

Presentation Abstracts

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Predators on the farm: Augmentative releases for biological control of blueberry aphid in British Columbia

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The practice of augmentative biological control is supported globally by a well-established industry that produces over 230 products. Despite this, adoption of augmentative releases for management of pests of field crops has been rare compared to the use of these products in greenhouse agriculture. Here, we describe the results of releases of *Micromus variegatus* (Neuroptera: Hemerobiidae) and *Aphidoletes aphidimyza* (Diptera: Cecidomyiidae) for management of the blueberry aphid (*Ericaphis fimbriata*, Hemiptera: Aphididae) on blueberries in British Columbia (BC). *Ericaphis fimbriata* is the vector of blueberry scorch virus, a pathogen that causes serious economic damage to blueberry plantings in the province. Releases of both predators were made at three small, organic farms in June and July, 2014. Aphid populations at the three farms declined dramatically after releases approximately two to three weeks earlier than typical seasonal declines of aphids. Eggs of *A. aphidimyza* were observed in post-release samples at all three release locations, providing evidence that this predator reproduced. Augmentative releases of these biological control products clearly have a strong potential as a strategy for managing blueberry aphid, especially in organic plantings.

Metabarcoding as a tool for assessing stream biodiversity and ecosystem function at pipeline crossings

M. Schwarzfeld, A.-M. Flores, A. Thielman, A. O'Dell, A. Costello, D. Erasmus, B. Murray, L. Poirier, J. Robert, M. Gillingham, J. M. Shrimpton and D. Huber, Natural Resources and Environmental Studies, University of

Northern British Columbia, Prince George, B.C.

This study is designed as a before–after, control–impact (BACI) analysis of stream biodiversity and ecological processes at pipeline crossings. We are using a combination of morphological methods, DNA barcoding, and metabarcoding techniques to assess benthic invertebrate communities, environmental DNA in water, and aquatic food webs.

Terrestrial invertebrate indicators of ecological function in alpine ecosystems

A. Thielman, D. Huber and M. Gillingham, Natural Resources and Environmental Studies, University of Northern British Columbia, Prince George, B.C.

An invertebrate biodiversity monitoring and assessment program in northwest British Columbia is currently investigating ecological function in alpine ecosystems throughout construction of a natural gas pipeline and subsequent restoration activities. Preliminary 2014 results and a discussion of taxa collected and their potential for use as indicators of ecosystem function were presented.

Impact of two contrasting marine habitats on decomposition and arthropod colonization of cadaver models in the Salish Sea

G. Anderson and L. Bell, Centre for Forensic Research, School of Criminology, Simon Fraser University, Burnaby, B.C.

Pig carcasses were deployed on the ocean floor, in Saanich Inlet at 92 m, and in the Strait of Georgia at 300 m. Both sets of carcasses were deployed under a tripod that carried a high-definition video camera, oxygen optode and a seawater conductivity, temperature and density instrument package (CTD). Dramatic differences in colonization were noted.

Is aggregated oviposition by blowflies *Lucilia sericata* and *Phormia regina* (Diptera: Calliphoridae) pheromone mediated?

*W. Wong*¹, *B. Brodiel*, *S. VanLaerhoven*² and *G. Gries*¹, ¹*Department of Biological Sciences, Simon Fraser University, Burnaby, B.C., and* ²*University of Windsor, Windsor, Ontario*

Aggregative oviposition in female blowflies has been perceived as pheromone mediated. Our study with two species of blowflies demonstrated that the presence of female blow flies at varying reproductive stages on an oviposition site enhance its attractiveness to fellow female blow flies by depositing semiochemicals associated with feeding.

Baculovirus and co-infection dynamics in an insect host, *Trichoplusia ni*

J. Scholefield and *J. Cory*, *Department of Biological Sciences, Simon Fraser University, Burnaby, B.C.*

When multiple pathogens co-infect a host, the outcomes can be far different from that of a single infection. We exposed *Trichoplusia ni* to a baculovirus, followed by a second pathogen. The presence of a competitor reduced the infection success of the baculovirus and had negative consequences for virus replication.

Do short-term changes in atmospheric pressure affect the calling behavior of male crickets?

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Olfactory-based, pheromone-mediated mating behavior of species from different insect orders has been shown to be affected by short-term changes in atmospheric conditions. We examined the acoustic chirping behavior of male crickets to determine if similar behavioral changes occur and if the response to this environmental cue varies with age.

Temperature effects on pea aphid (*Acyrtosiphon pisum*) "personalities" in

the context of anti-predator behavioural syndromes

D. Quach, *F. Simon* and *B. Roitberg*, *Department of Biological Sciences, Simon Fraser University, Burnaby, B.C.*

There is a growing body of evidence for the existence of "personalities" within animals. We demonstrate that genetically identical individuals—pea aphids—can have personalities and change their predatory escape response across temperature, and examine whether the distribution of variation between individuals of the same clone was retained across these environments.

Competitive behavioural strategies of *Drosophila suzukii* and *Drosophila melanogaster*

T. Dancau and *T. Stemberger*, *Department of Biological Sciences, Simon Fraser University, Burnaby, B.C.*

We investigated the adult competition dynamic between *Drosophila melanogaster* and *D. suzukii* females for a single resource. Resource-holding potential based on size as well as aggressive behaviours of varying intensities and costs were used to explore competitive behavioural strategies. Our results illuminate the complicated nature of aggressive interspecies interactions.

Relative desiccation resistance of *Rhagoletis sister* species

J. Hill, *K. Hausken*, *N. Shaffer* and *D. Schwarz*, *Department of Biology, Western Washington University, Bellingham, WA*

The invasive apple maggot fly is largely absent from the arid regions of the Pacific Northwest, which is occupied by its native sibling, the snowberry fly. We compare the desiccation resistance of both species and discuss potential consequences of interspecific hybridization on drought adaptation in the apple maggot.

Red-throated Caracaras versus army ants as wasp predators in Neotropical forests

S. McCann, *T. Jones*, *O. Moeri*, *C. Scott*, *S. O'Donnell* and *G. Gries*, *Department of Biological Sciences, Simon Fraser University, Burnaby, B.C.*

Predators of Neotropical social wasps have not been well studied, but historically, army

ants have been considered the most important wasp predators. We studied Red-throated Caracara provisioning behaviour. Our quantitative results suggest that these specialist predators may rival army ants as predators on social wasps.

When barcoding fails: Molecular identification of apple maggot flies in the face of gene flow

D. Schwarz, Department of Biology, Western Washington University, Bellingham, WA

Economically important apple maggot flies and their non-pest snowberry maggot sibling species share too much genetic variation to be distinguished by a single gene. Instead, a modest number of unlinked single nucleotide polymorphisms provide a fast and cost-effective method to identify apple maggots despite ongoing introgression from snowberry maggots.

Apple Maggot (*Rhagoletis pomonella* Walsh): Resident quarantine pest in southwest British Columbia (Lower Mainland)

S. Glasgow and T. Hueppelsheuser, Plant Health Unit, Plant and Animal Health Branch, British Columbia Ministry of Agriculture, Abbotsford, B.C.

A quarantine pest of apples, Apple Maggot (*Rhagoletis pomonella* W.) was first detected in British Columbia along the Canada-U.S border of the Lower Mainland in 2006. In this presentation we share the methods used and data collected during 2013/2014 monitoring of adult flight and fruit damage. Adult flight monitoring has given insight to the lifecycle of Apple Maggot in southern B.C., and we hope this is useful to commercial growers for timing their pest management activities. This project was funded in part by the BC Ministry of Agriculture and Agriculture and Agri-Food Canada through Growing Forward 2, a federal-provincial-territorial initiative.

Stark sexual display divergence among jumping spider populations in the face of gene flow

G. Blackburn and W. Maddison, Department of Zoology, University of British Columbia, Vancouver, B.C.

Can selection prompt population divergence in the face of gene flow? If so, what traits are involved? We present genetic evidence that, in *Habronattus americanus* jumping spiders, selection can promote stark sexual display divergence in the face of gene flow even among closely related populations.

Genetic and ecological consequences of sex ratio distortion in a booklouse

C. Hodson and S. Perlman, Department of Biology, University of Victoria, Victoria, B.C.

In a newly discovered species of booklouse, we have found that two female types exist: one that produces both female and male offspring and the other that produces only females. As this difference is stable across generations, it has population consequences. We discuss the genetic consequences, in terms of mitochondrial structure, and the ecological consequences, in terms of differences in reproductive potential between the female types.

The immune repertoire of a divergent, symbiont-defended *Drosophila*

M. Hanson, F. Hamilton and S. Perlman, Department of Biology, University of Victoria, Victoria, B.C.

Drosophila melanogaster is a wonderful model for studying the innate immune system. However, immunity in divergent lineages of *Drosophila*, with distinct ecologies and natural enemies, is largely unstudied. Using transcriptomics, we describe the immune pathways of the mushroom-feeding *D. neotestacea*, a natural system where hosts are commonly infected with a *Spiroplasma* defensive symbiont that protects against a virulent nematode parasite. Although the major immune cascades are well conserved, some antimicrobial peptides were absent from the *D. neotestacea* transcriptome.

What women want: Does bait influence the age of female *Drosophila suzukii* (Diptera: Drosophilidae) caught in traps?

K. Sim and T. Hueppelsheuser, Plant Health Unit, Plant and Animal Health Branch, British Columbia Ministry of Agriculture, Abbotsford, B.C.

Bait preference is of major concern for effective monitoring of the crop pest

Drosophila suzukii Matsumura (Diptera: Drosophilidae), spotted wing drosophila (SWD). Catching SWD when it first becomes active in the spring has been a focal point for many bait studies; however, in areas where SWD populations are not completely inactive during winter months, such as south western B.C., it is difficult to pinpoint when SWD populations become an active risk to crops. Monitoring in these areas, in order to allow timely management decisions by commercial fruit growers, may benefit from tracking the presence of reproductively viable females in the population. To implement effective population age structure monitoring, it is important to determine if bait preference is influenced by female age. Here we compare the age classes of caught female SWD in two baits types, yeast solution and apple cider vinegar, to determine if age-based bait preference exists. This project was funded in part by the BC Ministry of Agriculture and Agriculture and Agri-Food Canada through Growing Forward 2, a federal-provincial-territorial initiative.

How the false widow spider finds true love: Female contact pheromone elicits male courtship behaviour in *Steatoda grossa*

C. Gerak, C. Scott, S. McCann and G. Gries, Department of Biological Sciences, Simon Fraser University, Burnaby, B.C.

We investigated courtship behaviour and pheromonal communication in the false black widow spider, *Steatoda grossa*. Males engage in a complex pre-copulatory courtship ritual that includes dismantling the female's web (web-reduction behaviour). We show that a pheromone on the silk of virgin but not mated females elicits courtship behaviour by males.

Temperature-induced changes in western tent caterpillar feeding behaviour as a mechanism for variability in NPV susceptibility

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Western tent caterpillar populations display cyclical dynamics with 8- to 11-year periodicity in southwestern B.C. Long-term

data shows that Nucleopolyhedrovirus (NPV) is an integral component of these dynamics, but climate might also be involved. We investigate how temperature influences individual feeding behaviour in western tent caterpillars to propose how climate might alter infection dynamics.

Keeping up with climate change: Temperature and humidity effects on an insect herbivore in apple orchards

J. Swain¹, G. Judd² and J. Cory¹, ¹Department of Biological Sciences, Simon Fraser University, Burnaby, B.C., and ²Pacific Agri-Food Research Centre, Agriculture and Agri-Food Canada, Summerland, B.C.

We investigate how temperature and humidity contribute to the outbreak potential of *Spilonota ocellana* during seasonally vulnerable life stages. Our results indicate a threshold tolerance of spring larvae to sub-zero temperatures, such as those experienced during frost events, and optimum conditions for egg hatch and development.

"Weeding" out climbing cutworm: The toxic, yet alluring power of shepherd's purse in vineyards

N. DeLury, T. Lowery, K. Deglow and A. Mostafa, Pacific Agri-Food Research Centre, Agriculture and Agri-Food Canada, Summerland, B.C.

We investigate the presence of shepherd's purse, *Capsella bursa-pastoris* (L.) (Brassicaceae), in vineyards as a potential means to control native and invasive climbing cutworm species—all serious pests of grape buds in south-central B.C.—with varying results.