

PEAR: *Pyrus communis* L.

Greenhouse Test on Repellents of Winterform Pear Psylla

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The objective of this study was to compare repellency effects of various materials to pear psylla (PP). Repelling adults PP from entering pear orchards and creating a barrier against oviposition is important during prebloom colonization. Kaolin clay (Surround) and/or horticultural oils are most often used for this purpose, but growers also apply other materials for tree nutrition or disease management, and it is of interest to know if these treatments also influence PP colonization and oviposition. Experimental units in this trial were individual potted ‘Anjou’ pear trees on Old Home × Farmingdale 87 rootstocks, ca. 76 cm tall and 1.3 cm caliper. The experiment was conducted in a large mesh cage in a greenhouse at the Washington State University’s Tree Fruit Research and Extension Center in Wenatchee, WA. Forty-five trees were placed in the cage, and 14 materials and a water check allocated in randomized complete block design (one treatment per tree). The experiment was conducted in two runs, each with three replications of each treatment. The first run was on 20 Mar and evaluated on 27 Mar, and the second was on 29 Mar and evaluated on 4 Apr. One block of replicates from the first run of the experiment was excluded from analysis ($N = 5$) because adults aggregated at the south end of the cage due to greater sunlight. This issue was corrected in the second run by adding shade netting to that end of the greenhouse. For each run, treatments were applied using 1-liter plastic hand-pump spray bottles to spray ca. 100 ml of test solution per tree. Trees were left to dry for at least 1 h before being placed in the cage. The next day, 1,200 adult PP were collected from the field using an aspirator and then released inside the edges

of the cage. After 6 d, in the morning when PP are less active, adult PP were counted on each tree with the unaided eye and eggs were counted under 5× magnification glasses (OptiVISOR DA-10, Donefan Optical Inc., Lenexa, KS). Response variables (numbers of PP adults and PP eggs) were pooled across runs and analyzed with R using the ‘anova’ function for two-way ANOVA with explanatory variables of treatment and block, followed by mean separation with Fisher’s least significant difference using the ‘LSD.test’ function of the ‘agricolae’ package.

Nine of the fourteen products significantly reduced PP oviposition, and only Surround WP had significantly fewer PP adults compared with the check (Table 1). The products that reduced oviposition included particle films (Surround WP, Microna AG), mineral oils (IAP 470 dormant oil, IAP 440 summer oil, and CNI paraffin oil), essential oils (cedar oil and pine oil), an organic insecticide derived from cinnamon aldehyde (Cinnerate) and sulfur (Microthiol Dispers), whereas products that did not significantly reduce oviposition included one organic insecticide derived from rosemary oil (Ectrol EC), Rex lime sulfur, and calcium particle film nutrient (Diamond K gypsum) or fruit sunburn protectants (PurShade and Raynox) that leave white powdery residues on leaves. The discrepancy between most products significantly reducing counts of eggs but not adults suggest that their main suppressive effect on PP is deterring oviposition rather than killing or repelling adults. Furthermore, although no tested product was superior to Surround WP, this study suggests mineral oils, essential oils, and sulfur can reduce PP oviposition when provided an alternate ovipositional choice.¹

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Table 1.

Formulation	Rate – amt form/liter	Amt form per tree	Mean PP count	
			Eggs	Adults
Surround WP (kaolin)	100 g	10 g	1.0e	0.4c
IAP 470 oil (heavy horticultural oil)	40 ml	4.0 ml	2.0de	2.6abc
Cedar Oil (cedar essential oil)	20 ml	2.0 ml	6.6cde	1.8abc
Microna AG (calcium carbonate)	100 g	10 g	9.8bcde	1.6bc
Cinnerate (cinnamon aldehyde)	20 ml	2.0 ml	11.0bcde	3.0abc
IAP 440 oil (light horticultural oil)	40 ml	4.0 ml	12.6bcde	4.6ab
CNI oil (paraffin oil)	10 ml	1.0 ml	12.8bcde	2.8abc
Microthiol Disperss (wetable sulfur)	68 g	6.8 g	13.4bcde	1.8abc
Pine Oil (pine essential oil)	20 ml	2.0 ml	14.4bcde	2.0abc
Ecotrol EC (rosemary and peppermint oil)	10 ml	1.0 ml	18.2abcde	5.2a
Diamond K Gypsum (calcium sulfate dihydrate)	100 g	10 g	20.4abcd	4.8ab
PurShade (calcium carbonate)	25 ml	2.5 ml	22.4abc	5.0ab
Raynox (carnauba wax)	60 ml	6.0 ml	23.6abc	4.4ab
Rex lime sulfur (calcium polysulfide)	70 ml	7.0 ml	26.6ab	3.8abc
Check (H ₂ O)	n/a	n/a	35.6a	4.4ab

Means followed by same letters within the same column were not significantly different according to Fisher's least significant difference ($P > 0.05$).