

Annual Report of **Establishment of a Blackberry Cultivar Trial to Assess Important Attributes of Fresh Fruit, Juice, and Wine for Promotion of Name Recognition in the Marketplace** (2009) Stafne, McGlynn, Lucas, and Clark

Prepared by Eric T. Stafne, Assistant Professor and Fruit Crops Specialist, Oklahoma State University and William G. McGlynn, Associate Professor, Horticulture Food Specialist, Oklahoma State University

Progress in Extension:

A blackberry production workshop was held April 8, 2009 at the Cimarron Valley Research Station in Perkins, Oklahoma. This workshop covered all basic topics for blackberries including site selection, cultivar choice, IPM, marketing, irrigation, and other pertinent topics as well as current grower perspectives. Sustainable production was a focus. All presentations were made available after the workshop and are accessible here: <http://oces.okstate.edu/oksusag/training-opportunities>

Outline of Workshop from April 8, 2009

- 8-8:10am Introduction to Workshop
(Eric Stafne, Assistant Professor and Fruit Crops Specialist)
- 8:10-8:30 What does Sustainability Mean and where do Blackberries Fit?
(Kefy Desta, Assistant Professor, Sustainable Agriculture)
- 8:30-8:50 Health-Based Properties of Blackberries as a Marketing Tool
(Edralin Lucas, Associate Professor, Nutritional Sciences)
- 8:50-9:10 Blackberry Basics and Site Selection
(Eric Stafne)
- 9:10-9:30 Cultivar Selection
(Eric Stafne)
- 9:30-9:50 Fertilizer Application and Weed Control
(Sue Gray, Tulsa County Extension Educator)
- 9:50-10:00 Break
- 10:00-10:30 Irrigation Design and Installation
(Mike Kizer, Professor and Irrigation Specialist)
- 10:30-10:50 Insect Pests and Control
(Phil Mulder, Professor and Entomology Specialist)
- 10:50-11:10 Disease Pests and Control

(Damon Smith, Professor and Plant Pathology Specialist)

11:10-11:30 Blackberry Enterprise Budget
(Roger Sahs, Extension Associate)

11:30-12:00 Current Grower Perspective Discussion

12:00-12:15 Workshop Evaluation

12:15-1:00pm Q&A in the Research Plots

The workshop was a big success with attendance maxed out at 50 attendees. Many had already planted blackberries, but needed more information. Some were just exploring the option of planting blackberries. An assessment of the workshop was given to attendees with 31 of 50 responding. The evaluation tool consisted of 10 questions, seven of which were on a scale of 1 (=no) to 5 (=yes), where 2 = a little, 3 = some, and 4 = mostly. The highest rated question was “Were the topics presented by the speakers adequate and applicable” with a 4.71. The lowest rated question was “Was the length of each session appropriate for the material covered” with a 4.42. Many respondents desired longer sessions on each topic.



Dr. Kefy Desta providing an overview of agricultural sustainability. Photo courtesy of Janelle Malone, Oklahoma State University.



Dr. Eric T. Stafne discussing the blackberry cultivar research trial established at the Cimarron Valley Research Station at Perkins, Oklahoma. Photo courtesy of Janelle Malone, Oklahoma State University.

Progress in Research:

Plants were ordered from Sakuma Bros. and planted in late March, 2009. There was no loss of plants, so establishment was 100%. Since blackberries grow wild in pastures in Oklahoma (likely *Rubus argutus*, *Rubus allegheniensis*, or hybrids thereof) interest is high in planting domesticated blackberries, although the best cultivar options are unknown. That is why the research trial establishment was important and incorporates cultivars from different breeding programs with different genetic backgrounds. Data collection will begin in 2010.

Berries from two thornless, erect, blackberry (*Rubus* subgenus *Rubus*) cultivars, Apache and Ouachita were harvested in summer 2008 from the University of Arkansas Fruit Research Substation in Clarksville, Arkansas and a commercial berry farm in Broken Arrow, Oklahoma. Our goal was to make both juice and wine from these blackberries in order to help determine if these cultivars, which grow well in our mid-western climate and are popular among regional fresh-market producers, are suitable for creating high-value processed products.

We analyzed the blackberries for common quality attributes such as sugar content, berry weights and dimensions, pH, and titratable acidity. We also evaluated antioxidant potential, which we defined as total phenolic content and measured as Gallic acid equivalents (GAE). In addition, we tested sensory attributes of the berries, including seediness, juiciness, sweetness, acidity and flavor. Blackberry juices and wines were produced and analyzed for antioxidant potential and also for antioxidant activity using the Oxygen Radical Absorbance Capacity (ORAC) assay, which is commonly used to assess the antioxidant activity of many foods. ORAC values are expressed in terms of equivalent units of Trolox (umole TE), which is a water soluble compound closely related to vitamin E. Higher trolox equivalents equate to greater antioxidant activity. Overall, Apache berries from both locations showed slightly higher average sugar content than Ouachita (10.3% versus 9.5%). Both types of blackberries showed slightly higher average berry weights when grown in Arkansas (Oklahoma Ouachita: 2.8 g, Arkansas Ouachita: 4.2 g; Oklahoma Apache: 4.8 g, Arkansas Apache: 5.8 g). No meaningful trends were seen in titratable acidity or pH values. Sensory evaluations showed that people tended to prefer berries that they perceived as being sweeter; other sensory attributes such as juiciness or seediness did not appear to have as great an impact on which berries were preferred. No clear overall trends connected to growing location or cultivar were seen in the sensory evaluations.

Growing location did not have any identifiable overall effect on whole blackberry, blackberry juice, or blackberry wine antioxidant potential or activity. Comparing overall antioxidant potential, Ouachita berries did have slightly lower average total phenolics contents than Apache berries (Ouachita: 289 mg/100g, Apache: 335 mg/100g). But this did not translate into lower ORAC values for the juices and wines made from Ouachita berries. The average juice ORAC values were actually very similar for both blackberry types (Ouachita: 2,430 umoles TE/100 ml, Apache: 2,418 umoles TE/100 ml). Similarly, the average ORAC values measured for the blackberries wines were also close, with Apache being slightly lower (Ouachita: 1,414 umoles TE/100 ml, Apache: 1,335 umoles TE/100 ml). The ORAC values observed for our blackberry juices compare favorably to those measured by the USDA for other high-antioxidant beverages such as blueberry juice (2,906 umoles TE/100 g), Concord grape juice (2,377 umoles TE/100 ml), cranberry juice (865 umoles TE/100 g), and green tea (1,253 umoles TE/100 g). The ORAC values we measured for the blackberry wine were lower than what have typically been measured for red grape wines, but still compare favorably to many other high-antioxidant beverages. Overall, both cultivars produced high-antioxidant juices and wines.

The same work is being repeated with blackberries harvested in 2009. Preliminary results so far appear to confirm the results obtained from the 2008 harvest. Overall our results show that both Apache and Ouachita blackberries are suitable for creating value-added products such as juices and wines.



Youri Joh preparing to agitate blackberry wine. Photo courtesy of Richelle Stafne, Oklahoma State University.



Youri Joh filtering blackberry juice for further analysis. Photo courtesy of Richelle Stafne, Oklahoma State University.



Blackberry wines during fermentation. Photo courtesy of Richelle Stafne, Oklahoma State University.

Funding from NARBA lead to submission of another grant proposal to the USDA-NIFA SCRI entitled: “Assessing the attributes and economic potential of fruit and non-traditional grape juices and wines for production, processing, and marketing”. Although unsuccessful in 2009, we will resubmit in a revised form in 2010, in collaboration with the University of Arkansas and the University of Missouri, as a way to increase funding already received through NARBA.

Funding of this project from NARBA will help to achieve scientifically valid results through multiple years of testing as well as provide extension opportunities. The workshop on April 8, 2009 was the first workshop with another to follow in spring 2010. The follow-up workshops will include topics like pruning, harvest, marketing, and processing.

Publications derived from grant to date:

Stafne, R.A., W.G. McGlynn, E.T. Stafne, E.A. Lucas, and J.R. Clark. 2009. Sensory, health and quality evaluation of two blackberry (*Rubus* subgenus *Rubus*) cultivars from Oklahoma and Arkansas. HortScience 44:1121 (abstr.).