Automated Thinner Lettuce and Weed Control Evaluation

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Summary: Organic and conventional materials for use by spray thinners and/or automated weeders were evaluated. Two trials were conducted based on application timing: 16 and 21 days after seeding. Higher water volume improved the activity of materials applied on a volume/volume basis. The addition of 1% methylated seed oil (MSO) greatly improved the activity of 27-0-0-5 fertilizer. Rely was slower to kill weeds and lettuce, but by 8 days, it provided excellent weed control.

Methods: Two trials were established at the Hartnell East Campus Research Facility. The Romaine lettuce variety Sun Valley was seeded onto shaped beds on August 17 and the first irrigation water was applied on August 18. There was a high population of the following weeds at this site: sow thistle, hairy nightshade, common purslane, burning nettle, shepherd's purse and nettleleaf goosefoot. Other weeds included malva and groundsel. The weeds were allowed to come up with the lettuce and the site was split into two trials and the lettuce and weeds were sprayed at two growth stages: ***Trial No. 1*** was treated on September 2, 16 days after first water; ***Trial No. 2*** was treated on September 7, 21 days after first water. Trial 1 represented application date is timing typically used by commercial thinners and Trial 2 represents an application when weeds are larger and more difficult to control and that might be used by an automated weeder. Materials applied in Trial 1 were applied in the equivalent of 74 gallons of water per acre and in Trial 2 they were applied in the equivalent of 37 gallons of water per acre. Spray materials were selected based on materials potentially used by spray thinners and/or automated weeders. Materials included organic as well as conventional materials. See tables for materials and rates. Weed evaluations were made on two dates after application of each trial by counting weeds in two 1 ft^2 quadrats per plot.

Results: ***Trial No. 1:*** All materials applied on a volume/volume basis (Suppress, Scythe and SF exp) provided good weed control on the first evaluation date (4 days after application, Table 1). However, it was a mistake to apply these materials at high water volume because it probably made them look better than they would at lower water volumes (see Trial No. 2). Of the non-volume/volume materials, Shark provided excellent weed control. Rely did not provide complete kill of weeds on the first evaluation date. The fertilizer, 27-0-0-5 was much more effective with the addition of 1% v/v of MSO. On the second evaluation date (13 days after application date, Table 2), all materials provided excellent weed control except for 27-0-0-5 without MSO. Rely was also effective on this date indicating that it is slower acting than the other materials. ***Trial No. 2:*** All materials applied on a volume/volume basis controlled 68 to 90% of the weeds on the first evaluation date (2 days after application, Table 3). Suppress at 9% buffered to pH 6.5 gave

the good weed control while unbuffered Suppress at 9% was less effective. Of the non-volume/volume materials, Shark and 27-0-0-5 + MSO provided the best weed control. Rely did not provide good weed control on this evaluation date. On the second evaluation date (8 days after application, Table 4) the volume/volume materials provided the same amount of weed control as the first evaluation date. Both rates of Rely, Shark and 27-0-0-5 + MSO provided excellent weed control on this evaluation date.

Suppress 6%   Suppress 6% @ pH 6.5   Suppress 9%

Suppress 9% @ pH 6.5   Scythe 9%   Rely 29 ounces

Rely 43 ounces   Shark 1.0 ounce   27-0-0-5

27-0-0-5 + MSO 1%   SF exp 12%   Untreated control

Table 1. Trial No. 1. Weed counts (no/m^2) on Sept. 6 (4 days after application)

Material	Rate	Lettuce	Sow thistle	Night-shade	Purslane	Burning nettle	Shepherds. purse	Nettleleaf goosefoot	Other weeds	Total weeds
Suppress	6% v/v	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Suppress	6% v/v pH-6.5*	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3
Suppress	9% v/v	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.7
Suppress	9% v/v pH-6.5*	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.7
Scythe	9% v/v	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rely	29 oz/A	4.0	0.3	0.0	3.0	2.0	4.3	0.0	0.7	14.3
Rely	43 oz/A	1.0	0.3	0.3	3.0	0.7	3.3	0.0	0.3	9.0
Shark	1 oz/A	0.0	0.3	0.0	0.3	0.0	1.0	0.0	0.0	1.7
27-0-0-5	37 gal/A	0.0	9.3	0.0	16.0	0.0	0.0	0.0	0.0	25.3
27-0-0-5 MSO	37 gal/A 1% v/v	0.3	0.0	0.0	0.3	0.0	1.0	0.0	0.0	1.7
SF exp.	12% v/v	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.3	1.0
Untreated	---	10.0	15.3	2.3	30.3	11.3	12.3	7.3	1.3	90.3
	Pr>F treat	<0.0001	<0.0001	0.0057	0.0076	<0.0001	0.0026	0.0048	0.0163	<0.0001
	LSD$_{0.05}$	0.8	4.6	1.0	14.9	2.7	5.2	3.6	0.7	9.4

* pH adjusted to 6.5 with Biolink acidifier.

Table 2. Trial No. 1. Weed counts (no/m^2) on Sept. 15 (13 days after application)

Material	Rate	Lettuce	Sow thistle	Night-shade	Purslane	Burning nettle	Shepherds . purse	Nettleleaf goosefoot	Other weeds	Total weeds
Suppress	6% v/v	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Suppress	6% v/v pH-6.5*	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.7
Suppress	9% v/v	0.0	0.0	0.0	0.3	0.0	0.7	0.0	0.0	1.0
Suppress	9% v/v pH-6.5*	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3
Scythe	9% v/v	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rely	29 oz/A	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.3	1.0
Rely	43 oz/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shark	1 oz/A	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
27-0-0-5	37 gal/A	0.0	5.7	0.0	7.7	0.0	0.7	0.0	0.7	14.7
27-0-0-5 MSO	37 gal/A 1% v/v	0.0	0.0	0.0	1.0	0.0	0.3	0.0	0.0	1.3
SF exp.	12% v/v	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.3	1.0
Untreated	---	9.7	13.7	0.3	31.7	11.7	10.7	5.7	1.7	85.0
	Pr>F treat	<0.0001	<0.0001	0.4767	0.0016	<0.0001	0.0022	<0.0001	<0.0001	<0.0001
	LSD$_{0.05}$	1.0	4.7	ns	12.8	2.2	4.4	0.8	0.6	5.4

* pH adjusted to 6.5 with Biolink acidifier.

Table 3. Trial No. 2. Weed counts (no/m^2) on Sept. 9 (2 days after application)

Material	Rate	Lettuce	Sow thistle	Night-shade	Purslane	Burning nettle	Shepherds. purse	Nettleleaf goosefoot	Other weeds	Total weeds
Suppress	6% v/v	0.0	0.0	0.3	1.7	15.3	4.0	0.0	0.0	21.3
Suppress	6% v/v pH-6.5*	1.0	0.0	0.0	0.7	15.7	4.3	0.0	0.7	22.3
Suppress	9% v/v	0.0	0.0	0.0	6.7	10.0	4.0	0.0	1.7	22.3
Suppress	9% v/v pH-6.5*	0.0	0.0	1.0	0.7	2.3	2.7	0.0	0.3	7.0
Scythe	9% v/v	0.3	0.0	0.3	3.0	8.0	1.7	0.0	0.0	13.3
Rely	29 oz/A	4.7	6.3	2.0	8.7	20.3	4.7	2.0	0.0	48.7
Rely	43 oz/A	5.3	8.0	0.3	8.0	22.0	2.7	1.0	0.3	47.7

Material	Rate	Lettuce	Sow thistle	Night-shade	Purslane	Burning nettle	Shepherds. purse	Nettleleaf goosefoo	Other weeds	Total weeds
Shark	1 oz/A	0.0	0.0	0.0	1.0	0.0	6.3	0.0	0.3	7.7
27-0-0-5	37 gal/A	0.3	5.3	0.3	8.0	5.7	2.3	0.7	0.0	22.7
27-0-0-5 MSO	37 gal/A 1% v/v	0.0	0.3	0.3	1.0	1.3	1.0	0.0	0.3	4.3
SF exp.	12% v/v	0.0	0.0	0.3	2.7	11.7	0.7	0.0	0.7	16.0
Untreated	---	6.7	8.7	0.7	19.0	20.3	9.7	4.0	1.7	70.7
	Pr>F treat	<0.0001	<0.0001	0.1047	0.0552	0.0012	0.1439	0.0029	0.4382	<0.0001
	LSD$_{0.05}$	2.4	4.0	ns	ns	10.7	ns	1.8	ns	19.0

* pH adjusted to 6.5 with Biolink acidifier.

Table 4. Trial No. 1. Weed counts (no/m^2) on Sept. 15 (8 days after application)

Material	Rate	Lettuce	Sow thistle	Night-shade	Purslane	Burning nettle	Shepherds. purse	Nettleleaf goosefoo	Other weeds	Total weeds

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Suppress	6% v/v	0.7	0.0	1.7	5.0	12.7	6.0	0.0	0.0	26.0
Suppress	6% v/v pH-6.5*	0.7	1.0	1.3	1.3	16.3	5.7	0.0	0.7	27.0
Suppress	9% v/v	0.3	0.0	0.7	6.0	10.0	5.3	0.3	1.7	24.3
Suppress	9% v/v pH-6.5*	0.7	0.0	1.3	2.0	4.0	3.7	0.0	2.0	13.7
Scythe	9% v/v	0.0	0.0	0.3	7.7	6.0	3.0	0.7	0.7	18.3
Rely	29 oz/A	0.0	0.0	0.0	0.3	1.3	0.7	0.0	0.3	2.7
Rely	43 oz/A	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.3	1.7
Shark	1 oz/A	0.0	0.3	0.0	0.0	0.0	1.7	0.0	0.3	2.3
27-0-0-5	37 gal/A	0.0	7.3	0.0	7.7	2.3	1.7	0.0	0.3	19.3
27-0-0-5 MSO	37 gal/A 1% v/v	0.0	0.3	0.0	2.0	0.7	0.0	0.0	0.7	3.7
SF exp.	12% v/v	0.7	0.0	0.7	8.3	9.0	1.0	0.0	0.3	20.0
Untreated	---	9.0	10.3	0.3	21.7	13.3	10.7	2.3	1.0	68.7
	Pr>F treat	<0.0001	0.0017	0.4133	0.0540	0.0071	0.0243	<0.0001	0.3563	<0.0001
	LSD$_{0.05}$	1.7	4.9	ns	12.0	9.1	5.7	0.7	ns	16.8

* pH adjusted to 6.5 with Biolink acidifier.