

Evaluation of a berry cuticle supplement to reduce cluster rots in vineyards

A progress report to the New York Wine & Grape Foundation

Co-Principal Investigators

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Objective: Evaluate the effectiveness of a proprietary oil/wax formulation, HydroShield, in reducing *Botrytis* bunch rot and sour rot and in improving berry skin firmness.

Materials and methods

On Long Island and in the Finger Lakes, plots were established to assess differences between untreated and HydroShield treated berries. Disease incidence and severity was evaluated when berries reached harvest maturity, by examining 20 clusters per replication and visually estimating the percentage of the cluster affected by *Botrytis* and/or sour rot. The incidence of each disease was calculated from these data on the basis of the percentage of clusters showing severity values greater than zero. Berry firmness was assessed as an indicator of the berries' ability to resist cracking and egg-laying, and was measured using a digital penetrometer, Agricultural Solutions model FHP-801 Fruit Firmness Tester. This model was recommended for soft fruit including grapes.

Long Island

Plots were established in the LIHREC Sauvignon Blanc (12 panels) and Pinot Noir (3 panels). Vines were trained to a VSP system and were leaf pulled by hand to maintain airflow through the cluster zone. Sprays were directed at the cluster zone with a CO₂ backpack sprayer using ~ 90 GPA water, 50 psi, 3 passes/side. In each 4-vine panel, two vines were treated, two served as untreated controls. HydroShield was applied @ 0.5% v/v solution on the following dates: July 10, 24; August 7, 21 and September 5. Data collection for Pinot Noir took place on September 17 and for Sauvignon Blanc on September 23. The SB had no cluster rot, only penetrometer readings were done.

Finger Lakes

Plots were established at the FLGP's Teaching & Demonstration Vineyard on Seneca Lake. The trial was conducted on Riesling, a cultivar known for its susceptibility to cluster rots. Vines were trained using a VSP system, and had leaves pulled from the fruit zone to mimic commercial practices. We alternated sprayed and unsprayed panels in each cultivar, with four replicates for each treatment, and collected data from two interior vines within each panel. The amount of material and was identical to those used in Long Island, as described above. HydroShield was applied six times during the growing season, beginning when berries were pea-sized in early July and every 14 days thereafter until early September, just after veraison.

Results - Long Island

Cluster rot did not appear to be significantly different in treated and untreated plots with the exception of *Botrytis* in Pinot Noir. It was evident in untreated plots and totally absent from HydroShield plots.

Table 1. Cluster rot, LIHREC Pinot Noir, Sept. 17, 2019

	Untreated			HydroShield	
	Incidence	Severity		Incidence	Severity
Shrivel	90.5	14.8		95.1	14.1
Sour rot	23.0	5.0		46.3	5.2
Botrytis	4.2	10.8		0	0

In both locations, berries were tasted by several people. This was done as a blind tasting so that tasters could not see the berries as HydroShield treated berries also had a shinier appearance. Tasters were able to accurately identify HydroShield treated berries as they had a much tougher skin.

Penetrometer readings were very time intensive. We attempted to minimize variability by having a rigorous berry sampling scheme (5 berries/cluster, 10 clusters/plot, all from the exposed eastern side of the cluster, all taken by the same person). We also had the same person conduct all the penetrometer readings. Results were inconclusive, due primarily to the poor performance of this particular unit. If berries had the slightest tear by the attachment point to pedicel, the tip of the penetrometer tended to smash the whole berry rather than just penetrate the skin. It was also evident that, upon penetrating the berry, the force of the downward pressure caused the tip of the penetrometer to hit the solid surface below. It is therefore possible that the reading was derived from this rather than the skin firmness. Also, the unit stated the readings would range from 0.5-5.0 kg/cm². A number of the readings were >6.0.

Table 2. Penetrometer readings, LIHREC Pinot Noir, Sept. 17, 2019

Panel	Control	HS treated
1	4.74	5.23
2	5.23	5.00
3	5.04	5.06

Units – kg/cm²

Table 3. Penetrometer readings, LIHREC Sauvignon Blanc, Sept. 23, 2019

Panel	Clone 376			Clone 530	
	Control	HS treated		Control	HS treated
1	4.94	4.73		5.15	4.87
2	4.85	4.62		5.01	4.61
3	4.62	4.72		4.96	4.71

Units – kg/cm²

Results – Finger Lakes

We did not see any significant differences in cluster rot incidence or severity between the vines treated with HydroShield and the control (Table 1). In contrast to the 2018 season, there was very little sour rot development in Finger Lakes vineyards in 2019. As a result, virtually all of the rots that were found in both treatments were caused by *Botrytis* infections, with no indications of any significant sour rot (lack of vinegar odor or fruit fly activity) in the trial vines.

Table 1. Cluster rot incidence and severity in Riesling

	Incidence	Severity
Control	61.3	17.4
HydroShield	57.0	11.8

Penetrometer data was collected on 4 randomly selected berries from each of 10 clusters from each experimental unit. We used the same penetrometer unit as that used in Long Island, however we modified it by gluing a small nail to the tip of the unit, which reduced the number of smashed berries in our sampling. We did not find any significant difference between skin firmness as measured by our penetrometer (Table 2), however there was a distinct difference (not measured) between the treated and untreated fruit in skin texture when the fruit was chewed in the mouth.

Table 2. Penetrometer readings – Riesling; October 24, 2019

Panel	Control	Treatment
1	8.90	10.17
2	9.73	10.85
3	9.70	9.90
4	10.99	9.51
Mean	9.83	10.11
S.D.	0.86	0.57

Units: Newtons

Conclusion

In 2019, we measured a reduction in *Botrytis* infection incidence and severity in Pinot noir fruit on Long Island. We could not measure differences in skin firmness in any of the cultivars using penetrometers, however we did note that berry skins from clusters treated with HydroShield were significantly tougher when chewed in the mouth. The trial this year was influenced to some extent by the low disease

pressure for rot development this season, especially for sour rot, which may be a factor in the results that we saw this year.

Results from other trials in Oregon have indicated that HydroShield can reduce fruit fly activity in small fruits, including *Drosophila suzukii*, and therefore improve harvestable yields. While we did not see consistent results with the product this past season, we believe that further investigation over more seasons is needed to determine the potential for this product to be a viable tool for management of cluster rots in Eastern vineyards.

Acknowledgements

We wish to thank the NY Wine & Grape Foundation for their generous support of this project and Long Island grape growers for providing matching funds. Many thanks to Vaughn Walton and Clive Kaiser, Oregon State University, for advice and for providing HydroShield.

Appendix

Impact statement: HydroShield, a proprietary oil/wax formulation that purportedly toughens grape berry cuticles, was evaluated for its impact on late season cluster rot and on berry skin firmness. HydroShield reduced Botrytis in two of three plots. From a sensory standpoint, HydroShield definitely toughened the berry skin as it was much harder to bite into the berries.

Publications

Articles are planned for Suffolk County Agricultural News (scheduled for May, 2020; circ. 330) and the Finger Lakes Vineyard Update (circ. 410).

Summaries will be posted to the CCE-Suffolk County Grape Program website (>2400 hits in 2019) – <http://ccesuffolk.org/agriculture/grape-program> - and the Finger Lakes Grape Program website – <http://flgp.cce.cornell.edu>.

Presentations

All presentations were prepared considering results from both regions.

- July 31, 2019 – Plant Science Day, Long Island. 12 growers toured plots.
- Sept. 4, 2019 – LIHREC Vineyard tour, Long Island – 15 growers toured plots.
- Dec. 11, 2019 – Walter-Peterson gave a zoom presentation at CRAVE, Cornell Recent Advances in Viticulture and Enology, 33 attendees.
- December 13, 2019 – Long Island: Walter-Peterson traveled to Long Island for a joint presentation with Wise on the project. It was very well-received by the 24 growers in attendance.
- February 28, 2020 – Wise will travel to Rochester to give a joint presentation with Walter-Peterson at the B.E.V. NY conference.