

## **SERA014 Progress Report 2005**

### **VITICULTURE PROGRAM Mid-America Viticulture and Enology Center Missouri State University, Mountain Grove, Missouri**

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## INTRODUCTION

Current efforts of the Viticulture Program of the Mid-America Viticulture and Enology Research Center (MVEC) fall within the areas of advisement and research.

## ADVISEMENT

The following activities have been completed during the past year:

1. Grape Pruning Workshops - Rocheport, MO, January 11, 2005  
Hermann, MO, January 12, 2005  
St. Genevieve, MO, January 18, 2005
2. Midwest Grape and Wine Conference - Osage Beach, MO, February 5-7, 2005
3. Missouri Grape Production Short Courses, held at Mountain Grove, MO –  
February 24, 2005; April 7, 2005; May 12, 2005; June 2, 2005;  
July 21, 2005; September 15, 2005 and October 27, 2005
4. Missouri Grape Growers Association Annual Meeting, Rolla, MO - March 9, 2005
5. Viticulture Field Day, Mountain Grove, MO – June 9, 2005
6. Publish *Vintage and Vineyard View* newsletter on a quarterly basis
7. Make site visits for problem diagnosis or site evaluation as requested
8. Publish an electronic advisory for Missouri and regional growers periodically
9. Respond to requests for information by phone, e-mail or letter as needed
10. Vineyard Best Management Practices Project

### **Project Title: Demonstration and Verification of Best Management Practices for Winegrape Production in the Ozark Mountain Region**

The vineyard best management practices demonstration and verification (BMP) project was begun in April, 2005 upon receiving notice of grant approval in late March.

The project is funded jointly by the Missouri Grape and Wine Advisory Board and the Viticulture Consortium East. It is a two-state, three-year project with the following objectives:

- 1) To conduct surveys to establish a benchmark and quantify progress in adopting grape best management practices (BMP) and to identify constraints to implementation in Arkansas and Missouri
- 2) To demonstrate grape best management practices
- 3) To disseminate grape management and insect pest and/or disease event information in a timely manner.
- 4) To produce a Wine Grape Best Management Practices Workbook for use in grower best management practices workshops

Once notice of grant approval was given, six lighthouse vineyard sites were selected and the cooperation of the owners to participate in the project was obtained. The cooperating vineyards are Wiederkehr Wine Cellars in Altus AR, Lynn Gay Farm in Hindsville, AR, Crown Valley Winery in Ste. Genevieve, MO, St. James Winery in St. James, MO, Stone Hill Winery in Hermann, MO, and Les Bourgeois Winery in Rocheport, MO.

Grape berry moth traps and temperature loggers were placed at each site in early April to monitor grape berry moth presence and development. During the second year of the project, when funds are available to do so, the temperature loggers will be replaced with weather stations, as specified in the grant. Japanese beetle traps were set out in June and grape root borer traps were set out in July at each vineyard site. A person at each location was instructed in how to scout for the presence of these insect pests in the traps weekly, and trap counts were reported to Johnson on a regular basis. Allen made regular trips to the Missouri vineyard sites to download the temperature loggers and report the data to Johnson. Johnson and Lewis collected weather data at the Arkansas sites. Trap catch and degree day were posted on the web at <http://comp.uark.edu/~dtjohnso/> for each site.

Allen and Striegler established canopy management demonstration plots at each of the sites and applied the canopy management techniques appropriate for the time of season and cultivar and trellis system used at each location. These techniques included some, but not all (except in one instance), of the following: shoot thinning, shoot positioning, cluster thinning, leaf removal, and all possible combinations thereof. There were problems at some of the sites, including poor disease management, severe drought stress, and inadequate trellis system maintenance, that had an effect on the results. However, differences due to treatments have been seen in the quality of the crop at most of the locations. The plots are now being harvested and the data will be analyzed and presented to the growers at season wrap-up meetings scheduled for October. A benchmark survey of current industry vineyard management practices will be conducted this fall.

The most important aspect of this project is the communication of information to growers in the region. As part of this project, vineyard tailgate meetings were held at each location in May, June, and July. Growers from Missouri, Arkansas, Oklahoma, Kansas, and Illinois were invited to, and were in attendance at, the site nearest their location. Allen and Striegler discussed aspects of vineyard management, including nutrition monitoring and fertilization, canopy and crop load management, fungicide spray programs and pre-harvest intervals, and berry sampling for maturity determination. Canopy management techniques were demonstrated and explained to growers in attendance and their relative beneficial contributions to crop quality and pest management were discussed. Johnson and Lewis discussed identification of the various insect pests and how to monitor for their presence and for damage through trapping and scouting within the vineyard. Insect life cycles and their relation to temperature were explained, and growers were instructed how to determine action thresholds and the most appropriate times to make efforts at controlling each insect pest. Other methods of communicating information are also being utilized. A new website <http://www.mvec-usa.org/> was created for the project and information will be added to the site as it is developed. A BMP workbook will be developed beginning this fall/winter and revised over the course of the three-year project that will defining the

best management practices and how and when they should be applied for maximum benefit.

## **RESEARCH**

A 2003 survey of Missouri growers resulted in the following research priorities:

- 1) Cultivar evaluation with emphasis on adaptability to Missouri conditions  
Key areas: cold hardiness, disease resistance and fruit quality
- 2) Efficient and sustainable production systems for Missouri vineyards  
Key areas: canopy management, nutrition/fertilization, vineyard mechanization, rootstock evaluation and irrigation
- 3) Management of insect pests and diseases  
Key areas: integrated pest management and propagation of virus free material
- 4) Viticultural practices to address issues in production of Norton and Vignoles

Research activities in the Viticulture Program are focused on the above priorities and are as follows:

## **CULTIVAR EVALUATION**

### **Evaluation of New York advanced selection red wine grape cultivars**

R.K. Striegler and J.R. Morris

The wine grape breeding program at Cornell University has produced several advanced selections which may be adapted to the Ozark Mountain Region and may provide winemakers with options for red wine production beyond the currently limited selection of adapted cultivars. These selections include: GR7 (Buffalo x Baco Noir), a very vigorous and highly productive selection that makes a dark red wine with a classical hybrid aroma; NY70.0809.10 (SV 18-307 x Steuben) a vigorous and productive selection that produces a *vinifera* type wine; and NY73.0136.17 (NY33277 x Chancellor x Steuben) a vigorous selection that produces a full-bodied wine with moderate tannin content. This experiment was established to evaluate the suitability of

these advanced selections for red wine grape production and to compare them to standard red wine grape cultivars. The experiment is being conducted in an experimental vineyard at the Arkansas Agricultural Research and Extension Center, Fayetteville, Arkansas that was planted in 2000. The vineyard is drip-irrigated and vineyard spacing is 2.4 m x 3.4 m (vine x row). Vines are trained to a bilateral cordon and spur pruned. A vertical shoot-positioned trellis system with moveable catch wires has been used, and row orientation is north to south. The treatments are: NY70.0809.10 grafted on 3309 rootstock, NY70.0809.10 own-rooted, NY73.0136.17 grafted on 3309 rootstock, NY73.0136.17 own-rooted, GR7 own-rooted, Chambourcin own-rooted, and St. Vincent own-rooted. Data were collected during the 2002 - 2005 seasons. To date, the viticultural performance of Chambourcin has been superior to that of the other cultivars.

### **Evaluation of winegrape cultivars for Missouri and the Ozark Mountain Region**

R.K. Striegler and S. Howard

Grape cultivar selection is an important part of the vineyard establishment process. Planting the right cultivar in an appropriate site can often mean the difference between profit and loss for the vineyard enterprise. In the mid 1990's, hybrid wine grape selections were imported from breeding programs in Eastern Europe (Bulgaria, the Czech Republic, Hungary, Moldavia, Romania and the Ukraine). The viticultural performance of these selections and selections and/or cultivars from breeding programs in Germany and the eastern United States (Cornell and the University of Minnesota) are being evaluated in southern Missouri at the Missouri State University – Mountain Grove campus. All cultivars from Eastern Europe sources are certified free from known viruses before they are planted into evaluation blocks. Control treatments are Norton/Cynthiana (red cultivars) and Vignoles (white cultivars).

Data collection includes dates of important phenological events, dormant pruning weight, yield, components of yield, fruit composition and primary bud cold hardiness. Selected cultivars (those showing superior viticulture performance) are made into wine, and wine chemistry is determined. Initial results indicate that Kozma 55, Laurot and Regent are promising red wine grape cultivars.

## **ROOTSTOCK EFFECTS ON YIELD AND QUALITY**

### **Effects of rootstock on fruit composition, yield, growth and vine nutritional status of Cabernet Franc**

R.K. Striegler, J.R. Morris, G.L. Main and C.B. Lake

An experiment was designed to evaluate the impact of selected rootstocks on fruit composition, yield, vegetative growth, and vine nutritional status of Cabernet Franc grapevines in the Altus viticultural area. This experiment shows results for three seasons (2000-2002) in a commercial vineyard near Altus, Arkansas. Cabernet Franc vines grafted onto 3309 Couderc (control), 110 Richter, Freedom, and 44-53 Malègue rootstocks were planted in 1998. The trellis system was a four-arm Kniffen, and the vineyard was not irrigated. Few statistically significant differences between rootstocks were observed for yield, fruit composition or nutritional status. Vines grafted onto 3309 Couderc rootstock sustained winter injury in 2000/2001 likely due to severe water deficit at veraison. Vegetative growth, as indicated by dormant pruning weight, was greatest for vines grafted onto 110R and Freedom. Fruit from vines grafted to Freedom had higher pH as compared to fruit from other vines. Vegetative growth and field observations suggest that vines grafted onto Freedom might benefit from conversion to a divided canopy due to increased vine size.

### **Effect of rootstock on performance of Chambourcin and Vignoles grapevines**

R.K. Striegler and J.R. Morris

Two of the more important wine grape cultivars for the Ozark Mountain Region are Chambourcin (red) and Vignoles (white). These cultivars are generally planted as own-rooted vines since the use of rootstocks is not widespread in this district nor is there sufficient information on the appropriate combinations of scion/rootstock for optimum productivity and adaptation to the environmental stresses found in the region. A study was established in 2000 at the Arkansas Agricultural Research and Extension Center, Fayetteville, Arkansas to determine the effect of rootstock on productivity, fruit composition and wine composition of Chambourcin and Vignoles. Vines were planted in

a drip-irrigated vineyard with plant spacing of 2.4 m x 3.1 m (vine x row) and a Captina silt loam soil. Vines are trained to a Geneva Double Curtain trellis system and row orientation is north to south. Rootstock treatments are: own-rooted, 5BB Kober, Freedom, 3309 Couderc, 1103 Paulsen, 44-53 Malègue, and 110 Richter.

Rootstock selection did not affect yield or clusters/vine for Chambourcin in 2004. Chambourcin grafted on 44-53 Malègue rootstock exhibited yield that was numerically lower than the other rootstocks but the difference was not statistically significant. All treatments produced high yield in 2004. Cluster weight was highest for vines grafted on 5BB rootstock and lowest for vines grafted on 44-53 rootstock. Own-rooted Chambourcin vines produced berries that had significantly greater weight than berries from vines grafted on 44-53. The number of berries per cluster was not significantly altered by rootstock treatment. Choice of rootstock had a limited effect on fruit composition of Chambourcin vines in 2004. In general, dormant pruning weight was low across rootstock treatments possibly due to the high yield obtained. Vine nutritional status was significantly impacted by rootstock selection.

Rootstock selection had a greater impact on yield and fruit composition of Vignoles than was recorded for Chambourcin in 2004. Yield of Vignoles vines grafted on Freedom rootstock was higher than yield of vines grafted on 110 R rootstock. Clusters/vine was highest for own-rooted vines and lowest for vines grafted on 110 R. Vignoles vines grafted to Freedom produced the largest berries. Percentage soluble solids of fruit from vines grafted on 110 R was higher than for the other treatments. This result may be related to the yield obtained from this treatment which was lower than the yield recorded for the other rootstocks or own-rooted vines. Fruit pH was highest for vines grafted to 3309 rootstock. Titratable acidity was relatively high for all treatments in 2004. Vines grafted to Freedom had higher titratable acidity than vines grafted to 110 R or 5BB. Choice of rootstock had a limited effect on petiole nutrient content or vegetative growth (dormant pruning weight) of Vignoles in 2004.

## **Effect of rootstock on performance of Cynthiana/Norton grapevines**

R.K. Striegler and J.R. Morris

Norton grapevines established at the Arkansas Agricultural Research and Extension Center, Fayetteville, Arkansas in 2001 exhibited a significant yield response to rootstock selection. Vines grafted on 3309 rootstock had significantly higher yield than vines grafted on 44-53 rootstock. The yield of vines grafted on 101-14, 5C, and 1103 rootstocks or own-rooted vines was intermediate. The number of clusters/vine was significantly greater for vines grafted on 3309 than for vines grafted on 5C or 44-53. Cluster weight and berry weight did not differ significantly between rootstock treatments. The number of berries/cluster was highest for own-rooted vines and lowest for vines grafted on 44-53 rootstock.

Rootstock selection had a significant impact on fruit composition in 2004. Fruit pH of vines grafted to 101-14 and 44-53 was greater than the pH of fruit from own-rooted vines. Vines grafted on 5C and 1103 rootstocks had lower titratable acidity than own-rooted vines or vines grafted on 44-53 rootstock. The soluble solids content of fruit did not differ between rootstock treatments.

Rootstock selection had a limited impact on the petiole nutrient content of Norton grapevines. N and Ca levels in petioles were influenced by rootstock treatment. Own-rooted vines had more N in petioles than vines grafted on 101-14 rootstock. Ca content in petioles was higher for own-rooted vines than for vines grafted on 3309, 101-14, and 1103 rootstock.

## **Effect of rootstock on Sunbelt grape yield and composition**

R.K. Striegler, J.R. Morris, and G.L. Main

The yield of Sunbelt grapes grown in Arkansas tends to be lower than Sunbelt yields in California. In an effort to increase fruit yield, a rootstock study was established in 1998 on Sunbelt grapes with own-rooted, Paulsen 1103, Couderc 3309, and T.V. Munson Extra vines. Due to extreme vegetative growth at the site, the experiment was converted from a high wire bilateral curtain to a Geneva Double Curtain system in 2002. Data collected for a two year period on the bilateral cordon vines showed an increase in cluster number and yield when vines were grown on 3309C as compared to own-rooted vines with no difference in soluble solids.

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