2017 RESEARCH REPORT

Oregon Strawberry Commissoin

Improving weed control options in strawberries

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Rationale

Limited cost-effective weed control options are available for perennial strawberry producers in Oregon. Herbicides options are often restricted to flumioxazin (Chateau), sulfentrazone (Spartan) and pendimethalin (Prowl) applied at transplanting, alone or in combination. These herbicides provide a weed control during early in the season, but weed control is lost during summer. To complement the herbicide program of perennial strawberries, we evaluated herbicides that are being considered for registration as well as compounds not yet tested.

Objectives

Develop efficacy and crop safety data for potential herbicides in strawberry production.

Methods

The experiment was conducted on a commercial farm in Albany, Oregon (44.63N and 122.94W) during the summer of 2017. The area was flat and well drained, located on a Cloquato silt loam soil (20:63:10 sand: silt: clay, 7% organic matter, and a native pH of 6). The soil was tilled and leveled for transplanting the strawberries in flat bare ground systems grown as a perennial crop. Strawberry variety Mary's peak were transplanted on the afternoon of June 13, 2017, at a row spacing of 38-inches and 15-inches between plants. The day after transplanting, the field was irrigated with a hose-pulled, traveler irrigation system for the establishment, and later irrigation transition to a sub-surface drip system.

The herbicide treatments were applied using a CO2 pressurized, back-pack sprayer equipped with a four nozzle boom, spaced at 19 inches. The sprayer was calibrated to deliver 20 GPA at 40 psi and 3 mph. Application details are provided in Table 1. All treatments were applied over the top, and two application timings were evaluated. Application A, refers to treatments applied within 24 hours after transplanting, and application B are treatments applied weeks after transplant. A list of herbicide treatments is provided in Table 2.

Table 1: Herbicide application data.

Application timing	A (POSTTR)	B (POSPOS)
Crop stage BBCH	00- Dormant 10- First leaf emerging	12 – 2nd leaf unfolded
Date	June 14, 2017	June 28, 2017
Start /end time	11:23 to 1:43 PM	9:15 to 11:00 am
Air temperature	72.3 F	69.6 F
Relative humidity	68 %	82%
Wind velocity and direction	2.2 MPH SSW	1.1 MPH SW

Dew Presence	N	N
Cloud cover	85%	65%
Soil moisture	moist	moist
Sprayer/ pressure	40 PSI	40 PSI
Ground speed	3 MPH	3 MPH
Nozzle type	11002XR flat-fan	11002XR flat-fan
incorporation	overhead irrigation	-

Field maintenance included weed hoeing after every evaluation starting on July 5. Before the August 10 evaluation, the grower had irrigated the area with over-the-top irrigation promoting weed growth. The experimental design was a randomized complete-block design with three replication. Plot size was 7x20 feet. Assessment of plant injury (Injury%) and stunning (STU %) were made at 7 and 14 days after first application (A), and 7, 14, 28, and 42 days after the second application (B). The herbicide pendimethalin (Prowl H20) was used as a standard for comparison. Weed control rating was not provided, as plots were weeded as needed. Data were subjected to ANOVA and means separated by Tukey's t-test ($p \leq 0.05$).

Results

The herbicide pendimethalin applied at transplanting (A) or two weeks after transplanting (B) resulted in initial crop injury at levels 3% or lower and crop stunning at 16% or less with no differences in between application timings A or B for crop injury (Table 1). Plants recovered treatment during the experiment. The lowest level of crop injury was observed with s-metolachlor (Dual Magnum) at 1.05 or 2.1 qt/A. The herbicides quinclorac (Quinstar), indaziflam (Alion), and fomesafen (Reflex) provided slight stunting of the crop initially (<10%) followed by full plant recovery at the end of the experiment. Similar results were observed with tolpyralate and pyroxasulfone, but a small injury level was noticeable up to 57 days after application. The herbicide bicyclopyrone provided unacceptable injury levels when applied at transplanting (application A). When applied two weeks after transplanting the observed injury levels were 35% or less and acceptable levels of crop safety were observed at the end of the experiment. Additional evaluations are required for bicyclopyrone. The herbicides indaziflam, fomesafen, quinclorac, tolpyralate, s-metolachlor, and pyroxasulfone presented acceptable crop safety in strawberry in this experiment.

Table 2. Crop injury (Injury%) and stunning (**STU %**) of strawberry transplants treated with different herbicides at transplnaintg (A) or two weeks after transplanting (B).

		Application A		**Application B**			
Trt (Appl code)	Rate	**7DAT**	**14DAT**	**7DAT**	**14DAT**	**28DAT**	**42DAT**
		PHYGEN (%)					
1.untreated check		0b	0b	0d	0b	0c	0b
2. pendimethalin (A)	3 qt/A	0b	3b	3d	3b	0c	0b
3. pendimethalin (B)	3 qt/A	0b	0b	3d	0b	0c	0b
4. bicyclopyrone (A)	3.2 fl oz/A	20a	50a	80a	40a	91a	96a
5. bicyclopyrone (B)	3.2 fl oz/A	0b	0b	46b	40a	43b	7b
6. s-metolachlor (A)	1.05 qt/A	0b	3b	0d	0b	0c	0b
7. s-metolachlor (A)	2.1 qt/A	0b	0b	0d	0b	0c	0b
8. indaziflam (A)	2.5 fl oz/A	0b	3b	0d	10b	6c	0b
9. pyroxasulfone (A)	1 fl oz/A	3b	6b	3d	0b	0c	0b
10. fomesafen (A)	8 fl oz/A	0b	0b	0d	0b	0c	0b
11. quinclorac (A)	8.4 fl oz/A	0b	0b	0d	0b	0c	0b
12. tolpyralate (A)	1 fl oz/A	3b	6b	26c	13b	0c	0b

		STU (%)					
		Application A		**Application B**			
Trt (Appl code)	Rate	**7DAT**	**14DAT**	**7DAT**	**14DAT**	**28DAT**	**42DAT**
1.untreated check		0a	0a	0b	0b	0c	0b
2. pendimethalin (A)	3 qt/A	0a	0a	16a	3b	13bc	0b
3. pendimethalin (B)	3 qt/A	0a	0a	13a	6b	6c	3b
4. bicyclopyrone (A)	3.2 fl oz/A	0a	6a	30a	56a	86a	93a
5. bicyclopyrone (B)	3.2 fl oz/A	0a	0a	20a	16b	26b	16b
6. s-metolachlor (A)	1.05 qt/A	0a	0a	0b	0b	3c	0b
7. s-metolachlor (A)	2.1 qt/A	0a	0a	0b	0b	0c	0b
8. indaziflam (A)	2.5 fl oz/A	10a	10a	0b	10b	10bc	10b
9. pyroxasulfone (A)	1 fl oz/A	0a	0a	0b	3b	16bc	6b
10. fomesafen (A)	8 fl oz/A	0a	0a	6b	13b	0c	0b
11. quinclorac (A)	8.4 fl oz/A	0a	0a	0b	10b	0c	0b
12. tolpyralate (A)	1 fl oz/A	0a	10a	10a	6b	3c	0b