

Plain Language Research Summary - AgriScience Grape & Wine Cluster 2023-2024

Activity 13: Grapevine red blotch virus: insect vector biology and ecology

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1. What is the overall focus of this research activity?

Red blotch disease caused by grapevine red blotch virus (GRBV) is a new and important problem in grapes in North America. Secondary spread of GRBV is occurring in some regions, but the ability of insects to transmit GRBV is not well understood, particularly in Ontario. In this proposal, we will build on our previous research showing that a planthopper, *Melanoliarus*, and buffalo treehoppers, *Stictocephala*, can acquire GRBV. We will focus on determining the ecology and biology of *Melanoliarus*, and whether grapes are feeding and reproductive hosts, including for its soil-dwelling/root-feeding immature stages. Research has focused on insect adults transmitting GRBV to grape leaves and stems, but acquisition of GRBV through root feeding may also occur for *Melanoliarus*. We will conduct experiments with planthoppers and treehoppers to determine whether GRBV can be transmitted from GRBV-infected vines to uninfected vines, while focusing on insect-virus interactions that may inhibit the circulation of the virus within insects and thus its transmissibility. Finally, we will determine the phenology and movement of planthoppers and treehoppers to work towards recommendations for management of these potential GRBV vectors. Overall, the goal of the projects is to provide new insights about the secondary spread of GRBV by insects in Ontario so that the grape industry can take appropriate action to mitigate losses due to GRBV.

2. What are the main progress updates/milestones in terms of work that was done on this research activity this year?

Very little progress was made in 2023-2024 due to the unavailability of research funds. Several collection methods for *Melanoliarus* adults at 1 vineyard site in Niagara were tried. Blacklight trapping and Malaise trapping would be passive methods to collect, but blacklights caught no *Melanoliarus* and Malaise traps very few. Sweep netting in vegetation around vineyards still appears to be the best way to collect, but is time and labour intensive. We placed collected *Melanoliarus* on several potted, cage grape vines, but they did not survive more than a few days and did not appear to lay any eggs.

3. What is this research activity's intended impact on the Canadian grape and wine industry? What benefits could/will the growers, wineries, consumers, etc. see as a result of this research?

Studying vector biology and ecology directly addresses research priorities of virus identification, mitigation, and effects, while also addressing management of vectors to prevent GRBV spread. If *Melanoliarus* nymphs are identified as important GRBV vectors, this will be a significant finding, given that all previous studies have only investigated transmission by flying adult insects. Integrated management efforts may then be also be expanded to soil-applications of insecticides or biological control agents (e.g., entomopathogenic fungi or nematodes). New knowledge of GRBV transmission pathways and the biology of the insects responsible will contribute to strengthening the economic growth of the grape and wine industry in Canada. Grape production systems can be modified and improved to mitigate losses due to GRBV through future implementation of smarter integrated pest management strategies for GRBV vectors. Such strategies will be aimed at promoting environmental sustainability through use of alternative controls such as biologically-based insecticides or improving the biodiversity and abundance of biological control agents.

4. Do you have any communications materials, publications, or other content related to this research activity that you would like CGCN-RCCV to share? If so, please provide a brief description here and either link it here or send the file as an attachment along with this summary.

N/A