

## Integrated Mite Management in Apples in Israel: Augmentation of a Beneficial Mite and Sensitivity of Tetranychid and Phytoseiid Mites to Pesticides

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Augmentative releases of the phytoseiid mite *Typhlodromus athiasae* were evaluated during summer 1987 in an apple orchard designated to be maintained under an IPM (integrated pest management) regime. Evaluation for establishment and recovery 2 weeks after each release showed complete absence of the mite and high population density of the injurious tetranychid mites. It was suspected that pesticides that had been used to control key pests may have been the cause. Laboratory tests with the pesticides used showed that the insect growth regulators triflumuron and fenoxycarb and the fungicide triadimenol caused only slight mortality of the predacious mites *T. athiasae* (0-12%) and *Phytoseiulus persimilis* (6-10%), but a highly significant reduction in fecundity. Four days after treatment a reduction of 94%, 74% and 100% in fecundity of *T. athiasae*, and 2 days after treatment a reduction of 78%, 53% and 80% in fecundity of *P. persimilis* was brought about by triflumuron, fenoxycarb and triadimenol, respectively. On the other hand, 4 days after treatment there was a 27%, 16% and 9% increase in fecundity of the phytophagous mite *Tetranychus cinnabarinus* caused by triflumuron, fenoxycarb and triadimenol, respectively. Laboratory and field tests were carried out to evaluate 13 other pesticides as to their selectivity to *T. athiasae*. The compounds azinphos-methyl, penconazole, vamidothion and diflubenzuron were found to be relatively harmless to this beneficial mite and they replaced the materials mentioned above in the coming seasons in several orchards. This caused recovery in high density of the predacious mite, which allowed reduced application of acaricides and the achievement of integrated mite management.

KEY WORDS: *Tetranychus cinnabarinus*; *Phytoseiulus persimilis*; *Typhlodromus athiasae*; augmentative releases; pesticides; integrated control.

### INTRODUCTION

The situation of phytophagous tetranychid mites (TM) in apple orchards in Israel is rather complicated (13,14); *inter alia*, resistance to acaricides has been reported (9). During the last 3 years apple growers have complained about severe

Contribution from the Agricultural Research Organization. No. 3502-E, 1992 series. Received April 12, 1992; received in final form Aug. 27, 1992.

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