2014 Evaluation of Spray Materials for Thinning/Weeding Lettuce

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Background: Automated thinning for direct seeded lettuce is now a viable practice for growers in the Salinas and other production districts. There are now four companies that offer machines and/or services for thinning lettuce: Ag Mechtronix (Silver City, New Mexico), Blue River Technology (Mountain View, CA), and Ramsey Highlander/Oraka Technologies (Gonzales, CA) and Vision Robotics (San Diego, CA). There are four postemergence herbicides registered for use on lettuce: glyphosate (Roundup), paraquat (Gramaxone), pelargonic acid (Scythe) and carfentrazone (Shark). In 2012-13 we evaluated carfentrazone and pelargonic acid and determined that carfentrazone was highly effective. A request for a 24c registration was submitted to both Arizona and California to allow the use of carfentrazone specifically for thinning lettuce. The California request was approved in early October 2013. In addition, topical applications of salt based fertilizers such as AN20 and acid fertilizers such as NpHuric can also thin lettuce and remove weeds.

This trial tested three organically acceptable materials and four conventional materials. The materials were applied in cool conditions shortly after dawn when the plants were still wet with dew. This time was chose because it has been observed to be the most difficult conditions for spray materials to effectively remove unwanted lettuce plants in thinning operations, as well as any weeds that may be associated with the lettuce plants.

Methods: The trial was conducted at the Hartnell East Campus Research Facility. The lettuce variety Sun Belt was seeded in two rows 40-inch wide beds on August 28 the first sprinkler irrigation was applied on August 29. There was good emergence of malva, purslane, hairy nightshade and burning nettle along with the lettuce. Weeds and lettuce were treated on September 11. The organic materials tested were Suppress (Westbridge), Weed Pharm (Pharm Solutions) and Weeds Away (Organic Ag Products); conventional materials tested were Scythe (Gowan), Shark (FMC), NpHuric, and 14-0-0-5. On the application date, September 11, the lettuce plants had 1-2 true leaves which is the time that lettuce typically use the automated thinners. Plots were one 40 inch bed wide by 30 feet long and replicated four times in a randomized complete block design. Materials were applied with one pass of a one wand with one 8008E nozzle at 20 psi. The material was applied in the equivalent of 20 gallons of water per acre. Weather at the time of application was clear and the temperatures were 65 °F; dew was present on the plants at the time of application.

Results: Shark is the standard material for thinning conventionally grown lettuce. It performed the best of any of the materials under the conditions in this trial (cool and wet). The fertilizer materials did not perform well under these conditions, but under dry conditions they have been observed to provide better results. Scythe gave good control of lettuce, but was weak on burning nettle. Of the organic materials, Suppress at 9% gave good results and was similar to Scythe in the level of control that it provided, as well as being weak on burning nettle. Weed Pharm was less effective and Weeds Away was ineffective.

Photos of the plot of the 1 day after germination water applications on September 12

1. Suppress 3%

2. Suppress 6%

3. Suppress 9%

4. Suppress 9%
Note missed nettle

5. Weed Pharm 100%

6. Weeds Away 12%

7. Scythe 9%

8. Shark 1.0 oz/A

9. 14-0-0-5 20 gal/A

10. NpHuric 30%

11. Untreated

Table 1. Lettuce plant and overall weed control rating on September 12 and 18
(1 and 7 days after application)

Control Material	Rate	Lettuce Control rating[1]	Overall Weed Control rating[1]	Lettuce Control rating[1]	Overall Weed Control rating[1]
Organic		1 day	1 day	7 days	7 days
Suppress	3% v/v	4.0	4.5	5.3	5.8
Suppress	6% v/v	7.5	7.8	7.5	8.0
Suppress	9% v/v	9.1	8.5	9.4	8.8
Weed Pharm Oroboost	100% v/v 1% v/v	8.8	8.3	8.8	7.5
Weeds Away Oroboost	12% v/v 1% v/v	1.8	1.8	2.8	3.0
Conventional					
Scythe DynAmic	9% v/v 0.25% v/v	8.9	8.3	9.4	8.5
Shark DynAmic	1.0 oz/A 0.25% v/v	9.9	9.5	10.0	10.0
14-0-0-5 DynAmic	20 gal/A 0.25% v/v	5.3	5.0	6.3	4.8
NpHuric DynAmic	30% v/v 0.25% v/v	8.6	8.3	8.3	8.0
Untreated	---	0.0	0.0	0.0	0.0
Pr>Treat		0.0001	0.0001	0.0001	0.0001
LSD (0.05)		0.9	0.9	0.8	1.1

1 – lettuce plant and weed control rating: 0 = no control to 10 = complete control