Evaluation of Miticides for Two-Spotted Spider Mite Control in Carrots Grown for Hybrid Seed in Central Oregon, 2014

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Abstract

Two-spotted spider mites (TSSM) are an important pest on hybrid carrot seed production in central Oregon. Concern about the two-week knock down period and re-entry interval (REI) for Comite (propargite) prompted a search for other products that could be used. Plots were established in two commercial fields in central Oregon. All treatments generally provided greater control than the untreated check, with statistical differences between treated and untreated plots at one location. The trend was for Agri-Mek (abamectin) to provide similar results to Comite and Oberon (spiromesifen) and to sometimes provide greater control of TSSM than Comite.

Introduction

Two-spotted spider mites (TSSM) are a significant pest in hybrid carrot seed in central Oregon. Spider mite populations can increase dramatically during the time bees are present to pollinate the crop from late June until mid-August. During this time, no insecticide applications are made. Once bees are removed from the fields, a cleanup application to control insect pests often includes a combination of Orthene (acephate) and Comite (propargite). However, Comite is problematic due to the two weeks it takes for mites to die and the two week re-entry interval (REI) that prevents rouging crews from accessing the fields. There can be two weeks or less between the cleanup spray and swathing the fields for harvest so a product with a shorter REI is necessary.

The objective of this project was to compare the efficacy against TSSM for two potential new products, Agri-Mek (abamectin) and Oberon (spiromesifen) compared to Comite.

Methods and Materials

Research was conducted in two commercial hybrid carrot seed field near Madras and Culver, Oregon. Plots consisted of four female rows 10 ft x 20 ft replicated four times in a randomized complete block design. The entire plot area at each location was covered with agricultural paper and held down on the edges with dirt during aerial application of Orthene plus Comite to the remainder of the Madras location on August 13 and Culver location on August 16. Pre-application TSSM counts were taken at the Madras location on August 14 and at the Culver location on August 18. Mite counts were taken by counting the number of mites on 20 flower bracts per plot from secondary umbels, with a maximum of 20 mites counted per bract.

Treatments were applied August 15 at the Madras location and August 19 at the Culver location. Applications were made using a CO_2-pressurized, hand-held boom sprayer at 40 psi and 10 gals per acre water. A non-ionic surfactant at 1 qt/100 gal was included with all treatments. A clean-up spray of Orthene at 1 lb/acre plus Brigade (bifenthrin) at 6.4 oz/acre to control lygus and other insect pests was applied to the entire plot area with the treatments.

Post-treatment mite counts were taken every five days with the final count 30 days after treatment (DAT) at the Madras location and 25 DAT at the Culver location. Prior to commercial swathing of the field, a random sampling of 20 secondary umbels per plot were collected at the Madras location for testing percent germination to determine if there was any detrimental effect from the treatments. Germination testing was conducted by Agri Seed Testing, Inc. in Salem, Oregon.

Results and Discussion

Data from each location were analyzed statistically to determine the Area Under Mite Progress Curve (AUMPC). This approach is a quantitative summary of mite intensity over time. It accumulates the average mite count between each pair of adjacent time points and adjusts each value based on the length of time between paired time points. Results of this analysis indicates no significant differences between treated and untreated plots at the Madras location (Table 1), but significant differences between treated and untreated plots at the Culver location 10 DAT and when analyzed as AUMPC (Table 2). These results indicate that all insecticide treatments significantly reduced mite populations compared to the untreated check at the Culver location where there was a higher mite population.

When evaluating trends, treated plots consistently had fewer TSSM than the untreated at both locations, with few exceptions. Pre-counts of TSSM at the Madras location were relatively low and remained so during the evaluation period. Treatment effects at the Madras location only begin to separate at 25 and 30 DAT. At the Madras location TSSM counts across treatments increased significantly starting 25 DAT as expected. The exception was Oberon, which continued to have relative lower TSSM counts 25 and 31 DAT compared to the other treatments and untreated check.

At the Culver location TSSM were higher and more consistent across plots. However, TSSM counts inexplicably dropped dramatically 24 DAT (Table 2). Prior to that event, on 20 DAT Oberon at both rates and Agri-Mek at the higher rate had lower counts than the untreated check. Oberon provided the most consistent control of TSSM and was generally equal to or better than Comite. Agri-Mek generally provided similar results to Comite.

Analysis of seed samples for percent germination indicated no significant differences between treatments, indicating no detrimental effect from miticide treatments.

Table 1. Average mites per flower bract and percent seed germination following insecticide treatments applied August 15 to control two-spotted spider mites on hybrid seed carrots near Madras, OR, 2014.

Treatment	Rate/A	Pre-Count Aug 14	Post-Counts (DAT) 5	10	15	20	25	30	AUMPC
Agri-Mek	3.5 fl oz	5.0	0.3	0.5	1.5	3.5	12.8	11.0	133
Agri-Mek	7.0 fl oz	1.3	0.5	1.8	2.5	1.5	10.0	8.5	110
Oberon	8.0 fl oz	1.0	0.0	0.3	0.5	0.8	3.0	4.3	37
Oberon	16 fl oz	2.8	0.5	1.0	1.5	0.3	1.3	3.3	31
Comite	2.5 pt	0.3	1.5	0.3	1.8	2.3	14.5	10.5	137
Untreated	-------	3.3	0.5	3.8	2.3	3.8	14.3	13.5	169
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Statistical analysis using Tukey's test ($P < 0.05$). Data is an average of 20 flower bracts/plot. No more than 20 mites per bract were counted.

Table 2. Average mites per flower bract following insecticide treatments applied August 19 to control two-spotted spider mites on hybrid seed carrots near Culver, OR, 2014.

Treatment	Rate/A	Pre-Count Aug 14	Post-Counts (DAT) 5	10	15	20	25	AUMPC
Agri-Mek	3.5 fl oz	10.3	1.8	4.8 b	11.8	12.8	0.5	82 b
Agri-Mek	7.0 fl oz	13.8	1.5	4.0 b	6.5	9.0	3.8	59 b
Oberon	8.0 fl oz	12.0	1.3	6.0 b	2.0	7.0	0.8	38 b
Oberon	16 fl oz	18.0	2.0	3.8 b	6.8	7.0	1.0	55 b
Comite	2.5 pt	18.5	2.0	3.5 b	6.5	14.3	0.0	51 b
Untreated	-------	15.5	5.0	16.3 a	17.5	22.0	2.3	167 a

Statistical analysis using Tukey's test ($P < 0.05$). Data is an average of 20 flower bracts/plot. No more than 20 mites per bract were counted.

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