

MEETING ABSTRACT

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# Insect cell lines and baculoviruses as effective biocontrol agents of forest pests

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From 22nd European Society for Animal Cell Technology (ESACT) Meeting on Cell Based Technologies  
Vienna, Austria. 15-18 May 2011

## Background

Canada is a nation of trees. Canadian forests cover 50% of Canada's land area and represent 10% of world's forested area. Canada exports more processed forest products than any other country. It is also a host to a variety of forest insects both native and non native that limit the economic, recreational and wildlife habitat use. Our research focuses on initiating insect cell lines, determining nutritional requirements of cells, and developing low cost media for large scale propagation of insect pathogenic viruses as ecologically sound alternatives to chemical pesticides. Cell lines are used for bioassay and strain selection of viruses and bacterial toxins and for production of foreign gene products using baculovirus- and entomopoxvirus expression vectors. They offer a cleaner, viable alternative to insect larvae for producing viral pesticides.

Since 1969, over 150 continuous cell lines have been produced for forest insect pest research at GLFC. This collection represents one of largest single site repository of frozen insect cell lines in the world. Cell lines developed include tissues of the eastern spruce budworm (*Choristoneura fumiferana*), western spruce budworm (*Choristoneura occidentalis*), forest tent caterpillar (*Malacosoma disstria*), tobacco hornworm (*Manduca sexta*), white-marked tussock moth (*Orgyia leucostigma*), red-headed pine sawfly (*Neodiprion lecontei*), gypsy moth (*Lymantria dispar*), white pine weevil (*Pissodes strobi*), the tarnished plant bug (*Lygus lineolaris*) and the ash and privet borer (*Tylomatus bimaculatus*). These cell lines represent six tissues of origin, namely neonate larvae, pre-pupae, embryos, ovaries, hemocytes, and midgut and four Insect Orders namely Lepidoptera, Hymenoptera, Coleoptera and Hemiptera.

Presently, cell lines developed at GLFC are being used by 41 researchers in 8 Canadian provinces, 42 researchers in 21 US States and 28 researchers in 12 countries worldwide.

## Biological control

Although chemical pesticides are generally more reliable and effective control agents, they are not environmentally acceptable as their negative impact far out weigh their benefits. We have developed methodologies to duplicate the *in vivo* process of the insect by producing both baculovirus phenotypes, the occlusion derived virus (ODV) and the budded virus (BV) *in vitro*. During the *in vivo* infection process hemolymph (BV) is collected and cultures are infected producing both phenotypes. BV, released in the media is used to infect other cells; ODV produced in the nuclei to infect other insects.

## Lawn assay

Trees produce numerous compounds with toxic and growth regulating properties to protect themselves against insect attack. We have developed a rapid *in vitro* agarose lawn assay for testing the toxicity of freeze-dried ethanolic leaf extracts and secondary compounds. Foliage from sugar maple, trembling aspen and mulberry was assayed for possible insecticidal properties against cells from two lepidopteran defoliators, spruce budworm and fall armyworm. Cells were suspended in buffered agarose and spread in a petri dish. Leaf extracts solubilized in 50-70% DMSO were applied directly to the cells. Trypan blue staining was used as an indicator of toxicity. Quantitative comparisons were determined by threshold doses that elicited positive responses. Toxicity and validity of the assay were further confirmed by the presence of membrane disruption and cellular lysis. The activity of trembling aspen was markedly enhanced when the pH was raised from 7 to 10.5, a level similar

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# Baculoviruses For Insect Pest Control Safety Considerations

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Velavancorresponding**



## **Baculoviruses For Insect Pest Control Safety Considerations:**

## Adopting the Melody of Phrase: An Emotional Symphony within **Baculoviruses For Insect Pest Control Safety Considerations**

In a world consumed by screens and the ceaseless chatter of immediate connection, the melodic elegance and psychological symphony developed by the published word usually diminish in to the backdrop, eclipsed by the persistent sound and disturbances that permeate our lives. However, situated within the pages of **Baculoviruses For Insect Pest Control Safety Considerations** a charming fictional value full of raw emotions, lies an immersive symphony waiting to be embraced. Constructed by a wonderful composer of language, this interesting masterpiece conducts visitors on a psychological trip, well unraveling the hidden songs and profound affect resonating within each cautiously crafted phrase. Within the depths of this poignant review, we will discover the book is key harmonies, analyze its enthralling writing model, and surrender ourselves to the profound resonance that echoes in the depths of readers souls.

<https://dashboard.colourpop.com/results/uploaded-files/HomePages/Air%20Pollutions%20Toll%20On%20Forests%20Crops.pdf>

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