

Implementation Programs

Control and Regulation of *Panonychus ulmi* at Low Densities by Single and Multiple Species of
Predaceous Mites During 1990-95

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Abstract: We expected that more predator diversity would result in regulation of prey at a lower equilibrium density than would less predator diversity. To test this hypothesis, prey and predator mites were sampled in 1994-1995 in apple plots that had received similar horticulture but 3 different pesticide treatments during 1990-1995: azinphosmethyl (an organophosphate) + endosulfan (OP + E), azinphosmethyl alone (OP) and unsprayed (1993-1995). Data for the OP-resistant spider mite, *Panonychus ulmi* Koch, and three predators, OP-resistant *Typhlodromus pyri* Scheuten, OP-tolerant *Zetzellia mali* (Ewing) and OP-susceptible *Amblyseius andersoni* (Chant), supported the general hypothesis: OP + E had the most *P. ulmi* (but 200-fold less than in 1990) and the most *T. pyri*; OP had fewer *P. ulmi* and *T. pyri* but the most *Z. mali* and unsprayed had the fewest *P. ulmi* and *T. pyri*, moderate *Z. mali* and the most *A. andersoni*. Combined predator counts did not differ among the 3 treatments in either year. Regulation of *P. ulmi* occurred at the lowest equilibrium levels in plots with the most diversity of predators (unsprayed) and at the highest densities in plots with the least diversity (OP + E). OP was intermediate for both. Two mites, an OP-susceptible *Eotetranychus* sp. and an OP-resistant *Aculus schlechtendali* Nalepa, had low but more similar levels in all plots. *Bryobia rubrioculus* Scheuten occurred only in plots that were unsprayed because of its susceptibility to pesticides. Roles of each predator in the apple mite complex are discussed.