

NYWGF RESEARCH - FINAL REPORT

Funding for fiscal year: 2024-2025

Project title: Improving crop estimation for Concord grape production in the Finger Lakes region

Principal Investigator:

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New Research ☒ **Continued Research** ☐

Amount Funded \$ 39,849

Project Summary Impact Statement: The goal of this project was to demonstrate the use of NDVI data to improve crop estimation in Concord vineyards in the Finger Lakes region.

Objectives:

- Improve crop estimation in Concord vineyards in the Finger Lakes region to better manage vineyard productivity and health, and to improve harvest logistics.
- Demonstrate how the MyEV mapping tool can help growers to better understand and visualize conditions in their vineyards and how they can use that to make more informed management decisions.

Materials & Methods:

Five commercial Concord vineyards in the Finger Lakes were selected for this project, all of which are in Yates County, NY. Each vineyard operator was asked to choose one block of Concord that, based on their experience, had a high amount of variability in it relative to their other blocks.

At bloom (May 31 – June 4), FLGP staff scanned each of the five blocks using NDVI sensors that were connected to a GPS-enabled data logger. This data was uploaded to the MyEV platform and mapped for each of the cooperating farms. Zones of low, medium and high vigor (correlated to relative NDVI values) were identified in each block, and three sampling points were selected within each zone for sampling thirty days later.

Approximately thirty days after bloom, field staff from Gallo and the FLGP collected yield samples from each block based on the NDVI maps. The sampling protocol and crop estimation

methods were like those described by Terry Bates[1]. The crop weight for each sample was used to calculate the potential yield for the block. Each grower was asked to make their own yield prediction for the subject blocks using whatever method they use. The actual yield for each block was recorded by Gallo staff at harvest for comparison to the two yield estimates.

Results/Outcomes/Next Steps:

Table 1 contains a summary of the data from this project. Overall, our estimates were approximately 15% off from the actual yields at harvest, while the grower estimates were off by just over 10%. The accuracy of the NDVI-based estimates was similar to, or better than, the grower estimates at Farms A, B, and C. At Farms D and E, the NDVI-based estimates significantly overestimated the actual yields (21% and 31%, respectively). There are a few potential reasons for these overestimates: 1) our estimates did not take into account the number of missing vines in the block, 2) the final berry weight was lower than our estimate predicted, and 3) sampling error. It is likely that all three of these played a role in our overestimate to some extent. Failure to account for missing vines is a likely explanation as to why four of the five NDVI estimates were higher than the actual harvest yield. At two of the five farms, we met our desired error rate of 10% or less.

Table 1. Summary of in-field estimates and final yield and % error.

Block ID	NDVI Estimate	Grower Estimate	Final Yield	% Error NDVI	% Error Grower	Abs. Avg. NDVI % Error	Abs. Avg. Grower % Error
Block A	14.1	11.5	12.8	10.2	-10.2	15.7	10.9
Block B	17.4	18.2	15.4	13.0	18.2	15.7	10.9
Block C	10.4	10.5	10.7	-2.8	-1.9	15.7	10.9
Block D	12.5	10.6	10.3	21.4	2.9	15.7	10.9
Block E	15.9	9.5	12.1	31.4	-21.5	15.7	10.9

Outcomes & Next Steps:

We will not be conducting this study again in 2025, but are still working to help growers to improve their crop estimates each year. We will be continuing to do NDVI scans in a couple of Finger Lakes vineyards (both Concord and *vinifera*) as part of this effort. While we did not achieve the level of accuracy in 2024 that we had hoped for, work with this technology in other parts of the U.S. have shown that it has potential to improve crop estimation in both “high wire” and “low wire” systems. This further work may lead to a new project proposal that would be submitted for funding in the future.

Technology Transfer Plan

None currently on this particular project but work on improving crop estimation for growers will continue and be reported on as tools and techniques are developed.

SECTION 3:

Project summary and objectives: Crop estimation in Concord vineyards relies on collecting samples from random locations in the vineyard, which often does not end up fully representing the actual variation in soil conditions, vine size and health, and other factors that can influence

yield. In this project, we used NDVI sensors to assess the variation in vine size within several Concord vineyards and create maps of that variation to better inform decisions on where to collect samples to estimate final yields at harvest. These estimates were compared to final yields at the end of the season to see if this technology could help to improve crop estimation for Concord grape growers.

Importance of research to the NY wine industry:

The ability to estimate crop yields accurately during the growing season continues to be a challenge for most growers, especially when vineyards are impacted by winter injury and spring frosts. Accurate crop estimates can help with harvest logistics, giving growers and their buyers a sense of how much fruit is available for harvest, and if there will be an excess or shortage that can be planned for before harvest. It can also lead to improved fruit quality by indicating if crop yields are high enough as to make ripening more challenging.

Project Results/next steps:

In this project, the accuracy of our yield estimates was similar to or better than those of three of the five participating growers, although we only met our desired accuracy of 90% or better at two of them. We identified potential factors that could explain some of the error in our estimates and will begin taking them into account in our follow-up work. We will not be continuing this project in 2025 but will continue to work on improving crop estimates with growers in the Finger Lakes region.

