

Final Report

TITLE: Developing Methods for Use of Own-rooted *Vitis vinifera* Vines in Michigan Vineyards

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OBJECTIVES:

- (1) To determine the ability to culture varieties of the species *Vitis vinifera* on a long term basis with a combination of own-rooted vines and the use of the insecticide spirotetramat.
- (2) To develop and provide growers with effective vine establishment and vine management systems for own-rooted vines of the *Vitis vinifera* species under Michigan growing conditions.

RESULTS AND DISCUSSION: The overall goal of this project was to develop methods of establishing own-rooted *Vitis vinifera* grapevines from cuttings as rapidly as possible, to then treat those vines in various ways with the insecticide spirotetramat and then to evaluate the long term performance of those vines under Michigan growing conditions. Spirotetramat (tradename Movento) is registered for the control of Phylloxera and nematodes of grapevines. Can this chemical strategy for control of Phylloxera replace the need for a Phylloxera-resistant rootstock when growing grape varieties of the species *Vitis vinifera* on Phylloxera-infested soils?

The most rapid establishment of a vineyard from hardwood cuttings is possible when both the propagation of the vines and the planting of the vineyard is accomplished in one step. Therefore, our strategy was to plant hardwood cuttings directly into the vineyard site. So that these cuttings might have the best chance for rapid growth and survival, we employed a concept, which we have called a "mini-nursery." Cuttings were placed into the ground and surrounded by a potting soil mix. This nurtures the cutting in regard to both water availability and nutrition. Additionally, the soil surface around the cutting was sealed with a woodchip mulch and then trickle irrigation was supplied to these cuttings to insure adequate moisture to the cuttings. Weed control proximate to the cuttings was achieved in several ways to minimize the competition of weeds with the cuttings for nutrients and water. The initial work in this project involved planting of fully dormant cuttings. One trial consisted of planting cuttings 6, 12, 18 or 24 inches in length. In the second stage of this work, the onset of shoot growth from these

cuttings was advanced by treating cuttings in various ways. One technique involved the callusing of cuttings before planting, either in a heated callusing box or the traditional method of inverting cuttings near the surface of the soil as it was warming up in the spring. Another method involved potting of dormant cuttings into a soil mix and placing them in a warm, sunny location.

2013 Planting - Cuttings of the variety Gruner Veltliner were evaluated for a third time in 2015. This evaluation took place after vines in this trial had experienced two episodes of severe winter injury and two episodes of a spring freeze. Despite those stresses, 98% of the vines originating from cuttings were alive and growing well in 2015. Grafted vines were also planted in this trial to compare their performance with own-rooted vines, which were grown from cuttings as described above. The 2015 evaluation revealed that 10% of the vines grafted with the C3309 rootstock and 20% of the vines grafted with the 5C rootstock had perished. Own-rooted vines in this planting averaged shoot growth 6-8 feet long by the end of the 2015 growing season.

There are replicated treatments in this planting for varying times of application of the insecticide spirotetramat. Treatments are: (a) Control – no application, (b) one application per year, (c) two applications per year and (d) one application every three years. As of 2015, there were no differences in the performance of vines among these treatments.

2015 Plantings

- (1) Cabernet Sauvignon Planting** – Certified cuttings of Cabernet Sauvignon (Clone 191) were prepared for planting as (a) dormant cuttings, (b) callused cuttings or (c) cuttings potted with a soil mix. In addition, grafted vines (101-14 rootstock) of clone 33(191) were planted for comparison with the cuttings treatments. Vines and cuttings were planted on 6/3/15. They were managed by mulching and trickle irrigation. Counts of plant survival and the length of the longest shoot on each vine were taken on 9/15/15. These data indicate that 100% of the plants in this trial were successfully established in 2015 (Table 1). The length of the longest shoot (LLS) on each vine was measured as an indication of the extent of growth of these plants. The LLS for vines grown from cuttings averaged 37 cm with range among the treatments of 36 to 39 cm. The vines grown from rooted vines on rootstock 101-14 had an average LLS of 48 cm.

Table 1. Cutting survival and the length of the longest shoot on grapevines grown on rootstock 101-14 or from cuttings for the varieties Cabernet Sauvignon and Gruner Veltliner. Data recorded on 9/15/15.

<u>Treatment</u>	<u>Cabernet Sauvignon</u>		<u>Gruner Veltliner</u>	
	Plants Alive (%)	Longest Shoot (cm)	Plants Alive (%)	Longest Shoot (cm)
Dormant Cutting	100	39	90	23
Bench-Callused Cutting	100	36	76	24
Soil-Callused Cutting	————	————	98	30
Potted Cutting	100	38	100	59
Grafted	100	48	————	————

(2)Gruner Veltliner Planting – Cuttings of Gruner Veltliner were prepared for planting and managed through the growing season as described above. They were planted on 6/9/15. The percent of vines alive at the end of the 2015 growing season ranged from 76 % to 100 % for four types of cuttings used (Table 1). Cuttings prepared for planting as potted cuttings had considerably more shoot growth than the other types of cuttings and the LLS averaged 59 cm (Table 1).

Layering Trial – The viticultural practice of layering is another strategy for creating an own-rooted vine. Canes of the variety Cabernet Sauvignon were planted as layers in a 15 year-old vineyard. Evaluation of these layers on 8/2/15 indicated that 302 out of 358 or 84% were successfully established. A trial, which utilized green shoots to establish layers, was established during the time period from 7/20/15 to 9/24/15. Evaluation of these layered green shoots in December, 2015 indicated that all of them had matured into canes. Those shoots used for layers in July also exhibited considerable root initiation.

Interplanting of Cuttings - Cuttings of the variety Marquette were planted between existing mature vines of the table grape variety Vanessa. The purpose of this trial is to determine if interplanting of cuttings may be a viable strategy for transitioning from one variety to another in an existing mature vineyard. 100% of these cuttings exhibited growth in the 2015 growing season.

TIME PERIOD OF STUDY - This project began in 2013 and will continue through 2016. The grant funded this work from 1/1/15 to 12/31/15.

METHODS – See the grant proposal for methods used in this study.

COMMUNICATION ACTIVITIES The following activities were held in 2015 and portions or all of these meetings contained information developed in this project.

Zabadal, T.J. and J Wells. Propagating own-rooted vines in the vineyard from cuttings and layers. January 13, 2015. The Northwest Orchard & Vineyard Show. Acme, MI

Zabadal, T.J. and Jenny Wells. Recovery from Winter Injury. February 4, 2015. The Southwest Michigan Horticultural Days. Benton Harbor, MI

Zabadal, T.J. and Jenny Wells. Growing Own-rooted *Vitis vinifera* grapevines. February 4, 2015. The Southwest Michigan Horticultural Days. Benton Harbor, MI

Zabadal, T.J., D. Francis and J. Wells. Under-trellis Sod as a Vineyard Management Tool. February 5, 2015. The Southwest Michigan Hort Days. Benton Harbor, MI.

Zabadal, T. J. June 3, 2015. Evaluating Winter Injury to Grapevines. MSU Extension Meeting. Baroda, MI

Baughman, B., J Wells and T. Zabadal. July 29, 2015. Inter-planting for Changing Varieties in a Vineyard. 26th Annual MSU Viticulture Field Day. Benton Harbor, MI

Zabadal, T., Jenny Wells and M. DeSchaaf. July 29, 2015. Growing Own-rooted *Vitis vinifera*. . 26th Annual MSU Viticulture Field Day. Benton Harbor, MI

Zabadal, T. and J. Wells. August 10, 2015. Layering to Renovate a Winter-Injured Vineyard. Terrace Hill Vineyards. Watervliet, MI

Zabadal, T.J. August 10, 2015. The Third Growing Season for Gruner Veltliner grapevines, which were started from dormant cuttings. Terrace Hill Vineyards. Watervliet, MI

Zabadal, T.J. September 24, 2015. Rebuilding Winter-Injured Vineyards. Lake Michigan College Enology & Viticulture Class. Terrace Hill Vineyards. Watervliet, MI

Zabadal, T.J. September 24, 2015. Grape Phylloxera and Growing Own-rooted *Vitis vinifera* grapevines. Lake Michigan College Enology & Viticulture Class. Terrace Hill Vineyards. Watervliet, MI

Zabadal, T.J. and Jenny Schoonmaker. November 18, 2015. Recovering from Winter Injury to Vineyards. MSU NW Horticultural Research Station. Traverse City, MI

Zabadal, T.J. and Jenny Schoonmaker. November 24, 2015. Recovering from Winter Injury to Vineyards. MSU Southwest Michigan Research & Extension Center. Benton Harbor, MI

IMPACT- This project has developed vine propagating techniques that several commercial wine grape growers are now evaluating. It is too early to know if the insecticide spirotetramat is capable of supporting sustainable production on own-rooted *Vitis vinifera* grapevines in Michigan. However, the early results are encouraging and impressive. It has been possible to develop full vine size of a *Vitis vinifera* vineyard (Gruner Veltliner variety in just two years from the time of planting of dormant cuttings Figure 1.)



Figure 1. A Gruner Veltliner vineyard in Southwest Michigan. Vines were planted as dormant cuttings in June, 2013. Picture taken on July 28, 2015.

BUDGET NARRATIVE - This project utilized the resources of this grant as originally proposed with one exception. Because there had been extensive winter injury to vines in this project (and throughout the Michigan wine grape industry), it was decided that it would be necessary to use temperature monitoring equipment in the plots of this experiment. This resulted in additional material cost expenditures.

The Bayer Crop Sciences corporation contributed approximately \$1500 worth of the insecticide Movento for use in this project.

ABSTRACT Wine grape varieties of the species *Vitis vinifera* are recognized worldwide for producing the very best wine quality. Recently chemical control of root Phylloxera may be a possible alternative to grafting for *V. vinifera* production. This project is evaluating that option along with methods for the rapid establishment of own-rooted *V. vinifera* grapevines. Results to date have indicated as little as a two-year period for establishment of productive vines, no decline in own-rooted *V. vinifera* vines and advantages of own-rooted vines in regard to recovery from winter injury. Further evaluation is needed to determine if this technology can provide sustainable *Vitis vinifera* productivity.