

PEAR: *Pyrus communis* L., ‘Bartlett’, ‘d’Anjou’

Organic and Conventional Insecticide Programs for Control of Pear Psylla in Pear, 2020

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Pear | *Pyrus communis*

Pear psylla | *Cacopsylla pyricola*

The objective of this study was to compare efficacy among four organic pesticide programs, a conventional spray program (positive check), and an untreated program (check) for control of PP in pear. This study was conducted within a 2-acre intermixed ‘Bartlett’ and ‘d’Anjou’ pear orchard planted in 1972 at the Washington State University Tree Fruit Research and Extension Center in Wenatchee, WA. PP densities in the orchard prior to study were high, so the entire orchard was sprayed with Surround CF (kaolin clay) at 50 lb/acre on 16 March, prior to the start of the study, for uniform PP suppression. Sprays for all treatment programs occurred on four dates: 2 April (bud swell), 8 April (popcorn), 23 April (petal fall), and 27 April (petal fall + 5 d) of 2020 (Table 1). Plots consisted of four consecutive pear trees within one orchard row. There were four replicate plots for each treatment, two of which were only d’Anjou trees, and two were only Bartletts. Plots were separated by at least two trees within rows and two untreated orchard rows. Insect sampling was conducted on multiple dates around spray timings, starting with a pretreatment count on eggs conducted on 25 March. PP adults and natural enemies were sampled using a beat tray method. PP adults and NEs were sampled with a 45 × 45 cm white cloth beat tray, using four trays per plot. Six buds per plot were randomly selected for PP egg sampling on each sample date. Buds were excised and returned to the lab for inspection with a stereoscopic microscope. All eggs were counted over the entire bud until individual flowers and leaves formed, at which point only three flowers and three leaves per bud were counted. After leaves around buds hardened, 25 leaves per plot were randomly collected and returned to the lab for leaf-brush sampling. A leaf-brushing machine was used to dislodge insects

and mites onto a revolving glass plate, and the composite sample was counted under a stereoscopic microscope. Young nymphs (instars 1–3) and old nymphs (instars 4 and 5) were counted individually; however, all instars were combined for analysis due to low numbers of old nymphs. Pretreatment insect densities were analyzed for differences among treatments by ANOVA. Post-treatment insect densities were analyzed for differences among treatments using repeated measures across sample dates. Means separation for pretreatment and post-treatment analyses were performed by Tukey’s HSD. Differences were accepted at $P < 0.05$.

Overall, the Aza-Direct and Cinnerate tank-mix program (treatment 4), and the Bexar and Assail rotation program (treatment 5, positive check) showed the best control of PP (Table 1). The conventional program (treatment 5) resulted in significant seasonal reductions of PP for all life stages and sample types. The Aza-Direct and Cinnerate tank-mix program resulted in significant seasonal reductions of PP adults/tray and eggs/leaf, and noticeable numerical reductions in nymphs/bud and nymphs/leaf compared with the check. The Aza-Direct alone program (treatment 1) resulted in significant seasonal reductions of PP eggs/leaf compared with the check, but nymph densities were similar to the check for both sample types. Rango alone (treatment 2) and Cinnerate alone (treatment 3) resulted in numerical, but not significant, reductions for all PP life stage samples. No treatments resulted in a significant decrease in natural enemies, although the standard program did produce a noticeable numerical decrease in natural enemies. This decrease could have been the result of lower numbers of PP (prey) and/or direct toxicity. Interestingly, all organic insecticide treatments resulted in numerically higher averages of natural enemies than the untreated check, although they were not statistically different.¹

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Table 1.

Treatment/formulation(s)	Rate/acre	Application dates ^a	Pre-treat ^b	14 Apr.	1 May	5 May	Post-treat mean ^c
Average PP eggs/bud							
1. Aza-Direct 0.0987L	3 pt	ABCD	23.13	20.96a	—	—	—
2. Rango 5.37L	1.8% v:v	AB	15.38	17.17ab	—	—	—
	1.3% v:v	CD					
3. Cinnerate 60% L	50 fl oz	ABCD	12.75	12.58ab	—	—	—
4. Aza-Direct 0.0987L + Cinnerate 60% L	3 pt; 50 fl oz	ABCD	19.63	19.29a	—	—	—
5. Bexar 1.34 L	27 fl oz	AC	21.58	9.46b	—	—	—
Assail 70WP	3.4 oz	BD					
6. Untreated check	—	—	17.25	18.25a	—	—	—
Average PP eggs/leaf							
1. Aza-Direct 0.0987 L	3 pt	ABCD	—	—	0.18	0.01	0.18bc
2. Rango 5.37 L	1.8% v:v	AB	—	—	0.30	0.00	0.30ab
	1.3% v:v	CD					
3. Cinnerate 60% L	50 fl oz	ABCD	—	—	0.20	0.00	0.20abc
4. Aza-Direct 0.0987L + Cinnerate 60%L	3 pt; 50 fl oz	ABCD	—	—	0.04	0.01	0.04c
5. Bexar 1.34L	27 fl oz	AC	—	—	0.10	0.02	0.10bc
Assail 70WP	3.4 oz	BD					
6. Untreated check	—	—	—	—	0.45	0.01	0.45a
Average PP nymphs/bud							
1. Aza-Direct 0.0987L	3 pt	ABCD	0.00	0.75a	—	—	—
2. Rango 5.37 L	1.8% v:v	AB	0.00	0.29ab	—	—	—
	1.3% v:v	CD					
3. Cinnerate 60%L	50 fl oz	ABCD	0.00	0.30ab	—	—	—
4. Aza-Direct 0.0987L + Cinnerate 60%L	3 pt; 50 fl oz	ABCD	0.00	0.13ab	—	—	—
5. Bexar 1.34L	27 fl oz	AC	0.00	0.04b	—	—	—
Assail 70WP	3.4 oz	BD					
6. Untreated check	—	—	0.00	0.46a	—	—	—
Average PP nymphs/leaf							
1. Aza-Direct 0.0987L	3 pt	ABCD	—	—	0.65	0.04	0.35a
2. Rango 5.37L	1.8% v:v	AB	—	—	0.31	0.03	0.17ab
	1.3% v:v	CD					
3. Cinnerate 60%L	50 fl oz	ABCD	—	—	0.52	0.07	0.30ab
4. Aza-Direct 0.0987L + Cinnerate 60%L	3 pt; 50 fl oz	ABCD	—	—	0.19	0.02	0.11ab
5. Bexar 1.34L	27 fl oz	AC	—	—	0.09	0.00	0.05b
Assail 70WP	3.4 oz	BD					
6. Untreated check	—	—	—	—	0.58	0.03	0.31a
Average PP adults/tray							
1. Aza-Direct 0.0987L	3 pt	ABCD	23.39	8.89	3.39	2.95	5.07ab
2. Rango 5.37L	1.8% v:v	AB	29.32	6.82	3.32	2.82	4.32ab
	1.3% v:v	CD					
3. Cinnerate 60%L	50 fl oz	ABCD	22.82	8.64	4.26	3.01	5.30ab
4. Aza-Direct 0.0987L + Cinnerate 60%L	3 pt; 50 fl oz	ABCD	24.07	6.32	3.20	1.89	3.80b
5. Bexar 1.34L	27 fl oz	AC	26.01	4.57	2.95	2.51	3.34b
Assail 70WP	3.4 oz	BD					
6. Untreated check	—	—	21.20	11.57	5.20	4.20	6.99a
Average NEs/tray							
1. Aza-Direct 0.0987L	3 pt	ABCD	—	0.01	1.26	1.26	0.84a
2. Rango 5.37L	1.8% v:v	AB	—	0.76	1.01	0.51	0.76a
	1.3% v:v	CD					
3. Cinnerate 60%L	50 fl oz	ABCD	—	0.51	1.01	1.01	0.84a
4. Aza-Direct 0.0987L + Cinnerate 60%L	3 pt; 50 fl oz	ABCD	—	0.26	0.76	0.76	0.59a
5. Bexar 1.34L	27 fl oz	AC	—	0.01	0.51	0.26	0.26a
Assail 70WP	3.4 oz	BD					
6. Untreated check	—	—	—	0.01	0.76	0.76	0.51a

Means within columns followed by the same letters are not significantly different, Tukey's HSD.

^aA, 2 April; B, 8 April; C, 23 April; D, 27 April.

^bPP adults, 5 March; PP eggs and nymphs, 25 March.

^cPost-treatment sampling dates were analyzed using ANOVA with repeated measures; data shown are means of those dates.