

PROGRESS REPORT

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

A progress report to the New York Wine & Grape Foundation

January 2022

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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.

Activities/Methods

On Long Island and in the Finger Lakes, research trials were established to assess differences between untreated and HydroShield-treated berries. Treatments varied according to time and number of applications. The number of spray applications was purposely kept to a minimum to reflect concerns about the high cost of cuticle enhancing products. Disease ratings, fruit ripeness and berry skin toughness were assessed in the week prior to harvest.

Disease incidence and severity was evaluated by examining a set number of clusters per replication and visually estimating the percentage of the cluster affected by *Botrytis* and/or sour rot. The incidence of disease was calculated from these data based on 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 by fruit flies. The digital penetrometer used in 2019 and 2020 (Agricultural Solutions model FHP-801 Fruit Firmness Tester) functioned erratically so we elected to find an alternative. A single Turoni FruitFirm meter was purchased (funds from another source), recommended by a CALS colleague. According to the company literature, this is a 'small, hand-held, self-contained device for non-destructive firmness testing of kiwifruit and other produce.' The company assured us that this would be appropriate for grapes. Samples were collected from the eastern side of the trellis only.

Long Island: Two trials were implemented in commercial blocks of Pinot Noir and Sauvignon. At both sites, vines were trained to a VSP system and were leaf pulled to maintain airflow through the cluster zone. Prior to spray application, supplemental hand leafing was required in both blocks to facilitate spray penetration. Sprays were directed at the cluster zone with a CO2 backpack sprayer using ~ 90 GPA water, 40 psi, 3 passes/side. HydroShield was applied @ 0.5% v/v solution using the treatments below. Each treatment had five replications (panels). Pinot Noir treatments were applied July 13 and August 4; Sauvignon Blanc treatments were applied July 11 and August 10. Data was collected from interior vines within the panel.

Table 1. HydroShield treatments, Long Island

Treatment	Spray timing	
	<i>Bunch closure</i>	<i>Veraison</i>
1	X	---
2	---	X
3	X	X
4	---	---

For the assessment of fruit firmness, five berries from the exposed side of the cluster were selected from each of four clusters on two vines. Twenty berries were assessed for firmness in each of the five replicates.

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 established four replicates of each treatment listed below, and collected data from two interior vines within each panel. The material was applied with a backpack sprayer to the fruit zone, at a concentration of 0.5% by volume. The dates for each application are shown in Table 2.

Table 2. HydroShield treatments, Finger Lakes

Treatment	Spray Timing		
	<i>Pea-sized berries (7/1)</i>	<i>Bunch closure (7/15)</i>	<i>Veraison (8/10)</i>
1	X		
2		X	
3			X
4	X	X	
5		X	X
6	X	X	X
7	untreated		

Results - Long Island

Cluster rot infections were overwhelmingly sour rot. While *Botrytis* occurred and was noted, the very low incidence was not included in the incidence and severity ratings. At both sites, two applications of HydroShield slightly reduced the severity of cluster rot infections. Incidence was also slightly reduced

though, curiously, not statistically significant in the Sauvignon Blanc. None of the treatments had a significant impact on berry weight, Brix, pH or titratable acidity (data not shown).

Table 3. Sour rot incidence and severity – Long Island, 2021

Trt	Trt timing	Sept. 10		Sept 15	
		% cluster rot, Pinot Noir		% cluster rot, Sauv. Blanc	
		Incidence	Severity	Incidence	Severity
1	bunch closure	86.0	20.1 a	42.8	4.43 ab
2	veraison	90.0	19.6 a	52.2	5.97 a
3	BC + ver	83.8	15.7 b	36.9	3.83 b
4	untreated	85.0	18.2 ab	43.5	6.51 a
	Significance ¹	ns	0.03	ns	0.0006

¹ Values are significantly different at $p=0.05$. ns – not significant.

Fruit firmness

The Fruitfirm device has a range of 0-100 units. There is no specified unit of measure, rather, results are relative. A total of 100 berries/treatment were tested. The results were not statistically significant. In 2020, differences between treated and untreated berries were detected from a sensory standpoint as treated berries were much firmer. However, in 2021, there was disagreement among staff as to which treatment had the firmest berries.

Table 4. Long Island fruit firmness ratings, 2021

Trt	Treatment timing	Pressure ¹	
		Sept. 10 Pinot Noir	Sept. 15 Sauvignon Blanc
1	bunch closing	13.85	13.36
2	veraison	14.12	13.67
3	BC + Ver	13.67	13.73
4	untreated	13.56	13.58

¹ Tester does not use specific units of measure. Results are relative. Values are not significantly different at $p=0.05$.

Results - Finger Lakes

Disease incidence and severity

We did not see any significant differences in incidence or severity of *Botrytis* or sour rot infections due to the treatments in 2021. Sour rot incidence was much higher in all treatments than botrytis, but severity was still very low. Overall, levels of bunch rots were higher than they were in 2019 and 2020, but were still low compared to what many growers experienced with their Riesling crops in 2021. The low levels of rot in this trial were primarily due to the data for this trial being collected prior to October, when over 8.5" of rain was recorded for the month. Had this data been collected just prior to when this fruit would have been harvested, incidence and severity for both diseases would likely have been much higher.

Table 5. Incidence and severity of botrytis and sour rot in Riesling – Finger Lakes. September 30, 2021.

Treatment	Botrytis Incidence (%)	Botrytis Severity (%)	Sour Rot Incidence (%)	Sour Rot Severity (%)
1	14.1	1.3	29.8	3.5
2	10.1	1.3	35.7	4.4
3	13.9	1.7	38.3	6.2
4 (Trmt 1+2)	8.5	0.4	24.0	3.6
5 (Trmt 2+3)	17.1	0.7	45.8	3.3
6 (Trmt 1+2+3)	8.7	0.2	53.4	5.0
Control	6.7	0.4	36.6	3.5

Fruit firmness

We did find small, yet statistically significant, differences in fruit firmness between all of the treatments and the unsprayed control (Table 6). However, based on the results shown in Table 5, these differences did not have an influence on the amount of bunch rot that developed in these treatments compared to the control. As was the case last year, it was still possible to sense a difference in skin “toughness” between sprayed and unsprayed berries when chewed between the teeth.

Table 6. Finger Lakes fruit firmness ratings; October 1, 2021

Treatment	Pressure
1	12.38 ab
2	12.56 a
3	12.62 a
4	12.56 a
5	12.36 ab
6	12.57 a
Control	11.57 b

Conclusion/Next Steps

The increased pressure for cluster rot development this year made this a better season for evaluation of this material. However, we did not see consistent and practical differences in the amount of rot that developed between the different treatments this past season. In both sites, differences in either fruit firmness or disease development did not correlate with the other parameter, making it difficult to make any conclusions about a connection between fruit and skin firmness due to the material and disease incidence or severity.

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 would like to continue this trial for one more season with an increase in the number and adjustment to timings of the applications to determine if this material could be used by eastern grape growers as another tool to manage late-season rots.

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 Dr. Clive Kaiser, formerly of 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, it was apparent that HydroShield toughened the berry skin as it was much harder to bite into the berries.

Publications

Suffolk County Agricultural News article, May, 2020 and May, 2021 (circ. 330)

Finger Lakes Vineyard Update article, August 12, 2020 (circ. 410).

Summaries were posted to the CCE-Suffolk County Grape Program website (>2000 hits in 2021) –

<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 – B.E.V. NY conference – Walter-Peterson presented. Wise was scheduled to travel to Rochester to give a joint presentation but flight was canceled. 175 attendees
- Canceled: April, 2021 Grape Pest Management (LI); LIHREC Plant Science Day, Aug. 2021 (presentation and tour/discussion of LIHREC vineyard, respectively)