



***Proceedings of the 66th Annual Meeting of the
Acadian Entomological Society***

June 11-13, 2006

Agriculture and Agri-Food Canada Research Centre

Kentville, Nova Scotia



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**Agenda of the 66th Annual Meeting of the
Acadian Entomological Society**

June 11-13, 2006

**at the Agriculture and Agri-Food Canada Research Centre
Kentville, Nova Scotia**

Sunday, June 11, 2006

- 1:00 – 4:00 *Kentville Agricultural Centre, 32 Main St., Kentville*
Public Awareness Event:
 “Who are the Insects in Your Neighbourhood?”
Field Collecting (1:30 – 3:00)
Rhododendron Sunday (all day)
- 6:00 – 9:00 *Registration & Reception, Old Orchard Inn*

Monday, June 12, 2006 – Morning

- 8:00 – 9:00 *Registration*
- 9:00 – 9:05 Welcome from Dr. Roy Bush, Research Manager, AAFC, Kentville
- 9:05 – 12:15 **Pollination Symposium: ‘Reel’ Bees do the Genetic Shuffle!**
Moderator: Kenna MacKenzie
- 9:05 Introduction, Kenna MacKenzie, AAFC - Kentville
- 9:10 Keynote Address: Bee Biodiversity and a New Conservation
Imperative, Laurence Packer, York University
- 9:40 iPoll: Barcoding the Bees of Nova Scotia
Cory Sheffield, York University
- 10:00 Sex in a Dangerous Tide
Sara Good-Avila, Acadia University
- 10:20 **Refreshment Break**
- 10:40 Bees on the Wild Side
Frank Drummond, University of Maine
- 11:00 Landscape and Pollinators
Steve Javorek, AAFC – Kentville
- 11:20 Bees at the Bar: Are Honey Bees at Risk of Intoxication While
Foraging?
Richard Rogers, Wildwood Labs Inc.
- 11:40 City Bees: The Urban Buzz in Halifax
Calum Ewing, Nova Scotia Museum
- 12:00 Questions and Wrap-up, Kenna MacKenzie, AAFC – Kentville
- 12:15 - 1:15 **Lunch (AAFC cafeteria)**

Monday, June 12, 2006 – Afternoon: Student Presentations

Moderator: Sonia Gaul

* indicates this is a student presentation

- 1:15 – 1:30 Roger W. Graves* - Suppression of the Balsam Fir Sawfly (*Neodiprion abietis* Harris) Using a Naturally Occurring Nucleopolyhedrovirus
- 1:30 – 1:45 Kathryn Dau-Schmidt* - European Corn Borer Eggs as an Indicator of Larval Infestation in Potatoes
- 1:45 – 2:00 Graham Cox* - Differential Gall Initiation of Two Sympatric Host Races of *Gnorimoschema galaesolidaginis* (Belechiidae) on Two Golden-Rod Species
- 2:00 – 2:15 Hui Zhou* - The Effects of Plant Volatiles on Black Vine Weevil (*Otiorhynchus sulcatus* F.) Behaviour
- 2:15 – 2:30 Christopher Kolacz* - Spatial Structure of Host-Race Formation in the Parasitoid *Copidosoma gelechiaiae*
- 2:30 – 2:45 Lauren Pinault* - Sampling Strategies for the Pale-Winged Gray Moth Allow Predictions of Eastern Hemlock Defoliation
- 2:45 – 3:15 **Poster Session and Refreshment Break**
- Lisa Harkness* – Non-Chemical Alternatives for Controlling the Black Vine Weevil, *Otiorhynchus sulcatus* (Coleoptera: Curculionidae)
- Kenna MacKenzie – Exclusion Barriers for Management of Black Vine Weevil, *Otiorhynchus sulcatus*, in First Year Strawberry
- Sonia Gaul – Using PCR to Identify a Putative Esterase in *Plutella xylostella* L.
- Sonia Gaul - Volatile Components Common to Fruit of Host Species Infested by *Rhagoletis mendax* (Diptera: Tephritidae)
- Rob Johns* – Intratree Heterogeneity Influences the Foliage-Age Preference and Performance of Larvae of a Specialist Herbivore
- 3:15 – 3:30 Jennifer Brown* - Temporal Changes in the Long-Horned Beetle (Coleoptera: Cerambycidae) Fauna of Ontario
- 3:30 – 3:45 Leah Flaherty* - Opposite Effects of Plant Module Size and *A. bieticis* Density on Gall Initiation Success
- 3:45 – 4:00 Sheena Townsend*- Beetle Diversity in a Managed Dairy Pasture in Nova Scotia
- 4:00 – 4:15 Sean LeMoine* - What Role Does Habitat Structure Play in Invertebrate Diversity in Agriculture?: A Look at Ground Beetles (Family: Carabidae) in Hayfields

Monday, June 12, 2006 – Evening

6:00 Banquet (cash bar) at Rosie's Pub, Kentville
 Presentation of Student Awards
 Musical Entertainment by Higher Ground

(note: Rosie's is a brew pub in downtown Kentville. Transportation will be available to take participants back to the Old Orchard Inn from 11:00 – 12:00 pm)

Tuesday, June 13, 2006 – Morning: Contributed Papers

Moderator: Dick Rogers

9:00 – 9:15 Donna Giberson - The Black Flies of the Magdalen Islands: Survey Results and Tests of Colonization Hypothesis

9:15 – 9:30 Shelley Adamo - Stress-Induced Immunosuppression in Insects

9:30 – 9:45 Dan Quring - Influence of Climate and Stand Density on the Incidence of Damage by Balsam Woolly Adelgid

9:45 – 10:00 Jon Sweeney - Parasitism of the Brown Spruce Longhorn Beetle, *Tetropium fuscum* (Fabr.) by North American Species (Hymenoptera: Ichneumonidae & Braconidae)

10:00 – 10:15 Kenna MacKenzie - Cuba: Making a Success of Biocontrol and Organic Agriculture

10:15 – 10:35 **Refreshment Break**

10:35 – 11:00 Pest Updates
 Richard Rogers - Recent Arrivals in Nova Scotia

11:00 – 11:30 AES Business Meeting

11:30 – 12:30 **Lunch**

2006 Acadian Entomological Society 66th Annual Meeting Abstracts

Pollination Symposium: “Reel” Bees do the Genetic Shuffle

Bee Biodiversity and a New Conservation Imperative

Laurence Packer

Department of Biology, York University, 4700 Keele Street, Toronto, ON M3J 1P3

There are approximately 17,000 species of bees that have been described. The general view has been that they are classified in seven families. This presentation will begin with a treatment of bee taxonomic biodiversity by looking at these seven families and then looking at the most recent reclassification of the bees which has some somewhat surprising conclusions.

How many species of bees there are that remain undescribed is difficult to assess. I will present the results of two different approaches to this problem: discovery of new species by collecting in undersampled areas and the use of genetic methods. Both approaches alone suggest that there are thousands of species left to be discovered.

The ecological diversity of bees is enormous and bee communities can be divided into guilds such as: solitary versus social, ground versus wood or twig nesters, floral generalists or specialists, cleptoparasitic bees and potential hosts. Understanding how these different groups respond to environmental disturbances is a hot topic in current research.

Lastly, despite their ecologically crucial role in pollination, there is another reason why bees should be considered essential. I will present the results of work that suggests that bees are highly prone to extinction and that they may serve as a suite of miner's canaries with which to assess the state of the world's terrestrial ecosystems.

Pollination Symposium: “Reel” Bees do the Genetic Shuffle

iPoll: Barcoding the Bees of Nova Scotia

**Cory Sheffield¹, Peter G. Kevan², Paul D. N. Hebert³, Jeremy R. deWaard³
and Laurence Packer¹**

¹Department of Biology, York University, 4700 Keele Street, Toronto, Ontario M3J 1P3;

²Department of Environmental Biology, University of Guelph, Guelph, Ontario N1G 2W1;

³Department of Zoology, University of Guelph, Guelph, Ontario N1G 2W1

Earth may have 10-100 million species and despite over 250 years of taxonomic work, only a small proportion has been described. Certain groups of organisms have received the lion's share of taxonomic attention (i.e., terrestrial vertebrates) and are therefore relatively well known, but make up a small proportion of all described life. The arthropods in contrast, including the insects, are a much more diverse albeit poorly studied group. With the recognition that morphology-based species identification has limitations, supplemental and/or alternative means of species discrimination should be developed and evaluated. Microgenomic systems, which discriminate species diversity through the analysis of a small segment of the genome, represent a promising approach to diagnosing biodiversity. 'DNA barcoding' for species recognition via comparative analysis of sequence diversity in the cytochrome *c* oxidase I (COI) mitochondrial gene has shown great potential as a model system.

Bees (Apiformes), because of their importance in most terrestrial ecosystems as pollinators and their diverse life histories are a relatively well known group. In Canada, approximately 1000 species have been reported representing 1/4 to 1/3 the total for North America. Approximately 20% of the Canadian fauna is found in Nova Scotia. The province's somewhat isolated location on the north eastern edge of the continent provides an ideal location for complete faunistic study of bees. The purpose of this presentation is to review bee diversity in Nova Scotia, and summarizes the preliminary results of DNA barcoding for bee species identification in the province.

Pollination Symposium: “Reel” Bees do the Genetic Shuffle

Sex in a Dangerous Tide

Andrew Trant, **Sara V. Good-Avila** and Tom Herman

Acadia University, Department of Biology, Wolfville, Nova Scotia, B4P 2R6

We examined the pollination ecology of *Sabatia kennedyana* Fern., a hermaphroditic, insect-pollinated species at risk. The effect of lakeshore development on pollination processes were explored on large (>70 flowering plants), small (<50 flowering plants) and disturbed (<25 m from a shoreline development) sites on 3 lakes in Yarmouth County, NS. 156 hours of pollinator visitation observation indicated the primary pollinators were Syrphid flies (Diptera: Syrphidae) (87.2%) and solitary Halictid bees (Hymenoptera: Halictidae) (4.8%). Pollinator diversity was not significantly different among lakes or sites. Pollinator visitation rates, handling times and proportion of flowers visited were significantly lower on disturbed sites than either small or large sites and areas of high flowering density were visited significantly more often than less density areas ($P=0.0165$). Even though disturbed populations appeared to suffer from having fewer pollinators, small populations had lower reproductive success of open pollinated fruit than either large or disturbed sites. We propose that reduced pollinator service in disturbed sites could be caused by a loss of nesting habitat for pollinators and from increased disturbance associated with human activity. The implications of this for conservation and areas of on-going research are discussed.

Pollination Symposium: “Reel” Bees do the Genetic Shuffle

Bees on the Wild Side

Frank Drummond

University of Maine

CANCELLED

Pollination Symposium: “Reel” Bees do the Genetic Shuffle

Landscape and Pollinators

Steve Javorek

Agriculture and Agri-Food Canada, 32 Main St., Kentville, NS B4N 1J5

NO ABSTRACT SUBMITTED

Pollination Symposium: “Reel” Bees do the Genetic Shuffle

Bees at the Bar: Are Honey Bees at Risk of Intoxication While Foraging?

Richard E. L. Rogers

Wildwood Labs Inc / Wageningen University, Kentville, NS

Honey bees can be highly sensitive to certain insecticides applied to the environment and yet diagnosis of negative effects on honey bee adults and brood can be difficult and inconclusive. In recent years honey bee colony mortality has increased in many countries. At least some of the blame has been directed toward the use of crop protection products and bee exposure during foraging. If pesticide products are used according to label instructions, are honey bees really at risk of intoxication while foraging? Many residue and toxicology studies have been performed and many more are on-going. To standardize the tests, guidelines are being perfected. Some of these studies and methodologies are reviewed in this paper. The effects of pesticides on bees are being more intensively studied now than ever before and the answer to the question of risk is becoming increasingly clear – many factors must be considered. Five recommendations for reducing negative effects on bees are presented, and other causes with similar symptoms are mentioned.

Key words: Pesticides, residues, NOAEC, clover, canola, hives

Pollination Symposium: “Reel” Bees do the Genetic Shuffle

City Bees: The Urban Buzz in Halifax

Calum Ewing

Nova Scotia Museum, 1747 Summer Street, Halifax, NS B3H 3A6

While many people are familiar with pastoral scenes of bee hives in orchards, most urban residents give little thought to the presence of the large diversity of bees present in city gardens and parks. In 1996, the Museum of Natural History established an observation hive of honeybees to help visitors learn about the lives of bees and their role in nature and crop production. The hive is used in school and public programs at the museum to help visitors observe first-hand the life cycle, social behaviour, communication and activities of bees. Interpretive programs contrast the life history strategies of the honeybees with other bees both familiar and lesser known, including Bumblebees, Leafcutter Bees and Plasterer Bees. This presentation will examine the construction, development, management and history of this hive, the accompanying exhibits and its use in school and public educational programs.

Oral Presentations

* indicates this is a student presentation

Stress-Induced Immunosuppression in Insects

Shelley A. Adamo

Dept. Psychology/Neuroscience Institute, Dalhousie University, Halifax, NS

Both vertebrates and mollusks (e.g. oysters) become more susceptible to disease after exposure to a stressor, suggesting that stress-induced immunosuppression is an old and wide spread phenomenon. We found that insects are also immunosuppressed by 'stress'. Running on a treadmill, physical restraint, flight, aggressive behaviour and elevated levels of the fight-or-flight neurohormone octopamine reduced immune function (lysozyme-like activity) and disease resistance (resistance to the bacterium *Serratia marcescens*) in the cricket *Gryllus texensis*. However, a brief escape run did not induce an increase in hemolymph octopamine titres nor did it reduce resistance to *S. marcescens*. These results suggest that a prolonged period of elevated metabolism coupled with neurohormonal octopamine release are required for immunosuppression. We found no evidence that immune resources are undergoing redistribution after stress. Wound infection was more likely after restraint stress than in controls. Preliminary evidence suggests that the decline in immune function after stress is due to a physiological constraint involving carrier molecules (lipophorins) that are required both for ferrying lipid energy compounds from fat body to muscle as well as for normal immune function.

Temporal Changes in the Long-Horned Beetle (Coleoptera: Cerambycidae) Fauna of Ontario

Jennifer M. Brown* and David B. McCorquodale

Department of Biology, Cape Breton University, Sydney, NS B1P 6L2

Long-horned beetles (Coleoptera: Cerambycidae), are important phytophagous insects in forests; some species devalue lumber, transmit pathogens, and/or cause tree mortality. Cerambycids are taxonomically and ecologically well known in North America. Because many are large and colourful, they are relatively easy to recognize and well represented in collections, therefore providing an opportunity to ask questions about faunal change.

The purpose of this research was to determine whether there have been temporal changes in the number of species of cerambycids collected in Ontario. Using a database of museum specimens (N=8523) dating back to 1862 and representing nine major Canadian collections, I asked whether fewer species were collected after 1950 compared to before 1950.

More species were collected pre-1950 (205 species) than post-1950 (191 species). Rarefaction estimates of species richness support this, with 204 species per 4000 records before 1950, compared to 190 species per 4000 records after 1950. Fourteen cerambycid species are not represented in collections after 1950 and are potential extirpations, while only nine species were first collected after 1950 (possible range expansions, introductions, or invasions). Asymptotic species accumulation curves suggest it is highly unlikely that these “missing” species are simply overlooked due to insufficient sampling.

Two other lines of evidence support a decline in species richness. Rarefied species richness in eight time periods shows a consistent decrease. Additionally, most species with fewer than five records show a decrease in numbers post-1950, while eight of the ten most common species show an increase. This suggests a shift in species composition, favouring more common species and thus a loss of overall diversity.

These results show that the cerambycid fauna in Ontario is changing. Future research should concentrate on the ecological factors that have lead to these changes and look at utilizing cerambycid species as indicators of forest health and quality in Ontario.

Differential Gall Initiation of Two Sympatric Host Races of *Gnorimoschema gallaesolidaginis* (Gelechiidae) on Two Golden-Rod Species.

Graham H. Cox* and Stephen B. Heard

Biology Department, University Of New Brunswick, 779 Charlotte Street, Fredericton, NB
E3B 1M6

The existence of genetically distinct races of the gelechiid moth *Gnorimoschema gallaesolidaginis* feeding on two different goldenrods in the same geographic area allows for the testing of ecological mechanisms that maintain reproductive isolation of sympatric, host-specialist populations in phytophagous insects. Several mechanisms may work together to maintain the sympatric host races. However, recent data suggest that differential ability of the races to initiate galls on the two host plants may make a major contribution to the maintenance of these distinct host populations. Results of a lab experiment examining host specificity in gall induction by *G. gallaesolidaginis* to induce galls will be presented.

European Corn Borer Eggs as an Indicator of Larval Infestation in Potatoes

Kathryn Dau-Schmidt*^{1,2}, Christine Noronha¹, Donna Giberson²

¹Agriculture and Agri-food Canada, Crops and Livestock Research, Charlottetown, PE;

²Department of Biology, University of Prince Edward Island, Charlottetown, PE

European corn borer (*Ostrinia nubilalis*, ECB) has been observed at pest levels in potato crops on PEI since 1987 and is now considered a primary pest of potatoes in the Maritimes. Because ECB larvae are hidden inside the potato stems, the level of ECB infestation in potatoes can be difficult to measure. ECB egg masses are currently used as an indicator of the level of ECB infestation in potatoes, with the crop scouts using 2 egg masses per ten plants as an action threshold.

Research plots were established at the Harrington Research Farm using two potato varieties, Russet Burbank and Shepody. Four repetitions of five treatments were assigned to plots for each potato variety using a random block design. The four treatments were: control, 25% infestation, 30% infestation, and 40% infestation. The percentages were established using egg masses from laboratory reared moths. In the fifth treatment the wild moths were allowed free access to the plots.

While there is excellent correlation between the number of egg masses and the number ECB larvae, the effect of increasing levels of egg masses or larvae on tuber yield is less clear. Even so, there is evidence that the action threshold could be raised to 4 egg masses per ten plants in potatoes without affecting tuber yield.

Opposite Effects of Plant Module Size and *A. abietis* Density on Gall Initiation Success

Leah Flaherty*

University of New Brunswick, 28 Dineen Drive, FOREM, Fredericton, NB E3B 5A3

In the formation of a gall, plants respond to a species-specific stimulus from a gall-inducing insect that alters normal physiological processes in the host plant and causes atypical plant tissue growth. Several theories have attempted to explain interactions between galling insects and host plant traits, including the plant vigor (PVH) and optimal module size hypotheses (OMSH). A non-destructive field study was conducted in a clonal white spruce, *Picea glauca* (Moench) Voss, somatic embling plantation in Lower Queensbury, New Brunswick, in the summer of 2005. The objective of this investigation was to evaluate the predictions of the PVH and OMSH, concerning the influence of shoot size on gall initiation success using a shoot-galling adelgid, *Adelges abietis* (L.) of spruce. In addition, we tested whether increasing the dose of induction stimulus on different sized modules, achieved by using differing *A. abietis* densities per bud, could increase the rate of successful gall initiation, as predicted by the OMSH. There was a negative relationship between shoot length and successful gall initiation, supporting the OMSH. Gall initiation success increased with *A. abietis* density per bud, and success was higher than expected if the stimulus of each *A. abietis* was working independently, also supporting predictions of the OMSH.

The Black Flies of the Magdalen Islands: Survey Results and Tests of Colonization Hypotheses

Donna J. Giberson¹ and Peter H. Adler²

¹Department of Biology, University of Prince Edward Island, Charlottetown, PE and ²Division of Entomology, Clemson University, Clemson, South Carolina

Twenty stream sites on the Magdalen Islands were surveyed for Black flies during 2001 and 2002 to determine the species composition and distribution of Simuliidae on the island group and to evaluate different colonization hypotheses. Thirteen species were found in three genera. All 13 species were also represented on the surrounding source areas (mainland and large islands of PEI and Cape Breton), which has a total of 52 known species. Only three species were ornithophilic (23%, compared to 40% in source areas) suggesting that colonization via bird hosts was not a major colonization mechanism. Nine species (69%) belonged to the genus *Simulium* compared to 71% in the source areas; members of *Simulium* are considered to be the strongest flyers in the group, so the similar proportions suggest that simple flight capability is not important in colonization of these island. Eight of the 13 species were univoltine (62%, compared to 69% in source areas) suggesting that multivoltine species were not more likely to colonize this island group. Comparison of these survey results with previous surveys of Prince Edward Island, Isle Royale (Lake Superior), and the Queen Charlotte Islands off the coast of British Columbia showed a strong relationship between distance of the islands from the source area and species richness, but little pattern with island area. Dispersal by wind may be the most important factor in colonization of the Magdalen Islands by black flies.

Suppression of the Balsam Fir Sawfly (*Neodiprion abietis* Harris) Using a Naturally Occurring Nucleopolyhedrovirus

Roger W. Graves*¹, Dan T. Quiring¹, Chris J. Lucarotti²

¹Faculty of Forestry and Environmental Management, P.O. Box 44555, 28 Dineen Dr. University of New Brunswick, Fredericton, New Brunswick, E3B 6C2; ²Canadian Forest Service, Atlantic Forestry Center, P.O. Box 4000, Regent St. Fredericton, New Brunswick, E3B 5P7

Balsam fir sawfly (BFS) has become a major forest insect pest of balsam fir (*Abies balsamea* (L.) Mill.) in Newfoundland. Western Newfoundland, in particular, is currently experiencing the worst outbreaks of balsam fir sawfly on record. Defoliation caused by BFS may lead to severe reductions in wood volume increment, with potential negative impacts on the future supply of the most important resource for the region. The primary natural regulator of BFS populations is a nucleopolyhedrovirus (NeabNPV). NeabNPV has recently been registered with the Pest Management Regulatory Agency (Health Canada) for the biological suppression of BFS populations under the trade name Abietiv. An understanding of BFS ecology and NeabNPV-BFS interactions was required for registration and contributes to the efficient use of NeabNPV in aerial spray programs. Laboratory and field studies were conducted to elucidate patterns of NeabNPV dispersal within groups of BFS larvae and at the level of the population. Field studies included manipulative experiments and large-scale aerial applications of NeabNPV. Our results indicate that NeabNPV is rapidly communicated between individuals in a larval cohort. NeabNPV spreads hundreds of meters from the point of aerial application within a single season. Significant suppression of balsam fir sawfly populations, with subsequent decreases in defoliation, are most evident in the year following the NeabNPV applications.

Spatial Structure of Host-Race Formation in the Parasitoid *Copidosoma gelechiae*

Christopher R. Kolacz* and Stephen B. Heard

Dept. of Biology, University of New Brunswick, Fredericton, N.B., Canada, E3B 6E1

Phytophagous insects and parasitoids are among the most diverse groups of organisms known. Host-associated genetic differentiation or host-race formation (HRF) has been put forward as a possible driver of diversification in these groups. Host-race formation has been documented in the galling moth *Gnorimoschema gallaesolidaginis* (Lepidoptera: Gelechiidae) on two sympatric host species of goldenrod (*Solidago spp.*). HRF has also been documented in a parasitoid of this moth (*Copidosoma gelechiae*), with the intriguing suggestion that host shifting and genetic divergence may have proceeded in parallel in multiple populations. Our research has sought to reconstruct geographic and host-associated patterns of divergence between *Copidosoma* populations. In particular, we asked how many independent divergence events gave rise to the present *Copidosoma* host races, and we measured the degree of genetic differentiation between host races and (within a race) between populations. We sampled *Copidosoma* populations from across the mid-west and north-east US and eastern Canada. We used AFLP (Amplified Fragment Length Polymorphism) to analyze the genetic makeup of the sampled populations and to test hypotheses about the history of HRF in *Copidosoma*. Our broader goal is to contribute to our understanding of the frequency of sympatric host race formation. If HRF occurs frequently, it may explain a significant portion of the massive diversity we see in some insect groups.

What Role Does Habitat Structure Play in Invertebrate Diversity in Agriculture?: A Look at Ground Beetles (Family: Carabidae) in Hayfields

Sean LeMoine*

Biology Department, Acadia University, 24 University Ave., Wolfville, NS, B4P 2R6

There is a growing realization that modern agriculture has the greatest negative influence on global biodiversity. This has resulted in increased studies in biodiversity and more specifically species diversity in agricultural ecosystems. However, such studies conducted at a small scale (within or between fields) tend to compare invertebrate and vegetation diversity without accounting for the importance of vegetation structure.

As part of a larger study in Annapolis County, Nova Scotia, hayfield vegetation diversity and structure and their influence on ground beetle (Family: Carabidae) diversity is being examined. The study includes a comparison between new (3 years old) and old (20 years +) hayfields to gain insight on how the vegetation variables influence ground beetle diversity over time. The manner in which vegetation structure potentially contributes to invertebrate diversity in agricultural fields will be discussed.

Cuba: Making a Success of Biocontrol and Organic Agriculture

Kenna MacKenzie

Agriculture and Agri-Food Canada, 32 Main St., Kentville, NS B4N 1J5

Cuba imported 60 % of its food as well as crude oil and other refined products and depended on highly mechanized, extensive input agriculture to produce sugar cane and other export crops until the fall of the Soviet block in 1989 to 1991. In the early 1990's, food imports were halved as were important agricultural imports such as pesticides, fertilizers and feeds. To avert widespread famine, Cuba had to find a way to produce twice the amount of food with half the agricultural inputs. To do this, Cuba turned to organic agriculture and biological control as the primary pest management strategy, and to its own scientists for solutions. Soil fertility has concentrated on 'biofertilizers' including vermiculture for humus and recycling of waste products. Intercropping is now widely utilized and reforestation has been emphasized. Many biologicals including parasitoids, entomopathogenic organisms (Bt, fungi, nematodes) are being produced and used throughout the country. There has also been a movement away from tractors back to animal, especially oxen, cultivation. Small farms especially in the vicinity of large cities and urban gardens called 'organoponicos' have flourished. These changes have had positive consequences for food production in Cuba including food security and farmers income.

In March, I visited Cuba on an IPM Bio-Technical Tour and plan to show examples of Cuba's success in championing organic, urban agriculture that I saw during this visit.

Sampling Strategies for the Pale-Winged Gray Moth Allow Predictions of Eastern Hemlock Defoliation

Lauren Pinault* and Dan Quiring

FOREM, University of New Brunswick, 3D-158 Brunswick Street, Fredericton, NB E3B 1G6

The pale-winged gray moth, *Iridopsis ephyraria* (Wlk.) (Lepidoptera: Geometridae), a native species across eastern Canada, has been defoliating eastern hemlock trees (*Tsuga canadensis*) in south-central Nova Scotia, particularly in Kejimikujik National Park. Due to the severity of this attack and the lack of prior knowledge of this species, it was crucial to develop sampling techniques that could be used to predict heavy defoliation at specific sites. Due to the large size of mature hemlocks, traditional sampling methods such as pole pruning were not useful. Four alternate sampling techniques are being used to estimate insect densities in the field: sticky tape and beating sheets for larvae, and foam oviposition traps and bark sampling for eggs. Defoliation for each foliar age class was estimated using 10% defoliation categories for both mature hemlock trees and saplings. Significant insect density – tree defoliation relationships were established for both sticky tape ($R^2=0.69$, $P<0.01$) and beating sheet ($R^2=0.84$, $P<0.05$) sampling methods. Egg densities on foam traps from summer 2005 will be compared to defoliation data from the 2006 field season. The advantages and shortcomings of all four sampling methods will be discussed.

Influence of Climate and Stand Density on the Incidence of Damage by Balsam Woolly Adelgid

Dan Quiring, Don Ostaff, Andrew Morrison, Dan Lavigne, Lester Hartling, Hubert Crummey, Nelson Carter, Ian DeMerchant and Lucie Royer

University of New Brunswick, 3D-158 Brunswick Street, Fredericton, NB E3B 1G6

Balsam woolly adelgid (BWA) was introduced into Canada from Europe early in the last century, occurs on both coasts, and has caused extensive tree damage. Affected trees are unsuitable for lumber due to uneven shrinkage causing warping and splitting, and pulp is of inferior quality to that from normal wood. Stem attack can result in growth reductions in excess of 50%, with high populations killing trees of merchantable size within three years. Chronic crown infestation can cause a tree to succumb in 10 to 20 years. Damage also predisposes trees to infection by Armillaria root-rot. We have carried out field surveys of damage by BWA in pairs of adjacent thinned and unthinned balsam fir stands in New Brunswick and Newfoundland. Presence or absence of BWA damage in an area was best explained by plant hardiness zones, presumably due to the inability of overwintering stages to withstand cold temperatures. Damage by BWA was parabolically related to water table depth. Effects of thinning and age of stands since thinning were more variable. We will discuss the potential to use these results to establish a hazard rating for BWA.

**Parasitism of the Brown Spruce Longhorn Beetle, *Tetropium fuscum* (Fabr.)
by North American Species (Hymenoptera: Ichneumonidae & Braconidae)**

**Jon Sweeney¹, Georgette Smith¹, Jessica Price¹, Gavin Broad², Henri Goulet³, and
Andrew Bennett¹**

¹Natural Resources Canada – Canadian Forest Service, P.O. Box 4000, Fredericton, NB E3B
5P7; ²Biological Records Centre, CEH Monks Wood, Cambs, England PE28 2LS; and
³Agriculture and Agri-Food Canada, 960 Carling Ave., Ottawa, ON K1A 0C6

Weevil (Coleoptera: Curculionoidea) Diversity in a Managed Nova Scotia Dairy Pasture

Sheena M. Townsend* and David B. McCorquodale

Department of Biology, Cape Breton University, Sydney, NS B1P 6L2

Agricultural intensification may lower biodiversity; a trend observed over a wide range of taxonomic groups. We look at the effects of management intensity on one group of herbivorous insects, weevils (Coleoptera: Curculionoidea), within a managed dairy pasture located in Colchester County, Nova Scotia. Like other Coleoptera, weevils may be less abundant and diverse when management intensity is higher. Weevils were collected by sweep-netting in the summer of 2005. An inventory that documented seasonal trends in the abundance of adult Curculionoidea was compiled. Twenty-eight species of Curculionidae and two of Brentidae were collected. Of these, 22 are adventive. Eleven species were found in all management intensities. Seasonal abundance varied by species. The species richness, diversity and abundance of Curculionoidea in the pasture did not decrease as management intensity increased. Taxon sampling curves, rarefaction and diversity indices were used to examine the effect of management intensity on diversity. No differences in abundance among the four treatments were detected when data were analyzed using ANOVA. Caution should be used in both interpreting and gathering abundance data for Curculionoidea. Seasonal fluctuations varied among treatments and individual species' responses were not homogenous.

Keywords: Coleoptera, Curculionidae, dairy pasture, biodiversity, rarefaction

The Effects of Plant Volatiles on Black Vine Weevil (*Otiorhynchus sulcatus* F.) Behavior

Hui Zhou*¹, Doug Strongman¹ and Kenna MacKenzie²

¹Department of Biology, Saint Mary's University, Halifax, Nova Scotia and ²Atlantic Food & Horticulture Research Center, Agriculture and Agri-Food Canada, Kentville, Nova Scotia

New tools are required for the management of the black vine weevil, *Otiorhynchus sulcatus*, a serious pest of Canadian strawberry crops, because limited success is achieved with current tactics. This study was set up to examine a novel approach, the use of plant volatile compounds to alter weevil behaviour. Volatiles from two plants, strawberry and mint (preferred and not preferred in choice tests) were used. Two volatiles, hexenol and hexenyl acetate were extracted from leaves of the strawberry cultivar Annapolis and identified by headspace sampling coupled with gas chromatography-mass spectrometry (H-GC-MS). These two compounds and two known mint volatiles, menthone and menthol, were chosen for behavioural assays by testing weevil feeding preferences and olfactory responses with 9-cm Petri dishes and olfactometers. The weevils were strongly attracted to hexenyl acetate at 10^{-6} and 10^{-9} concentrations, while hexenol, hexenyl acetate and menthone at concentration 10^{-3} repelled the weevils (Chi-square test, $p < 0.05$). These results are encouraging and further research examining the use of volatiles in odour-baited traps or repellent sprays for black vine weevil management should be considered.

Key words: Plant volatiles, Black vine weevil, Feeding preferences, Olfactory responses

Poster Presentations

* indicates this is a student presentation

Using PCR to Identify a Putative Esterase in *Plutella xylostella* L.

Stephanie L. Chaisson^{1,2}, Donald T. Stewart², **Sonia Gaul**¹ and Kathleen Glover³

¹Agriculture and Agri-Food Canada, 32 Main St., Kentville, NS B4N 1J5; ²Biology Department, Acadia University, 24 University Ave., Wolfville, NS, B4P 2R6; ³Azar Consultants, Truro, NS

Degenerate primers designed from a *Myzus persicae* and an apparently homologous *Drosophila* esterase sequence were used in the polymerase chain reaction (PCR) to amplify DNA fragments and to direct sequence a 306 bp DNA fragment from *P. xylostella* DNA. The 306 bp sequence matched other insect esterase sequences, including a partial esterase active site (oxyanion hole). The 306 bp sequence may provide a probe marker for *P. xylostella* resistance to pesticides.

Volatile Components Common to Fruit of Host Species Infested by *Rhagoletis mendax* (Diptera: Tephritidae)

Sonia Gaul¹, Dennis M. Nash¹, Kenna MacKenzie¹, Charles Vincent² and Pierre LeMoyne²

¹Agriculture and Agri-Food Canada, 32 Main St., Kentville, NS; ²Agriculture and Agri-Food Canada, 430 Gouin Blvd., St.-Jean-sur-Richelieu, PQ

Volatile components present in lowbush blueberry and in other fruit from plants known to be hosts of *Rhagoletis mendax* were identified from 70 samples obtained in 2002 and 2003. The volatile components common to several fruit which can become infested by *R. mendax* may provide a chemical cue to the adults during changes in the local landscape. Components to be incorporated in synthetic mixes were selected based on the criteria of occurrence and the relative amount present in each fruit extract. The components may have potential both in the development of an attractive lure and also in understanding the potential range of *R. mendax*.

Non-Chemical Alternatives for Controlling the Black Vine Weevil, *Otiorhyncus sulcatus* (Coleoptera: Curculionidae)

Lisa Harkness*¹, Beata Lees¹, Todd Smith², and Kenna MacKenzie¹

¹Atlantic Food & Horticulture Research Center, Agriculture and Agri-Food Canada, Kentville, NS B4N 1J5 and ²Nova Scotia and Acadia University, Department of Biology, Wolfville, NS B4P 2R6

The black vine weevil, *Otiorhyncus sulcatus*, is an important pest of commercial strawberries. With concerns for food safety and ecological stewardship, pressure has increased to develop natural methods of controlling insect pests. The purpose of this study was to test two non-chemical albeit naturally occurring compounds, yellow mustard powder and pea flour, as anti-feeding agents for *O. sulcatus*. To test the effectiveness of the two compounds, five strawberry leaf discs were individually treated with a 1% w/v solution of each powder solution; water served as a control. The experiment was replicated three times. A single *O. sulcatus* was confined to each feeding dish for four days. Following the feeding period, leaf surface area was measured to determine consumed leaf tissue. Weevils were then placed on fresh untreated leaf discs, and consumption was measured for five days. Leaves treated with mustard powder were consumed to significantly lesser degree than those treated with pea flour or controls; those treated with pea flour were consumed to a significantly lesser degree than controls. Weevils which had fed on mustard powder ate significantly less untreated leaf tissue in the five days following the experiment than those that had fed on control leaves, but significant differences in feeding were not observed between mustard powder and pea flour treatments, and between pea flour and control treatments. These results suggest that mustard powder, and to a lesser extent pea flour, may serve as effective anti-feeding agents for management of *O. sulcatus* for strawberry production.

Intratree Heterogeneity Influences the Foliage-Age Preference and Performance of Larvae of a Specialist Herbivore

Rob Johns* and Dan Quiring

Department of Biology, University of New Brunswick.

Herbivorous insects that feed on plants with persistent foliage, such as conifers, often specialize on either developing or mature leaves, although some insects can feed on both. Several laboratory studies have demonstrated how foliage age can shape the preference and associated performance of herbivorous insects. Such effects, however, have rarely been demonstrated in the field and remain poorly understood.

Here I present results from manipulative field studies and surveys investigating the feeding preference of *Pikonema alaskensis* (Roh.) on different-aged foliage of black spruce (*Picea mariana* [Mills.] B.S.P.). Larvae generally preferred new foliage and fed in a hierarchical fashion on older age-classes of foliage (e.g., one-year old foliage was consumed before two-year old foliage, etc.). Based on field surveys of natural populations, back-feeding by larvae occurred almost exclusively in whorls 1-3 and rarely occurred in lower whorls.

To test the hypothesis that the foliage-age preference of *P. alaskensis* observed within and among black spruce whorls is adaptive, I evaluated the fitness of groups of larvae we forced to feed on selected age-classes of foliage in the upper or lower crown. Results supported the hypothesis that *P. alaskensis* larvae forage adaptively: early and late-instar larvae performed best when feeding on current-year foliage, particularly in the upper crown. Furthermore, larvae feeding on one-year old foliage in the upper crown had similar performance to larvae feeding on current-year foliage in lower whorls. This study further emphasizes the important influence on insect behavior and performance of within plant heterogeneity.

Exclusion Barriers for Management of Black Vine Weevil, *Otiorhynchus sulcatus*, in first year strawberries

J. H. Tolman¹, P. Fisher², **K. MacKenzie**³, T. A. Sawinski¹, K. Butt¹ and R. Tromp¹

¹Agriculture and Agri-Food Canada, Southern Crop Protection & Food Research Centre, London, ON; ²Ontario Ministry of Agriculture, Food and Rural Affairs, Simcoe, ON; and ³Agriculture and Agri-Food Canada, Atlantic Food & Horticulture Research Centre, Kentville, NS.

Black vine weevil (BVW), a pest in strawberry around the world, is difficult to manage with current methods. Although flightless, BVW are active walkers quickly moving into newly planted fields from elsewhere. Barriers may present an alternative technique to reduce colonizing BVW populations. In 2005, a trial was set up to evaluate two types of barriers, the “Vernon” trench made of extruded black plastic and a “Sheet” fence. The “sheet” fence consisted of a 30 cm plastic length (Polytarp - supersix®) with one edge buried in the soil and the remainder supported vertically with wooden stakes. Large pit fall traps (4 L ice cream pails) were located at the ends of the barriers. BVW began to move into the plantings in early August and continued until the study ended mid-Sept. The “Sheet” barriers caught on average 20 BVW/m barrier. “Vernon” barriers were not very effective and also were difficult to use. These results suggest that “Sheet” barriers could be an effective tool to prevent colonization of new strawberry plantings by Black Vine Weevil.

**ACADIAN ENTOMOLOGICAL SOCIETY
66TH ANNUAL BUSINESS MEETING**

MINUTES

**Tuesday, June 13, 2006
Kentville Agricultural Centre, Kentville, NS**

Call to Order: The 66th Acadian Entomological Society Annual Business Meeting was called to order by President, Kenna MacKenzie at 11:35 am on Tuesday, June 13, 2006. Approximately twenty members were present.

Approval of 2005 Minutes: Were accepted as written. Moved by Andrew Morrison and second by Jon Sweeney

Business arising from Minutes:

- a. Poster prize for students was established and given out at this meeting.
- b. Student representative on executive. President did not identify anyone throughout the year. There was a call for volunteers. Lauren Pinault agreed to take on the position.
- c. AES Investments. Christine Noronha, Don Ostaff and Suzanne Blatt were to investigate investment of current GICs and large bank account. Also, Don Ostaff and Donna Giberson were to look into the possibility of establishing an endowment fund. Neither of these happened.

Action: Suzanne Blatt, treasurer and Don Ostaff, past treasurer to look into investment and possibility of an endowment fund for the large bank account for the society

President's report: Acadian Entomological Society continues to move along. It has been relatively quiet with few requests. A survey on the ESC/Regional Society meeting was completed by the executive. We will be seeking membership approval of that report at this meeting. A request for past proceedings from Europe (Universitaetsbibliothek Johann Christian Senckenberg Zeitschriftenabteilung) was received. All but one of these, 1999, was located and will be sent to the library. If anyone has that volume, a photocopy would be much appreciated.

Kenna thanked all the individuals that have helped out with the meeting preparation. Suzanne Blatt did a great job organizing the 'Bug' event on Sunday, and it went really well despite the weather. AES now has a number of great displays that can be used (laminated pictures) by other members of the society if they want to. These are located at AAFC in Kentville. The other executive members, Michelle Larsen and Dick Rogers pitched in. Also, thanks to individuals who judged the student competitions – it isn't an easy task and your effort is appreciated. Our sponsors support - AgraPoint International and Agriculture and Agri-Food Canada for meeting refreshments, and Koppert Biological Systems and Springvale Nursery for assistance for the 'Bug Event' was greatly appreciated.

Dick Rogers moved and Andrew seconded adoption of the Presidents report.

Treasurers Report: (attached)

Kenna directed everyone to look at the Treasurer's report (two parts - one to Dec 31 (full fiscal year), and a partial year one). Final balance very healthy.

Kenna called for comments or questions. General consensus that we need to do something with this amount of money (see action from business arising).

Dan Quiring moved and Jon Sweeney seconded that we accept the report.

Journal Editor's report: Don Ostaff reported that there have been 7 articles submitted, and 2 are now published on the website. 2 rejected, one withdrawn. Moving along nicely with the new journal. Note that the format of the journal has been changed, in case you're planning to submit. Andrew Moved and Jon Sweeney seconded acceptance of the report.

Recorded for the minutes: Special thanks to Don for getting this up and running; the journal looks good and people very impressed.

Also special thanks to our webmaster, Rick West, for the great job he is doing on the webpage!

Action: Kenna will write notes of thanks on behalf of the society to these folks.

New Business:

a. Annual Meeting survey: Kenna distributed the survey on how annual joint meetings should be held with the national society, where the national society was looking for input on how to do the meetings. She noted that we made a preliminary response to the survey, but wanted input from the society before giving a formal response. Dan Quiring reported on discussions at the national meeting and indicated that there seemed to be some consensus about how the meetings will be operated in discussion with the regional members. There is a greater willingness for communication, and an updated handbook to help out folks that are doing.

Kenna went through the list of questions in the survey and summarized the responses we made. Donna asked whether some of these questions had been addressed, particularly the one about cost-sharing, and Dan indicated that the ESC thinks that all of this should be flexible still.

Kenna moved, and Dave McCorquodale seconded that we send this report to the ESC as indicative of the society's response.

South Okanagan ecological reserve

Kenna brought up the topic of this reserve and the fact that it is under some pressure in BC right now from urban development. This is a call for societies and individuals to respond with some sort of letter. Donna G moved and Dick Rogers moved that Kenna write a letter to all and sundry in support of the reserve and against the development. Dan Quiring reported that the ESC has done the same.

Report on National Society: Dan Quiring, President

Dan brought greetings from the National Society.

- Dan reported that there is now a new bulletin editor and they're looking for a new Journal editor. They have a new admin person at the ESC with Sandy's retirement. Dan Quiring also reported that submissions to Can Ent are now electronic, just as a word or PDF file.

They are also looking into software for converting to pdf to put on the web. He reminded people of the meeting in Montreal in November, and reported that there would be service awards for Sandy Devine and for Peter Harper at that meeting. Dan also reported that Hugh Danks will be retiring, and that the ESC would also be looking to encourage the National Museum to maintain the position with the Biological Survey.

Next Year's meeting:

Kenna suggested Halifax or Cape Breton for meeting locations. A number of people seemed to think that Halifax would be good to get some of the Halifax entomologists involved. Kenna asked if it could be left up to the executive to come up with a location and notify the membership. Rob Johns moved and Andrew Morrison seconded that the executive choose the location. Timing of the meeting? Is this a good time? General consensus that June is a good time

Motion from the floor (Dan Quiring) to thank the organizers! Unanimous!

Just before adjournment, Kenna called on the President of the ESC to draw some numbers from the tub for door prizes. Kathryn Dau-Schmidt and Dave McCorquodale were winners! Prizes were some nice mugs.

Adjourned at 12:17 pm

**Financial Statement - Acadian Entomological Society
(Jan-Dec. 2006)**

Balance Forward		\$11,294.29
Revenue		\$2,443.51
2006 Membership Dues	\$266.00	
Registration - 66th AES Meeting (June 2006)	\$1,766.00	
Miscellaneous - bank interest	\$0.21	
Manuscript fees	\$25.00	
AES/AGM sponsorships	\$101.30	
Education Grant ESC	\$200.00	
AES/AGM sales (books, pins, t-shirts)	\$85.00	
Expenses		\$3,879.85
Honorarium for Webmaster (Rick West)	\$200.00	
Speakers for ESC/AES Annual Meeting	\$715.81	
Gifts/awards during AES/AGM	\$200.00	
AES/AGM expenses (food, supplies, refunds)	\$2,602.32	
Bank Charges	\$48.69	
PAYG fees	\$96.00	
New cheques ordered	\$17.03	
BALANCE		\$9,857.95