Symposium Abstracts: Grape IPM

Entomological Society of British Columbia Annual General Meeting, Pacific Agri-Food Research Station, Summerland, B.C., Oct. 11-12, 2012

Note: There was a total of eight papers presented in this symposium. We were able to obtain abstracts from six of the authors.

Grape insect pests, including spotted wing drosophila

Susanna Acheampong, *BC Ministry of Agriculture, Kelowna, BC*

Major and secondary insect pests of grapes in the Okanagan Valley, British Columbia, include leafhoppers, climbing cutworms, wasps, grape phylloxera, mealybugs, thrips, mites, and earwigs. Monitoring and management of these insect pests will be discussed. Results from monitoring and damage assessment of spotted wing drosophila in grapes in the Okanagan in 2011 will also be presented. Spotted wing drosophila adults were caught in apple cider vinegar traps placed in vineyards during the last week of July, with peak numbers occurring in September and October. Spotted wing drosophila flies were reared from only damaged wine and table grape varieties sampled, not from intact grape samples. In damaged samples with spotted wing drosophila and other drosophila species, very low numbers of spotted wing drosophila were found compared to other drosophila species.

Cutworm species complex and natural control agents

Naomi DeLury, and Tom Lowery, *Pacific Agri-Food Research Centre, Agriculture and Agri-Food Canada, Summerland, BC.*

A total of 27 species of cutworm (Lepidoptera: Noctuidae) were collected as larvae feeding at night on grapevines, *Vitis* sp. L (Vitaceae), in the Okanagan Valley, British Columbia, during April–May, 2004–2012. The majority of the population (86.6%) is represented by three species: *Abagrotis orbis* (Grote), *A. nefascia* (Smith), and *A. reedi* Buckett. The species complex differs by soil type and region, with occasional outbreaks of minor species in specific locations. The invasive lesser underwing moth, *Noctua comes* (Hübner), has potential to cause significant damage due to increasing numbers and distribution. Natural control agents—parasitoids and pathogens—are being considered for control of cutworm larvae. Twelve species of parasitoids (Hymenoptera and Diptera) have been reared from field-collected late-instar larvae, but parasitism rates are overall very low. Investigation into susceptibility of *A. orbis* to commercial and field-collected fungal cultures, as well as to a novel indigenous *Abagrotis* nuclear polyhedrosis virus, is underway.

Grapevine nematode pests in British Columbia

Tom Forge, Gerry Neilsen, Denise Neilsen, Rosy Smit, and Pat Bowen, *Pacific Agri-Food Research Centre, Agriculture and Agri-Food Canada, Summerland, BC*

Several species of plant-parasitic nematodes are recognized to be damaging pests of grapevines in most major grape-growing regions of the world. These include species of root-knot nematodes (primarily *Meloidogyne incognita* and *M. arenaria*), dagger nematodes (primarily *Xiphinema index*), and root-lesion nematodes (primarily *Pratylenchus vulnus*). In the Okanagan Valley, the northern root-knot nematode, *Meloidogyne hapla*, is present but its pathogenicity to grapevine is not as well known as *M. incognita* and *M. arenaria*. Dagger nematodes in the *X. americanum* group (*X. bricolensis* and *X. pacificum*), are widespread in Okanagan vineyards, but they are not considered to be as directly damaging to grapes as *X. index* is. Species from the *X. americanum* group can be important as vectors of tomato ringspot virus, but only *X. index* transmits grapevine fanleaf virus, which is among the most damaging of grapevine virus diseases. *Pratylenchus penetrans* is also widespread in Okanagan vineyards, but its pathogenicity relative to *P. vulnus* is unknown.

In 2006, we began recovering ring nematodes (*Mesocriconema xenoplax*) from Okanagan vineyards that exhibited patchy, poor growth and impaired root systems. Controlled inoculation studies in field microplots at the Pacific Agri-Food Research Centre–Summerland indicate that *M. xenoplax* can significantly reduce growth (trunk diameter, pruning weights, and root biomass) over three years of self-rooted Merlot. The nematode also reduced trunk growth of Merlot on 3309C rootstock, but Merlot on 44-53 and Riparia Gloire rootstocks appeared to be tolerant to the nematode. Similar microplot research to evaluate the pathogenicity of *P. penetrans* under British Columbia growing conditions is warranted, as is additional research to extend knowledge of the distribution and impacts of *M. xenoplax* on different rootstocks.

Anagrus parasitoids of leafhopper eggs on grapevines

Tom Lowery, *Pacific Agri-Food Research Centre, Agriculture and Agri-Food Canada, Summerland, BC*

There are at least 10 known instances of *Anagrus* (Hymenoptera: Mymaridae) egg parasites successfully imported for the control of leafhopper pests in various countries. In British Columbia, they are important for the control of Virginia creeper leafhopper, *Erythroneura ziczac*, and western grape leafhopper, *E. elegantula*. Their parasitism rates in certain locations near riparian areas reach nearly 100% late in the season. Our research has shown that their activity is limited by a lack of suitable overwintering hosts and that they are sensitive to chemical sprays. Until recently, the taxonomy and host relationships of *Anagrus* species that use eggs of leafhoppers on grapes was poorly studied. A single species, *Anagrus epos*, was thought to parasitize both *E. ziczac* and *E. elegantula*, but it is now understood that one species, *A. daanei*, uses eggs of the former and a different species, *A. erythroneurae*, parasitizes the latter. A survey is being conducted to determine if a third species, *A. tretiakovae*, that parasitizes eggs of both species has arrived in the province from Washington State, or if it can be imported from its native range in eastern North America.

Vineyard plant diversity: Relation to insect populations

Olga Shaposhnikova, Pat Bowen, Tom Lowery, and Naomi DeLury, *Pacific Agri-Food Research Centre, Agriculture and Agri-Food Canada, Summerland, BC*

Ninety-eight vineyards in the Okanagan and Similkameen valleys in south-central British Columbia were included in a study of vegetation within and surrounding vineyards as a component of terroir. Plant species diversity was evaluated three times at the vineyard sites during the 2011 growing season. Attention was paid to broadleaf flowering plants used as cover crops, as these can potentially serve as habitats for beneficial insects. Grapevine-leaf samples were collected during the second and third visits to determine populations of beneficial insects and pests. Fourteen sites were selected for study of native plant communities. These were suitable for vineyard development, but were undeveloped and contained representative native local ecosystems. Hypothetically, inclusion of plants inherent in natural ecosystems as vineyard residents can help to integrate the native and vineyard landscapes, and increase vineyard ecosystem stability by balancing it with the natural environment. The natural and vineyard study sites were mapped, and a database was created using Geographic Information System tools. It was found that, at the majority of vineyard sites where populations of beneficial insects were recorded, at least 10% of the ground-cover crops comprised broadleaf plants at early and mid-season. About 60% of these sites were located in close proximity to the natural areas. It was observed that ground-cover crop composition at some study sites changed considerably during the season, depending on management practices. Some management practices apparently prevented formation of stable habitats for beneficial insects. Plant species diversity in the vineyards was low, consisting of a maximum of two to three introduced species that were evenly distributed. In comparison, the natural sites had a minimum of five plant species observed later in the season. We found higher populations of some beneficial insects when broadleaf flowering plants are resident in vineyard ground-cover crop and when the grapevines are located near natural areas.

Grape-insect toxicology

Mike Smirle, Cheryl Zurowski, Marissa Neuner, and Tom Lowery, *Pacific Agri-Food Research Centre, Agriculture and Agri-Food Canada, Summerland, BC*

The effects of natural and synthetic materials on two insect pests of grapes, cutworms (Lepidoptera: Noctuidae) and leafhoppers (Hemiptera: Cicadellidae), are discussed. In all of these studies assessing the effects of toxicants, the importance of dose response was stressed (Paracelsus: "The dose makes the poison"). In the first set of studies, insecticides were tested for efficacy on fourth-instar larvae of three species of cutworms that have become serious pests in British Columbia vineyards: *Abagrotis orbis*, A. *nefascia*, and *A. reedi*. There was considerable variation in response to these insecticides (chlorantraniliprole [rynaxypyr], permethrin, methoxyfenozide, spinetoram, spinosad, malathion, carbaryl, and *Bacillus thuringiensis*), both within and among the three species. Significant differences in tolerance among the species to currently registered active ingredients chlorantraniliprole and permethrin illustrates the importance of correct identification of the species complex present in different locations. The second set of experiments examined the effects of essential oils on the Virginia creeper leafhopper, *Erythroneura ziczac*. These studies are an example of experiments that assess behavioral responses, not mortality, resulting from exposure to toxicants. In this case, repellency was measured using leaf-disc choice tests on third-instar nymphs. Of the 11 oils tested, four repelled leafhopper nymphs (paraffin oil, canola oil, mustard seed oil, and lemon oil), whereas tea tree oil and citronella oil repelled nymphs at high concentrations but attracted them at low concentrations. Five materials had no significant effect (eucalyptus oil, peppermint oil, rice bran oil, cedarwood oil, and garlic juice). Essential oils may be useful in reducing leafhopper feeding if appropriate formulations can be developed and effective usage patterns determined.

Presentation Abstracts

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Current insect pest issues in the Southern Interior of British Columbia

Susanna Acheampong, *BC Ministry of Agriculture, Kelowna, BC*

Insect pests of concern in 2012 on stone fruit and vegetable crops and their management will be discussed. Pest species include San Jose scale, *Quadraspidiotus perniciosus*; apple leaf curling midge, *Dasineura mali*; woolly apple aphid, *Eriosoma lanigerum*; onion maggot, *Delia Antigua*; and, garlic bulb mites.

***Micromus variegatus*: a new biological control agent for aphids on greenhouse peppers**

Rob McGregor, and Jordan Bannerman, *Douglas College, New Westminster, BC*

Brown lacewings (Neuroptera: Hemerobiidae) have rarely been used in augmentative biological control programs. Hemerobiids feed voraciously on aphids in both the larval and adult stages, and often display low developmental temperature thresholds. Both of these characteristics confer advantages regarding the use of brown lacewings for biological control. Here, we present results of a greenhouse cage experiment where the brown lacewing, *Micromus variegatus*, was released alone and simultaneously with the parasitoid, *Aphidius matricariae*, for management of the green peach aphid, *Myzus persicae*.

Thrips (Thysanoptera: Thripidae): From the greenhouse to the lab, a new pest on lavender, *Lavendula pinnata*, and in coriander, *Coriandrum sativa*, tissue culture

Lauren Erland, Naomi DeLury, and Soheil Mahmoud, *Agriculture & Agri-Food Canada, Summerland BC*

Thrips are a common phytophagous pest with a significant economic impact. Adults and nymphs were found on lavender, a plant