‘White Diamond’ and ‘White Cloud’ Peaches

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‘White Diamond’ and ‘White Cloud’ are the fourth and fifth white-fleshed peach releases from the University of Arkansas peach [*Prunus persica* (L.) Batsch] breeding program. Prior releases include ‘White River’ (2002) (Clark and Moore, 2003) and ‘White Rock’ and ‘White County’ (2004) (Clark et al., 2005). The program began in the 1960s (Clark et al., 1999) and included an objective to develop adapted white-fleshed peach cultivars for on-farm, local, and shipping sales. This group of cultivars provides for ≈6 to 7 weeks of adapted white peaches for Arkansas growers and other producers in similar climates.

‘White Diamond’ is a late-season maturity freestone with very firm flesh that softens when fully ripe and is low acid in flavor. ‘White Cloud’ is an early, midseason clingstone with non-melting flesh like that found in processing cling peaches. It has a standard acid flavor. These cultivars have good to very good resistance to bacterial spot [caused by *Xanthomonas campestris* pv. *pruni* (Smith) Dye] and should provide high-quality options for growers in areas where bacterial spot disease is a concern. These cultivars also expand options for growers in the mid- to the upper southern United States and other areas of the world with similar climatic conditions.

Origin

‘White Cloud’ resulted from a cross of ‘Allgold’ × Ark. 374 made in 1988 (Fig. 1). It was selected in 1992 and was designated Ark. 499. ‘White Diamond’ resulted from a cross of Ark. 392 × ‘White River’ made in 1994 (Fig. 2). It was selected in 1998 and was designated Ark. 700. All crossing and selection was done at the University of Arkansas Fruit Research Station, Clarksville.

Primary testing of these selections and comparison cultivars was at the Fruit Research Station [west central Arkansas, long. 35°31′58″ N and lat. 93°24′12″ W; U.S. Dept. of Agriculture hardiness zone 7a; soil type Linker fine sandy loam (Typic Hapludult)]. In all testing, trees were either open

center-trained and spaced 5.5 m between trees and rows or trained to a perpendicular-V system with trees spaced 1.9 m and rows spaced 5.5 m. Trees were dormant-pruned and fertilized annually with either complete or nitrogen fertilizers and irrigated as needed. Perpendicular-V trees also received one summer pruning, consisting of removing inward-growing shoots, in mid-June of each year. Pests were managed using a program typical for commercial orchards of the area. No bactericides were applied to plantings during testing. Fruits were thinned to a distance of 12 to 15 cm between fruit after shuck split but before pit hardening each year.

A trial consisting of open center-trained, two-tree observational plots of ‘White Diamond’ and ‘White Cloud’ and comparison cultivars White County, White River, and White Rock on ‘Lovell’ rootstock was maintained at Clarksville and data were collected from these trees or the original selection (own-root) trees from 1999 through 2008 (no data for 2007 as a result of the crop lost to spring frost). Dates for 10% and full bloom (90% of flowers open) and first harvest were recorded along with ratings of bloom amount (intensity) on a 1 to 5 scale with heaviest bloom = 5 rating. Fruit ratings in the orchard at first harvest were taken from these years for firmness and flavor, whereas trees were rated for vigor, crop, and health with an emphasis on bacterial spot severity on leaves and/or fruit. The rating scale for these fruit and tree variables was 1 to 10 with 10 being most desirable. An exception was a rating of 7 to 8 being most desirable for vigor and a rating of 10 indicated excessive vigor. Additionally, a five-fruit sample was collected each year and average fruit weight and soluble solids using a bench refractometer (Abbe model; Fisher Scientific, Pittsburgh, PA) were determined. Also from this sample, percent blush on fruit skin was estimated.

Replicated trials of perpendicular-V-trained trees were also established at the Fruit Research Station that included comparison cultivars and ‘White Cloud’ in 2000 and ‘White Diamond’ in 2003. Data collected on these plantings were yield and average fruit weight. In each planting, four single-tree replications arranged in a randomized complete block design were used, and data for each year were analyzed separately by analysis of variance and means separated by least significant difference (SAS Institute, 1989).

‘White Cloud’ was first ripe on average 5 July at Clarksville (average 103 d after full bloom) in observational plots (Table 1). ‘White Diamond’ first ripe date averaged 31 July (average 128 d after full bloom). A key potential value of these cultivars is that they ripen at dates between or after previous white-fleshed releases with ‘White Cloud’ ripening between ‘White County’ and ‘White Rock’ and ‘White Diamond’ ripening after ‘White River’. These five white-fleshed cultivars could be used to provide uninterrupted production starting in late June with ‘White Rock’ through early August with ‘White Diamond’.

Crop load ratings on a 10-point scale on observational trees for ‘White Cloud’ averaged 8.8, whereas ‘White Diamond’ averaged 9.0 (data not shown). These ratings were comparable to or higher than those for ‘White Rock’, ‘White County’, and ‘White River’. Yields for ‘White Cloud’ in a replicated trial were good in all years and were the highest or among the highest for 3 of 7 years (Table 2). ‘White Diamond’ yields were comparable to or higher than ‘White River’ in all years of the replicated trial and exceeded that for ‘Nectar’ in 2008 and 2009 (Table 3).

Average fruit weight for ‘White Cloud’ was 210 g and ‘White Diamond’ 208 g on samples from observational trees, higher than ‘White Rock’ but less heavy than ‘White County’ and ‘White River’ (Table 1). In the 2000 replicated trial, ‘White Cloud’ was the largest or among the largest in 3 of 7 years (Table 2), whereas ‘White Diamond’ was comparable to ‘White River’ in 3 of 5 years in the 2003 trial (Table 3). ‘White Cloud’ was also comparable to ‘Nectar’ in 5 of 7 years of comparison in the 2000 trial.

Fruits of ‘White Cloud’ are clingstone and have non-melting flesh. This flesh type is derived from processing peaches with this trait coming from its parent, ‘Allgold’. This flesh type provides for a firm fruit at harvest and also is excellent for canning. The flavor is a distinct white peach type with standard acidity. Flavor rating averaged 8.0 for ‘White Cloud’, comparable to comparison cultivars (data not shown). Soluble solids averaged 11.7%, comparable to ‘White Rock’ and lower than other comparison cultivars (Table 1). Firmness rating averaged 8.1, higher than that of the melting flesh ‘White River’. Fruit skin averaged 75% blush, providing for an attractive fruit.

‘White Diamond’ fruits are freestone and flesh is crisp at early ripening (which are of harvest quality) and soften when fully ripe (Fig. 3). Flavor is a light white peach type and low acid. Its flavor is much like that of the low acid cultivar White County. Soluble solids averaged 14.6%, higher than any of the other comparison cultivars (Table 1). This sweetness coupled with low acidity provides a very sweet taste. Flavor rating averaged 8.1 (data not shown). Firmness of fruits average 8.5, near that of the very firm ‘White Rock’ and ‘White County’. Fruit is very attractive with a blush covering averaging 85% of the surface. No postharvest evaluations have been conducted on these new introductions.

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Fig. 1. Pedigree of 'White Cloud' peach.

Fig. 2. Pedigree of 'White Diamond' peach.

Flowers of 'White Cloud' are non-showy and 'White Diamond' are showy; both cultivars are self-fertile. Average 10% bloom dates for 'White Cloud' and 'White Diamond' were 17 and 18 Mar., respectively, 2 to 3 d earlier than 'White Rock', 'White County', and 'White River' (Table 1). Average full bloom date was 22 Mar. for 'White Cloud' and 23 Mar.

for 'White Diamond' (Table 1). Bloom amount (intensity) rating averaged 3.1 (on a 5-point scale) for 'White Cloud' (among the highest ratings), whereas 'White Diamond' averaged 2.8, lower than comparison cultivars except 'White Rock' (Table 1).

'White Diamond' leaf glands are reniform and located at the base of leaf blade and top

of the petiole. Measurements indicated leaf glands were 0.09 mm wide and 0.18 cm long. 'White Cloud' leaf glands are also reniform, located on the petiole near the leaf blade, and were 0.09 cm long and 0.05 cm wide.

Tree vigor ratings on observational trees averaged 7.6 for 'White Cloud' and 7.0 for 'White Diamond', considered an optimum

Table 1. Fruit and plant characteristics of five white-fleshed peach cultivars from two-tree observational plots, University of Arkansas Fruit Research Station, Clarksville, 1999–2010 (missing all 2007 data resulting from frost).^z

	White Diamond	White Cloud	White Rock	White County	White River
Fruit					
First harvest date ^y	31 July ± 5 ^x	5 July ± 11	29 June ± 6 ^w	17 July ± 5	20 July ± 5
Days bloom to harvest ^y	128 ± 4.5 ^x	103 ± 11.8	92 ± 2.5 ^w	113 ± 3.9	114 ± 3.5
Fruit weight ^u (g)	208 ± 30 ^x	210 ± 38	147 ± 31 ^w	257 ± 114	272 ± 56
Soluble solids ^u (%)	14.6 ± 1.4 ^x	11.7 ± 1.6	11.3 ± 2.1 ^w	12.9 ± 1.9	12.2 ± 1.3
Firmness rating ^t	8.5 ± 0.9 ^x	8.1 ± 0.3	8.8 ± 0.6	8.7 ± 1.0	7.3 ± 0.5
Percent blush ^s	85 ± 9 ^x	75 ± 12	64 ± 8	84 ± 7	70 ± 12
Plant					
10% bloom date ^y	18 Mar. ± 9	17 Mar. ± 8	21 Mar. ± 7 ^w	20 Mar. ± 6	21 Mar. ± 7
Full bloom date ^y	23 Mar. ± 6	22 Mar. ± 7	26 Mar. ± 5 ^w	25 Mar. ± 5	26 Mar. ± 6
Bloom amount rating ^{y,x}	2.8 ± 0.9	3.1 ± 0.6	2.8 ± 0.7 ^w	3.2 ± 0.6	3.3 ± 0.9

^zData for fruit weight, soluble solids, firmness, and percent blush based on a five-fruit sample collected each year at first harvest date. Data are mean values ± sd.

^yData years 1999–2004, 2008–2010.

^xNo 2010 data.

^wNo 2004 data.

^uData years 1999, 2001–2004, 2008, 2010.

^tData years 1999, 2001–2005, 2008–2010.

^sFirmness rating based on a 1 to 10 scale with 10 being very firm. Data years 1999–2010.

^zData years 1999–2005, 2008–2010.

^yBased on observation of mature trees at full bloom using a scale of 1 to 5 with 5 = very heavy bloom.

Table 3. Production characteristics of replicated ‘White Diamond’, ‘White River’, and ‘Nectar’ white flesh peach cultivars, University of Arkansas Fruit Research Station, Clarksville, 2004–2006, 2008, and 2009.^z

Cultivar	Yield/tree (kg)	Fruit wt (g)
2004		
White Diamond	0.71 a ^y	192.5 a
White River	1.31 a	208.5 a
Nectar	0.63 a	155.9 a
2005		
White Diamond	6.30 a	173.2 b
White River	1.18 b	218.5 a
Nectar	—	—
2006		
White Diamond	7.49 a	121.1 a
White River	4.63 a	161.9 a
Nectar	—	—
2008		
White Diamond	9.94 a	173.3 b
White River	9.27 a	197.8 a
Nectar	3.94 b	208.2 a
2009		
White Diamond	8.04 a	186.9 a
White River	2.57 b	169.0 a
Nectar	3.80 b	140.3 b

^zPlanting established in 2003.

^yMean separation by least significant difference, 0.05.

vigor on a 10-point scale (data not shown). Tree health rating for ‘White Cloud’ and ‘White Diamond’ averaged 8.7 on a 10-point scale, comparable to the comparison cultivars (data not shown). A major component of the tree health rating is resistance to bacterial spot, a disease that can be quite severe at Clarksville. ‘White Cloud’ and ‘White Diamond’ were observed to have only light infections of bacterial spot in some years of evaluation, very similar to the other Arkansas white flesh cultivars. Among comparison cultivars in the replicated trials, ‘Carolina Belle’ and ‘Nectar’ had more instances of bacterial spot on leaves than the Arkansas

Fig. 3. ‘White Diamond’ fruit.

cultivars (data not shown). The other disease seen on ‘White Cloud’ and ‘White Diamond’ has been occasional brown rot [caused by *Monilinia fructicola* (G. Wint.) Honey]; however, infections were not observed most years and these cultivars are not anticipated to be different in susceptibility than most peach cultivars. A commercial fungicide program is required for disease control on all Arkansas peach cultivars in areas where brown rot occurs.

Chilling requirement of these cultivars has not been determined but is probably near 800 h below 7 °C based on observations of budbreak and bloom in comparative plantings with test cultivars of known chill requirement. These

Table 2. Production characteristics of replicated ‘White Cloud’, ‘White County’, ‘White Rock’, ‘White River’, ‘Nectar’, and ‘Carolina Belle’ white flesh peach cultivars, University of Arkansas Fruit Research Station, Clarksville, 2001–2006 and 2008.^z

Cultivar	Yield/tree (kg)	Fruit wt (g)
2001		
White Cloud	0.44 b ^y	118.9 b
White County	0.57 b	183.4 a
White Rock	2.13 a	100.8 b
White River	0.49 b	216.2 a
Nectar	0.72 b	127.4 b
Carolina Belle	3.53 a	142.4 a
2002		
White Cloud	5.04 b	161.3 b
White County	9.11 a	162.0 b
White Rock	6.92 ab	148.2 b
White River	7.28 a	192.3 a
Nectar	1.32 c	175.2 ab
Carolina Belle	5.35 b	185.4 ab
2003		
White Cloud	18.81 a	176.1 a
White County	20.39 a	136.5 b
White Rock	18.89 a	117.9 b
White River	15.18 a	122.6 b
Nectar	7.08 b	129.5 b
Carolina Belle	21.63 a	171.5 a
2004		
White Cloud	17.10 bc	221.4 b
White County	26.29 a	196.1 c
White Rock	18.3 bc	135.1 d
White River	12.24 c	239.7 a
Nectar	4.08 d	185.4 c
Carolina Belle	23.06 a	203.4 bc
2005		
White Cloud	16.27 a	204.5 b
White County	16.70 a	230.9 ab
White Rock	19.18 a	162.6 b
White River	20.30 a	249.6 a
Nectar	5.80 b	233.1 ab
Carolina Belle	23.23 a	207.5 b
2006		
White Cloud	13.80 a	146.9 a
White County	14.51 a	152.2 a
White Rock	13.54 a	119.4 b
White River	10.97 ab	162.2 a
Nectar	9.71 b	148.1 a
Carolina Belle	7.99 b	161.8 a
2008		
White Cloud	11.21 b	213.8 a
White County	18.62 a	199.0 a
White Rock	15.66 ab	155.3 b
White River	11.39 b	225.5 a
Nectar	8.72 b	195.7 a
Carolina Belle	13.71 ab	200.6 a

^zPlanting established in 2000.

^yMean separation by least significant difference, 0.05.

cultivars have not been tested in colder locations than Arkansas, thus bud hardiness has not been determined.

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