

40TH ANNUAL MEETING OF THE SOCIETY FOR INVERTEBRATE PATHOLOGY

AND

1ST INTERNATIONAL FORUM ON ENTOMOPATHOGENIC NEMATODES AND SYMBIOTIC BACTERIA

Quebec City – Université Laval
August 12-16, 2007



Poster / Microbial Control. MC-03
Semiochemical auto-dissemination of tortricid viruses
in the orchard

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An alternate strategy to that of spray application for the delivery of two tortricid viruses was assessed in the orchard, using attract and contaminate devices. The *Adoxophyes orana* (Ador) sex pheromone was used in the lure for the *A. orana* granulovirus (AdorGV) dispensers and either the *Cydia pomonella* (Cp) sex pheromone or a bisexual attractant (pear kairomone (Ethyl (2E, 4Z)-2,4-decadienoate, DA2313) or a combination of both were used in the lures for the CpGV dispensers. Virus transfer experiments were conducted in the orchard in year 1 and year 2, to compare the spread of infectious CpGV and AdorGV in the orchard, using powder and liquid formulations of the viruses, respectively. In the third year, we carried out a large scale orchard experiment involving twelve one hectare plots (triplicate plots for four treatments), in a large commercial cider orchard focusing only on codling moth. Sting damage and deep entry damage were assessed on three occasions during the season. Samples of stings from damaged apples, larvae from deep entry damage and overwintering larvae were checked for the presence of CpGV, using insect based bioassays and molecular techniques.

Poster / Microbial Control. MC-04
Antifeeding toxin or just bad taste?

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With the a current trend towards lessening the environmental impact of pest control, and a continuing desire to mitigate losses incurred from insect borne diseases and insect mediated crop damage, the search for new biological insecticidal toxins is ongoing. The Toxin Complex (Tc) family of proteins are a relatively new class of insecticidal proteins showing promise for use in insect control programs. Tc toxins are prevalent among nematode associated bacteria (e.g. *Photorhabdus luminescens*) and *Enterobacteriaceae* associated with soil environments (e.g. *Serratia entomophila*). We have examined the anti-feeding and pathogenic effects of a range of Tc containing bacteria against the New Zealand grass grub, *Costelytra zealandica* (White), and the diamond back moth, *Plutella xylostella* (L.). The results indicate a range of feeding responses and pathological effects from the Tc containing bacteria. A discussion of the differences in efficacy will be presented with emphasis on the feeding response.

Poster / Microbial Control. MC-05
Proteinase activities and proteolytical processing of the B.t.-
corn-toxin Cry3Bb1 in the midgut of Western Corn Rootworm
(*Diabrotica virgifera virgifera*)

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The Western Corn Rootworm is an economical important pest in corn (*Zea mays* L.). One possibility for its control is the cultivation of transgenic corn expressing the *Bacillus thuringiensis* toxin Cry3Bb1. However, cultivation of B.t.-corn may result in resistant pest populations.

The potential of insect resistance to B.t.-toxins can be located at any step of the toxic pathway: ingestion, solubilization, proteolytical processing, binding to specific receptors, membrane integration, pore formation, cell lysis, and insect death. However, in other B.t.-toxin-pest-systems, resistance is mainly proteinase- or receptor-mediated. To establish reference systems for the characterization of potential

available resistant individuals, studies on proteinase activities and proteolytical processing of the B.t.-corn-toxin Cry3Bb1 were carried out with midgut fluid of susceptible WCR 3rd instar larvae (pH 5,75).

As a result, the digestive serin-endopeptidases trypsin, chymotrypsin, and elastase as well as aminopeptidase – an exopeptidase – were identified. Due to the acid midgut fluid, in Chrysomelidae cysteine-endopeptidases were expected. Accordingly, high activities of Cathepsin L, Cathepsin B, and Cathepsin H were found.

IOBC wprs Bulletin (Meeting: IOBC wprs Study Group "Ecological Impact of Genetically Modified Organisms", November 26-29, 2003, PraguBy in vitro incubation with WCR midgut fluid, the B.t.-corn-toxin Cry3Bb1 was processed. To identify the midgut proteinases, which are responsible for the proteolytical processing, available model proteinases were used to simulate the midgut conditions.

Poster / Microbial Control. MC-06
A peptide derived from *Manduca sexta* Bt-R1a cadherin
enhances activity of commercial Bt formulation on Bt-susceptible
and Bt-resistant insects

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The cadherin Bt-R1a is a receptor for *Bacillus thuringiensis* (Bt) Cry1A toxins in midgut epithelia of tobacco hornworm (*Manduca sexta*). The Bt-R1a region most proximal to the cell membrane (CR12-MPED) is the essential binding region required for Cry1A-mediated cytotoxicity. Previously, we discovered that a peptide containing this region expressed in *Escherichia coli* functions as an enhancer of Cry1A toxicity against lepidopteran larvae. We now demonstrate that a derivative of the enhancer peptide increases the activity of a commercial Bt sprayable product in plant-based bioassays. The enhancer peptide (called BtBooster™) is being developed by InsectiGen, Inc. as a commercial product that enhances the performance of Bt products. BtBooster™ enhanced Javelin® WG (CertisUSA) (contains the Bt NRD12 strain) in tomato excised-leaf bioassays against *Helicoverpa zea*. Additional excised-leaf bioassays using soybean and cabbage consistently demonstrated that BtBooster™ significantly enhanced Javelin® WG. We also demonstrated that BtBooster™ was able to partially overcome resistance in a diamondback moth, *Plutella xylostella*, strain that had developed resistance to Bt in the field. Bioassays with Javelin® WG plus BtBooster™ against resistant *P. xylostella* larvae consistently showed that the addition of BtBooster™ to the biopesticide significantly enhanced mortality in both excised-leaf and whole plant greenhouse experiments.

Poster / Microbial Control. MC-07
Efficacy of *Beauveria bassiana* (Bals.) Vuill. against the tar-
nished plant bug, *Lygus lineolaris* L., in strawberry crop
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The entomopathogenic fungus *Beauveria bassiana* has a high insecticide potential to control the populations of the tarnished plant bug, *Lygus lineolaris*, a significant pest of strawberry crop. Results of screening experiment shown that *L. lineolaris* adults were susceptible to several *B. bassiana* isolates. A second screening test with *Coleomegilla maculata*, a natural enemy found in strawberry crop, was also performed in order to select the isolate which have lower entomopathogenic impact on this insect. Based on results obtained on both insect species and on the ecozone origin of the *B. bassiana* isolates, INRS-IP and INRS-CFL isolates were selected for further