

NYWGF RESEARCH - FINAL REPORT

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

Co-PI Investigators with contact info:

Alice Wise, Sr. Issue Educator/Viticulturist
Cornell Cooperative Extension of Suffolk County
423 Griffing Ave., Suite 100, Riverhead, NY, 11901
Ph. 631.727.3595; fax 631.727.3611; avw1@cornell.edu

Hans Walter Peterson, Senior Viticulture Extension Specialist
Finger Lakes Grape Program
417 Liberty Street, Suite 1024, Penn Yan, NY 14527
Ph. 315.536.5134; fax 315.536.5117; hcw5@cornell.edu

New Research **Continued Research**

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Project Summary Impact Statement:

In years when there is plenty of rain and humidity during the ripening period, cluster rots can establish and spread quickly in vineyards. These rots can cost growers hundreds of dollars an acre in lost revenue, and also negatively impact wine quality. Chemical controls are available to manage these diseases, but they are expensive and prone to the development of resistance in the target organisms, which has already been found in New York. This project evaluated a material called *HydroShield* that thickened the berry cuticle, in hopes of making it less prone to the cracking and splitting that allow cluster rots to get established. We found very little effect of *HydroShield* on cluster rots over the three years of this trial, and therefore cannot recommend it to New York growers.

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

Materials & 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 timing and number of applications. Timing was skewed early as *Botrytis* can become established pre-veraison if conditions are favorable.

Berry firmness was assessed as an indicator of the berries' ability to resist cracking and egg-laying by fruit flies. A single Turoni FruitFirm meter was purchased (funds from another source),

Incidence and severity ratings were conducted on October 4, 2022, approximately three days before harvest. Twenty clusters were rated within each replicate from the 8 interior vines. Samples of 50 berries were collected from the same vines for fruit chemistry and average berry weight data. Fruit firmness data was collected using the Turoni instrument, testing 40 berries within each replicate.

Results/Outcomes/Next Steps:

Long Island

Cluster rot evaluations

The Sauvignon Blanc had no cluster rot. Cluster rot infections in the Pinot Noir were overwhelmingly sour rot. *Botrytis* occurred at very low levels and was not included in the ratings. For incidence, there was a statistical difference only between untreated and the five-application treatment. For severity ratings, the untreated plots had slightly higher levels of cluster rot compared to two of the treatments. However, the very low levels of sour rot suggest that there was no practical difference between treatments. Low levels of cluster rot in 2021 and 2022 potentially undermined results in this experiment.

Table 3. Sour rot incidence and severity, Pinot Noir, Long Island, 2022

Trt	Trt timing	Sept. 7 % cluster rot, Pinot Noir			
		Incidence ¹		Severity ¹	
1	3 apps	22.96	AB	0.66	AB
2	4 apps	21.22	AB	0.62	B
3	5 apps	9.28	B	0.38	B
4	untreated	27.06	A	1.35	A

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

Berry skin firmness measurements

The Fruitfirm device has a range of 0-100 units. There is no specified unit of measure, rather, results are relative. A total of 150 berries/treatment were tested. The results for Pinot Noir were not statistically significant. There were statistical differences for Sauvignon Blanc; however, the differences are not meaningful in practical terms. This firmness meter was difficult to operate and often inconsistent. It is unlikely that the much higher firmness readings in Pinot Noir represent tougher skins than those found in Sauvignon Blanc. While several colleagues have related that there is a reliable firmness meter on the market, it is prohibitively expensive for modest extension research projects.

Table 4. Berry skin firmness results, Long Island, 2022

Trmt	Trmt timing	Pinot Noir ¹ Sept. 7	Sauvignon Blanc ² Sept. 14	
1	3 apps	17.98	13.44	B
2	4 apps	17.57	15.48	A
3	5 apps	17.55	14.88	A
4	untreated	17.85	14.96	A

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

² Values are significantly different at $p=0.001$.

Fruit quality measurements

There were no differences between treatments in either block in berry weight, °Brix, TA or pH. Data available upon request.

Sensory tests for berry skin firmness

In 2020, differences between treated and untreated berries were detected from a sensory standpoint as treated berries were much firmer. However, in 2021 and 2022, there was disagreement among staff as to which treatment had the firmest berries. Unfortunately, this was the case in both blocks.

Finger Lakes

Cluster Rot

We found no statistical difference between any of the treatments in either incidence or severity of cluster rots (Table 5). Similar to our trial in 2020, cluster rot incidence and severity were both very low compared to most years due to the dry conditions in the Finger Lakes starting in early September.

Table 5. Cluster rot incidence and severity. Collected 10/4/22.

Treatment	Incidence %	Severity %
1	21.25	1.58
2	31.25	3.65
Control	21.25	2.08
<i>p-value</i>	<i>0.1715</i>	<i>0.1687</i>

Fruit Chemistry and Berry Weight

No differences were found in average berry weight or Brix levels between any of the treatments. We did measure a slight reduction in titratable acidity (TA) and increase in pH in Treatment 1 compared to the other two (Table 6). It is unclear what could explain this difference based on how HydroShield works. One thought was that HydroShield may have reduced berry transpiration slightly, meaning more water remained to dilute the acidity in the berry. However, the average berry weight in Treatment 1 is no different than the others, so it appears unlikely that would be the cause.

Table 6. Average berry weight and fruit chemistry

Treatment	Avg berry wt (g)	Brix	pH	TA
1	1.23	19.5	2.85 a	9.40 b
2	1.24	19.3	2.80 b	10.53 a
Control	1.28	19.2	2.79 b	10.38 a
<i>p-value</i>	<i>0.6185</i>	<i>0.6606</i>	<i>0.0381</i>	<i>0.0091</i>

Fruit Firmness

We used the same Turoni unit that was used in Long Island to measure firmness (see above for more details). While there is a trend of fruit and skins becoming slightly firmer with the application of HydroShield, it is not statistically significant (Table 7).

Table 7. Berry skin firmness. Measurements are unitless.

Treatment	Fruit firmness
1	30.9
2	29.6
Control	29.1
<i>p-value</i>	<i>0.3465</i>

What's next?

While there were occasional instances where HydroShield seemed to result in a small decrease in cluster rots, they were not consistent across years and significant enough to likely be economically viable for most growers. We will continue to evaluate non-chemical options to help manage cluster rots in vineyards, but because of the lack of results and HydroShield's unavailability commercially, we will no longer evaluate it for use in New York vineyards.

Technology Transfer Plan

Long Island – A PowerPoint presentation was given Jan. 12, 2023 at the Viticulture Session of the Long Island Agricultural Forum (28 attendees). A research report will be posted to CCE-SC grape program website, <https://ccesuffolk.org/agriculture/grape-program>. A summary will be included with the LIHREC Annual Report which will be posted on-line.

Finger Lakes – The results from this trial will be communicated to Finger Lakes growers by means of a summary article that will be posted on the Finger Lakes Grape Program website - <https://blogs.cornell.edu/flxgrapes/>. They will also be included as part of a larger discussion about sour rot management at the 2023 Spring Grape IPM meeting, which is attended by about 100 growers each year.

Attachments: See photos attached to this final report.

SECTION 3: *(The goal of this research is to benefit growers and producers across New York State. Result summaries will be shared on the NYWGF website and via email newsletters. To that end, this section should be brief and written in terms understandable for the average grower and producer, as well as consumers and trade interested in our industry.*

Project summary and objectives:

HydroShield is a proprietary oil/wax formulation that purportedly thickens the cuticle layer that surrounds grape berries, making clusters potentially less susceptible to late season cluster rot. HydroShield was evaluated in vineyard research trials on Long Island and in the Finger Lakes. Cluster rot, berry skin firmness and ripeness characteristics were evaluated on three different rot-prone cultivars – Pinot noir, Sauvignon blanc, and Riesling. Cluster rots can cost growers hundreds of dollars per acre in lost revenue in some years, and can negatively impact wine quality for the wineries. Unfortunately, there were only minor differences between treatments in the level of cluster rot in each year of this trial.

Importance of research to the NY wine industry: Cluster rot is a significant pest management challenge for NY grape growers, resulting in both yield and quality losses. This project was an attempt to use a proprietary biofilm product to toughen berry skins, thereby reducing cluster rot. This work reflects the goals of many grape growers to reduce pesticide use in favor of low impact pest management methods. If HydroShield successfully reduced cluster rot, conventional pesticides targeting cluster rot microorganisms and fruit flies (which spread cluster rot) could be reduced or eliminated. Unfortunately, the efficacy of HydroShield in reducing cluster rot was minimal, and therefore we cannot recommend its use for this purpose in New York vineyards.

Project Results/next steps: Repeated applications of HydroShield started in mid-July and continued every 7-14 days through August. A few treatments resulted in minor reductions in cluster rot incidence and severity compared to untreated plots, but results were not consistent enough across all the years of this trial to consider it worthwhile to continue to investigate its use. Because HydroShield is not available commercially and there are no plans to pursue this avenue, this project will not be continued.

Photo 1. Riesling grapes in Control treatment. Photo take October 4, 2022.



Photo 2. Riesling grapes in Treatment 2 (applied every 14 days; 6 total sprays). Notice the difference in appearance between the berries in the control treatment (Photo 1) and the berries with HydroShield applied to them.

