

Chemical Control/New Products

Control of codling moth with reduced risk insecticides in pears—2002

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Abstract: A trial was conducted in Fairfield, CA, to evaluate the efficacy of reduced risk insecticides for control of codling moth (CM) in pears. Each experimental treatment was replicated four times in a RCB. The CM infestation in all experimental treatments was significantly lower than in the untreated control. All experimental treatments except for Dimilin without Omni Supreme oil and Omni Supreme oil alone provided acceptable control that was very similar to the grower standard of Imidan and Guthion. However Dimilin without oil and Omni Supreme oil significantly suppressed CM populations compared to the untreated control. A flare up in both twospotted spider mite and European red mite (ERM) was observed with the grower standard without Agri-Mek and with Calypso without Omni Supreme oil compared to the untreated control. The grower standard without Agri-Mek had significantly greater pear psylla (PP) than all the other treatments. Assail combined with Omni Supreme oil with or without Dimilin continues to be a very promising combination for total pest control in pears.

Materials and Methods

A trial was conducted on mature 'Bartlett' pear trees in a commercial orchard near Fairfield, CA. Fifteen treatments were replicated four times in a RCB design. Each replicate consisted of an individual tree. Treatments were applied with a hand-held orchard sprayer operating at 250 psi and delivering 200 gpa of finished spray (2.87 gal/tree). Application timings were based on degree-days (DD). DD were calculated with a 28 Mar biofix for the first generation and a 15 Jun biofix for the second generation using a single sine horizontal cutoff model with a lower threshold of 50°F and an upper threshold of 88°F. Maximum and minimum air temperatures were obtained from the IMPACT weather station near Cordelia, CA. Control was evaluated at commercial harvest on 23 Jul for CM infestation by inspecting a maximum of 250 fruits per replicate. Control of motile TSSM, ERM, SJS crawlers and PP nymphs was evaluated weekly from 14 May through 15 Jul by sampling 10 exterior and 10 interior leaves per replicate. The leaves were brushed and the motile TSSM, ERM, San Jose scale (SJS) crawlers and PP nymphs were counted under magnification (20X).

Results and Discussion

CM Flight Activity. The overwintering CM flight began 22 March. Biofix was set on 28 March (Appendix). CM biofix is set when sunset air temperatures meet or exceed 62°F and there is a sustained moth flight. This temperature is the minimum required for CM oviposition.

The overwintering flight was not highly bimodal this year. The first peak of the overwintering flight occurred around 25 April at 281 DD. The air temperatures then turned cool and moth flight decreased dramatically. The first peak often occurs at 300 DD after biofix. The second peak of the overwintering flight occurred around 28 May at 633 DD. The second peak often occurs at 650 DD after biofix. The first flight was completed by 14 June at 970 DD. The first flight is usually completed by 1,000 DD. The second biofix was set on 15 June. The peak of the second CM flight occurred approximately on 1 July at 324 DD.

CM Evaluations. The CM infestation in the untreated control was over 56% (Table 1). Thus, this trial provided a stringent test of the experimental treatments. The CM infestation in all experimental treatments was significantly lower than in the untreated control. The experimental treatments which had significantly higher CM infestation than the grower standard (Tr. #2) were Dimilin 2L (Tr. #12) and 1% Omni Supreme oil (Tr. #14). Although the Omni Supreme oil treatment had over 13% CM infestation, the oil still provided significantly lower CM infestation than the untreated control. The reason that Dimilin 2L without Omni Supreme oil (Tr. #12) had significantly greater CM infestation compared to Dimilin 2L with Omni Supreme oil (Tr. #11) is unknown but may be related to the synergy of the ovicidal effects of the combination of both Dimilin and oil in conjunction with the CM phenology. In addition, Calypso with or without Omni Supreme oil followed by Intrepid (Trs. #6 and 8) and Calypso with Agri-mycin followed by Intrepid (Tr. #7) had numerically higher levels of CM infestation compared to the grower standard. This higher level, though not significant, is troubling. It appears that Calypso is not as efficacious as Assail. Assail, Assail combined with Dimilin and Novaluron continue to show promise as replacement treatments for the grower standard.

Secondary Pest Evaluations. A flare-up in both TSSM and ERM was observed with the grower standard without Agri-Mek (Tr. #1) and Calypso without oil (Trs. #6 & 7) compared to the untreated control (Table 2). Flare-ups of mites have been previously observed in neonicotinoid insecticides. There is also some indication of mite flare-ups with Novaluron. The inclusion of 1% horticultural oil was sufficient in preventing mite flare-ups. Western predatory mite (WPM) and western flower thrips (WFT) were counted along with the other secondary pests. WPM is an important predator of both TSSM and ERM. WFT is both phytophagous and entomophagous and feeds on mite eggs. There was no significant trend with these predators, and their counts were not included in the report. The grower standard without Agri-Mek (Tr. #1) had significantly greater PP than all the other treatments while the grower standard with Agri-Mek (Tr. #2) had numerically greater PP than the other treatments (Table 3). All the other experimental treatments had PP populations similar to or less than the untreated control. The grower standard and all experimental treatments, except for Dimilin without oil (Tr. #12), had significantly lower SJS populations compared to the untreated control (Table 3).

This trial was conducted against a very high CM population with over 50% of the fruit infested at harvest in the untreated control and with 0.9% CM infested fruit in the grower standard. This trial should be considered a rigorous test of the experimental materials. However,

this year the CM population was not as high as in previous years. Assail combined with horticultural oil with or without Dimilin continues to be a very promising combination for total insect pest control in pears. Assail combined with horticultural oil provided acceptable CM control that was very similar to the grower standard while at the same time suppressing TSSM, ERM and PP populations. Multiple applications of Novaluron were effective in suppressing CM but there is some indication of ERM flare-up. Two applications of Calypso followed by one application of Intrepid had increased levels of CM infestation compared to the grower standard.

Table 1. Mean percent codling moth-infested fruit inspected at commercial harvest in Fairfield, CA—2002

Treatment	Rate lb (AI)/acre	No. appl.	Mean ^a percent infested fruit at commercial harvest
1. Imidan 70WP ^b	4.2	1	1.0 a
Guthion 50WP	1.25	2	
2. Agri-Mek 0.15EC ^c	0.0117	1	0.9 a
Imidan 70WP ^b	4.2	1	
Guthion 50WP	1.25	2	
3. Agri-Mek 0.15EC ^c	0.0117	1	1.0 a
Assail 70WP	0.147	3	
4. Agri-Mek 0.15EC ^c	0.0117	1	0.9 a
Assail 70WP ^d +	0.147	3	
Dimilin 2L	0.25		
5. Agri-Mek 0.15EC ^c	0.0117	1	1.2 a
Calypso 4SC	0.1875	2	
Intrepid 2F ^e	0.25	1	
6. Calypso 4SC	0.1875	2	3.4 a
Intrepid 2F ^e	0.25	1	
7. Calypso 4SC +	0.1875	2	2.0 a
Agri-mycin17	0.306		
Intrepid 2F ^e	0.25	1	
8. Calypso 4SC ^d	0.1875	2	2.8 a
Intrepid 2F ^d	0.25	1	
9. Novaluron 7.5WG	0.25	6	1.0 a
10. Novaluron 7.5WG	0.333	6	1.6 a
11. Dimilin 2L ^d	0.25	4	1.4 a
12. Dimilin 2L	0.25	4	18.0 b
13. Novaluron 7.5WG	0.333	4	1.0 a
14. Omni Supreme oil by vol.	1.0%	3	13.2 b
15. Untreated			56.8 c

^aMeans followed by the same letter within a column are not significantly different. (Fisher's protected LSD, $P \leq 0.05$). Data analyzed using an arcsin transformation.

^bpH was adjusted to < 6.

^cTreatments contained 0.25% Omni Supreme oil by volume.

^dTreatments contained 1.0% Omni Supreme oil by volume.

^eTreatments contained 0.0625% Latron B-1956 by volume.

Table 2. Mean total number of motile twospotted spider mites and European red mites in Fairfield, CA—2002

Treatment	Rate lb (AI)/acre	No. appl.	Mean ^a total per 20 leaves	
			TSSM	ERM
1. Imidan 70WP ^b	4.2	1	14.2 c	13.5 abc
Guthion 50WP	1.25	2		
2. Agri-Mek 0.15EC ^c	0.0117	1	1.1 ab	1.9 ab
Imidan 70WP ^b	4.2	1		
Guthion 50WP	1.25	2		
3. Agri-Mek 0.15EC ^c	0.0117	1	0.0 a	2.5 ab
Assail 70WP	0.147	3		
4. Agri-Mek 0.15EC ^c	0.0117	1	0.0 a	2.6 ab
Assail 70WP ^d +	0.147	3		
Dimilin 2L	0.25			
5. Agri-Mek 0.15EC ^c	0.0117	1	1.5 ab	0.5 a
Calypso 4SC	0.1875	2		
Intrepid 2F ^e	0.25	1		
6. Calypso 4SC	0.1875	2	8.5 abc	16.5 c
Intrepid 2F ^e	0.25	1		
7. Calypso 4SC +	0.1875	2	8.9 bc	14.1 bc
Agri-mycin17	0.306			
Intrepid 2F ^e	0.25	1		
8. Calypso 4SC ^d	0.1875	2	0.8 ab	1.3 ab
Intrepid 2F ^d	0.25	1		
9. Novaluron 7.5WG	0.25	6	5.9 abc	8.5 abc
10. Novaluron 7.5WG	0.333	6	1.4 ab	5.6 abc
11. Dimilin 2L ^d	0.25	4	0.0 a	0.8 a
12. Dimilin 2L	0.25	4	2.2 ab	3.8 abc
13. Novaluron 7.5WG	0.333	4	2.3 ab	6.9 abc
14. Omni Supreme oil by vol.	1.0%	3	0.8 ab	0.3 a
15. Untreated	—		1.7 ab	1.7 ab

^aMeans followed by the same letter within a column are not significantly different.

(Fisher's protected LSD, $P \leq 0.05$). Data analyzed using an arcsin transformation.

^b pH was adjusted to < 6.

^c Treatments contained 0.25% Omni Supreme oil by volume.

^d Treatments contained 1.0% Omni Supreme oil by volume.

^e Treatments contained 0.0625% Latron B-1956 by volume.

Table 3. Mean total number of pear psylla nymphs and San Jose Scale in Fairfield, CA—2002

Treatment	Rate lb (AI)/acre	No. appl.	Mean ^a total per 20 leaves	
			PP	SJS
1. Imidan 70WP ^b	4.2	1	297.0 d	2.9 a
Guthion 50WP	1.25	2		
2. Agri-Mek 0.15EC ^c	0.0117	1	114.0 c	6.3 a
Imidan 70WP ^b	4.2	1		
Guthion 50WP	1.25	2		
3. Agri-Mek 0.15EC ^c	0.0117	1	60.2 ab	8.6 a
Assail 70WP	0.147	3		
4. Agri-Mek 0.15EC ^c	0.0117	1	57.2 ab	13.5 a
Assail 70WP ^d +	0.147	3		
Dimilin 2L	0.25			
5. Agri-Mek 0.15EC ^c	0.0117	1	43.7 a	10.4 a
Calypso 4SC	0.1875	2		
Intrepid 2F ^e	0.25	1		
6. Calypso 4SC	0.1875	2	70.5 abc	7.7 a
Intrepid 2F ^e	0.25	1		
7. Calypso 4SC +	0.1875	2	59.3 ab	9.9 a
Agri-mycin17	0.306			
Intrepid 2F ^e	0.25	1		
8. Calypso 4SC ^d	0.1875	2	65.2 ab	11.9 a
Intrepid 2F ^d	0.25	1		
9. Novaluron 7.5WG	0.25	6	48.4 ab	11.0 a
10. Novaluron 7.5WG	0.333	6	67.7 abc	10.4 a
11. Dimilin 2L ^d	0.25	4	77.6 abc	19.2 a
12. Dimilin 2L	0.25	4	73.0 abc	117.5 b
13. Novaluron 7.5WG	0.333	4	91.7 bc	22.8 a
14. Omni Supreme oil by vol.	1.0%	3	61.8 ab	19.5 a
15. Untreated	—		75.3 abc	144.1 b

^aMeans followed by the same letter within a column are not significantly different.

(Fisher's protected LSD, $P \leq 0.05$). Data analyzed using an arcsin transformation.

^bpH was adjusted to < 6.

^cTreatments contained 0.25% Omni Supreme oil by volume.

^dTreatments contained 1.0% Omni Supreme oil by volume.

^eTreatments contained 0.0625% Latron B-1956 by volume