VITICULTURE PROGRAM
SERA-IEG-14 REPORT

Mid-America Viticulture and Enology Center
Southwest 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

Andy Allen was hired as the Viticulture Adviser for MVEC in June 2004. The following activities have been completed during the past year:

1. Grape Pruning Workshops - Rocheport, MO, January 13, 2004
   Hermann, MO, January 14, 2004
   St. Genevieve, MO, January 15, 2004

2. Midwest Grape and Wine Conference, Osage Beach, MO - February 7-9, 2004

3. Missouri Grape Production Short Course, Mountain Grove - February 26, 2004; April 1, 2004; May 13, 2004; June 10, 2004; July 22, 2004; September 23, 2004 and October 28, 2004

4. Missouri Grape Growers Association Annual Meeting, Rolla, MO- March 13, 2004

5. Viticulture Field Day, Mountain Grove, MO – June 15, 2004

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

RESEARCH

The following research priorities were compiled from a survey of Missouri growers in 2003:

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 these priorities and are as follows:

CULTIVAR EVALUATION

Evaluation of selected *Vitis vinifera L*. and interspecific hybrid grape cultivars for Arkansas

(R.K. Striegler, K. Woodburn, J.R. Morris and C.B. Lake)

Vitis vinifera L. cultivars have been grown commercially in Arkansas for over 35 years. The most widely planted cultivars are Chardonnay, French Colombard, Riesling, Cabernet Sauvignon and Merlot. Cultivar selection is a key component of successful and profitable viticulture. Growing the right cultivar is critical if growers are to achieve consistent production of high quality fruit. The objective of this study was to evaluate the performance of newer *Vitis vinifera L.* cultivars. The *Vitis vinifera L.* cultivars included in this study were selected on their reported potential to produce high quality wine under warm, humid climate conditions. Selected interspecific hybrids were also evaluated.

The study was conducted at the University of Arkansas Division of Agriculture Fruit Substation near Clarksville. The soil type was a Linkers fine sandy loam and vines were planted in 1999. The vineyard spacing was 2.4m x 3.1m (vine x row). Vines were grafted on 1103 Paulsen rootstock and vines were trained to a vertical-shoot-positioned trellis system. The vineyard was irrigated using a drip irrigation system.

Red and white cultivars were evaluated in separate experiments. White cultivars included in this study were Chardonnay (control), Chardonel, Symphony, Traminette, Viognier and Verdelho. Cabernet Sauvignon (control), Cabernet Franc, Chamborcin, Malbec, Sangiovese, Syrah and Tempranillo were the red cultivars evaluated. The experimental design for each experiment was a randomized complete block with four blocks. Data collection plots consisted of three adjacent vines. Data collected during the entire study included yield, components of yield, fruit composition, and vegetative growth as indicated by dormant pruning weight. In 2003, red wine grapes were analyzed for color. Data were analyzed by analysis of variance and means were separated using the Tukey-Kramer HSD test.

Based on yield and fruit composition parameters, all white cultivars except Symphony performed well under the conditions of this study. Traminette and Verdelho had the highest dormant pruning weight among the white cultivars. Performance was less consistent for the red cultivars. Cabernet Sauvignon, Cabernet Franc, Chambourcin and Syrah performed best based on yield and fruit composition parameters. Dormant pruning weight was greatest for Cabernet Sauvignon and Malbec. These data are preliminary and further research is needed before final recommendations can be made.

Yield, quality and nutraceutical potential of selected muscadine cultivars grown in Southwest Arkansas

(R.K. Striegler, P.M. Carter, J.R. Morris, J.R. Clark, R.T. Threlfall and L.R. Howard)

A muscadine grape (*Vitis rotundifolia*) planting was established in 1996 at the University of Arkansas Division of Agriculture Southwest Research and Extension Center in Hope to provide information on the performance of muscadine grape cultivars in a region where cold hardiness is not a major limitation. The research evaluated harvest parameters, fruit and juice quality, and nutraceutical potential of selected muscadine cultivars grown in southwestern Arkansas. The cultivars evaluated were 'Black Beauty', 'Carlos', 'Cowart', 'Doreen', 'Early Fry', 'Fry', 'Granny Val', 'Ison', 'Jumbo', 'Late Fry', NC67A015-17, NC67A015-26, 'Nesbitt', 'Scarlett', 'Southern Home', 'Sterling', 'Sugargate', 'Summit', 'Supreme' and 'Tara'. Muscadine cultivars differed in productivity and fruit quality. In 2002 and 2003, juice was produced from 'Carlos', 'Granny Val', 'Ison', 'Nesbitt', 'Southern Home', 'Summit' and 'Supreme' grapes. 'Black Beauty' was also processed into juice in 2003. In 2002, 'Nesbitt' grapes had the highest juice yield, 520 L/t (124.6 gal/ton). 'Ison' and 'Supreme' juice had the highest soluble solids level. In 2003, 'Granny Val' grapes had the highest juice yield, 551 L/t (132.0 gal/ton). 'Southern Home' juice had the highest soluble solids.

The press materials of muscadine grapes were a potential source of high levels of nutraceutical compounds. Dried seeds had the highest phenolic and Oxygen Radical Absorbance capacity (ORAC) levels followed by the dried skins, the grapes, and then the juice. The skins of the black cultivars had the highest total anthocyanins level. The 'Supreme' seeds had the highest total phenolic and ORAC levels while 'Ison' skins had the highest total anthocyanins level. Based on yield, harvest and juice quality, cultivars recommended to growers in southwestern Arkansas and other areas with a

similar climate include 'Black Beauty', 'Carlos', 'Fry', 'Granny Val', 'Nesbitt', 'Southern Home', 'Summit' and 'Supreme'.

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 Chancelor 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, AR 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 - 2004 seasons. To date, Chambourcin has proven to be the superior cultivar.

Evaluation of Eastern European cultivars
(R.K. Striegler, M.R.Dharmadakahri, S. Howard and W. Qiu)

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 SMSU – 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, AR 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 had a significant impact on yield and components of yield for Chambourcin in 2003. Own-rooted Chambourcin and Chambourcin grafted on 5BB and Freedom had higher yield than Chambourcin grafted on 44-53. Berry weight and cluster weight were lowest for vines grafted on 44-53. Fruit from 44-53 vines was more mature than fruit from the other treatments. Vegetative growth (dormant pruning weight) and vine nutritional status were also significantly impacted by rootstock selection.

Rootstock effects were less evident for Vignoles grapevines. Yield, yield components, and fruit composition were not influenced by rootstock choice in 2003. There was a limited effect of rootstock on petiole nutrient content. Grafting onto 110 R rootstock significantly increased P and B levels in grape petioles. Vine vegetative growth (dormant pruning weight) was greatest for own-rooted Vignoles and Vignoles grafted on Freedom.

Effect of rootstock on performance of Cynthiana/Norton grapevines
(R.K. Striegler and J.R. Morris)

This study was established in 2001 at the Arkansas Agricultural Research and Extension Center, Fayetteville, AR. Own-rooted Cynthiana/Norton vines and Cynthiana/Norton vines grafted on 3309 Couderc, 101-14 Millardet et de Grasset, 5C Teleki, 1103 Paulsen, and 44-53 Malègue rootstocks were planted into a Captina silt loam soil. Vine spacing is 2.4 m x 3.1 m (vine x row) and vines are trained on a Geneva

Double Curtain trellis system and row orientation is north to south. Yield, components of yield, dormant pruning weight, shoot density, fruit composition, wine composition, and vine nutritional status (petiole samples) data are being collected.

A significant yield response to rootstock selection occurred in 2003. Own-rooted vines had significantly lower yield than vines grafted on 3309 rootstock. Vines grafted on 101-14,1103P, 44-53 or 5C rootstocks produced intermediate yield. Fruit composition was not significantly affected by rootstock selection. Differences in petiole nutrient content and vegetative growth (dormant pruning weight) were also observed during the 2003 season.

Effect of rootstock on Sunbelt grape yield and composition

(R.K. Striegler and J.R. Morris)

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.

INTEGRATED PEST MANAGEMENT

The impact and management of aerial phylloxera on Norton/Cynthiana and Seyval grapes

(D.E. Waldstein, R.K. Striegler and S. Howard)

Grape phylloxera is a key pest in grape growing regions throughout the world. The root feeding form of grape phylloxera was responsible for the devastation of the French wine industry in the 1870's. Control of the root form of phylloxera is achieved by the grafting of susceptible cultivars onto resistant rootstocks. This practice is used for *Vitis vinifera* cultivars where phylloxera is a problem. For French American and American hybrid cultivars, the leaf feeding or aerial form of grape phylloxera is more significant because most of these cultivars have sufficient root tolerance to the root

feeding form of phylloxera. Norton/Cynthiana, Seyval, Vidal, Vignoles, Chambourcin, Chardonnel and Rougeon are commonly grown cultivars in Missouri that have moderate to high susceptibility to aerial phylloxera. In addition to causing leaf distortion, leaf galling by aerial phylloxera can lead to premature leaf drop, delayed fruit ripening and an increased level of root infestations.

Traditionally, endosulfan applied at bloom and 10-14 days later has been used to control aerial phylloxera. Some drawbacks to endosulfan use include phytotoxicity to sulfur sensitive cultivars (Norton/Cynthiana, Rougeon and others) and high toxicity to humans, fish, birds and other wildlife. Danitol (fenpropathrin) is the only other conventional insecticide registered for control of aerial grape phylloxera. Danitol is a restricted use insecticide and some growers are reluctant to use it.

The objectives of this experiment are to compare the effectiveness of Provado, Assail and summer spray oil with conventional aerial phylloxera insecticides, evaluate the effectiveness of timing of spray applications for aerial phylloxera, and determine the impact of aerial phylloxera damage on vine performance. Initial data collection has begun during the 2004 season.

PUBLICATIONS

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