



Prime-Ark[®] 45

Blackberry

(cultivar APF-45)

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Officially released in late August, 2009, Prime-Ark[®] 45 blackberry is the latest release from the UA Division of Agriculture fruit breeding program. This is the third of the unique primocane-fruiting type varieties. A top priority in the Arkansas blackberry breeding program is fruit quality, and Prime-Ark[®] 45 is considered a substantial advance in quality over Prime-Jan[®] and Prime-Jim[®]. In fact, as far as postharvest handling, Prime-Ark[®] 45 is a quicker advance than I was anticipating based on the quality of the parents being used in breeding in 1999, the year its parents were crossed. How broadly adapted is this variety? That is always a big question with any new release. It has shown promise in tests in Arkansas, North Carolina, Pennsylvania, Oregon, California, and a few other places. But, as always with a new release, not to mention one of a “new” crop such as primocane-fruiting blackberries, there is much to learn in the area of true commercial value. I have confidence that if this plant can be grown successfully in your location it will provide a good quality berry that could greatly diversify production, expand markets, and of great importance, increase grower profits. Here are a few comments on various aspects of Prime-Ark[®] 45.

Origin: The initial seedling plant of Prime-Ark[®] 45 was selected in June, 2002 in a seedling field at the University of Arkansas Fruit Research Station, Clarksville, during the floricanne fruiting season. It was tested as selection APF-45. At the time of selection it was noted to be the firmest fruit of any primocane-fruiting selection found at the time in the primocane-fruiting blackberry breeding program.

Fruit Quality: Prime-Ark[®] 45 is the first shipping-quality primocane-fruiting blackberry. In comparative storage trials, Prime-Ark[®] 45 has been rated very good for firmness, lack of leakage and mold, and retention of black color (see Table 1). Data show that it is in the same category of postharvest handling as University of Arkansas thornless varieties in most comparisons. In an overall calculation of marketability, it was similar to Ouachita in all years of evaluation. It should be noted that fruit used for postharvest evaluations was collected from plants (in Arkansas) that did not have fungicides applied and rains were common during the harvest period in each year. Data provided were collected on floricanne fruits. Primocane fruits harvested in North Carolina and California (a dry climate) had very good postharvest handling capability also. Even though many growers do not ship blackberries, it is hoped that this improved handling capability will enhance farmers market, on-farm, and other sales opportunities. (Note: the table includes postharvest evaluations for 2008 and 2009 of Tupy, the famous Brazilian variety grown primarily in Mexico. These are the first data we have collected to compare this variety with the Arkansas releases.)

Fruit Sweetness and Flavor: Average soluble solids (a measurement of sweetness) of Prime-Ark[®] 45 was 9.7%, just under that of Ouachita in Arkansas (Table 2). In additional measurements in other plantings

and years, soluble solids of 10 to 11% have been measured on floricane fruits of Prime-Ark[®] 45. Primocane fruit soluble solids levels have achieved 12%. Overall fruit flavor ratings for Prime-Ark[®] 45 were higher than the previous primocane-fruiting releases, and were near that of Ouachita (see Table 2).

Fruit Size: Fruits of Prime-Ark[®]45 are medium-large, averaging 6 g or more in most trials measuring floricane fruits in Arkansas (see Table 3). In trials in Oregon and California, primocane fruits averaged just over 7 g and near 9 g, respectively. In Arkansas, primocane fruits are smaller, usually 4 to 5 g.

Fruit Yield: Fruit yields have been very good in trials of Prime-Ark[®] 45. Most of the yield evaluation in Arkansas has been done on floricanes, and in a 2007-established planting that fruited in 2008, floricane yields of Prime-Ark[®] 45 exceeded Prime-Jim[®] and were comparable to thornless, floricane-fruiting varieties at Clarksville (Table 3). For primocane yields, data from Arkansas showed higher yields for Prime-Ark[®] 45 compared to Prime-Jim[®] (Tables 3 and 4). In observational plots in California and Oregon, primocane yields were very good. Prime-Ark[®] 45 out-yielded both Prime-Jim[®] and Prime-Jan[®] in California (the latter two varieties were not present for comparison in Oregon).

Fruit Ripening Periods: Floricane first harvest date for Prime-Ark[®] 45 averaged June 9 at Clarksville, 4 days after Prime-Jim[®] and Natchez and 4 days before Ouachita. Primocane first bloom date for Prime-Ark[®] 45 was about 2 weeks later than that for Prime-Jan[®] and Prime-Jim[®] (Table 2). Likewise, primocane fruit ripened 2-3 weeks later for Prime-Ark[®] 45 compared to Prime-Jan[®] and Prime-Jim[®], averaging August 8. In California, ripening of primocane fruit was in late August and in Oregon was mid September. It is very important to note the later flowering and ripening dates for primocane fruits for Prime-Ark[®] 45; its later flowering and fruiting dates must be considered if this variety is planted in upper Midwestern and northeastern states where fruit ripening prior to frost for Prime-Jim[®] and Prime-Jan[®] have been observed to not achieve completion. Of course, use of tunnels can greatly affect the fruiting season completion.

Fruit Set in Summer Heat: Overall performance in Arkansas of Prime-Ark[®] 45 on primocanes is improved over that of Prime-Jim[®] and Prime-Jan[®] (See Tables 3 and 4), in that yield and berry size is greater. However, damaging effects of heat have been seen on Prime-Ark[®] 45 in most years of observation in Arkansas. As has been a concern since the first primocane-fruiting blackberries were developed in Arkansas, summer heat during bloom and ripening continues to be limiting for this type of blackberry. In more moderate temperatures (middle to high 80s and lower) in the last two summers, set in the heat on Prime-Ark[®]45 has been quite good at Clarksville. Also encouraging is the increased yield over Prime-Jim[®].

Cane and Plant Characteristics: Canes of Prime-Ark[®] 45 are very erect, equal or exceeding comparison varieties. Cane health and vigor ratings were comparable to comparison varieties (Table 2). Disease resistance has been good, and no orange rust has been seen on the new variety. Anthracnose has rarely been seen on fruits or canes of Prime-Ark[®] 45. The variety has not been exposed to double blossom/rosette, so no information on susceptibility exists. Floricane hardiness has not been well characterized due to moderate winters during testing, but canes have fruited after winter lows near 10 to 12°F. It is a thorny plant.

Plant Availability: There will likely be a limited supply of Prime-Ark[®] 45 plants available for Spring planting in 2010. For a list of licensed nurseries, see this website:
http://www.aragriculture.org/horticulture/fruits_nuts/Blackberries/licensedprop.htm

Table 1. Postharvest evaluations of Prime-Ark® 45 blackberries from 2007- 2009 at the Fruit Research Station, Clarksville, compared with other named varieties (7 days in cold storage at ~40°F or 5°C).

Variety	Marketability ^z	Red (%) ^y	Leak (%) ^x	Decay (%) ^w	Soft (%) ^v
<u>2007</u>					
Natchez	80.5 b ^u	29.4 a	12.5 b	0.0 a	29.7 ab
Prime-Ark®45	85.8 ab	2.8 b	14.9 b	0.0 a	39.6 b
Apache	88.3 ab	0.0 b	16.0 b	1.6 a	24.0 a
Ouachita	90.5 a	4.5 b	5.5 a	1.6 a	22.0 a
<u>2008</u>					
Natchez	91.8 a	66.6 ab	12.6 a	1.4 a	10.6 a
Prime-Ark®45	85.6 ab	25.3 bc	7.5 a	0.9 a	9.6 a
Apache	80.8 ab	4.7 c	21.3 ab	10.6 b	21.1 ab
Arapaho	80.0 ab	6.1 c	26.8 ab	4.3 ab	22.9 ab
Ouachita	76.8 ab	22.8 bc	15.5 a	11.5 b	19.9 ab
Tupy	64.3 b	35.1 abc	39.7 bc	1.8 a	30.7 b
Prime-Jim®	33.3 c	75.3 a	56.0 c	11.0 b	57.7 c
<u>2009</u>					
Natchez	90.5 a	14.8 ab	14.7 a	1.3 a	12.8 a
Prime-Ark®45	87.0 ab	4.8 b	29.9 ab	3.4 a	5.7 a
Apache	63.3 d	0.0 b	68.8 c	18.2 bc	23.3 a
Arapaho	73.6 bcd	0.0 b	56.4 c	0.0 a	22.9 a
Ouachita	85.1 abc	0.0 b	35.0 ab	3.5 a	6.3 a
Tupy	57.8 e	12.0 ab	64.0 c	19.6 c	43.0 b
Prime-Jim®	70.8 cde	23.3 a	51.5 bc	11.9 ab	24.3 b

^zPercent marketability ratings are used as an indicator of performance after 7 d in the cooler. Percent marketability is calculated as: $100 - [\text{sum}(\% \text{ decayed} + \% \text{ soft (4- and 5-rated berries)} + \% \text{ leaky})] / 3$. A minimum of 85 is desired.

^y The berries were rated on a yes/no scale for presence of red drupelets in clusters of three or more.

^x The berries were rated on a yes/no scale for presence of leakiness.

^w The berries were rated on a yes/no scale for presence of decay.

^v The berries were rated on a 1-5 scale for softness, where 1 = firm and 5 = collapsed berry, very leaky. Means represent berries that scored a 4 or 5.

^u Means followed by the same letter are not significantly different ($P > 0.05$) by t-test.

Methods used in these evaluations were developed by Dr. Penny Perkins-Veazie, NC State University.

Table 2. Plant and fruit characteristics of five blackberry varieties at the University of Arkansas Fruit Research Station, Clarksville.

Characteristic	Variety				
	Prime-Ark®45	Prime-Jan®	Prime-Jim®	Ouachita	Natchez
<i>Floricanes bloom date</i> ^z					
10% bloom	29 Apr.	---	29 Apr.	3 May.	29 Apr.
50% bloom	2 May	---	2 May	6 May	1 May
<i>Floricanes harvest date</i> ^z					
First	9 June	---	5 June	13 June	5 June
Peak	25 June	---	23 June	30 June	23 June
Last	17 July	---	7 July	17 July	17 June
<i>Primocane first bloom date</i> ^y	30 June	16 June	13 June	---	---
<i>Primocane first ripe fruit date</i> ^y	8Aug.	18 July	15 July	---	---
<i>Fruit</i> ^{xw}					
Firmness	8.0 (0.0)	6.7 (0.6)	6.6 (0.6)	8.2 (0.5)	7.5 (0.6)
Flavor	7.8 (1.1)	7.0 (0.0)	6.4 (0.6)	8.0 (0.0)	7.5 (0.6)
Soluble solids (%) ^v	9.7 (0.5)	8.6 (0.6)	9.1 (1.5)	10.4 (2.1)	8.6 (0.7)
<i>Plant</i> ^{xw}					
Vigor	7.2 (0.5)	6.5 (1.0)	7.6 (0.6)	7.0 (0.0)	7.2 (0.0)
Health	7.6 (0.6)	7.0 (1.4)	7.6 (0.6)	8.0 (0.7)	7.5 (0.6)
Erectness	9.0 (0.7)	7.3 (0.5)	7.8 (0.8)	8.2 (0.5)	7.0 (0.8)

^z Data from one year, 2008, with data collected from the 2007-established replicated plots.

^y Means of 4 years, 2004-2008, with data collected from the observational plots.

^x Means of 4 years, 2004-2008, with data collected from the observational plots; ⚡ the standard deviation.

^w Rating scale of 1 to 10 where 10=best.

^v Soluble solids measured on a 25-fruit sample from observational plots harvested during the floricanes-fruiting season.

Table 3. Floricane yield and berry weight of two primocane fruiting and two floricane-fruiting blackberry varieties followed by primocane yield and berry weight in a replicated trial at the Fruit Research Station, Clarksville, Arkansas established in 2007. Data are for 2008 (primocane crop was greatly impacted with an infestation of raspberry crown borer in this planting, contributing to poor yields).

Variety	Yield (lbs/A)	Weight/berry (g)
<i>Floricane</i>		
Prime-Ark®45	11,682 a ^z	6.1 b
Prime-Jim	5,407 a	4.6 c
Ouachita	7,822 a	5.8 b
Natchez	12,565 a	7.9 a
<i>Primocane</i>		
Prime-Ark®45	986 a	4.3 a
Prime-Jim®	75 b	3.2 b

^z Mean separation within columns by *t* test ($P \leq 0.05$).

Table 4. Primocane yield and berry weight of two primocane-fruiting blackberry varieties for 2007 in replicated plantings established at the Fruit Research Station, Clarksville, Arkansas. Prime-Jim® plants were planted in 2004 and Prime-Ark®45 in 2005. All plants were fully mature at the time of data collection.

Variety	Yield (lbs/A)	Weight/berry (g)
Prime-Jim®	1,749	4.0
Prime-Ark®45	4,515	5.2

Fig. 1. Prime-Ark®45 on July 30, 2009 at Clarksville, Arkansas, with fruits developed generally prior to above 92°F temperatures that occurred in August (photo John R. Clark).



Fig.2. Fruits of Prime-Ark®45. Upper, floricanes in Arkansas (photo John R. Clark); lower, primocane fruits in California (photo Ellen Thompson).

