**Ontario Grape and Wine Research Inc.**

**MVIP Reporting – Interim Report**

## Section 1: Project overview

**1A.** Grapevine Virus Diseases and Virus Vector Control

**1B.** March 2020

### 1C. Executive Summary

- The temporal and spatial distribution of grapevine leafroll and red blotch diseases was determined in red and white vinifera as well as hybrid variety blocks in the major grape growing areas using a medium-density sampling procedure.
- Intended outcomes were met.

### 1D. Description of project activities

- Petiole samples were collected from 20 panels from each of 44 vineyards in Ontario, including Niagara and Lake Erie North Shore.
- Samples were submitted to CCOVI lab for testing for grapevine leafroll-associated-3 and grapevine red blotch viruses using PCR.
- Petiole samples were collected in 2019 from individual vines at each of the 3 vineyards where individual vines were sampled in 2018. Samples were submitted to CCOVI lab for testing for GLRV-3 and GRBV.
- The effect of solo and co-infections with GLRaV-3 and GRBV on fruit yield and quality were determined.
- Foliar ABA was applied once or twice starting at veraison to vines infected with GRBV. Fruit was harvested and yield and Brix were determined, and bud samples were collected monthly to determine LTE.
- Mealybug populations were monitored from April through October in 4 vineyards.

### 1E. Project Outcomes (Actual vs. Expected)

*a) Short-term*

- 40 vineyards in Niagara and 4 in Lake Erie North shore were sampled for GLRV-3 and GRBV. Vineyards in Prince Edward County were not sampled due to lack of grower response. One of the LENS vineyards was not sampled because leaves had dropped by the time the vineyard was identified.
- The 3 vineyards that were sampled vine-by-vine in 2018 were sampled and geolocated in 2019.
- Brix was determined for fruit from GRBV infected vines with different ABA treatments. Cold hardiness data will continue to be collected through the winter and vine vigor will be evaluated based on pruning weight.

*b) Long Term*

- Vines infected with GLRaV-3 or GRBV produce fruit that is lower in sugar and other quality components (anthocyanins, etc.). In order for Ontario growers to consistently produce high quality fruit and wines, it is critical that baseline levels of virus infection be established and management strategies for the diseases be understood for Ontario conditions.
- GRBV spread in the commercial vineyard conditions was evaluated using sentinel vines
- ddPCR methods for GRBV and GLRaV-3 were standardized.
- Management of vectors of the 2 viruses is critical to maintaining the health and viability of virus-free vines.

**Section 2: Project Success to Date**

| **Project Successes**<br><br>Set out any successes in relation to the Project to date. Provide an explanation of the successes. Insert additional rows as needed. | |
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| **Success** | **Explanation** |
| 44 vineyards were sampled for GLRaV-3 and GRBV | Vineyards in Niagara and Lake Erie North Shore were sampled for viruses. At each site, a composite sample of each of 20 5-vine samples was collected and submitted to CCOVI for PCR testing for GLRaV-3 and GRBV. |
| Vineyards were sampled for spatial temporal monitoring of virus distribution | 3 vineyards (1 Chardonnay, 1 Cab franc, 1 Vidal) that were sampled vine-by-vine in 2018 were resampled and tested for GLRa-V3 and GRBV. Individual vines were geolocated. |
| Preliminary evaluation of impacts of solo and combined infections of GRBV and GLRaV-3 on bud hardiness. | Vines sampled monthly throughout the winter to determine LTE values as a measure of cold hardiness. |
| Preliminary trial to test ABA for mitigation of GRBV infection | ABA was applied at veraison and 2 weeks later at 4 vineyards (1 Chardonnay, 1 Riesling, 2 Cab franc). Fruit yield and Brix were determined. Buds have been tested monthly to determine effect of GRBV infection and ABA treatment on bud cold hardiness. |
| Early detection and investigation on biology of vectors of GLRaV-3 | Mealybug and scale populations were monitored in 4 vineyards in Niagara from April through October. Temperature and vine phenology were also monitored. |
| Evaluated the secondary spread of GRBV in the commercial vineyards | Experiments conducted to evaluate the insect mediated spread of GRBV in two commercial vineyards in the Niagara region using sentinel vines and proved that the secondary spread is possible in high disease and insect pressure conditions. Studies |

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| | on identifying the possible insect vectors are underway. |
| ddPCR methods standardized for GLRaV-3 and GRBV | ddPCR methods were evaluated and being used in the current experiments on sentinel vines and insect species collected in the commercial vineyards in 2019 growing season. |

**Section 3: Project Challenges to date**

| **Project Challenges**<br><br>Set out any challenges that have arisen in relation to the Project to date. Provide an explanation of those challenges as well as what you did to address those challenges. Insert additional rows as needed. | |
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| **Challenges to Date** | **Explanation** |
| No samples from Prince Edward County | Only one grower responded to the call for having vines sampled. Given the time to travel to PEC, the single vineyard was not sampled. |
| Issues with vine-by-vine tracking from 2018-2019 | Confusion regarding vine numbers not appearing to line up from 2018-2019. Each of the vineyards was thoroughly reviewed and we re now confident of the location of each vine for future monitoring. |

**Section 4: Public Relations to Date**

| **Public Relations**<br><br>Set out any communications that you have made in relation to the Project. Include the date(s) in which those communications were made, where they were made, how they were made and a summary of what was communicated. Insert additional rows as needed. | |
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| **Date** | **Communication** |
| February 20, 2020 | Oral presentation Update on grape virus research at Ontario Fruit and Vegetable Growers Convention, Niagara Falls, ON. Approx 75 attendees. Power point will be made available on the OFVC website. |
| March 2, 2020 | Oral presentation for CCOVI lecture series. Update on grape virus research. |
| August 2019 | CCOVI-GGO Webinar series: **Poojari S.** Importance of Grapevine viruses and how to collect samples for virus detection. 2019. http://www.grapegrowersofontario.com/1616 |

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| Feb 2020 | **S. Poojari et al.** 2020. Disease incidence and genetic variability of grapevine viruses under cool-climate conditions of Nova Scotia. Canadian Journal of Plant Pathology. TCJP-2019-0202. |
| September 2019 | Li Y, Mansour H, Wang T, **Poojari S**, and Li F. 2019. Naked-Eye Detection of Grapevine Red-Blotch Viral Infection Using a Plasmonic CRISPR Cas12a Assay. Analytical Chemistry 91 (18): 11510-11513 |
| May 2019 | **S Poojari**. 2019. Grapevine virus sampling 101. Ontario Craft Wine Conference & Trade Show. Toronto. 1st May 2019. (Oral presentation/Invited Speaker). |
| July 2019 | **S Poojari**. Importance of virus diagnostics and grapevine leaf and cane sample collection for virus testing. The 19th Bi-annual Enology & Viticulture Conference, Penticton, BC Canada. July 17-18, 2019. (Oral Presentation). |
| Feb 2019 | **S Poojari.** Current advances in understanding grapevine virus diseases. CCOVI lecture series. February 25, 2019 (Invited Speaker). |

**Section 5: Doing things different**

| **Doing Things Differently**<br><br>Knowing what you know now, identify what you would have done differently to date in relation to the Project. Include an explanation as to why you would have done it differently and how doing it differently would have helped in relation to the Project. Insert additional rows as needed. | |
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| **Item(s) Done Differently** | **Explanation** |
| Use geolocation to identify individual vines for sampling | This will improve the accuracy of tracking virus movement from one year to the next. |
| Testing survey samples for grapevine pinot gris virus | The samples collected from 40 vineyards are being tested for an additional virus to study the incidence. |
| Use of sentinel vines to study the spread of virus | Use of sentinel vines was not in the project plan. Since GRBV vector is unknown in Ontario, we used virus-free vines in the commercial vineyards to study the possible insect mediated spread. |