2013 Automated Lettuce Thinner Evaluations

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Summary: Trials were conducted to evaluate the following: 1) the appropriate rate of Shark to use in automated thinners that use a spray mechanism to remove unwanted lettuce plants and 2) the relative efficacy of Shark vs the fertilizer 14-0-0-5. The trials were initiated during the cold weather to evaluate the effectiveness of these materials during this time of the year. Shark at 1.0 ounce/A effectively and rapidly killed unwanted lettuce plants. 14-0-0-5 was less effective and took more time to remove doubles and unwanted lettuce plants during the weeding/double removal operation that occurs approximately 10 days following thinning. There were stunted plants in the various treatments, presumably due to contact with the herbicides and/or fertilizer. This problem can be improved over time as the technology of the applicator improves.

These evaluations did not include the acid based fertilizers such as sulfuric acid, NpHuric or phosphoric acid fertilizer (e.g. 7-7-0-7) due to concerns that they would corrode the electronics of the automated thinner.

Methods: ***Trial No. 1:*** Trials were conducted in fields that were mechanically thinned with an automated thinner (Oraka Developments, Ltd, New Zealand and Ramsay Higlander, Gonzales, CA). This trial was conducted to evaluate the effect of cold temperatures on the efficiency of thinning carried out by the automated thinner on February 22. The machine applied approximately 20 gallons of water/A and the rates of the materials used for thinning the lettuce are shown in Table 1. Each treatment was applied to approximately a one acre area. The automated thinner was used at the 1-2 true leaf stage. Prior to the weeding/double removal operation, counts were made of the number of doubles and unkilled lettuce plants. Following the weeding/double removal operation final stand counts were made and the number of stunted plants were counted. ***Trial No. 2:*** Was thinned with the same automated thinner as trial no. 1 on March 25. Post thinning evaluations were carried out on two dates (Table 2) and evaluated the efficiency of each material to effectively kill lettuce, the resulting stands and hours per acre to hand thin.

Results: ***Trial No. 1:*** This trial evaluated the efficacy of various materials for use in an automated thinner which removed unwanted lettuce plants. The number of double and unkilled lettuce plants was higher in the Scythe and Scythe+fertilizer treatments. Both of these treatments were less effective in killing unwanted lettuce plants and which resulted in more plants being left for the weeding/double removal operation. Shark at 1.0 oz/A had the greatest number of plants per acre and had the fewest stunted plant/A of the three Shark treatments. Plant stunting could be improved with greater accuracy of the application. *Trial No. 2:* There were more doubles/A in the 14-0-0-5 treatment. Thinning with Shark brought the plant population following the automated thinner closer to the final plant population following the weeding/double removal operation. The weeding/double removal operation took 2.6 hours per acre in the Shark treatment vs 5.1 hours per acre in the 14-0-0-5 treatment.

Table 1. Trial No. 1: Number of plants prior to automated thinning. Prehand weeding/double removal evaluations and final stand

Treatments & Rate/A	Pre-thin plants/A	Doubles & unkilled plants/A	Post thin plants/A	Plant spacing inches	Stunted lettuce plants/A	Harvest Mean head wt lbs
	Feb. 22	Mar. 4	----------March 7----------			April 30
Standard	121,334	105	33,715	9.3	0	2.87
Shark 1.0 oz COC 0.25% v/v	120,447	1,464	34,003	9.2	810	2.78
Shark 2.0 oz COC 0.25% v/v	122,418	1,555	29,978	10.5	3,502	2.62
Shark 4.0 oz COC 0.25% v/v	116,764	1,594	30,109	10.4	3,215	2.55
Scythe 9.0% v/v	120,243	2,091	32,696	9.6	470	2.69
Scythe 3.8% v/v 14-0-0-5 63% v/v	120,936	6,456	30,265	10.7	366	2.73

Table 2. Trial No. 2: Following automated thinning on March 28: no. of double, plants per acre and spacing; Hours/A to remove doubles, final stand and plant spacing

Treatments & Rate/A	Double/A	Stand Plants/A	Plant spacing inches	Double removal Hrs/A	Stand Plants/A	Plant spacing inches	Harvest Mean head wt lbs
	----------March 28----------			----------April 3----------			May 14
Shark 1.0 oz COC 0.25% v/v	4,120	37,611	8.4	2.6	33,162	9.5	2.1
14-0-0-5 22 gals	6,344	52,524	6.0	5.1	31,952	9.8	2.1

1.0 ounce Shark


Good efficacy on unwanted plants

Scythe @ 9% v/v and Scythe + Fertilizer


Unthinned plant in middle and unkilled plants adjacent to unthinned plants

General Photos

Over view of thinning

Doubles: plants too close for the machine to thin