

‘Cardinal Joy’ Peach

Chunxian Chen and William R. Okie

Southeastern Fruit and Tree Nut Research Laboratory, US Department of Agriculture, Agricultural Research Service, 21 Dunbar Road, Byron, GA 31008, USA

Keywords. early season, fruit breeding, high chill, *Prunus persica*

The southeastern US peach industry in the main season production area still needs new and improved cultivars for shipping and roadside fresh markets. Over the past decades the US Department of Agriculture, Agricultural Research Service (USDA-ARS) peach breeding program in Byron, GA, USA, has released the “prince” and “Joy” series cultivars with similar fruit attributes to cover the entire harvest season (Chen 2021; Chen and Okie 2020; Okie 1997; Okie and Layne 2008). Now a new early maturing cultivar, ripening in mid to late May in Byron, GA, USA (32°38'56"N, 83°45'20"W), ‘Cardinal Joy’ (tested as BY02P3726), is released. ‘Cardinal Joy’ fruit has high percentage blush, yellow melting flesh, semifreestone pit, normal acidity, rich flavor with balanced sugar and acid ratios, and good firmness for handling, similar to most of our releases that still dominate the production profile in the area. ‘Cardinal Joy’ is a promising candidate for commercial success in the early harvest season in that it has a high chilling requirement (~850 chill hours) and blooms later with relatively lower risk of crop loss to spring frost. It is suggested for trials wherever the “prince” and “Joy” series cultivars are grown.

Origin

‘Cardinal Joy’ resulted from a BY93P3635 × ‘Rich Joy’ cross in 2001 (Fig. 1). BY93P3635 was selected from a ‘Blazeprince’ × BY89P3023 population. BY89P3023 was an open-pollinated (OP) progeny of BY86P0366 that was selected from ‘Hakuto’ × ‘Flavorcrest’. The original seedling tree of ‘Cardinal Joy’ was named 02-3726v when planted at the Southeastern

Fruit and Tree Nut Research Laboratory in Byron in 2002 and subsequently designated as BY02P3726 in trials.

Description

Trees of ‘Cardinal Joy’ are productive in years with adequate chill. Blossoms have large, showy pink petals and are self-fertile; the cultivar blooms about with ‘Elberta’ and ‘Rubyprince’ and slightly after ‘Blazeprince’, requiring ~850 chill hours below 7.2 °C (~45 °F) to break the bud dormancy in a climate similar to that of Byron (32°38'56"N, 83°45'20"W). ‘Cardinal Joy’ is a reliable higher chill alternative in the harvest seasons of ‘Flavorich’ (~700 chill hours) and ‘Carored’ (~650 chill hours) that bloom earlier and thus usually incur higher risk of crop loss to spring frost. Trees have not been extensively tested in northern climates. Leaf glands are reniform. No virus symptoms have been observed on ‘Cardinal Joy’ trees in Byron, GA, USA.

Performance

Performance in Byron, GA, USA was evaluated yearly based on the selected original seedling, as well as on multiple sets of

four or six nonreplicated grafted trees in test blocks (‘Guardian’ as rootstock; Table 1). Performance in South Carolina was evaluated in the ‘Springcrest’ season (20–31 May) at Musser Farm of Clemson University (<http://www.clemsonpeach.org>, by search of variety BY02P3726). Appropriate pesticide sprays were applied on the schedule as recommended by the Byron farm management team and Georgia extension service, primarily to control weeds or manage pests and fungal diseases on fruit. No bactericides were used any test trees or locations, to maximize bacterial spot (*Xanthomonas arboricola* pv. *pruni*) expression. Trees appear to be resistant to bacterial spot based on the lack of visual symptoms on leaves and fruit throughout the evaluation years, compared with some susceptible cultivars in the same test blocks developing typical symptoms on leaves (rarely on fruit) in some of the years (data not shown). ‘Cardinal Joy’ crops reliably, sizes well, and ripens in mid to late May in Byron, ≈1 week after ‘Flavorich’ (syn. ‘Rich May’) and a few days before ‘Carored’. At maturity, ‘Cardinal Joy’ fruit is usually round to slightly elongated and medium in size (Table 1), and fruit surface has high percent red and little pubescence (Fig. 2). ‘Cardinal Joy’ fruit appear very attractive to birds, likely due to the extensive coloration and early maturity. The flesh is yellow with little red in the pit cavity. The semifreestone fruit develops excellent melting texture and rich flavor as it ripens. It is worth noting that at Byron, GA, USA in 2015 the cultivar yielded a partial crop after a severe spring frost that caused complete crop loss in many peaches (Chen et al. 2016), including of ‘Flavorich’ and ‘Carored’. In 2017 ‘Cardinal

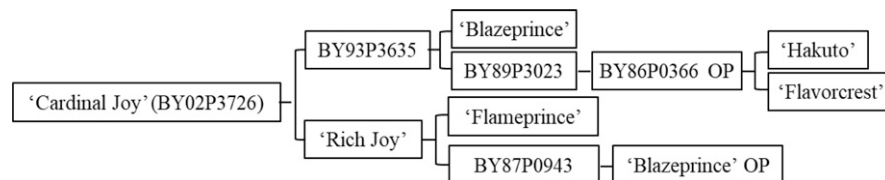


Fig. 1. Pedigree of ‘Cardinal Joy’ peach. OP = open pollinated seedling.

Table 1. Evaluation data of ‘Cardinal Joy’, ‘Flavorich’, and ‘Carored’ in Byron, GA, USA.ⁱ

Cultivar	Size (mm)	Set (0–9)	Blush (0–9)	Attractiveness (0–9)
Cardinal Joy	62.37 ± 1.04 a	6.36 ± 0.44 a	7.41 ± 0.11 a	7.13 ± 0.20 a
Flavorich	61.23 ± 0.91 a	5.58 ± 0.57 a	7.13 ± 0.16 a	6.08 ± 0.36 ab
Carored	62.01 ± 1.02 a	4.55 ± 0.56 a	7.32 ± 0.23 a	5.36 ± 0.41 b

ⁱ Trees were grafted on ‘Guardian’ rootstock. Evaluation data were collected from multiple sets of four or six trees in different test blocks during 2004–10 and 2014–22 (missing data during 2011–13 due to retirement). Size was diameter (millimeters) converted from the equatorial circumference of fruit measured using a circular measuring tape (Cranston Machinery Co., Oak Grove, OR, USA). Set, blush, and attractiveness were rated 0 to 9 (none to highest; 6 to 8, presumably commercially desirable). Statistical analysis was performed using the GLIMMIX procedure with Tukey’s honestly significant difference test in SAS 9.4 (SAS Institute Inc., Cary, NC, USA). The *F* values and probability > *F* (in the parentheses) of GLIMMIX Type III Tests for size, set, blush, and attractiveness are 2.94 (0.0652), 0.28 (0.7549), 1.13 (<0.3357), and 7.49 (<0.0019), respectively. Means ± standard errors, and significance letters are presented. Tukey–Kramer grouping for least squares means with the same letter are not significantly different ($\alpha = 0.05$).

Received for publication 6 Nov 2023. Accepted for publication 8 Dec 2023. Published online 23 Jan 2024.

We thank Luke Quick for maintaining the materials used in this work. The research was partly supported by the US Department of Agriculture (USDA) National Program of Plant Genetic Resources, Genomics and Genetic Improvement (project no. 6042-21000-005-000D). This article reports the results of research only. Mention of a trademark or proprietary product is solely for the purpose of providing specific information and does not constitute a guarantee or warranty of the product by the USDA and does not imply its approval to the exclusion of other products that may also be suitable.

C.C. is the corresponding author. E-mail: chunxian.chen@usda.gov.

This is an open access article distributed under the CC BY-NC-ND license (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).



Fig. 2. Typical ripe 'Cardinal Joy' fruit on a tree (left) and harvested (right) in Byron, GA, USA, on 19 May 2022, showing the size, shape, exterior, flesh, and pit in different fruit and section views. The views arranged in four columns on a Scor-Pal measuring board were back and suture sides, stem and blossom ends, longitudinal halves with and without the pit, and latitudinal halves with and without the pit. The tree and fruit photos were taken outdoor and indoor, respectively. There was no washing or other treatment of the freshly harvested fruit. Each square on the board is 1×1 cm.

Joy' produced no fruit due to extremely insufficient chill (~ 520 chill hours), as did all other high-chill peaches (Chen and Beckman 2019).

Availability

Request for the cultivar or prospective licensees should be addressed to USDA-ARS, Office of Technology Transfer, 5601 Sunnyside Ave, Room 4-1192, Beltsville, MD 20705-5131, or via license@usda.gov.

References Cited

Chen C. 2021. Peach cultivar releases and fruit trait distribution in the USDA-ARS Byron

program. *Acta Hort.* 1304:29-36. <https://doi.org/10.17660/ActaHortic.2021.1304.4>.

Chen C, Beckman TG. 2019. Effect of a late spring application of hydrogen cyanamide on high-chill peaches. *Agronomy*. 9:726. <https://doi.org/10.3390/agronomy9110726>.

Chen C, Okie WR. 2020. 'Rich Joy' peach. *HortScience*. 55:591-592. <https://doi.org/10.21273/Hortsci14720-19>.

Chen C, Okie WR, Beckman TG. 2016. Peach fruit set and buttoning after spring frost. *HortScience*. 51:816-821. <https://doi.org/10.21273/HORTSCI.51.7.816>.

Okie WR. 1997. USDA stone fruit breeding in the southeastern United States. *Fruit Var J*. 51:211-217.

Okie WR, Layne DR. 2008. 'Scarletprince' and 'Julyprince' peaches. *HortScience*. 43:1603-1605. <https://doi.org/10.21273/HORTSCI.43.5.1603>.