

Non-target Effects of Insecticides and Fungicides on Biological Control Agents

by Angela Gradish

Research was recently completed at the University of Guelph that examined the effect of currently used and new insecticides and fungicides on three biological control agents (*Orius insidiosus*, *Amblyseius swirskii*, and *Eretmocerus eremicus*). The objective of this study was to improve greenhouse vegetable integrated pest management programs by identifying pesticides that can safely be used with biological control agents.

The insecticides tested included Avid® (Syngenta Crop Protection Canada Inc.), Alverde™ (BASF Canada), and Coragen® (Dupont Canada). Alverde is being registered for lygus bug in pepper, and cucumber beetle in cucumber, while Coragen is being registered for cabbage looper. The fungicides tested included Nova® (Dow Agrosciences Canada), Milstop® (Bioworks Inc.), and Switch® (Syngenta Crop Protection Canada Inc.). The impact of each pesticide on adult biological control agent mortality was assessed through lab and greenhouse trials.

The biological control agents were exposed to each pesticide in the lab through leaf dip trials. Avid was the only pesticide that caused mortality of *Orius insidiosus* in lab bioassays. None of the pesticides caused mortality of *Amblyseius swirskii*.



Greenhouse trial for testing effects of various pesticides against biological control agents

Alverde increased mortality of *Eretmocerus eremicus* in the lab, but all other products were harmless.

Following lab tests, a greenhouse trial was conducted. The insecticides tested in the greenhouse trial included Avid and Alverde as both products caused mortality of a biological control agent in lab trials. The fungicides tested included Milstop and Switch because they are new products without associated toxicity information. Greenhouse cucumber plants were sprayed with each product at its label rate and the biological control agents were then exposed to the residues. None of the insecticides or fungicides tested caused any mortality of *O. insidiosus* or *A. swirskii* in the greenhouse. Alverde did cause mortality of *E. eremicus*, but all the other pesticides were harmless. These results indicate that *O. insidiosus* or *A. swirskii* can be safely introduced within 24 hours of application of any of these products. However, Avid has been found toxic to *O. insidiosus* in other studies and therefore should still be used with caution in the presence of this species. Finally, most insecticides and all fungicides tested were harmless to *E. eremicus*. Alverde, however, should be used with caution in the presence of this species.



Close-up of cage for housing biological control agents on leaves to test for effects of pesticides

This work was completed by Angela Gradish, a master's student, under the supervision of Cynthia Scott-Dupree (University of Guelph) and Les Shipp (AAFC, Harrow) and with assistance from Gillian Ferguson (OMAFRA) and Ron Harris (University of Guelph). Funding for this research was provided by the Pest Management Centre of AAFC and a CORD IV grant provided to the Ontario Greenhouse Vegetable Growers by the Agricultural Adaption Council.