Common Viruses in Interspecific Hybrid Grapes Behave Differently

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over 500,000
over 100,000
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other city
Capital of province or territory
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30% *Vinifera* / 70% hybrids
www.winesofnovascotia.ca
www.winesofnovascotia.ca

Importance of Virus to Nova Scotia?

Importance of Virus to Nova Scotia

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Virology/Virologie

Disease incidence and genetic variability of economically important grapevine viruses in Nova Scotia

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Abstract: Several virus diseases cause damage to *Vitis vinifera* L., but information on their incidence and impact on hybrid cultivars is scarce, particularly under cool-climate conditions. In Nova Scotia (NS), the wine industry is based predominantly on interspecific hybrid cultivars. To understand the occurrence of major grapevine viruses in NS, surveys were conducted in 2016, 2017 and 2018. A total of 965 composite five-vine samples, collected from 35 hybrids and 18 *V. vinifera* vineyard blocks, were tested for grapevine leafroll-associated virus 1 (GLRaV-1), GLRaV-2, GLRaV-3 and GLRaV-4, grapevine fanleaf virus (GFLV), grapevine red blotch virus (GRBV) and grapevine Pinot gris virus (GPGV) by PCR/RT-PCR. Overall, 3.4% of the samples were positive for GLRaV-1, 22.8% for GLRaV-3, 0.9% for GFLV, 4.6% for GRBV and 3.2% for GPGV. None of the 575 samples collected in 2016 and 2017 tested positive for GLRaV-2 or GLRaV-4. Mixed infections by more than one virus occurred in 3% of the composite samples. Of 671 hybrid and 294 *V. vinifera* samples tested, 38.3% and 27.6% were positive for at least one of the viruses (GLRaV-

GLRaV-3 and GRBV Impacts in *Vinifera*

Grapevine Leafroll-Associated Virus 3 (GLRaV-3) & Grapevine Red Blotch Virus (GRBV) - *Vinifera*

GGRBV-3

- White cultivars

- Red cultivars

GLRaV-3 & GRBV - *Vinifera*

Well studied!

- Stunted growth / ↓ photosynthesis
- Delayed maturity: ↓ °Brix / ↑ Acid
- ↓ yield
- ↓ winter hardiness (*not well studied*)


GLRaV-3 and GRBV in North American *Vitis (including hybrids)*

GLRaV-3 and GRBV in North American *Vitis* (*including Hybrids*)

- Relatively little is in the literature
- Typically (but not always) visually asymptomatic…
- **Out of sight out of mind?**


KRDC Hybrid Virus Trials

KRDC Hybrid Virus Trials

Virus impacts: hybrids vs *vinifera* norms

Visual Symptoms & Growth?

- No classic visual virus symptoms (i.e., leaf discolouration / downward rolling of leaf margins) to date (5 years).

- Limited evidence of reduced photosynthesis.

Virus impacts: hybrids vs *vinifera* norms

Reduced °Brix?

- Observed in MF:GLRaV-3 (**-1.8 °Brix**) and Mq:GRBV (**-1.0 °Brix**)

Increased Acid?

- No evidence of increased overall TA
- **BUT** Mq:GRBV showed higher Malic & lower Tartaric

Virus impacts: hybrids vs *vinifera* norms

Reduced Yield?

- No evidence

- ***Increased*** yield MF:GLRaV-3 (> **30%**) and Mq:GRBV (> **10%**)

- ***Increased*** berry size ≈ **10%** for both MF and Mq.

KRDC Hybrid Virus Trials: Results

Nutrients:

- Several impacts on plant nutrient status

Example:

Marquette (Mq) GRBV potassium levels	
Canes	Mq+ (31%) > Mq-
Berries	Mq+ (25%) > Mq-
Leaf petioles	Mq+ (14%) > Mq-
Rachises	Mq+ = Mq-
Leaf blades	Mq+ < Mq- (29%)

Virus impacts: hybrids vs *vinifera*

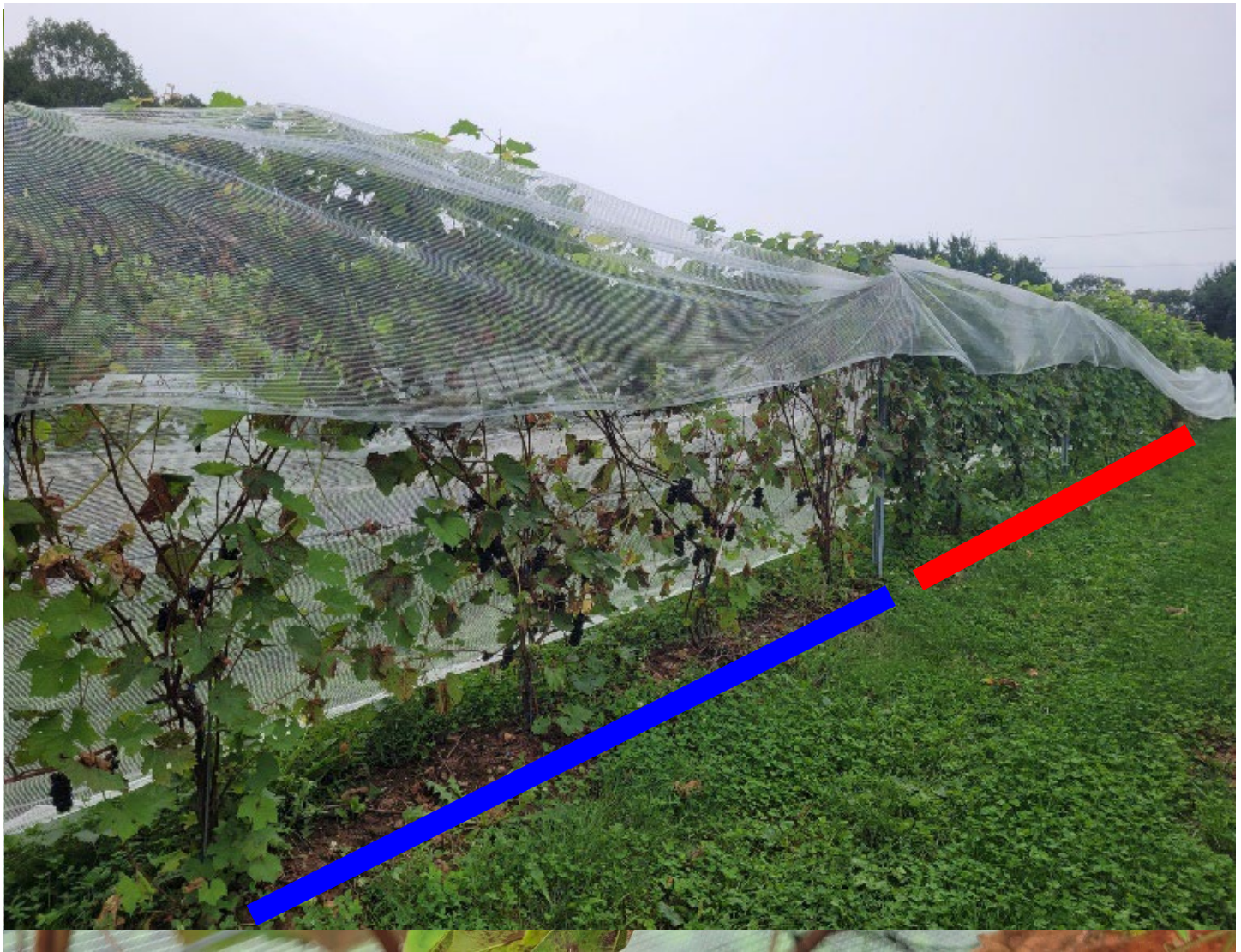
Winter hardiness?

- Marquette GRBV positive: 5 °C ***less*** hardy than virus free plants (early season)
- Seyval blanc and New York Muscat GLRaV-3 positive: 1 °C ***more*** hardy than control plants?


Virus-Enhanced Stress
Response in some Hybrids?

KRDC Hybrid Virus Trials: Results

Maréchal Foch / GVLRaV-3



In Conclusion

- While some virus impacts in visually-asymptomatic hybrids were found to be similar to *vinifera*, others are novel.

- As the vineyard trial ages, future research will continue to explore how viruses may be discretely impacting hybrid physiology.

Acknowledgements / contact / questions?

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CGCN · RCCV
Réseau canadien de certification de la vigne

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