

II. Pome Fruits

Pesticide resistance

1. Phytoseiids -- apple

Typhlodromus pyri Scheuten

Metaseiulus occidentalis Nesbitt

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SPATIAL DISTRIBUTION OF O-P RESISTANCE IN THE HOOD RIVER AND WILLAMETTE VALLEYS

Typhlodromus pyri and *Metaseiulus occidentalis* are the two primary predatory mite species found in apples in the Pacific Northwest. Both species have developed resistance to several chemicals used in commercial apple production. We have previously shown that *T. pyri* is relatively sedentary, rarely moving distances of over 10 m in a season. Alternatively, *M. occidentalis* is highly dispersive, moving distances greater than 100 m within weeks. These characteristics of migration lead to the hypothesis that resistance in *T. pyri* should be more patchy and localized, while a more regional homogeneity in resistance levels would be found in *M. occidentalis*. To assess the impact of surrounding vegetation on the evolution and maintenance of pesticide resistance, a study was initiated in 1989 to examine the distribution and dynamics of organophosphate resistance in *T. pyri* and *M. occidentalis* in two distinct apple growing regions of Oregon, the Hood River and Willamette Valleys.

For the first year of study, six experimental locations were selected in both the Hood River and Willamette Valleys. Within each valley, three sites were classified as isolated, i.e. surrounded primarily by native vegetation, and three were classified as intense, i.e. surrounded by other orchards. Three samples were made over the growing season along transects from the surrounding vegetation 100 m outside the orchard, through the orchard, and into the surrounding vegetation on the other side. Leaf samples were taken 100 m and 10 m away from the orchard, and from the outside edge and center of the orchard. In addition, corresponding samples were taken from the groundcover within the orchard. Adult female predatory mites were exposed to a diagnostic dose of 0.10% a.i. azinphosmethyl using the slide-dip method. Mortality was measured at 48 hours and sample percent mortality was compared for the treatments. Treatments included: region (Willamette Valley, Hood River Valley); orchard locality (isolated or surrounded primarily by other orchards); habitat type (orchard, groundcover, surrounding vegetation); sample time (early, mid, or late season); and distance from the orchard center.

T. pyri in both valleys had large differences between populations within orchards and outside orchards. Populations from within orchards were all resistant, with some variation in their level of resistance. Those at 100 m were all susceptible, and edge populations were either intermediate or susceptible. For *M. occidentalis*, levels of resistance were approximately equal at all orchard and surrounding vegetation locations in the Hood River Valley. In the Willamette Valley, there was more variation in the level of resistance from site to site, but the population densities of *M. occidentalis* were too low to reach any conclusions.

Further studies will be conducted to examine the distribution of OP resistance, and will also examine isozymic variation between populations inside and outside of the orchards. This will help determine the amount of gene flow occurring into and out of orchards, and indicate whether constant selection pressure will be necessary to maintain pesticide resistance in the predatory mites.