

‘WA 64’ Apple

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‘WA 64’ (‘Honeycrisp’ × ‘Cripps Pink’) is a new apple selection from the Washington State University apple breeding program with commercial potential based on its exceptional eating quality, attractive appearance, and storage potential. It is a medium-sized, attractive bi-colored apple with a red/pink blush over a green/yellow background. It has outstanding eating quality, being firm, crisp, and tasty. Fruit matures in ‘Golden Delicious’ season, typically mid-September in Wenatchee, WA, USA. It retains fruit quality, particularly firmness, after several months in refrigerated storage. It is suited to the fresh market with the potential to be a commercial cultivar suited for long-term storage. Slow browning flesh is a bonus for this selection.

Origin

‘WA 64’ originated from a cross between ‘Honeycrisp’ (female) and ‘Cripps Pink’ made in 1998 at the Washington State University (WSU) Tree Fruit Research and Extension Center (TFREC), Wenatchee, WA, USA. Seeds were germinated in Jan 1999 and raised in a greenhouse until the seedling was transferred to the nursery in May of the same year. It was budded onto M9-337 rootstock in 2001 and planted into the Phase 1 seedling block at the TFREC orchard (block 21, row 125, position 149) in Apr 2003. Fruit from this seedling tree was evaluated in 2005 and 2006. Following selection, second generation trees were budded onto M9 rootstock in Sep 2007. Five trees were planted at each of three Phase 2 sites in central Washington in Apr 2009. After further evaluation, additional trees were propagated for larger-scale Phase 3 plantings (either

planted in 2015 on G.41 rootstock or top-worked in 2015 on M.9-337 rootstock with various interstems). ‘WA 64’ was virus-tested, and certified material was released and budded onto virus-indexed MM.106 rootstock for production of certified propagation material.

Description and Performance

‘WA 64’ full bloom coincides with that of ‘Gala’ in Wenatchee, WA (lat. 47.26°N, long. 120.21°W), with a bloom period of around 15 d. The number of blooms per bud ranges from two to six, typically five, with individual flowers considered large (49 mm in diameter). Petals are white with greyed-purple undersurface highlights, Royal Horticultural Society (RHS 1966, 1986, 1995) 185C. Both surfaces of the sepals are yellow-green (RHS 144B) with tips highlighted grayed-orange (176A). White pubescence (RHS 155C) is moderately heavy on both surfaces. Pollen is viable; *S*-alleles are not yet determined but will be a combination of *S*₂, *S*₂₃, and *S*₂₄ based on parentage.

‘WA 64’ harvest maturity is mid-September in Wenatchee, 3 weeks after ‘Honeycrisp’ and 5 weeks before ‘Cripps Pink’, in ‘Golden Delicious’ season, and is not prone to preharvest drop. Fruit is small to medium in size, similar to ‘Cripps Pink’ and smaller than ‘Honeycrisp’ and is symmetrical, mostly round in shape with an average equatorial diameter of 7.1 cm and axis length of 6.3 cm. Fruit skin background color is yellow-green (RHS 150D) with overblush (if exposed) from the red group (RHS 47B) (Fig. 1). Lenticels are lightly prominent, small, round, and white. Fruit skin is smooth, with little russet observed (mainly located in the stem bowl). The pedicel is variable in length, averaging 2.8 cm; the pedicel cavity is an acute cone in shape and has an average depth of 1.3 cm. The calyx is erect, convergent with occasional reflexed tips. Seeds average two per cell, are 50% acute and 50% obtuse in shape, averaging 4.8 mm diameter by 8.7 mm in length, and are from the gray-brown group RHS 199A.

Fruit was evaluated from the original tree (Phase 1) at several harvest dates in 2005 and 2006, and from Phase 2 trees from 2010 to 2019. Fruit quality was evaluated from samples stored in regular cold storage at 1 to 2 °C for 60 d plus a week at room temperature (Tables 1 and 2) (Teh et al. 2021). ‘WA 64’ fruit is crisp, firm, and juicy (Table 3) in texture and

has a balanced sweet/tart flavor. Aroma is mild and apple-like, and flesh color is RHS white group 155D. Flesh enzymatic browning is minimal to none after 1 to 2 h, similar to the recently released ‘WA 38’ (Evans et al. 2012).

In May 2022, 120 untrained consumers in Wenatchee, WA, USA, were presented with slices of ‘WA 64’ at room temperature (from regular cold storage) for a direct paired preference test with ‘Cripps Pink’ (controlled-atmosphere-stored). They were asked which of the two apples they preferred overall and which they preferred for each attribute of appearance, taste, and texture. Whole apples were provided to judge appearance. Data were analyzed through comparison with the minimal number of responses required for a two-sided directional difference test (Roessler et al. 1976). The ‘WA 64’ fruit was significantly preferred overall by consumers, and for the attributes of taste and texture ($P < 0.001$) (Table 4). Although the appearance was slightly preferred, there was no statistical significance.

The ‘WA 64’ tree is a semispurred tip bearer of moderate vigor (Fig. 2). Fruit yield is within the range of other locally grown apple cultivars when correctly managed. ‘WA 64’ is considered hardy for the region (suitable for at least US Department of Agriculture hardiness zone 6b). Bark is grayed-brown (RHS 199A) and mostly smooth with some cracking and a moderate number of elongated brown lenticels (RHS N200A). Branches are grayed-brown (RHS 199A) with oval, grayed-orange (RHS 163C) lenticels. Leaves are acute in shape; the upper surface is leathery and smooth, with a high sheen, whereas the lower surface has a light covering of white pubescence (RHS 155C). Average blade length (of 10 blades) is 8.0 cm and width is 5.2 cm. The leaf tip is mostly acute, its base is rounded, and the margin is serrate. Stipules are on average 4.1 mm in length and are present on only 10% of leaves; their color is from the yellow-green group (RHS 152B), and they have no pubescence. Both surfaces of the leaf blade are from the yellow-green group (upper RHS 147A and lower RHS 147B). The midvein is from the yellow-green group (RHS 145C), with light density of pubescence (white RHS 155B) on 100% of the undersurface. Mean petiole length is 34 mm with an average diameter of 1.5 mm. An indistinct groove runs



Fig. 1. Fruits of ‘WA 64’ apple.

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Table 1. Fruit quality in 2014 for ‘WA 64’ and its parent cultivars Honeycrisp and Cripps Pink for fruit after 60 d in regular cold storage at 1 to 2 °C plus a week at room temperature from two locations in central Washington, USA.

Cultivar	Firmness (Newtons)	Crispness Cn ⁱ	Sugars (% soluble solids)	Acidity (mg/L malic acid)	Fruit wt (g)
Location A—Rock Island, Wenatchee, WA					
WA 64 ⁱⁱ	86.2	337	14.5	0.52	211
Honeycrisp ⁱⁱ	64.6	337	13.9	0.42	249
Cripps Pink ⁱⁱ	82.6	222	15.0	0.64	225
Location B—north of Richland, WA					
WA 64 ⁱⁱ	87.3	311	15.7	0.44	177
Honeycrisp ⁱⁱ	71.5	302	14.3	0.36	162
Cripps Pink ⁱⁱ	76.7	208	16.1	0.58	203

ⁱ Crispness measure Cn as recorded by Mohr[®] DigiTest (Evans et al. 2010).

ⁱⁱ Each mean is based on a 15-fruit sample.

Table 2. Mean instrumental fruit quality values for ‘WA 64’ and parent cultivars Honeycrisp and Cripps Pink for fruit after 60 d in regular cold storage at 1 to 2 °C plus a week at room temperature from the phase 2 trees of each cultivar at the Washington State University orchards, Rock Island, Wenatchee, WA, USA, from several harvest dates over 9 years.

Cultivar	Firmness (Newtons)	Crispness Ch ^{iv}	Sugars (% soluble solids)	Acidity (mg/L malic acid)
WA 64 ⁱ	83.4	327	13.9	0.47
Honeycrisp ⁱⁱ	64.6	326	13.1	0.43
Cripps Pink ⁱⁱⁱ	82.4	207	14.9	0.65

ⁱ Each mean is based on a 135-fruit sample.

ⁱⁱ Each mean based on a 100-fruit sample.

ⁱⁱⁱ Each mean based on a 95-fruit sample.

^{iv} Crispness measure Cn as recorded by Mohr[®] DigiTest.

the entire length of the upper surface that appears flat. Petiole color is yellow-green (RHS 152B) with the basal end highlighted from the orange-red group (RHS N34A). Pubescence (white RHS 155C) is light in density over the entire surface of the petiole.

Field observations of ‘WA 64’ have indicated moderate susceptibility to powdery mildew [*Podosphaera leucotricha*, Ell. and Ev. (E.S. Salmon)], which is mainly expressed as leaf infection (fruit marking is rare), and fire blight [*Erwinia amylovora* Burr. (Winsl. et al.)]. As a result of low inoculum levels of apple scab (*Venturia inaequalis* Cke) in We-

natchee, resistance or susceptibility has not been determined. Fruit rarely exhibits bitter pit or stem bowl cracking but has moderate susceptibility to sunburn in the apple-growing regions of central Washington. Fruit is not sensitive to bruising and has a high commercial packout potential. Fruit is sensitive to lenticel breakdown when using an aggressive soap (high or low pH) during commercial packing. ‘WA 64’ is heterozygous for the *Md-ACS-1 -1/2* gene and homozygous for the “2” allele of *Md-ACO-1 -1/1* gene for the ethylene pathway genes of 1-aminocyclopropane-1-carboxylic acid synthase and oxidase, similar to both of its

Table 3. Mean subjective ratings of fruit quality (hardness, crispness, juiciness, sweetness, and acidity) for ‘WA 64’, ‘Honeycrisp’, and ‘Cripps Pink’ for fruit after 60 d in regular cold storage at 1 to 2 °C plus a week at room temperature from the Phase 2 trees of each cultivar at the Washington State University orchards, Rock Island, Wenatchee, WA, USA, from several harvest dates over 9 years.

	Hardness	Crispness	Juiciness	Sweetness	Acidity
WA 64 ⁱ	3.5	3.1	3.1	3.2	3.1
Honeycrisp ⁱⁱ	2.9	3.5	3.6	2.9	2.8
Cripps Pink ⁱⁱⁱ	3.5	2.5	2.7	3.3	3.5

ⁱ Each mean based on a 54-fruit sample.

ⁱⁱ Each mean based on a 40-fruit sample.

ⁱⁱⁱ Each mean based on a 38-fruit sample.

Values are subjective ratings on a 1 to 5 scale with 1 = extremely poor, 2 = poor, 3 = average, 4 = very good, and 5 = outstanding.

Table 4. Consumer scores indicating the preferred sample in a pair comparing ‘WA 64’ to ‘Cripps Pink’ control in 2022. Consumers (n = 120) were asked about overall preference between the two apples as well as preference for appearance, taste, and texture.

	Number of consumers preferred		Total
	WA 64	Cripps Pink	
Overall	79***	36	115
Appearance	63	50	114
Taste	83***	34	117
Texture	79***	32	111

***P < 0.001.



Fig. 2. Third-leaf trees of ‘WA 64’ on Geneva 41 rootstock in Quincy, WA, USA.

parents. These genes influence fruit firmness retention (Zhu and Barritt 2008).

Availability

Washington State University is the assignee for the US patent of the ‘WA 64’ apple (Barritt and Evans 2023). Certified virus tested buds have been released to nurseries to build up propagating material. ‘WA 64’ will likely be released to Washington State growers in Winter 2025–26.

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