

Growing Blackberries in the Low Desert

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Abstract

Twenty-five plants of each of ten blackberry cultivars from Arkansas and Texas were established at the Yuma Mesa Agriculture Center in spring 1994. All the Arkansas cultivars died. Of the Texas cultivars, 'Rosborough' and 'Womack' performed the best, followed by 'Brisson' and 'Brazos'. Important cultural practices, harvesting practices and potential marketing strategies are discussed.

Introduction

Blackberries (*Rubus* sp.) are native to temperate areas around the globe, including North and South America, Europe and Asia. Three types exist in the US. Erect types are generally cold hardy, and are mainly found in the East and Southern US. Most of this fruit is destined for the fresh market. Most western trailing blackberry cultivars are grown along the West Coast, and much of this production is used for processing. The western trailing types are prone to winter injury and disease in humid areas. Southeastern trailing wild types are often known as dewberries, and will not survive cold winters (Lipe and Martin, 1984).

In the United States, commercial production is found chiefly in Oregon, California, Arkansas and Texas (Westwood, 1978). Eighty percent of the US commercial production is found in Oregon. Producers in northern areas commonly plant blackberry cultivars that require significant chill hours to produce a crop. In the southern US, cultivars require less chilling. USDA researchers initiated development and breeding of southern blackberry cultivars. However, several cultivars have Texas origins, and a successful blackberry improvement program now exists at the University of Arkansas.

Four Texas cultivars are commonly available, and were included in this study.

- 'Brazos' was developed at Texas A&M University and was introduced in 1959. It has erect canes, and large fruits that mature early (mid- to late-May in Texas). It is cold sensitive, and will be damaged at temperatures below 5F. Yields are said to be moderate. Fruit is soft.
- 'Brisson' was developed at Texas A&M and released in 1977. 'Brisson' is a 'Brazos' x ('Brainard' x 'Brazos') hybrid. It has erect canes and reports suggest that it has very large fruit (NCGR-Corvallis Germplasm Database). Some reports note that 'Brisson' ripens a few days earlier than 'Brazos' (Lipe, 1986), yet others note no difference (Lipe, 1979). Yields are said to be high. Seeds are smaller than those of 'Brazos'. Fruit is slightly less acid than 'Brazos'. Fruit is soft.
- 'Rosborough' was developed at Texas A&M University and released in 1977. 'Rosborough' is a sibling of 'Brisson' and 'Womack'. It has erect canes and reports suggest that it has very large fruit (NCGR-Corvallis Germplasm Database). Reports suggest that it ripens at the same time as 'Brazos', or slightly later (Lipe, 1979; Lipe 1986). Yields are higher than 'Brazos'. Fruit is sweeter than 'Brazos', but is soft.
- 'Womack' was developed at Texas A&M University and released in 1977. 'Rosborough' is a sibling of 'Brisson' and 'Rosborough'. It has erect canes and reports suggest that it has medium to large fruit (Lipe, 1979). Reports suggest that it ripens at the same time as 'Brazos', or slightly later (Lipe, 1979; Lipe 1986). Yields are higher than 'Brazos'. Fruit is sweeter than 'Brazos', but is soft.

Several of the Arkansas cultivars are available, and the following six were included in this study:

- ‘Arapaho’ was developed at the University of Arkansas and released in 1993 (Moore and Clark, 1993). Canes are upright and thornless. Plant vigor is high, and most root cuttings will produce plants. ‘Arapaho’ ripens early, compared to the other Arkansas cultivars, and its yield is moderate. Seed size is small, and fruit is firm.
- ‘Cherokee’ was developed at the University of Arkansas and released in 1974 (Moore *et al.* 1974a). Canes are upright and thorny. Plant vigor is moderately high, and most root cuttings will produce plants. ‘Cherokee’ ripens midseason, compared to the other Arkansas cultivars, and its yield is moderately high. Seed size is small, and fruit is moderately large and fairly firm.
- ‘Cheyenne’ was developed at the University of Arkansas and released in 1977 (Moore *et al.* 1977). Canes are upright and thorny. Plant vigor is moderately high, and most root cuttings will produce plants. ‘Cheyenne’ ripens early to midseason, compared to the other Arkansas cultivars, and its yield is high. Seed size is small, and fruit is very large and fairly firm.
- ‘Choctaw’ was developed at the University of Arkansas and released in 1989 (Moore and Clark, 1989a). Canes are upright and thorny. Plant vigor is high, and most root cuttings will produce plants. ‘Choctaw’ ripens early, compared to the other Arkansas cultivars, and its yield is high. Seed size is quite small, and fruit is moderately sized and firm.
- ‘Navajo’ was developed at the University of Arkansas and released in 1989 (Moore and Clark, 1989b). Canes are upright and thornless. Plant vigor is moderate, and about 75% of root cuttings will produce plants. ‘Navajo’ ripens late, compared to the other Arkansas cultivars, and its yield is moderate. Seed size is small, and fruit is moderately sized and firm.
- ‘Shawnee’ was developed at the University of Arkansas and released in 1985 (Moore *et al.* 1985). Canes are upright and thorny. Plant vigor is high, and most root cuttings will produce plants. ‘Shawnee’ ripens late, compared to the other Arkansas cultivars, and its yield is high. Seed size is small, and fruit is larger than ‘Cherokee’ and fairly firm.

This study was established to determine if these ten blackberry cultivars could be successfully grown in southern Arizona. Additionally, we wished to determine if subsequent cultivar yield and fruit quality data would suggest that a commercial blackberry industry in the area could be profitable.

Materials and Methods

Field Establishment. Twenty-five bare-root plants of each of the ten cultivars listed above were purchased from Womack’s Nursery in February 1994 (This and additional sources of plant material are listed below in Table 1). Plants arrived the following month. The planting was established in Block 23 at the Yuma Mesa Agriculture Center. Soil series at the site is Superstition sand with a pH of 7.9 to 8.4 (Barmore, 1980). Plants were planted in rows 15 feet apart. Within a row, plants were spaced 4 feet apart, and rows were 200 ft. long. There were two cultivars per row. Our spacing was determined by the configuration of the drip irrigation system already in the field, and thus is wider than is typically recommended in other states. In North Carolina and Texas, growers are advised to set plants 3 feet apart in rows 10 to 12 feet apart (Poling, 1992; Lipe, 1986). Our blackberry plants were set into the ground with no additional organic matter or fertilizer amendment.

Blackberry plants may also be set out as root cuttings for significantly less cost. Drop them about 2 feet apart and cover with 2 to 3 inches of soil.

Irrigation. During 1994, 1995 and the first six months of 1996, plants were irrigated using the established drip irrigation system. Each plant was established next to a 2-gph emitter. Irrigation intervals increased from once every two weeks in the winter to two to three times a week in the summer. Water was generally applied for 3 to 4 hours at a time.

Following the 1996 harvest, the drip irrigation system was abandoned, and replaced with flood irrigation. Lush plant growth began to make access to the drip lines difficult. It became difficult to repair plugged emitters and broken lines, and coyotes damaged the lines. Flood irrigation has proved successful, except that weed growth is greater around the plants, and root suckers are proliferating outside the rows. Plants are typically irrigated every one to two weeks with an 4-inch head of irrigation water.

Irrigation is critical for first-year blackberries. These small plants should receive at least two six-hour irrigations per week during the hot time of the year (Lipe, 1986). Once established, blackberries are relatively drought-tolerant, but water stress will negatively affect yield. Mature plants require more frequent, heavier irrigations than do young plants. For mature plants, most recommendations call for about 1 inch of water per week. (Lipe and Martin, 1984).

Fertilization. Blackberries require about 60 lbs actual nitrogen per acre per year (Lipe, 1986). During the first two and one-half years when plants were under drip irrigation, workers applied Peters General-Purpose Soluble Plant Food (W.R. Grace Co., Cambridge, MA) in 32 split applications weekly from March through October via fertigation. This fertilizer source contains 20% N, 20% P₂O₅, and 20% K₂O, and was applied at a rate equivalent to 4 lbs fertilizer per 100 ft of row the first year, and 8 lbs per 100 ft of row thereafter. A micronutrient source, Keyplex 350 (Morse Enterprises Ltd., Miami FL), was applied as well. Keyplex 350 (0.16% B, 3.50% Fe, 1.50% Mg, 0.75% Mn, 0.003% Mo, 4.00% S, 0.75% Zn) was applied through the drip line weekly at an annual rate of 6 ml per plant.

Beginning in June 1996, the fertilizer source has been 15-15-15. Plants were treated at a rate of 10 lbs per 100 ft of row, with two-thirds of the amount applied in early March, and one-third applied following harvest. Keyplex 350 was again applied at 6 ml per plant per year in a similar split application.

Pruning and Training. Blackberry canes are biennial. New shoots arise from buds within the crown of the plant. These shoots, known as "primocanes", are highly vigorous and produce lateral branches. The second year these same canes become known as "floricanes". Small branches grow from the laterals, and bear the flowers and fruits. After harvest, the floricanes die. Meanwhile new primocanes appear during mid-spring.

New primocanes will also arise from buds on the roots, and often these shoots are called root suckers. Suckers should be allowed to grow if they develop in a row as much as two feet wide. Suckers growing outside this one to two foot wide row should be removed. They may be replanted within the row if necessary.

Most sources state that floricanes should be removed following harvest to avoid disease and facilitate harvesting the following year (Lipe, 1986, Poling, 1992, Braswell *et al.* 1998). We removed floricanes in early June, then tipped back the primocanes to 36", to force new lateral growth.

Unlike trailing blackberries, erect blackberries require no training or trellising.

Diseases and Insects. To date, we have seen no diseases or insects. Sunburn has been the major quality problem. Bird damage has been light. If suitable organic fertilizers are used, it may be possible to grow blackberries organically.

Harvest. Fruits were harvested every two to three days. Only fully black fruit were harvested. All the berries from each of the varieties were weighed and counted.

Results and Discussion

Field Establishment. Most of the blackberries planted had new shoot growth three to four weeks after planting. Up to three plants of each variety did not have a growth flush; these plants had all died by summer 1994. All the plants of the 'Arapaho', 'Cherokee' and 'Shawnee' cultivars had died by spring 1995. All the plants of 'Cheyenne', 'Choctaw' and 'Navajo' cultivars had died by spring 1997. We attribute the mortality to lack of chilling. Arkansas varieties apparently do not grow well in southern Arizona because of the warm winters, as suggested by Moore (1984). They should be considered for less mild areas of the state, such as Kingman, Wickenburg, Cottonwood, Sierra Vista, Nogales, Douglas, Willcox, and Safford. Since the yield of the Arkansas varieties was so severely affected by the lack of cold, no data for those varieties will be presented here.

Harvest Period. We noticed no difference in ripening for the four Texas cultivars. The harvest periods for 1995, 1996, 1997 and 1998 was April 27th through June 1st, May 14th through June 14th, May 5th through May 30th, and May 14th through June 15th, respectively. These dates are from one to three weeks earlier than four successive harvest dates reported for each of the same four cultivars in East Texas (Lipe, 1979).

Yield and Fruit Size. Yield per plant and fruit size for the four Texas cultivars, from 1995-98, are presented in Table 2. 'Brazos' has consistently had the least yield over the four-year term of the study, compared to the other cultivars. Nonetheless, its production has increased by over 300% to just over 3 lbs of berries per plant. At our 4-ft within row spacing and a 10-ft between the row spacing, this yield would equal 3278 lbs of fruit per acre. Our yields for 'Brazos' are almost twice those reported by Lipe (1979) on a per acre basis. Fruit size for 'Brazos' has been consistently similar to the other cultivars.

'Brisson' has not performed as well as 'Rosborough' and 'Womack' until 1998. From 1995 until 1997, fruit production of 'Brisson' ranged from 40% to 80% of the production of the other two cultivars. In 1998, however, yield per plant of 'Brisson' topped 5 lbs, was virtually the same as the yield of 'Womack' and was 88% of the yield of 'Rosborough'. With a 4 x 10 ft spacing, the 1998 'Brisson' yield would equal 5608 lbs per acre, almost 6.5 times the yield reported by Lipe (1979) for 'Brisson' during the 1978 season. Fruit size for 'Brisson' has consistently been the smallest of all four Texas cultivars tested.

'Rosborough' and 'Womack' have been the best Texas cultivars in our study. Yields per plant of 'Rosborough' have been from 13% to 31% larger than the yield of 'Womack' in 1995, 1996 and 1998. In 1997, 'Womack' yield was 8% larger than the yield of 'Rosborough'. For 1998, at a 4 x 10 ft spacing, our yields equal 6371 and 5641 lbs of fruit per acre for 'Rosborough' and 'Womack' respectively. Berry size has varied between the two cultivars and no trends are apparent. These two cultivars appear to be the best for the southwestern low desert.

Harvesting and Marketing Considerations. Through the course of this study, we have achieved our primary objective; proving that blackberries can be grown successfully in southern Arizona. Our yields have been similar to or greater than those yields reported elsewhere (Lipe, 1979; Skirven and Hellman, 1984). Certainly, the information presented here is all that is necessary for the homeowner, but to grow blackberries commercially, a few other facts should be considered.

Since blackberries are perishable, frequent picking will be required. The Texas cultivars that appear to do well in southern Arizona have soft fruit, so fruit quality will be of primary importance. Berries should be picked every two to three days, but only berries that are fully black are harvested. At least three full-time pickers will be required per acre (Lipe, 1986). Harvest should take place early in the morning, and harvest into shallow containers to avoid smashing the fruit. Fruit should be cooled as soon as possible. Ideally, fruit should be moved to the market immediately following harvest. Blackberries will store well in the refrigerator for up to seven days.

Potential blackberry producers should investigate market possibilities carefully. Demand in Arizona will be high, if the price is moderate, because supplies of overseas blackberries are limited and expensive in May, and the fruit is a novelty. Blackberries may be ideally suited for a pick-your-own (PYO) or a local market.

A PYO is ideal marketing solution because of the high cost of harvest labor. Consumers must be educated about proper harvesting so that they are not disappointed. PYO prices may be more than \$5.00 per gallon (1 gallon of fruit = 6 lbs).

A local market is another option. Hotels, resorts, restaurants and supermarkets may be suitable markets for locally grown fruit. Wholesale prices will vary. Prices paid for fresh fruit to Oregon growers ranged from 58¢ to \$1.46 per lb. over the 10-year period from 1986 to 1996.

Literature Cited

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Table 1. Sources of blackberry plants.

Name	Address	Phone	e-mail	Cultivars ²
Arkansas Berry & Plant Farm.	22339 N. Hwy 71 Winslow, AR 72959	(501) 634-7120	www.alcasoft.com/arkansas/	1,4,5,6,7,9
Pense Nursery	16518 Marie Lane, Mountainburg, AR 72946	(501) 369-2494	www.alcasoft.com/pense/	1,4,5,6,7,8,9
Simmon's Berry Farm	11542 N. Hwy. 71 Mountainburg, AR 72946	(501)-369-2345	www.alcasoft.com/simmons/	1,6,7,8,9
Womack's Nursery	Rte. 1, Box 80, De Leon, TX 76444	(817) 893-6497	None	1,2,3,4,5,6,7,8,9,10

² 1=Arapaho, 2=Brazos, 3=Brison, 4=Cherokee, 5=Cheyenne, 6=Choctaw, 7=Navajo, 8=Rosborough, 9=Shawnee, 10-Womack.

Table 2. Yield per plant and fruit weight of four Texas blackberry cultivars grown in Yuma, AZ.

Cultivar Year	Yield per plant (lb.)				Fruit weight (g)			
	Brazos	Brison	Rosborough	Womack	Brazos	Brison	Rosborough	Womack
1995	0.92	0.73	1.71	1.34	5.0	4.2	5.3	4.9
1996	0.88	1.10	1.82	1.39	3.2	2.8	3.7	3.4
1997	2.17	2.58	3.59	3.89	4.0	3.2	3.6	4.0
1998	3.01	5.15	5.85	5.18	4.5	4.5	4.6	4.7