

# **Combining Pre-Emergence and Spring Applied Herbicide Treatments in Mint with Minimal Crop Restrictions for Small Grains**

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## **Abstract**

A field study was conducted in Culver, Oregon in 2013, in order to evaluate the viability of combining pre-emergence herbicides with minimal cropping restrictions for small grains, with post-emergence applications during the spring. The pre-emergence treatments included were oxyflourfen, pendimethalin, sulfentrazone, and trifluralin. All pre-emergence treatments provided similar weed reduction (37 percent) before the post-emergence application in May. Weed control improved to 90 percent across all treatments after the post-emergence application and remained until harvest. Prickly lettuce and dandelion were the most difficult species to control with these weed control programs.

## **Introduction**

Mint weed control programs in central Oregon usually include herbicides that provide long residual control. As a consequence planting options after mint harvest are restricted due to herbicide carry over. The potential for injury in the following crop increases if local environmental conditions slow herbicide breakdown. In order to address this problem several weed control programs based on spring applications capable of providing good weed control with limited residual effects for central Oregon were evaluated in the years 2012 and 2013. These programs were based on the use of bromoxynil (Buctril<sup>®</sup>), bentazon (Basagran<sup>®</sup>), clopyralid (Stinger<sup>®</sup>), clethodim (Select Max<sup>®</sup>), sethoxydim (Poast<sup>®</sup>) and quizalofop (Assure II<sup>®</sup>). All these programs required sequential applications of the herbicides due to the lack of residual control increasing the chances of crop injury. In order to reduce weed pressure, broaden the weed control spectrum and reduce the need of two sequential applications of post-emergence herbicides in spring it is necessary to compliment weed control treatments with pre-emergence applications early in the season. Available herbicide options with replant restrictions that would allow planting small grains after mint harvest include oxyflourfen (Goal 2XL<sup>®</sup>), pendimethalin (Prowl H<sub>2</sub>O<sup>®</sup>), sulfentrazone (Spartan<sup>®</sup>), and trifluralin (Treflan<sup>®</sup>). Several of these herbicides are viable options only if they are applied early in December in order to avoid cropping restrictions following mint in fall.

The objective of this study was to evaluate which pre-emergence herbicides labeled for use in mint can provide early weed control and can be used to complement post emergence spring applications with minimum cropping restrictions following mint.

## **Materials and Methods**

A field study was conducted in Culver, Oregon during 2013, in an irrigated mint field belonging to Mr. Jim and Mike Cloud. 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. Weed counts from a 6 ft<sup>2</sup> area were done in May before the spring application and before harvest in August. The list of pre-emergence herbicides treatments, rates, time of application and adjuvants used are detailed in table 2. All treatments included the application of Paraquat® at 2 pt/acre plus a NIS at 0.25 % v/v as tank mix partner when crop was dormant and in May again all treatments were followed with an application of Basagran® at 4 pt/acre + Stinger® at 0.3 pt/acre + Assure II® + COC at 1 % v/v. Plots were mechanically harvested, and the fresh weight of a 60 ft<sup>2</sup> section was recorded. Soil samples from each treatment were collected following harvest. Currently soil samples are been placed in trays and planted to wheat in the greenhouse facilities at COARC, to detect potential carry over from the tested treatments that can affect wheat growth.

### Results and Discussion

The early weed control provided by the pre-emergence herbicides was similar between treatments and averaged a 37 percent reduction when compared to the non-treated checks. The weed species accounted during the first count were prickly lettuce (*Lactuca serriola* L.), dandelion (*Taraxacum officinale* Weber in Wiggers), kochia (*Kochia scoparia* (L.) Schrad.) and western salsify (*Tragopogon dubious* Scop.). The pre-harvest weed counts indicated that the post applications were effective in maintaining the weed pressure low, averaging 90 percent control across treatments. Prickly lettuce and dandelions were the only weed species present at harvest, suggesting that these two species were the most difficult to control. No differences in fresh mint yields were observed between treatments, indicating good crop safety.

The potential carryover of the tested treatments will be determined once the plant grow-out tests have been completed.

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**Table 1.** Application dates and environmental conditions for all applications.

	A	B	Post
Application Date	1/15/2013	3/25/2013	5/30/2013
Time of Day	1:30 PM	12:30 PM	8:00 AM
Air Temperature	42	48	48
Relative Humidity	55	45	70
Wind Speed	2	4	1
Wind Direction	E	NNE	NNW

**Table 2.** Weed counts (plants/6 ft<sup>2</sup>) and harvested mint fresh weights (Ton/a) for individual treatments.

Treatment <sup>1</sup>	Rate	Unit	Time <sup>2</sup>	Weeds <sup>3</sup> per 6 ft <sup>2</sup>		Fresh Weights
				May	August	Tn/a
Goal 2XL <sup>®</sup>	6	pt/a	A	4 b	0 b	11 a
Goal 2XL <sup>®</sup>	2	pt/a	A	3 b	2 b	12 a
Spartan <sup>®</sup>	12	oz/a	A	3 b	1 b	11 a
Spartan <sup>®</sup>	6 + 6	oz/a	AB	2 b	1 b	11 a
Prowl H <sub>2</sub> O <sup>®</sup>	3	pt/a	B	3 b	1 b	10 a
Treflan <sup>®</sup>	1.25	pt/a	B	4 b	2 b	10 a
Non treated check			B	8 a	12 a	11 a

<sup>1</sup>All treatments included the application of Paraquat at 2 pt/a plus a NIS at 0.25 % v/v as tank mix partner.

<sup>2</sup>Application timings, A: 1/15/2013; B: 3/25/2013

<sup>3</sup>Means followed by different letters are significantly different at p= 0.05