



VITICULTURE RESEARCH PROJECTS

PROGRESS REPORT

April 1, 2019 – January 17, 2020

Project Title: Identifying clean nursery stocks for a sustainable New York viticulture

Principal Investigator: Marc Fuchs

Co PI's, Collaborators: n/a

Objectives:

- 1.- Index vine stocks at NY nurseries for detrimental viruses
- 2.- Communicate virus test results to the NY State Department of Agriculture and Markets in support of a certification program
- 3.- Disseminate information on the production of virus-tested, clean stocks and ongoing efforts to reinstate a grape certification program in NY to the wine and grape industry

Viruses can be major threats to a profitable and sustainable viticulture by reducing vine growth, fruit yield and quality, as well as by limiting the productive lifespan of vineyards. Viruses are primarily transmitted by vegetative propagation and grafting, although some of them can secondarily be transmitted by insect vectors in vineyard settings. The proposed project is designed to collaborate with local nurserymen on the production of virus-tested, clean grapevine stocks in support of a NY grape certification program. In conjunction with the NY State Department of Agriculture and Markets, vine stocks (scions and rootstocks) at NY nurseries were extensively indexed for viruses in the Fuchs lab at Cornell AgriTech using established protocols.

Leaf samples from increase vineyard blocks at three NY nurseries (Double A Vineyards, Hermann J. Wiemer nursery and Amberg Grapevines) were collected by NYSDAM horticultural inspectors. Collected samples were placed in plastic bags, labeled, and delivered to Fuchs' laboratory. Sample information on the vineyard origin, nursery owner, rootstock or cultivar identity was concealed from the Fuchs program.

A total of 33,152 grapevine leaf samples were collected in June-August of 2019 by NYSDAM and shipped to the Fuchs program. Samples were processed and tested for the presence of grapevine fanleaf

virus (GFLV), arabis mosaic virus (ArMV), tomato ringspot virus (ToRSV) and tobacco ringspot virus (TRSV) by DAS-ELISA using specific antibodies (Table 1). Results showed the occurrence of tomato ringspot virus (0.27%, 88 of 33,152) and grapevine fanleaf virus (0.14%, 46 of 33,152) in a very few samples. None of the samples were found infected with arabis mosaic virus or tobacco ringspot virus (Table 1). Test results were communicated to NYSDAM in a timely manner and infected vines were removed from the respective nursery increase vineyards.

Table 1: Summary of virus test results in grapevine samples collected in spring of 2019.

Grapes	N	ToRSV*	TRSV	ArMV	GFLV
Spring 2019	33,152	88	0	0	46

*ToRSV: tomato ringspot virus, TRSV: tobacco ringspot virus; ArMV: arabis mosaic virus; GFLV: grapevine fanleaf virus

In addition, a total of 32,073 grape samples were collected in September-December 2019 by NYSDAM and shipped to the Fuchs program. Samples were processed and tested for grapevine leafroll-associated virus 1 (GLRaV-1), grapevine leafroll-associated virus 2 (GLRaV-2), grapevine leafroll-associated virus 3 (GLRaV-3) and grapevine leafroll-associated virus 4 (GLRaV-4) by DAS-ELISA using specific antibodies (Table 2). Results showed the occurrence of grapevine leafroll-associated virus 1 (0.3%, 91 of 32,073), grapevine leafroll-associated virus 2 (0.11%, 34 of 32,073), grapevine leafroll-associated virus 3 (0.2%, 56 of 32,073), and grapevine leafroll-associated virus 4 (0.02%, 6 of 32,073) in a few samples (Table 2). Test results were communicated to NYSDAM in a timely manner and infected vines will be removed from the increase vineyards before the start of the 2020 growing season.

Table 2: Summary of virus test results in grapevine samples collected in fall of 2019.

Grapes	N	GLRaV-1*	GLRaV-2	GLRaV-3	GLRaV-4
Spring 2019	32,073	91	34	56	6

*GLRaV-1: grapevine leafroll-associated virus 1; GLRaV-2: grapevine leafroll-associated virus 2; GLRaV-3: grapevine leafroll-associated virus 3; GLRaV-4: grapevine leafroll-associated virus 4

The processing and testing of the 32,073 fall samples for grapevine red blotch virus by PCR is still underway. They will be completed by the end of January 2020. It is anticipated that the level of infection with red blotch virus will likely be extremely low (<0.1%).

Outreach activities

Project results were communicated to the wine and grape industry on Long Island:

Fuchs, M. 2020. Multipronged approaches for red blotch and leafroll virus control. Long Island Agriculture Forum, January 9, Riverhead, NY.

Communication efforts focused on raising awareness in terms of the value of virus-tested, clean stocks,; impact of viruses on vineyard productivity and fruit quality; and status of the NY grape certification program.

Impact Statement

Partial indexing result revealed that only 1% (321 of 33,152) of the leaf samples collected from vine stocks at three local nurseries and tested for eight viruses in spring and fall of 2020 were infected. These data do not consider the fall testing for grapevine red blotch virus; they will be updated as soon as test results are available. Nonetheless, the number of vines infected with a detrimental virus in increase vineyards managed by the three NY nurseries is very low. This is very encouraging for the reinstatement of a grape certification program in NY. However, the number of infected vine stocks identified so far is still too high in terms of a credible certification program. This is because a single infected vine can theoretically produce an average of 250 buds for grafting. By using 250 buds for grafting, it is possible to produce 150 grafted vines, assuming a very conservative 60% graft take. If one is further conservatively assuming that only 50% of the buds collected from virus-infected vines actually contain a virus, a total of 75 virus-infected vines can be produced annually from a single infected vine stock. This means that a single infected source vine can have huge consequences in the dissemination of viruses with all the documented consequence on poor vine performance in a vineyard. Consequently, our objective is to continue achieving a zero-tolerance level for detrimental viruses in increase vineyards managed by nurseries in NY. Our continued efforts will support the reinstatement of a NY grape certification program with unprecedented and unique high standards, and provide a competitive edge to the thriving NY grape, juice and wine industries.