technology should be used to improve their yields or to reduce production costs. The other early adopters (<5% of the growers) corresponded to organic farmers, and those who besides soybean develop other activities, such as honey and silkworm production, which are affected by chemicals, as well as those who were environmentally driven or who had bad cases of human intoxication by pesticides in their farms. The slower adopters included many of the IPM practitioners, but who strongly rely on the use of chemicals on a "when needed basis". The late adopters are those who usually do not adopt IPM properly and will decide on "testing" the AgNPV after its success and clear economic returns have been passed away by neighbors for many years. Cost-driven decision is predominant among these two latter groups, and that is also related to soybean price in a given year. The last group (ca. 50%) is represented by growers who are extremely resistant to change and often apply insecticides in excess. Most of them will probably not even try the AgNPV, because they simply do not tolerate any defoliation in their soybean fields. The expressive expansion of the AgNPV program among many farmers and acceptance of the product was facilitated by the following aspects: 1) Existence of a successful IPM program; 2) High efficiency of the AgNPV; 3) Tolerance of soybean to high defoliation; 4) Non simultaneous important pest with VBC in over 90% of the soybean area; 5) AgNPV production by farmers and private companies in the field at low costs; 6) Formal government support to extension organizations, in some regions, to the AgNPV program, and trained trainers committed and proactive. These conditions are usually not met for many other crops in different countries, turning acceptance of biological products by farmers more difficult, but that can be overcome by stronger efforts on global farmer education on use of these products.

**Thursday, 9:45**

## Studies with resistance of a Brazilian population of the velvetbean caterpillar, *Anticarsia gemmatalis*, to its *Nucleopolyhedrovirus*

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The velvetbean caterpillar (VPC), *Anticarsia gemmatalis* (Lep.: Noctuidae), is a major insect pest of soybean in Brazil, demanding frequent applications of insecticides for its control. An indigenous *Nucleopolyhedrosis* of this insect (AgNPV) was developed as a microbial insecticide since the earlier 1980's and currently it is used in more than 1.0 million ha annually (Moscardi 1999, Annu. Rev. Entomol. 44:257-89). With the dramatic increase in treated area with the AgNPV, the possibility of development of resistance to this agent become a concern. Studies with VBC populations collected in different regions of Brazil, with different histories of exposure to applications of the AgNPV, showed that all populations were highly susceptible to the vírus (Abot *et. al.* 1995, J. Entomol. Sci. 30:62-69). However, selection pressure experiments in the laboratory with two VBC populations (Dourados and Sertanopolis), up to generations F15 and F14 respectively, showed that VBC presented the highest potential to develop resistance to this virus than observed with other Baculoviruses studied to date (Abot *et* al. 1996, Biol. Control 7:126-130). In this paper we will present results obtained through 52 generations of the insect, evaluating different aspects of the resistance of the Sertanopolis population of *A. gemmatalis* to the AgNPV. Under continuous selection pressure (CL80) in the laboratory, the insect exhibited true resistance already in F4 (Resistance Ratio-RR=3.6). The RR increased subsequently reaching, a value over 3000 in F15, and oscillated thereafter at high values. The RR never reached a plateau and between F47 and F52 it oscillated above 10,000x in relation to the susceptible population, showing an unprecedent case of resistance potential to a Baculovirus. When the highly resistant population was released from selection pressure, a dramatic decrease in resistance was observed only after 11 generations (RR=11.6 in F11); however, the original levels of susceptibility were not reached, as RR varied from 2.1 to 9.0 from F12 to F19. When the highly resistant VBC population was backcrossed with the susceptible population, resistance was totally lost in 3-4 generations, suggesting that this may be an important mechanism to "buffer" field development of resistance in AgNPV treated areas. When these populations, that regained susceptibility through liberation from pressure and from backcrosses with susceptible insects, were again submitted to selection pressure by the AgNPV, they developed resistance more rapidly and at much higher RR values than the original population

Tuesday, POSTER VP10

## Molecular characterization of a mosquito baculovirus

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We present the first characterization of the genome of a mosquito baculovirus, isolated from *Culex nigripalpus* in Florida. This virus causes regular epizootics in field populations and is being studied as a potential biological control agent of mosquitoes.

The virus was amplified in larval mosquitoes, harvested and purified on a Ludox gradient. The genome size of ~ 75 kbp, as determined by pulsed-field gel electrophoresis and restriction enzyme analysis, represents the smallest baculovirus genome to date. Sequencing of the genome is in progress. Genomic libraries were generated by shotgun cloning of viral DNA, restricted with several enzymes, into pUC19. Recombinant plasmids were purified with Qiagen plasmid miniprep kits. DNA templates were sequenced from both ends with universal forward and reverse primers using dideoxy chain terminator sequencing. Results of the sequence analysis of this new baculovirus will be reported.

**Friday, 11:30 SYMPOSIUM**

## Molecular taxonomy of *Thelohania* and *Vairimorpha* from fire ants in North and South America

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Microsporidia of the genera *Thelohania* and *Vairimorpha* are pathogenic to two species of fire ants in South and North America and are being evaluated as potential biological control agents of imported fire ants in the United States. *Thelohania solenopsae* and *Vairimorpha invictae* have been described from the red imported fire ant *Solenopsis invicta* (type host) in Brazil. Unnamed species of *Thelohania* and *Vairimorpha* have been reported from the black imported fire ant *Solenopsis richteri* in Argentina and Uruguay and *S. invicta* in the United States.

The different geographical isolates of *Thelohania* and *Vairimorpha* cannot be distinguished from each other by light-microscopic and ultrastructural observations. We suggest grouping them into *T. solenopsae* and *Vairimorpha invictae* species complexes, respectively, until their taxonomic positions are resolved. We present comparative molecular studies (sequence comparisons of the 16S rRNA genes) designed to clarify the relationships of the members of these species complexes.

**Tuesday, POSTER FP13**

## Field-cage studies of *Beauveria bassiana* (Hyphomycetes: Moniliaceae) for the suppression of adult western corn rootworm (Coleoptera: Chrysomelidae)

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The efficacy of the entomopathogenic fungus, *Beauveria bassiana* (Balsamo) Vuillemin, was tested on populations of adult western corn rootworm, *Diabrotica virgifera virgifera* LeConte, in walk-in field cages. Suspensions of *B. bassiana* conidia were applied to corn plants in cages into which laboratory-reared beetles had been released. Beetles were


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