BC Cranberry Research Commission Research Report

Cranberry Dieback Disorder – 2007 Summary

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Finding the cause (or causes) of Cranberry Dieback Disorder (CDD) was identified as a priority by the BC Cranberry Research Committee. A project to conduct the research leading to discovering the causal agents and then to develop some effective management strategies, was funded by the industry and the Investment Agriculture Foundation. The work was undertaken by Dr Sheila Fitzpatrick, Dr Tom Forge and Dr Siva Sabaratnam. The following is a brief summary of the findings of the work done in 2007.

This is the first comprehensive investigation of "Cranberry Dieback Disorder", which is the common name given to symptoms of cranberry vine decline recently observed by cranberry growers in British Columbia. A total of 37 growers representing 41 cranberry farms were contacted and interviewed about symptoms of vine dieback on their farms. Vine decline and death that was clearly associated with Dearness scale infestations, or cranberry girdler feeding damage, or poor drainage, or herbicide damage was not considered to be Cranberry Dieback Disorder (abbreviated CDD). Symptoms of CDD begin in spring when uprights lose their lower leaves, remaining leaves take on a copper or burgundy colour, and upright stems become grey and dead looking. Later in summer, areas affected with CDD show as small or large blackened areas in the cranberry bed. Beneath the uprights, affected runners have blackened areas or cankers at rooting or branch points. Affected vines may be well rooted or poorly rooted. CDD does not kill all growing points on a vine, and vines can re-root and recover if affected areas are sanded or top-dressed with another substrate.

The major pathogenic fungal genera recovered from symptomatic runner tissue were *Allantophomopsis* (causal agent of Black Rot, a post-harvest fruit rot), *Coleophoma* (casual agent of Ripe Rot, a post-harvest fruit rot), *Colletotrichum* (causal agent of Bitter Rot, a post-harvest fruit rot), *Pestalotia* (potential causal agent of post-harvest fruit rot), *Phyllosticta* (causal agent of Early Rot, a pre- and post-harvest fruit rot and blighting of flowers, leaves and stems), *Fusarium*

and *Rhizoctonia*. Although the detection of fruit rotting fungi in cranberry beds highlights the significance of their presence in BC cranberry fields and importance of managing such pathogens in cranberry beds to minimize pre- and post-harvest fruit rot, their association with or role in CDD may not be significant. Several Oomycetes (fungi-like organisms, commonly referred to as water moulds or "protists", e.g. *Phytophthora* and *Pythium*) were also isolated from the runners and roots and will be identified based on their morphology and molecular characteristics. Runners with brown pith were consistently infected with the fungus *Cryptosporiopsis actinidiae,* which causes rot or canker disease on other plant species. It is possible that *C. actinidiae* may play a significant role in Cranberry Dieback Disorder Complex. A basidiomycete fungus was isolated from blackened areas on runners. Blueberry Scorch Virus was detected in samples from four sites, and Blueberry Shock Virus was detected at one site. These viruses are not known to produce symptoms or damage to cranberry.

Phytophthora cinnamomi, which causes root and runner rot in other cranberry growing areas, may or may not be implicated in CDD in BC. DNA consistent with *P. cinnamomi* DNA was isolated from several symptomatic and asymptomatic farms, most of them in Pitt Meadows. Results imply imply low levels of the pathogen in the soil. However, *P. cinnamomi* has not been cultured from symptomatic roots, runners, or surrounding soil, therefore it is premature to make a conclusive statement about whether or not *P. cinnamomi* is a causal agent of CDD in BC.

Nematode analyses were conducted on samples from each of 40 beds, including several non-symptomatic beds. The plant-parasitic nematodes *Helicotylenchus* spp. (spiral nematodes) and *Mesocriconema* spp. (ring nematodes) were found in 39 and 30 percent of symptomatic beds, respectively. While cranberry is known to be a good host for these nematodes, little is known of their pathogenicity. *Hemicycliophora* spp. (sheath nematodes), which are known to be pathogenic and widely distributed in east coast beds, were found in only 13 percent of the BC bogs. Of particular interest, *Paratrichodorus* spp. (stubby-root nematodes), which are known to be pathogenic to cranberry, were found in 47 percent of the symptomatic beds. Ten beds had no plant-parasitic nematodes, 11 beds had one species, 11 beds had two species, 6 beds had three species, and 2 beds had 4 species. The average number of nematode species per bed varied across growing areas, with Richmond beds averaging 2.2 species per bed, Pit Meadows averaging 0.8 species per bed, and Delta averaging 0.7 species per bed.

Paratrichodorus spp. and *Hemicycliophora spp.* appear to be the nematodes most likely to be causing damage in BC cranberry beds. Both of these groups of nematodes are ectoparasites. They preferentially feed on root tips and undifferentiated elongating cells near root tips, thereby disrupting root elongation, causing 'stubby' roots or witches-broom symptoms, and reducing overall root growth without necessarily causing noticeable lesions or necrotic areas.

These nematodes were not found in a few beds with extreme CDD symptoms, however, and nematodes do not appear to be the primary cause of the dieback disorder in BC (if there is a single cause). These nematodes are nonetheless likely to be having negative effects on cranberry health and productivity, but the extent of their effects is unclear.

In summary, the considerable amount of observation, sampling and analysis revealed several plant pathogens and plant-parasitic nematodes previously unrecorded from BC cranberry farms, and ruled out cranberry girdler as a contributing factor in CDD. No pathogen, nematode, or complex of pathogens or nematodes was <u>consistently</u> associated with symptoms of CDD. Future research will help determine which of the most likely pathogens and nematodes are implicated.