Small Fruit News

the
Southern Region
Small fruits consortium

Clemson University
NC State University
University of Georgia
University of Tennessee

Volume 4, No. 4 October 2004

In this Issue:

Special Reports

Drip Irrigation Rates for Muscadine Grapes

S. Scott NeSmith
University of Georgia – Griffin Campus

Muscadine grape (*Vitis rotundifolia* Michx.) is an important small fruit crop in the southeastern U.S., both for commercial operations and for home gardeners. The species of grape is well adapted to the heat of the southeast, and is quite common in the wild. However, little is known about the water requirements of this crop in relation to yields. Research has shown positive responses of vinifera grapes (*Vitis vinifera* L.) to drip irrigation (Bucks et al., 1985; Grimes and Williams, 1990; Hamman and Dami, 2000), yet, a study with muscadine grapes indicated little benefit from irrigation (Austin and Bondari, 1988).

The southeastern U.S. has experienced near record droughts in the past few years, and this has caused increase concern for efficient utilization of irrigation resources. Therefore, muscadine growers need to have additional information on how irrigation should be used in the production of their crop. The objective of this research was to determine the response of established muscadine grape vines to different rates of daily irrigation.

Materials and Methods

This research was conducted during 1997 through 1999 in an established 'Southland' muscadine vineyard located on a University of Georgia Experiment Station Research Farm near Griffin, Ga. The soil at the site was a Cecil sandy clay loam (Typic Hapludult). The vineyard was 5 years old at the onset of this irrigation experiment, and plants were previously irrigated only a limited amount to assist in establishment. Plant arrangement in the vineyard was a 10 ft spacing in the row and a 12 ft spacing between rows. Plants had been trained to a single-wire trellis, and annual pruning was conducted. Weed control, fertilization, and disease control measures were those typical of a commercial vineyard (Krewer et al., 1999).

In late spring 1997, drip irrigation plots were installed on the plants. There were four irrigation regimes: no irrigation, or rates of 4, 6, or 8 gallons per day (GPD) per plant. The irrigation rates were achieved using emitters with different flow volumes (1.0, 1.5, or 2.0 gallons/hour). Two emitters of the desired flow volume were placed 1 ft from the base of the main trunk in opposite directions in the plant row. All irrigation was ran for 2 hours daily, beginning in late May and running through the middle of October each year. Emitter output was checked each season by using catchments and measuring the volume of water over a specified time interval. Each irrigation plot contained three plants and was replicated four times. Precipitation and pan evaporation data were obtained from a weather station of the Georgia Automated Environmental Monitoring Network (http://www.griffin.uga.edu/bae/), located less than 1000 yards from the vineyard. Yields were determined each year from one (1999) or two (1997 and 1998) harvests. Fruit were hand-harvested from the center plant of each plot, and total weights were obtained. A sub-sample of fruit (two 25-berry samples per plant) was used to determine individual berry weight and soluble solids at each harvest.

Results and Discussion

Precipitation pattern varied considerably for each year. In 1997 and 1998, precipitation was low during late June to mid-July. Rainfall was plentiful during this same time period in 1999. There was an extended period of low rainfall from mid-July to mid-August during 1999, however. Using data from a nearby weather station, a monthly water balance (total precipitation-total pan evaporation) was calculated for each year (Table 1). These data indicate a moderate to heavy water deficit occurred in June during 1997 and 1998, while during June of 1999 there was a substantial precipitation surplus. Large water deficits occurred during August in both 1997 and 1999, while a moderate to heavy water deficit occurred during July of each year. The 30-year water balance from May thru October indicates a water deficit is typical during each month.

Yields in response to irrigation regimes are depicted in Table 2. The data indicate a significant response of yield to irrigation rate for both 1997 and 1998, while there was no significant irrigation effect observed during 1999. During 1997 and 1998, peak yields were observed for the 6 GPD irrigation treatment. No additional yield increases were observed for the 8 GPD treatment. The 3-year average yield response indicated all irrigation treatments were greater than the control, but again, yields peaked at an irrigation rate of 6 GPD. Over the 3-year period, the 4 GPD irrigation treatment yielded 20% more than the control, and the 6 GPD treatment yielded 38% more. Yields for treatments were similar for 1997 and 1998; however, there was an overall tendency for lower yields during 1999 for all treatments. There were no significant effects off irrigation in any year on berry size or soluble solids.

Table 1. Monthly water balance (total precipitation - total pan evaporation) for May thru October during 1997, 1998, and 1999 in Griffin, Ga. A positive number indicates precipitation exceeded evaporative demand, and a negative number indicates evaporative demand exceeded precipitation.

	Water balance (precipitation - evaporation)			
Month	1997	1998	1999	30 year average
	---------------- inches ----------------			
May	-0.44	-3.36	-2.10	-1.64
June	-0.86	-3.45	3.94	-2.40
July	-1.18	-1.92	-3.89	-1.56
August	-4.19	0.83	-3.68	-1.44
September	3.47	-1.04	-1.92	-1.31
October	1.63	-3.24	1.08	-0.64

In a previous study with muscadines in Georgia, little response to irrigation was denoted overall, although, the authors did observe increases in some years due to irrigation (Austin and Bondari, 1988; Austin et al., 1988). The vines used in that study were more than 30 years old at the onset of the irrigation experiment. In the current study, much younger vines were used, and the data indicated an overall benefit of irrigation, although as with many crops a positive response cannot be expected every year due to varying rainfall patterns. Perhaps installing irrigation on very old muscadines may be of less benefit than if irrigation is employed shortly after establishment.

Yields from 1997 and 1998 showed the greatest response to irrigation in the current study. Moderate to high water balance deficits were present during June and July in each of those years. This corresponds to the flowering and early fruit growth stages for muscadines in this geographic area. Likely, this is a sensitive stage for obtaining favorable yields, and water deficits during that time can reduce crop loads. During 1999, a year when little differences were observed between irrigation treatments, June and early July were characterized by positive water balances, although, severe water deficits occurred during late July and August. The later season deficits in 1999 could account for the depressed yields for all treatments during that year, however, soil water content data suggested otherwise since the 6 and 8 GPD irrigation regimes had favorable soil water content.

Table 2. Total fruit yield for 'Southland' muscadine grapes in response to different daily drip irrigation rates in Griffin, Ga. during 1997, 1998, and 1999.

	Total yield			
Daily irrigation amount/ plant	1997	1998	1999	3 year average
gallons	------------ lbs/plant---------------			
0	37.2	32.6	29.3	33.0
4	41.1	42.7	35.2	39.6
6	47.5	49.7	39.6	45.5
8	47.5	47.1	35.4	43.3
Significance[Z/]				
L	NS	**	NS	**
Q	*	**	NS	**

[Z/] NS, *, and ** indicate nonsignificant or significant at $P \leq 0.05$ or 0.01, respectively.

In a recent 1-year study in Colorado with *V. vinifera* (Hamman and Dami, 2000), it was reported that an irrigation rate of 25.4 gallons per week (3.6 GPD equivalent) yielded the same as a 50.7 gallons per week (7.2 GPD) irrigation regime and 44% more than 12.7 gallons per week (1.8 GPD). The authors concluded that a moderate irrigation treatment (3.6 GPD) could conserve water without reducing yields. In the current 3-year study with muscadine grapes, an irrigation rate of 4 GPD yielded more than no irrigation, but it yielded less than 6 GPD on average. Optimum irrigation regimes for muscadines in the warm, humid southeast likely are different than those reported elsewhere for *V. vinifera*. However, if water supply is limited, or if water conservation is imperative, the muscadine data indicate a positive benefit can still be gained from less water, but not optimum yields.

In the current study, irrigation was applied every day, rain or shine. This is certainly not the most efficient use of water; however, it was deemed the most conservative way to evaluate daily irrigation needs. Irrigation could have been turned off during rain events, thus conserving water. In fact, daily irrigations coupled with water deficit monitoring is one of the best ways to conserve water in a humid region. If large applications of water are made only 1 to 3 times a week, and heavy rainfall occurs shortly after the irrigation event, then some of the water will not be beneficial. Unfortunately, growers often fail to regulate irrigation systems unless there are several consecutive days of rain. Growers are urged to consider using automated devices for operating irrigation based on rainfall occurrence, which would increase efficiency.

In summary, muscadine grapes in the Southeast likely will respond to irrigation, especially when periods of water deficit are experienced early- to mid-season. While irrigation needs can vary depending on soil, climate, trellis type, etc., it appears that a daily rate of 6 GPD is near optimum for muscadines. Application amounts greater than this were not beneficial, while less irrigation amount resulted in lower yield. Monitoring soil water content can be useful in irrigation scheduling, but this is usually cumbersome for most growers. However, daily reports of pan evaporation and precipitation can easily be obtained and would be useful in guiding irrigation.

References

Anisko, T., D.S. NeSmith, and O.M. Lindstrom. 1994. Time-domain reflectometry for measuring water content of organic growing media in containers. HortScience 29: 1511-1513.

Austin, M. and K. Bondari. 1988. A study of cultural and environmental factors on the yield of *Vitis rotundifolia*. Scientia Hort. 34: 219-227.

Austin, M., K. Bondari, and W.T. Brightwell. 1988. Effects of plant spacing, trellis system, irrigation, fertilizer rate, and spur thinning on the yield of muscadine grape. Georgia Agr. Expt. Sta. Res. Bul. T-368. Univ. of Georgia College of Agric. and Environ. Sciences. Athens, GA.

Grimes, D.W. and L.E. Williams. 1990. Irrigation effects on plant water relations and productivity of Thompson seedless grapevines. Crop Sci. 30: 255-260.

Hamman, R.A. Jr. and I.E. Dami. 2000. Effects of irrigation on wine grape growth and fruit quality. HortTechnol. 10: 162-168.

Krewer, G., M. Hall, D.S. NeSmith, D. Horton, H. Scherm, P. Sumner, T. Tyson, and G. Westberry. 1999. Commercial Muscadine Culture. Bulletin 739. Univ. of Georgia College of Agric. and Environ. Sciences. Athens, GA.

Panta, G.R. 1995. Physiological and morphological responses of squash to water deficit stress. M.S. Thesis, The University of Georgia, Athens, GA.

'Palmetto': A New Southern Highbush Blueberry Cultivar

S. Scott NeSmith
University of Georgia – Griffin Campus

After several years of testing, a new University of Georgia southern highbush blueberry selection was approved for release in 2003. The name for the new UGA cultivar (developed jointly with USDA-ARS) is 'Palmetto' (Figure 1). 'Palmetto' was tested along with several southern highbush cultivars in multiple locations. Table 1 portrays yield for 'Palmetto', along with 'Georgiagem' and 'Sharpblue' over a 5-year period. These data are from plants that were established at Alapaha, Ga. in 1992, without bedding, irrigation or soil amendment. 'Georgiagem' yielded no fruit during the first week in May, whereas, 'Palmetto' yielded more that 35% of its fruit during that time period on average. When the first 2 weeks of May were considered, 'Palmetto' ripened more than 75% of its fruit during that time on average, compared to only 38% and 51% for 'Georgiagem' and 'Sharpblue', respectively. 'Palmetto' yields overall were twice that of 'Georgiagem' for the 5 year average.

Table 1. Yield of the new southern highbush blueberry 'Palmetto' and the standard cultivars 'Georgiagem' and 'Sharpblue' for different harvest periods during 1999 thru 2003 at Alapaha, GA.

	Total yield per bush (lbs)		
Harvest time	**Georgia-gem**	**Sharp-blue**	**Pal-metto**
1st week of May			
1999	0.0	1.7	1.0
2000	0.0	1.3	3.0
2001	0.0	2.8	1.8
2002	0.0	1.1	2.7
2003	0.0	---	1.9
5 yr average	**0.0**	**1.7**	**2.1**
2nd week of May			
1999	0.0	2.2	2.4
2000	1.3	2.1	3.7
2001	1.6	2.9	2.8
2002	0.8	0.0	0.7
2003	0.7	---	2.0
5 yr average	**0.9**	**1.8**	**2.3**
Total for season			
1999	2.6	7.2	6.2
2000	3.2	5.9	8.1
2001	4.3	13.1	6.2
2002	0.8	1.1	3.4
2003	1.2	---	5.0
5 yr average	**2.4**	**6.8**	**5.8**

Table 2 depicts average berry attributes and plant vigor for 'Palmetto' and 4 other southern highbush blueberry cultivars grown at Alapaha, Ga. over a 6 year period. 'Palmetto' exceeded all of the cultivars with respect to berry scar, berry firmness, and plant vigor. For other berry attributes, 'Palmetto' was generally similar to the various cultivars, except for berry size, which was smaller (but commercially acceptable). Thus, 'Palmetto' has good to excellent fruit quality, and outstanding plant vigor.

Table 2. Average ratings (1 to 10 scale) of some fruit and plant characteristics of 'Palmetto' and other southern highbush cultivars over a 6 year period at Alapaha, Ga. A value of 7 is generally considered to be the minimum acceptable rating for a commercial cultivar.

	Cultivar				
Berry/ plant attributes	**Palmetto**	**Georgiagem**	**Sharpblue**	**Star**	**O'Neal**
Berry size	7.3	7.5	7.7	7.8	8.1
Berry scar	8.5	7.0	7.8	7.8	7.9
Berry color	8.0	7.9	8.4	8.0	7.9
Berry firmness	8.3	6.7	7.6	7.5	7.6
Berry flavor	8.0	7.0	7.9	7.3	8.0
Plant vigor	8.8	7.0	6.8	6.3	5.1
50% bloom time	Mar 1	Mar 10	Feb 22	----	Mar 4
50% ripe time	May 9	May 17	May13	----	May17

Flowering and ripening times are important data for growers who are considering producing southern highbush blueberries. Generally, the early flowering times require frost protection measures, and growers want the ripening times to be early enough to offer a "high price reward" for the risk they encounter. Table 2 lists flowering and ripening dates for 'Palmetto' and 3 southern highbush cultivars at Alapaha, Ga. over a 6 year period. The flowering times of all of the selections (late February to early March) were early, yet, 'Palmetto' generally ripened the earliest.

As for adaptability to other areas, 'Palmetto' seems to be as adaptable as the popular cultivar 'Star' (released by Florida in 1996). Fruit and plant characteristics of 2- to 4-year-old plants of 'Palmetto' and 'Star' were evaluated at 3 locations in Georgia and one location in Mississippi during 2003. The two entries generally ripened at the same time, and had similar attributes. The exceptions were that 'Palmetto' had firmer fruit than 'Star', and typically had a better cropping score also; however, 'Star' typically had larger berry size.

'Palmetto' is a protected cultivar. For information on licenses and licensed propagators of 'Palmetto' and other University of Georgia blueberry cultivars, contact the Georgia Seed Development Commission in Athens (ph. 706-542-5640), or visit their web site at http://www.gsdc.com/.

Figure 1. Fruit clusters of the new southern highbush blueberry cultivar Palmetto (*photo courtesy of Mr. Dave Brazelton of Fall Creek Farm & Nusery, Lowell, OR*).

Meetings

Don't forget to mark your calendar for the small fruits meeting in Savannah, GA Jan. 7 and 8th 2004. Commodities such as blueberries, blackberries, wine grapes, muscadine grapes and strawberries will be covered. Info: 1-877-994-3842.

Blueberry weed control meeting and farm tour:

Blueberry Weed Control Meeting and Farm Tour
Friday, October 22, 2004
Cornelius Blueberry Farm Manor, Georgia

Farm is between Millwood and Manor, GA

Travel Directions to Cornelius Blueberry Farm – From Waycross, go West on Highway 122 seven miles, turn left onto Manor-Millwood Highway and go about 2 miles. You will see sign for farm on the right.

From Homerville- Head East to Manor on Highway 84. At Manor, turn north on the Manor–Millwood Highway. Go several miles and look for farm sign on left.

:30 a.m.	Registration	
0:00 a.m.	Welcome and Introduction	James Jacobs Ware County Extension Coord.
0:10 a.m.	Weed Control in Young Plantings and Pine Bark Beds	Dr. Mark CzarnotaExtension Weed Science
1:00 a.m.	Backpack Sprayer Calibration and Tour of Farm	Cornelius Blueberry Farm
2:00 p.m.	Lunch	
2:45 p.m.	Sponsor Recognition	Barry DeasWare County Young Farmer Advisor
1:00 p.m.	Georgia Blueberry Growers Association Update	Joe Cornelius, President
1:15 p.m.	Weed Control in Replanted Blueberries	Dr. Gerard KrewerExtension Horticulturist
1:30 p.m.	Pesticides Credits / Wrap Up	Elvin AndrewsLanier County Extension Coord.
2:00 p.m.	View Blueberry Replant Experiment at Cornelius Clinch County Farm	Gerard Krewer and Elvin Andrews

Commercial / Private Pesticide Credits Offered
RSVP requested for this sponsored meal meeting by noon Tuesday, October 19.

Ware County Extension	Ware Magnet Schools	Lanier County Extension
912-287-2456	Barry Deas – Advisor	229-482-3895 phone
912-287-2499	912-281-5386	229-482-2654 fax
uge4299@uga.edu		uge4173@uga.edu

Small Fruit News

Volume 4, No. 4 October, 2004

Editor and Contributor .... **Guido Schnabel**

Published four times/year. Small Fruit News is available on the Southern Region Small Fruit Consortium (SRSFC) web site www.smallfruits.org. To subscribe to an electronic notification service of new Small Fruit News issues on the web, send your e-mail address to schnabe@clemson.edu. You may also contact your local county agent office for a hardcopy of this newsletter.