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The Professional Pest Management Association of B.C.

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The Association's Objectives:

1. To promote professionalism in the practice of pest management for the protection of crops, livestock, public health and the environment in British Columbia;
2. To encourage scientific research and dissemination of information on pest management methods; and
3. To contribute to proposed regulatory legislation pertaining to any aspect of pest management.

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Proceedings of the 2012 Symposium: *Pest Management in Riparian Habitats.* February 28, 2012, Simon Fraser University, IRMACS Centre

Thank you to coffee break sponsors:
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Student Presentations

Thank you to the anonymous judges of the student papers.

Isolation and selection of beneficial soil micro-organisms from diverse sites in the lower mainland. Teresa Cavazos and Deborah Henderson. Kwantlen Polytechnic University, Institute for Sustainable Horticulture.

Postharvest infection of organically grown green-house tomatoes caused by a range of fungi in British Columbia. A.C. Wylie[1] (awylie@sfu.ca), Z.K. Punja[1], S. Fromby[1], A. Tirajoh[1], G. Rodriguez[1], and S. Chatterton[2]. [1]Department of Biological Sciences, Simon Fraser

University and [2] Lethbridge Research Centre, Agriculture and Agri-Food Canada.

Summary:
Background: Fungi are the major cause of postharvest spoilage of greenhouse crops such as tomato. Modern hydroponic greenhouses aim to exclude harmful fungi by operating in a sterile environment, including the plant growth and support media. Organic greenhouses use soil-like media for plant growth, and thus they support the growth of soil fungi that have a secondary role as opportunistic plant pathogens causing postharvest spoilage. We were interested to see what organisms were causing an aggressive black spotting of tomatoes in organic greenhouses, and of fungi present on fruit surfaces, which of these were capable of causing infection.

Project Overview: During 2009 to 2011, tomato fruits were sampled from a commercial organic greenhouse in the Fraser Valley of British Columbia to monitor for disease. Commonly, initial symptoms appeared as minute black spots on the fruit surface. The black spots expanded to form larger gray and yellow lesions with evidence of mycelial growth in the center after 5-10 days of storage. Other fruit showed symptoms of water-soaked lesions and softening followed by mycelial growth. Isolations from symptomatic skin and pericarp tissues from early and expanded lesions onto potato dextrose agar (PDA) yielded species of *Penicillium* including *Penicillium olsonii*. Cultures of *Rhizopus stolonifer*, *Alternaria alternata*, *Cladosporium* and *Geotrichum* species were also recovered. Healthy fruits were inoculated with these isolates and incubated at 21 C. The most prolific infection and decay resulted following inoculation with *R. stolonifer* followed by *P. olsonii*. The latter fruit developed black spots similar to those observed previously. Other recovered isolates of *Penicillium* identified as *P. solitum* and *P. polonicum* caused soft rot and decay similar to *Rhizopus*. During July-November 2011, swabs of growing tomato fruit surfaces and calyx tissues were plated onto PDA. High populations of *P. olsonii* were present (> 40 CFU/ fruit), followed by *Rhizopus*, *Alternaria* and *Cladosporium*. Similar populations were recovered when calyx tissues were plated directly onto media. Wounding significantly enhanced disease severity compared to unwounded treatments for most fungi but not for *P. olsonii*. Entry of *P. olsonii* is likely through naturally occurring cracks of the fruit cuticle from populations that appear to reside in part in leaf litter from prunings that also harbours significant populations of other fungi.

Conclusions: To our knowledge, this is the first report of a fruit spotting and postharvest decay of tomato fruits caused by *Penicillium olsonii*. It demonstrates the possible sources of inoculum for fruit colonization by various fungi. The growing conditions which may enhance fruit infection have not yet been determined. Storage of fruit at around 10 C does not preclude infection, which can progress further when fruit are shipped to retail outlets.

Industry Partners: Thank you to Origin Organic Farms, Delta BC for access to tomato greenhouses and for tomatoes for the experiments. Thanks to Village Farms, Delta BC for access to tomato greenhouses. Andrew Wylie is supported by an NSERC Industrial Partnership Scholarship with Herio Research Co. Ltd, Langley BC. Additional funding for this project was provided by the BC Greenhouse Growers Association through the Growing Forward program.

Characterization of *Arsenophonus*, a widespread inherited bacterial endosymbiont of leafhoppers across Canada. Leanne E. Peixoto[2], A.B. Maghodia[1], C.Y. Olivier[1], B. Galka[1], and S.J. Perlman[2]. [2]Saskatoon Research Centre, Agriculture and Agri-Food Canada and [1]Dept. of Biology, University of Victoria.

Summary: *Arsenophonus* is a widespread yet little studied clade of bacterial symbionts of arthropods that includes male-killers, mutualists, and plant pathogens. We show that *Arsenophonus* is pervasive in leafhoppers, with 12 out of 49 species testing positive, including 74% of individuals of *Macrosteles quadrilineatus,* the major vector of aster yellows disease. Similar symbiont strains infect different host species, suggesting that horizontal transmission is common. We will also present results of lab experiments measuring vertical transmission.

Invited Guests and Presentations

Invasive Pests in Canadian Forests. Dr. Leland Humble, Research Entomologist, Natural Resources Canada - Canadian Forest Service.

Lifetime Achievement Award Presentation by Jim Matteoni, President of PPMABC, to **Dr. Leland Humble**, in recognition of his scientific contributions to entomology and pest management in forestry; from cutting-edge detection and diagnostic tools for new species, to outreach on risks from invasive species.

Award for Excellence in Pest Management in British Columbia. Presented to Mr. Mario Lanthier by Cristina Machial, Contech Inc., in recognition of his contributions to integrated pest management in British Columbia; from field research to educating growers and practitioners.

Status of IPM Practices in Canadian Nurseries. Mr. Mario Lanthier, Crop Health Advising and Research www.crophealth.com

Summary: When asked how they monitor for pest problems, every nursery manager would answer: "We ask our staff to report the problems they see." The procedure is valid: those working all day with the plants are most likely to notice a developing problem or something abnormal about the plant appearance. When it comes to monitoring nursery crops, is it sufficient to ask staff to report the pest problems? How can we make it better? What would be "excellent" monitoring?

What is the current status of Integrated Pest Management in Canadian nurseries? In 2010, Landscape Ontario triggered a project to help answer the question. Over 30 nurseries were visited in all areas of the country – Québec, Ontario, Alberta and British Columbia. Each visit was a working tour with the pest manager – inspecting the plants, making decisions for treatments, discussing the attributes required to do this work. Another 60 nurseries were visited for a nursery certification program where they explained their current pest management program. The nursery industry is diverse – each site is unique for the plants, production methods and clientele. IPM has to be different from one nursery to another. Developing a set of "good ideas" would allow nursery managers to choose and adapt to their own situation. For monitoring of crops, how can we improve on staff reporting the pest problems?

A "better" monitoring program would be to dedicate one person to this task. This person would take 1, 2 or 3 days per week to tour production areas and look for pest problems. Many nurseries already have an IPM person. When asked about the added cost of this approach, the owners would reply "It is less expensive than our previous approach, which was to spray on calendar dates". An "excellent" monitoring program would be to develop an in-house calendar of seasonal pest problems. The pest manager uses historical data to prepare a list of pests to be expected at different times of the year. This calendar helps anticipate a problem rather than react to the damage.

An IPM program has many components. Besides monitoring, there is also prevention, identification, thresholds, treatment selection and evaluation. The same questions were asked for every component of IPM: What is the current status in Canadian nurseries? What would be a better approach? What is "excellence" as practiced

today? A full report of the findings is expected later this year.

Symposium: Pest Management in Riparian Habitats

Pest Management in Riparian Habitats: Issues and Mixed Agendas. Dave Trotter, Sustainable Agriculture Management Branch, BC Ministry of Agriculture. Dave works in the areas of agroforestry, riparian management and Environmental Farm Planning. Previously, Dave was employed as an IPM extension specialist in reforestation nurseries, early plantation establishment, forest health and constructed wetlands. He is a registered professional agrologist.

Weed Ecology and Management in the Riparian Zone. Linda Wilson, Plant Health Manager, BC Ministry of Agriculture. Linda has amassed over 33 years of weed management experience, from spraying invasive weeds in northern BC, to research including invasive plant ecology, applied weed biology and ecology, developing and implementing classical biological control using insects and plant pathogens, as well as providing technical and educational program support to field personnel and land managers in the US and Canada.

Vertebrate Corridors in Riparian Habitats. Art Guité, Rid Pest Services. Art is a Professional Agrologist and Registered Public Health Inspector. He is the owner operator of Ridpest Service Ltd. established in 1982. Art has extensive experience as a pest manager, Environmental Farm Plan Advisor , Farm Advisor to the Poultry Industry, third part auditor for Crop Life (pesticide warehouses), and the Canadian Nursery Certification Institute's *P.ramorum* Certification Program and their Clean Plants Program.

Spotted Wing Drosophila in Hedgerows: Trapping Results and Implications for Management. Kristine Ferris, Berry IPM Consultant, E.S. Cropconsult Ltd. Krisitne specializes in IPM for berry crops, monitoring for insects and diseases in commercial berry growing operations and providing growers with information on pest management.

Summary: Spotted Wing Drosophila (SWD) is an invasive pest first confirmed in the Fraser Valley in 2009. Female SWD are able to lay their eggs in soft-skinned, otherwise healthy fruit using their saw-like ovipositors. Larval feeding then causes the fruit to become soft, leaky and unmarketable. SWD poses a significant threat to the berry industry in British Columbia. Cultivated hosts include raspberries, blueberries and strawberries. Confirmed wild host species include Himalayan blackberry, salal, red elderberry and thimbleberry. These species are present in hedgerow areas on many farms in the Fraser Valley and may be serving as a reservoir for SWD populations. Trapping studies in 2010 and 2011 indicated that hedgerows are a preferred overwintering site for SWD, and that the highest numbers of SWD are caught in hedgerow trapping areas compared to field edges and field middles. These studies also indicated that SWD are moving from hedgerows into field edges, and then from field edges into field middles. Management options for hedgerow areas are limited, as hedgerows serve as habitat for beneficial species and are often part of protected riparian areas. However, the results of our studies may enable growers to make risk assessments of hedgerow areas on their farms, target insecticide sprays to edges of fields nearest these areas, and target wild host species for removal from hedgerows.

What's a farmer to do? Farmers caught in the middle, and **Environmental Farm Planning.** Darrell Zbeetnoff. As a Principal of Zbeetnoff Agro-Environmental Consulting and partner in Environmental Farm Planners Ltd., Darrell has provided agriculture industry-related services in BC for over 30 years, and has completed over 100 Environmental Farm Plans and over 20 associated riparian assessments and management plans for BC farmers.

Benefits & Ecological Services Provided by Farmland to Local Communities. Mark Robbins. Regional Agrologist, BC Ministry of Agriculture. Mark is a Regional Agrologist for the central Fraser Valley with the Sustainable Agriculture Management Branch, Ministry of Agriculture, Abbotsford, BC. In addition, Mark operates a free range chicken and turkey farm in Aldergrove.

Waterfowl and Crop Depredation on the Lower Fraser. Olga Lansdorp, Field Technician, Delta Farmland and Wildlife Trust. For the past two

winters Olga has been working for Delta Farmland & Wildlife Trust. She is responsible for monitoring waterfowl use of farm fields in Delta, BC. The data is being used to assess the capacity of cover crops to mitigate grazing damage to perennial forage fields and refine cover crop management practices.

Partnerships in Riparian Restorations. Kristine Schlamp, Abbotsford Soil Conservation Association, and Kwantlen Polytechnic University.

Boxwood blight, a serious concern for Canadian nurseries. Mario Lanthier, Crop Health Advising and Research.

New Perspectives on Riparian Pest Management. Dave Polster, Polster Environmental Services, Ltd. Dave is a plant ecologist with over 30 years of experience in vegetation studies, reclamation and invasive species management. He has developed a wide variety of reclamation techniques for mines, industrial developments and steep/unstable slopes as well as techniques for the re-establishment of riparian and aquatic habitats.

Summary: Riparian areas are critical to the ecological systems of British Columbia. If rivers, lakes and streams are the life blood of the Province, then riparian ecosystems are the blood vessels. Farms are where our food comes from and with Peak Oil local farms are going to be increasingly important. There are important ecological goods and services that riparian areas provide to farms and agricultural production. Riparian ecosystems and specifically the root systems of woody riparian plants help prevent soil loss due to flooding and erosion. For instance, riparian buffers can help reduce the smells coming from agricultural operations. There are a wide variety of things that healthy riparian ecosystems provide for farmlands. For instance, a babbling brook may ameliorate nutrients from an agricultural area through the aeration caused by the water flowing over rocks and logs and the aquatic organisms that may in turn rely on the organic matter that comes from over-hanging vegetation to do their work. Physical heterogeneity increases biodiversity so there may be one type of organism living on the upstream side of a rock and another on the downstream side and these two may provide different services in terms of cleaning up the agricultural run-off. Riparian buffers can serve as biodiversity corridors, creating important links between habitats. Temporal heterogeneity increases biodiversity so animals may use one ecosystem during one season and another during a different season. Riparian areas can provide pathways between these. Similarly, the dynamics of riparian areas creates temporal heterogeneity so a large flood may open sites to invasion by pioneering species that would then be replaced over time by later successional species creating different habitats that can be exploited by different species. A uniform bank of reed canary grass does not provide this.

Biodiversity is important because biodiversity contributes to ecological resilience (Holling 1973). Resilience incorporates that idea of redundancy so a diverse riparian area (not the reed canary grass and blackberry cloaked slopes that are common) are essential for resilience. Resilient ecosystems can recover more readily from unexpected insults and can adjust to changes in climate and assaults by new pests. Riparian areas are dynamic places so the resiliency must also be dynamic. Redundancy is one way ecosystems create resilience so for instance, the important service of erosion control provided by riparian areas might consist of emergent aquatic vegetation such as bulrushes as well as the woody species of the adjacent shore area. A fire rages through, taking out the woody species, but because the riparian ecosystem has redundancy, the bulrushes provide the erosion protection service until the forest recovers.

Restoration is the tool that can be used to build healthy riparian ecosystems. By restoring degraded riparian areas we can return important ecological services that may have been unknowingly lost. The theory of trophic cascades suggests that when parts of the ecosystem are lost, functioning riparian areas are an important part, other things, some of which can be un-expected, are lost. So degradation of the riparian areas in the Province has probably contributed to the decline of salmon populations, but may also contribute to the spread of diseases such as West Nile Virus. These ecological goods and services can be important contributors to the health, and therefore productivity of agricultural systems. Ecological studies have shown that biodiversity and productivity are linked through features such a niche complementarity. Riparian areas might

provide habitat for predators on agricultural pests therefore enhancing agricultural productivity. The goods and services provided to agricultural areas, such as pollination, from healthy riparian areas are important. In terms of pest control, natural systems play a major role, although this is rarely recognize this until those services are lost due to degradation of the ecosystems – Then there is the question why there is a pest-outbreak.

There are many interconnected parts to riparian ecosystems, prey and predators play a role as do the physical structure of ecosystem. Many of these roles are unknown but as Aldo Leopold (Leopold 1949) advised – the first rule of intelligent tinkering is to save all the parts. Healthy riparian ecosystems can also help to limit the movement of agricultural chemicals and nutrients off the fields and into local waterways. One of the most beautiful things about these natural systems is that they provide these services for free as long as we take care of the systems. There are many opportunities to create improved riparian ecosystems. A site where a spring fed ditch in a blueberry field can be made into excellent habitat for young salmon with a band of riparian vegetation along the edges. Improved riparian areas provide natural services that can help address pest issues as well as providing enhanced profits for farms.

References:

- Holling, C.S. 1973. Resilience and stability of ecological systems. Annu. Rev. Ecol. Syst. 4: 1-23.
- Leopold, A. 1949. A Sand County Almanac. Oxford University Press Inc.

Endnotes

Upcoming Meetings and Events

- **Entomological Society of Canada:** The 2012 Joint Annual Meeting between the Entomological Society of Alberta and the Entomological Society of Canada will be held November 3-7, 2012 at the Coast Edmonton Plaza Hotel in Edmonton, Alberta. http://www.esc-sec.ca/

- **Entomological Society of British Columbia:** The 2012 AGM & Symposium will be held October 11-12, 2012 at the Pacific Agri-Food Research Station in Summerland, BC. http://blogs.sfu.ca/groups/esbc/meetings/

Electronic Publishing

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Website

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Pesticulars Submissions

We are always looking for pest management topics to publish. If you or know of others who have information to relay, exciting research to share, or upcoming events that you would like posted in one of our issues, please contact us at ppmabc@sfu.ca, or directly contact an executive member.

KEEP YOUR EYES ON THE WEBPAGE; Information on the 2013 AGM will be coming soon!

The Annual General Meeting and Symposium will be in February 2013; please plan to attend!