crop injury never exceeded 14 percent, and there were no differences recorded between the 1 and 1.5 pt /acre rates of Bromoxynil. These levels of injury did not persist and the mint fresh weight yields were not affected.

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 (Sinbar®), 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. In spring of 2012, a series of treatments were tested as potential alternatives that resulted in different levels of crop injury. The objective of this study was to reevaluate these weed control programs in the spring of 2013, as weed control options in mint for central Oregon.

Materials and Methods

In 2013, a field study was conducted in Jefferson County, Oregon at a mint production field belonging to Mr. Jim Kaiser. The study design was a randomized complete block with four replications. Plot size was 10 ft wide by 30 ft long. Herbicides were applied with a backpack sprayer calibrated to deliver 20 gallons of spray solution per acre at 30 psi pressure using XR 8002 Teejet® nozzles. Application dates, environmental conditions, and crop stage are detailed in Table 1. Crop injury was based on visual evaluations using a scale from 0 percent (no injury) to 100 percent. Visual evaluations for crop injury were done 7 days after the first application and 7 and 30 days after the second. Plots were mechanically harvested, and the fresh weight of a 60 ft^2 section was recorded.

Results and Discussion

The evaluation of the herbicide applications was limited to crop injury due to the low weed pressure on the field. Mint injury after the first herbicide application was observed in all treatments that included Bromoxynil, but these levels were relatively low and ranged between 2 to 4 percent (Table 2). Injury increased after the second application and similarly to what was observed after the first application, it was in treatments that included Bromoxynil. The level of crop injury didn't differ between the 1 and 1.5 pt/acre of Bromoxynil. One month after the applications, the level of crop injury was similar to 7 days after the first application. These results suggest that mint plants recovered from the herbicide injury. This assumption was further confirmed when no differences were recorded among the harvested fresh weight of the herbicide 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, and crop height for both application timings.

	A	B
Application Date	5/31/2013	6/8/2013
Time of Day	7:00 AM	8:00 AM
Air Temperature	48	61
Relative Humidity	67	57
Wind Speed	1.5	5
Wind Direction	SE	S
Crop Stage	18"	20"

Table 2. Percent crop injury 7 days after first application, 7 and 30 days after second application and harvested fresh weight (Ton/a) for individual treatments.

Trt	Treatment[1]	Rate (pt./acre)	Application time	% Injury[2] 7 DAA_1		% Injury[2] 7 DAA_2		% Injury 30 DAA_2		Fresh Weight[3] (Ton/a)	
1	Bentazon	4	A	0	a	0	b	0	d	16.2	a
	Quizalofop	0.8	A								
	Bentazon	4	B								
2	Bentazon	4	A	0	a	0	b	0	d	16.7	a
	Quizalofop	0.8	A								
	Bentazon	2	B								
3	Bromoxynil	1.5	A	4	a	13	a	9	a	15.7	a
	Quizalofop	0.8	A								
	Bromoxynil	1.5	B								
4	Bromoxynil	1.5	A	4	a	11	a	4	a	15.2	a
	Quizalofop	0.8	A								
	Bromoxynil	1	B								
5	Bentazon	4	A	2	a	8	ab	1	a	17.2	a
	Bromoxynil	1.5	A								
	Quizalofop	0.8	A								
	Bentazon	4	B								
	Bromoxynil	1.5	B								
6	Bentazon	4	A	2	a	6	ab	5	a	16.6	a
	Bromoxynil	1.5	A								
	Quizalofop	0.8	A								
	Bentazon	2	B								
	Bromoxynil	1	B								
7	Clopyralid	0.3	A	3	a	14	a	5	a	15.2	a
	Bromoxynil	1.5	A								
	Quizalofop	0.8	A								
	Bromoxynil	1.5	B								
8	Clopyralid	0.3	A	3	a	9	a	4	a	15	a
	Bromoxynil	1.5	A								
	Quizalofop	0.8	A								
	Bromoxynil	1	B								
9	Untreated Check			0	a	0	b	0	a	19.4	a
	LSD (P=.05)			2		6		6		3.1	

[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