

‘Onyx’ Trailing Blackberry

Chad E. Finn¹

U.S. Department of Agriculture–Agricultural Research Service, Horticultural Crops Research Laboratory, Northwest Center for Small Fruit Research, Corvallis, OR 97330

Bernadine C. Strik

Department of Horticulture, Oregon State University, Corvallis, OR 97331

Brian M. Yorgey

Department of Food Science and Technology, Oregon State University, Corvallis, OR 97331

Robert R. Martin

U.S. Department of Agriculture–Agricultural Research Service, Horticultural Crops Research Laboratory, Northwest Center for Small Fruit Research, Corvallis, OR 97330

Additional index words. fresh market, fruit breeding, *Rubus*

‘Onyx’ is a new trailing blackberry (*Rubus* subg. *Rubus* Watson) cultivar from the U.S. Department of Agriculture–Agricultural Research Service (USDA-ARS) breeding program in Corvallis, OR, released in cooperation with the Oregon Agricultural Experiment Station. ‘Onyx’ is a vigorous, somewhat erect, thorny, trailing blackberry that produces moderate yields of uniform, firm, and sweet high-quality fruit with excellent flavor that are suited for the local and wholesale fresh market (Figs. 1 and 2). ‘Onyx’ is being released primarily as a result of its outstanding fresh fruit quality in the late season. An application for a U.S. plant patent has been submitted.

Origin

‘Onyx’, tested as ORUS 1523-4, was selected in Corvallis, OR, in 1997 from a cross made in 1995 of OSC 1466 and ORUS 1117-11 (Fig. 3). OSC 1466 was selected in 1966 and has always been noted for its productivity and outstanding fruit quality, especially flavor, but its fruit are small. ORUS 1117-11 is a thornless selection with high yields of late-ripening fruit

with excellent quality. ‘Onyx’ is being released primarily as a result of its outstanding fresh fruit quality in the late season.

Description and Performance

‘Onyx’ has been evaluated most extensively in trials at Oregon State University’s North Willamette Research and Extension Center (Aurora, OR; OSU-NWREC) as well as observation plots with the USDA-ARS in Corvallis, OR, and in commercial fields in Oregon’s Willamette Valley. In the trials, standard cultural practices for trailing blackberry production were used, including annual pre- and post-emergent herbicide applications, spring nitrogen fertilization (78 kg N/ha), post-harvest removal of floricanes, training of primocanes to a two-wire trellis, and weekly overhead application of 2.5 to 5.0 cm of irrigation during the growing season depending on rainfall. At OSU-NWREC, dormant applications of liquid lime sulfur and copper hydroxide were made to control leaf and cane spot caused by *Septoria rubi* Westend, purple blotch caused by *Septocytia ruborum* (Lib) Petr., rust caused by *Kuehneola uredinis* (Link) Arth., and anthracnose caused by *Elsinoe veneta* [Burkholder] Jenk. Plots also received a single bloom-time application of captan to control anthracnose, botrytis caused by *Botrytis cinerea* Pers.:Fr., cane spot, purple blotch, and stamen blight caused by *Haplospheeria deformans* (Syd.) Syd. at labeled rates. At the OSU-NWREC, ‘Onyx’ was planted in 1999 and 2005 in single, three-plant observation plots within a replicated trial that included the cultivars Adrienne, Black Diamond, Black Pearl, Everthornless, Marion, Metolius, Navaho, Nightfall, Obsidian, Silvan, Siskiyou, and Waldo as well as single plots of the cultivars Apache, Čačanska Bestrna, Loch Tay, and Shawnee. Of these cultivars, ‘Loch Tay’, ‘Navaho’, ‘Obsidian’, ‘Metolius’, and ‘Siskiyou’ fruit are commonly sold in the wholesale fresh

market and ‘Black Diamond’ and ‘Black Pearl’, although primarily cultivars for processing, also have had some success as fresh market cultivars. The rest are almost exclusively grown for the processing market. In 2002 at the OSU-NWREC, ‘Onyx’ was planted along with other selections and ‘Siskiyou’ and ‘Marion’ in a randomized complete block design with four three-plant replications used for determining fresh fruit characteristics. Three replications were harvested once a week to determine harvest season, yield, and average fruit weight based on a randomly selected subsample from each harvest (Finn et al., 1999; Waldo, 1957). These data, collected from 2004–2006, were analyzed as a split plot in time with cultivar as the main plot and year as the subplot with mean separation by least significant difference. Of the 13 genotypes harvested from this replicated trial, only the data from ‘Marion’ and ‘Siskiyou’ were included in the analysis. The cultivar × year interaction was significant for yield but not for fruit weight (Table 1). Thus, mean fruit weight is presented for each year of the trial. The fruit-ripening season in Oregon was characterized by the dates on which 5%, 50%, and 95% of the total fruit were harvested (data not shown). Subjective fruit evaluations were made during the 2003–2006 fruiting seasons using a 1 to 9 scale (9 = the best expression of each trait). The fruit ratings included sterility (subjective rating of drupelet set), firmness (as measured subjectively by hand in the field on six to eight fruit), color (ideal is a solid, dark black), shape (with a uniform, long conic berry being ideal), texture (subjectively rated when chewed while tasting berries in the field), separation (subjective rating of how easily the ripe fruit were separated from



Fig. 1. Plants of ‘Onyx’.



Fig. 2. Ripe fruit on plants of ‘Onyx’.

Received for publication 4 Jan. 2011. Accepted for publication 24 Jan. 2011.

This research was partially funded by the Oregon Raspberry and Blackberry Commission and from a grant through the USDA-ARS Northwest Center for Small Fruit Research.

We gratefully acknowledge Mary Peterson, Connie Pace, and Gil Buller for their assistance in the evaluation of ‘Onyx’; Derek Peacock with Hurst’s Berry Farm for their evaluation of ‘Onyx’ in a commercial setting; and Nola Mosier for efforts to produce the nuclear material that is free of known viruses.

Mention of trade names or commercial products in this manuscript is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the U.S. Department of Agriculture.

¹To whom reprint requests should be addressed; e-mail Chad.Finn@ARS.USDA.GOV.

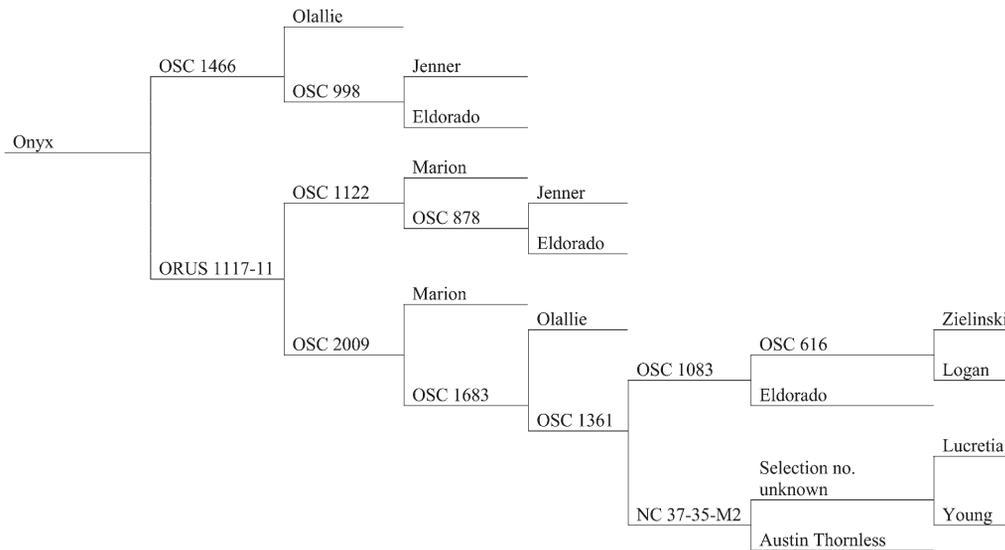


Fig. 3. Pedigree for 'Onyx'.

the plant), and flavor (subjectively rated by tasting fruit in the field) (Table 2). Plant ratings were conducted one time each year during the fruiting season for primocane and florican vigor, spines (1 = numerous, large spines; 9 = spineless), flowering or fruiting lateral length (1 = very short; 5 = very long) and strength (1 = weak, droopy; 5 = stiff, sturdy), and damage resulting from winter injury (1 = dead; 9 = no injury).

'Onyx' produced yields comparable to those of 'Marion' but higher than 'Siskiyou' in the replicated trial (Table 1) and yield was in the same range as 'Marion' in the other trials where it was planted in a single plot (data not shown). The harvest season for 'Onyx' is in the late season for a trailing blackberry, beginning in early July and ending \approx 1 Aug. with the 50% harvest date on 15 to 16 July (data not shown). This harvest season is 3 to 7 d later than 'Marion' and 7 d later than 'Black Diamond' but 21 to 28 d before 'Chickasaw' and 'Navaho'.

'Onyx' plants were rated thornier than 'Siskiyou' and 'Marion' and more vigorous than these two as well as 'Waldo' (Table 2). 'Onyx' canes have fruiting laterals that are fairly long, comparable to 'Marion', and longer than those of 'Siskiyou' or 'Waldo', thereby presenting the fruit well for hand-picking. No serious cane disease has been noted on 'Onyx' because it was selected. 'Onyx' was more cold-tolerant than 'Marion', 'Siskiyou', and 'Waldo' in a replicated trial. In Feb. 2006, temperatures early in the month were warm (12 to 15 °C) during the day and moderate at night (1 to 7 °C); however, in the third week of February, the night temperatures dropped to \approx -5 to -8 °C. Although 'Marion' had severe cold injury symptoms, damage was insignificant on 'Onyx', perhaps because 'Onyx' had not yet deacclimated, unlike 'Marion'. The canes are as resistant to cane and leaf spot as those of 'Marion'.

'Onyx' has consistently produced medium-sized fruit that are larger than 'Marion' but smaller than 'Siskiyou' (Table 1). The fruit are

Table 1. Yield and berry weight (2004–2006) for blackberry cultivars planted in replicated trial in 2002 at Oregon State University's North Willamette Research and Extension Center.

Cultivar	Berry wt (g) ^z 2004–2006	Yield (kg·ha ⁻¹)			2004–2006
		2004	2005	2006	
Marion	5.2 c ^z	19,527 a	14,967 a	8,851 ab	14,448 a
Onyx	6.1 b	16,849 a	12,432 a	13,645 a	14,309 a
Siskiyou	6.7 a	11,441 b	12,453 a	6,195 b	10,033 b

^zMeans within a column followed by the same lowercase letter are not significantly different, $P > 0.05$, by least significant difference test.

Table 2. Subjectively evaluated fruit quality traits and winter injury for four blackberry cultivars in a replicated trial planted in 2002 at Oregon State University's North Willamette Research and Extension Center and evaluated in 2003–2006.^z

Cultivars	Firmness ^y	Color	Shape	Sterility	Texture	Flavor	Winter injury
Marion	4.8 c	7.7 b	5.8 c	7.7 b	9.0 a	8.8 a	5.8 c
Onyx	8.4 a	8.7 a	7.8 b	8.6 a	8.9 a	7.5 c	8.6 a
Siskiyou	8.5 a	7.8 b	7.9 b	6.8 c	8.5 a	8.3 b	7.4 b
Waldo	6.5 b	7.5 b	8.8 a	9.0 a	8.6 a	6.1 d	7.9 b

^zSubjective fruit evaluations were made using a 1 to 9 scale (9 = the best expression of each trait). For color, a deep full black is ideal and for shape, a uniform, long conic is ideal.

^yMeans within a column followed by the same letter are not significantly different, $P > 0.05$, by least significant difference.

conic with compact uniform drupelets and are more uniformly shaped and show less drupelet set problems than 'Marion' but are not quite as perfectly formed as 'Waldo' (Table 2). 'Onyx' fruit are as firm as those of 'Siskiyou' and much firmer than 'Waldo' and 'Marion' (Table 2). The combination of 'Onyx's' fruit size, shape, and firmness makes them well suited for packing in clamshells for the wholesale fresh market. The fruit color is dark black and less purple than 'Marion', 'Siskiyou', and 'Waldo' (Table 2). The fruit texture is typical for a high-quality trailing blackberry with the seeds not being particularly crunchy or noticeable (Table 2). The fruit flavor was rated as excellent, although not as outstanding as 'Marion' or 'Siskiyou' but better than 'Waldo' (Table 2). 'Marion's' fruit flavor is the standard by which others are measured, because 'Marion' has an intense flavor and a rich, complex mixture of aromatic compounds and high acidity (Hall et al., 2002; Yorgey and Finn, 2005).

This intense flavor in 'Marion' is preferred in a processed product in which blackberries may make up a small proportion of the end product.

'Onyx' fruit have a similar percent soluble solids to 'Marion', 'Black Pearl', 'Navaho', 'Nightfall', 'Obsidian', 'Siskiyou' and 'Waldo' fruit and higher levels than 'Black Diamond' and 'Loch Tay' but lower than 'Thornless Evergreen', which ripens 5 weeks later in August to September (Table 3). The pH of 'Onyx' fruit was comparable to most cultivars but was higher than that of 'Marion' or the acidic 'Nightfall' (Table 3). The titratable acidity for 'Onyx' fruit was relatively low compared with most processing cultivars developed for the Pacific Northwest industry, although it was higher than that of 'Loch Tay' (Table 3). 'Onyx's' flavor, although not as intense as 'Marion', as discussed previously, is sweet and fruity with less acidity than is typical for 'Marion' fruit, making it very desirable to the average consumer.

Table 3. Fruit chemistry characteristics for a number of blackberry cultivars grown at Oregon State University's North Willamette Research and Extension Center and harvested in 2004–2006.

Cultivar	Soluble solids (°Brix) ^z	pH	Titrateable acidity (g·L ⁻¹ as citric)
Black Diamond	10.11 c	3.50 a	11.70 cd
Black Pearl	13.42 b	3.27 a–c	15.96 b
Thornless Evergreen	15.53 a	3.41 ab	12.16 c
Loch Tay	10.72 c	3.47 ab	9.68 d
Marion	13.74 b	3.26 bc	17.04 b
Navaho	13.92 b	3.41 ab	11.97 cd
Nightfall	12.75 b	3.08 c	30.15 a
Obsidian	12.44 b	3.32 ab	17.43 b
Onyx	12.69 b	3.49 a	11.08 cd
Siskiyou	12.93 b	3.33 ab	15.92 b
Waldo	13.52 b	3.35 ab	17.01 b

^zMeans within a column followed by the same lowercase letter are not significantly different, $P > 0.05$, by least significant difference test.

With its outstanding fresh, sweet flavor, and attractive fruit, 'Onyx' is likely to be best suited for the fresh market where it has sufficient firmness and skin toughness to be handled and shipped. In a small-scale commercial trial, 'Onyx' was handled and shipped successfully throughout North America as a high-quality product in the wholesale fresh fruit market.

'Onyx' nuclear stock has tested negative for *Apple mosaic virus*, *Arabis mosaic virus*,

Cherry leafroll virus, *Prunus necrotic ringspot virus*, *Raspberry bushy dwarf virus*, *Raspberry ringspot virus*, *Strawberry necrotic shock virus*, *Tobacco ringspot virus*, and *Tomato ringspot virus* by enzyme-linked immunosorbent assay; for *Black raspberry necrosis virus*, *Blackberry virus Y*, *Blackberry yellow vein associated virus*, *Raspberry latent virus*, *Raspberry leaf mottle virus*, and *Rubus yellow net virus* in reverse transcription–polymerase chain

reaction tests; and has indexed negative when grafted onto *R. occidentalis*.

An application for a U.S. plant patent has been submitted for 'Onyx'. When this germplasm contributes to the development of a new cultivar or germplasm, it is requested that appropriate recognition be given to the source. Further information and a list of nurseries propagating 'Onyx' is available on written request to Chad Finn. The USDA-ARS does not sell plants. In addition, genetic material of this release has been deposited in the National Plant Germplasm System as PI 654994 (CRUB 2514).

Literature Cited

- Finn, C.E., F.J. Lawrence, B.C. Strik, B. Yorgey, and J. DeFrancesco. 1999. 'Siskiyou' trailing blackberry. *HortScience* 34:1288–1290.
- Hall, H.K., M.J. Stephens, C.J. Stanley, C. Finn, and B. Yorgey. 2002. Breeding new 'Boysen' and 'Marion' cultivars. *Acta Hort.* 585:91–96.
- Waldo, G.F. 1957. The Marion blackberry. *Oregon Agr. Expt. Sta. Circ.* 571.
- Yorgey, B. and C.E. Finn. 2005. Comparison of 'Marion' to thornless blackberry genotypes as individually quick frozen and puree products. *HortScience* 40:513–515.