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‘Jelly Heart’ Japanese Plum

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‘Jelly Heart’ is the fifth cultivar of Japanese plum (*Prunus salicina* Lindl.) released through the stone fruit breeding program by the National Institute of Horticultural and Herbal Science under the Rural Development Administration. The primary objective of this breeding program is to develop new plum cultivars that meet consumer demands for high-quality fruit. ‘Jelly Heart’ originated in 2006 from an open-pollinated seed of ‘Shiho’, a progeny of ‘Gekko’ and ‘Oishiwase’, and was officially named in 2018. It is a midseason cultivar that ripens in late July, ~112 d after full bloom in the Wanju region of the Republic of Korea. The fruit has a cordate form with medium red flesh and weighs ~65.3 g. Its soluble solids content is 15.2 °Brix, and its titratable acidity is 0.64%, making it relatively higher in sugar content and lower in acidity compared with other cultivars. Its high sweetness and delightful flavor are expected to satisfy consumer preferences, and this new cultivar is promising in terms of market potential. Like most Japanese plum cultivars, ‘Jelly Heart’ is self-incompatible with an *S*-genotype of S_kS_{11}, requiring cross-compatible cultivars such as ‘Akihime’ (S_bS_h) and ‘Purple Queen’ (S_bS_c) to be planted alongside it for consistent fruit set.

Origin

‘Jelly Heart’ is a Japanese plum (*P. salicina* Lindl.) cultivar that originated from an open-polllinated seed of ‘Shiho’, a progeny of ‘Gekko’ and ‘Oishiwase’, with an unknown pollen parent (Fig. 1). A total of 124 seeds of ‘Shiho’ were obtained in 2006, and 62 germinated seedlings were planted at the experimental field in Suwon, Republic of Korea, in 2007. The seedlings were evaluated from 2008 to 2014, and the superior line ‘8-2081’ was selected for its high fruit quality in 2014. This selected line was designated as ‘Wonkyo Ma-22’ and was grafted onto ‘Maotao’ (*Prunus persica*) peach seedling rootstocks for adaptability testing. Subsequently, five trees of ‘Wonkyo Ma-22’ were planted in Wanju, South Korea, in 2015 with a spacing of 5 m between the rows and 4 m between the trees, and were trained to an open center system. These trees were later selected and officially released as ‘Jelly Heart’ in 2018. ‘Jelly Heart’ is self-incompatible, like most other Japanese plum cultivars, and its *S*-genotype was identified as S_kS_{11}. Trees were pruned in summer and winter, and diseases and pests were managed according to standard commercial guidelines followed in the Republic of Korea (Chung et al. 2013). To evaluate local adaptability, growth characteristics and fruit quality were investigated through trial cultivation in Cheongdo, Cheongju, Chuncheon, and Wanju from 2021 to 2024 (Table 1). Cheongdo is part of Gyeongsangbuk-do, which has the largest plum cultivation area, and is located in southeastern Republic of Korea. Cheongju, Chuncheon, and Wanju are located in the center, northeast, and southwest of the Republic of Korea, respectively.

Description

Tree. Tree, leaf, and flower characteristics were evaluated according to the International Union for the Protection of New Varieties of Plants (2021) guidelines for distinctness, uniformity, and stability of the Japanese plum (*P. salicina*). Trees of ‘Jelly Heart’ were moderately vigorous with a spreading growth habit, and the spur length was ~2.88 cm. The leaf blade was ovate in shape and medium green in color. The angle of the apex (excluding the tip) of the leaf blade was obtuse, and the leaf had a bicrenate form. The petiole length of the leaf was ~1.09 cm, and the nectaries were located predominantly at the base of the leaf blade.

Chilling requirement. The chilling requirement was estimated by forcing and calculated according to the Utah and Dynamic models as described by Kwon et al. (2020). The chilling requirement of ‘Jelly Heart’ was less than 200 chill units (CU) and 15 chilling portions.

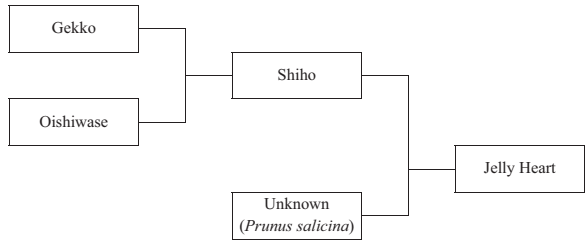

Fig. 1. Pedigree of ‘Jelly Heart’ plum. ‘Jelly Heart’ originated from an open-pollinated seed of ‘Shiho’, with an unknown pollen parent.

Table 1. Location and meteorological data of the four evaluation sites, 2021–24.

	Coordinates		Tempterature (°C)			Precipitation (mm)		
Location	Lat.	Long.	Avg	Max	Min	Avg	Max	Min
Cheongdo	35°39'N	128°44'E	15.0	37.8	–14.2	1280	1874	843
Cheongju	36°33'N	127°32'E	14.7	37.0	–16.7	1395	1806	1002
Chuncheon	37°83'N	128°32'E	12.5	36.6	–21.9	1346	1728	1046
Wanju	35°49'N	126°59'E	14.8	36.5	–16.5	1478	1987	1072

Temperature and annual precipitation data were obtained from Korean Meteorological Administration (2025).

Table 2. Phenological characteristics of ‘Jelly Heart’ and other comparison cultivars in Wanju, 2021–24.

Cultivar	Full bloom date	Ripening date	Days from full bloom to ripening
Jelly Heart	31 Mar	20 Jul a[1]	112 a
Oishiwase	1 Apr	21 Jun d	81 d
Purple Queen	31 Mar	6 Jul c	98 c
Santa Rosa	3 Apr	14 Jul b	102 bc
Shiho	2 Apr	17 Jul b	106 b

[1]Means within a column followed by different letters are significantly different by Duncan’s multiple range test at $P < 0.05$. Means within the full bloom date column are not significantly different.

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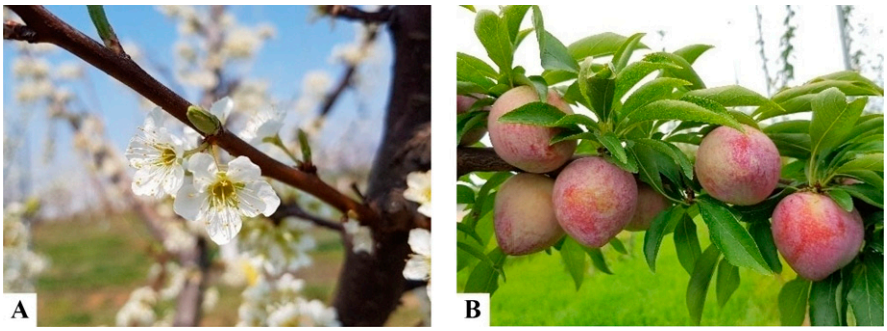

Fig. 2. Flower (**A**) and fruit (**B**) of 'Jelly Heart' plum.

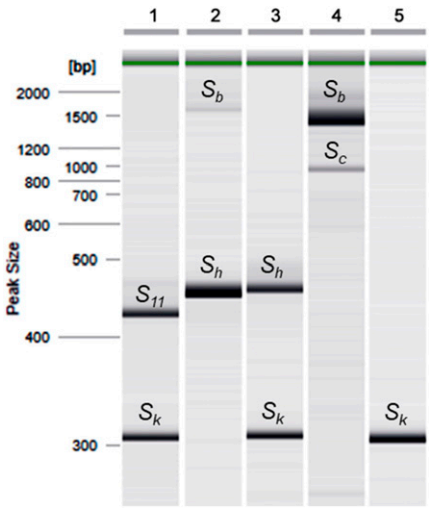

Fig. 3. Results of the polymerase chain reaction analysis of plum cultivars using the *S*-RNase gene-specific primer pair Pru-C2 and Pru-C6R (Jun et al. 2007). Lane 1, 'Jelly Heart' (S_kS_{11}); lane 2, 'Akihime' (S_bS_h); lane 3, 'Elephant Heart' (S_hS_k); lane 4, 'Purple Queen' (S_bS_c); and lane 5, 'Shiho' (*S*-S_k).

Flower. For the comparison of phenological characteristics, 'Jelly Heart' and four other cultivars—Oishiwase, Purple Queen, Santa Rosa, and Shiho—were grown in an experimental field in Wanju, Republic of Korea, under identical cultivation practices from 2021 to 2024. The full bloom date of 'Jelly Heart' was 31 Mar in Wanju, similar to the other comparison cultivars (Table 2). The pedicel length of 'Jelly Heart' was ~1.26 cm and the five petals were touching each other (Fig. 2A). The petals were circular in shape, and the undulation of the petal margins was weak. The stigma was positioned at the same level as the anthers.

Fruit set. 'Jelly Heart' is self-incompatible, like most other Japanese plum cultivars. The *S*-genotype of 'Jelly Heart' was determined using polymerase chain reaction as described by Jun et al. (2007). The *SI*-genotype of 'Jelly Heart' was determined to be S_kS_{11} (Fig. 3), and cross-compatible cultivars with different *S*-genotypes such as 'Akihime' (S_bS_h) and 'Purple Queen' (S_bS_c) that bloom synchronously need to be planted together in commercial orchards to ensure consistent fruit set.

Considering that the chilling requirement of typical Japanese plums ranges from 200 to 1000 CU (Guerra and Rodrigo 2015), 'Jelly Heart' is considered a low-chill cultivar.

Fruit. To investigate the fruit characteristics, fruit shape in ventral view, skin and flesh color, adherence to flesh, fruit weight, soluble solids content, acidity, and firmness were evaluated for 'Jelly Heart' and four comparison cultivars grown in Wanju, Republic of Korea, from 2021 to 2024. Fifty fully mature fruit were harvested from five trees and used to measure each trait. The fruit shape of 'Jelly Heart' was cordate, similar to 'Oishiwase' and 'Shiho' (Table 3; Fig. 2B). Overall skin color of 'Jelly Heart' was medium red, similar to the other comparison cultivars, with the exception of 'Purple Queen'. The flesh color was medium red, whereas that of the other cultivars was yellow or whitish. The adherence to the flesh was semiadherent, whereas other comparison cultivars were adherent. This semiadherent trait makes it easier for consumers to eat the fruit. The average fruit weight of 'Jelly Heart' was 68.9 g, whereas the comparison cultivars ranged from 77.6 ('Oishiwase') to 97.8 g ('Santa Rosa'). The productivity of 5-year-old 'Jelly Heart' trees was 19.5 kg/tree, whereas that of the comparison cultivars ranged from 17.4 ('Santa Rosa') to 23.1 kg/tree ('Purple Queen') in the 5- × 4-m plot (Table 4).

The average soluble solids content of 'Jelly Heart' was 14.6 °Brix, which is higher than that of the comparison cultivars (Table 3). The fruit acidity of 'Jelly Heart' was 0.64%, which is less than that of the comparison cultivars. Because 'Jelly Heart' has a greater sugar content and a lower acidity compared with the other cultivars, it forms a greater sugar-to-acid ratio, resulting in a sweeter taste. This sweet flavor would be appealing in the market, as consumers are increasingly preferring low-acid genotypes (Byrne et al. 2012)

'Jelly Heart' had a relatively high firmness of 49.8 N compared with the other cultivars (Table 3), and it maintained its firmness well at room temperature (~25 °C). Even after 3 d of storage, its firmness decreased only slightly to 43.7 N. In contrast, the firmness of 'Oishiwase' was 34.4 N at harvest and dropped to 24.9 N over the same period. This superior firmness retention makes 'Jelly Heart' a more suitable choice for commercial distribution and extended marketability.

The average ripening date of 'Jelly Heart' in Wanju was 20 Jul (Table 2), which is medium plum harvest season in the Republic of Korea. The fruit of 'Jelly Heart' ripen ~112 d after full bloom, generally 29 d later than 'Oishiwase' and 6 d later than 'Santa Rosa'. The recommended harvest time for commercial use is determined to be 107 to 113 d after full bloom (Fig. 4). During this period, the fruit weight and sugar content reach their highest values, whereas acidity decreases, resulting

Table 3. Fruit characteristics of 'Jelly Heart' and other comparison cultivars in Wanju, 2021–24.

Cultivar	Fruit shape, ventral view	Overall color of skin	Color of flesh	Adherence to flesh	Fruit wt (g)	Soluble solids content (°Brix)	Acidity (%)	Firmness (N)
Jelly Heart	Cordate	Medium red	Medium red	Semiadherent	68.9 b[1]	14.6 a	0.64 b	49.8 a
Oishiwase	Cordate	Medium red	Yellow	Adherent	77.6 b	12.6 ab	1.19 a	34.4 c
Purple Queen	Oblate	Purple	Yellow	Adherent	80.0 b	14.1 a	0.89 b	38.9 bc
Santa Rosa	Obcordate	Medium red	Yellow	Adherent	97.8 a	11.6 b	0.77 b	42.8 ab
Shiho	Cordate	Medium red	Whitish	Adherent	95.4 a	13.2 ab	0.89 b	42.1 ab

[1]Means with a column followed by different letters are significantly different by Duncan's multiple range test at $P < 0.05$.

Table 4. Tree characteristics of 'Jelly Heart' and other comparison cultivars in Wanju, 2023–24.

Cultivar	Tree vigor	Tree habit	Yield (kg/tree)	Bacterial leaf spot (%)	Brown rot (%)
Jelly Heart	Medium	Upright	19.5 ab[1]	1.5 c	0.6 b
Oishiwase	Medium	Semiupright	18.1 ab	2.2 b	0.9 ab
Purple Queen	Strong	Upright	23.1 a	1.2 c	0.7 b
Santa Rosa	Strong	Upright	17.4 b	3.4 a	1.2 a
Shiho	Medium	Upright	—	2.3 b	1.1 a

[1]Means with a column followed by different letters are significantly different by Duncan's multiple range test at $P < 0.05$.

Fig. 4. Fruit development and coloration of fruit skin and flesh of 'Jelly Heart' 95 to 116 d after full bloom (DAFB).

Table 5. Phenological characteristics of 'Jelly Heart' and 'Oishiwase' from four locations in 2021–24.

	Full bloom date (mean ± *SD*)		Ripening date (mean ± *SD*)		Days from full bloom to ripening (mean ± *SD*)	
Location	Jelly Heart	Oishiwase	Jelly Heart	Oishiwase	Jelly Heart	Oishiwase
Cheongdo	28 Mar ± 4.9	29 Mar ± 2.8	28 Jul ± 6.1	23 Jun ± 4.3	121 ± 5.5	86 ± 7.0
Cheongju	2 Apr ± 4.7	2 Apr ± 4.9	26 Jul ± 5.7	20 Jun ± 3.8	115 ± 7.5	80 ± 7.6
Chuncheon	10 Apr ± 1.5	—	4 Aug ± 7.5	—	116 ± 6.6	—
Wanju	31 Mar ± 3.3	1 Apr ± 4.0	20 Jul ± 1.0	21 Jun ± 2.4	112 ± 3.0	80 ± 3.3

SD = standard deviation.

in excellent taste (data not shown). Visually, more than half of the fruit skin turns red, and the flesh becomes entirely deep red. After this period, the firmness decreases, making distribution less favorable.

Diseases. Field infections of bacterial spot (*Xanthomonas arboricola*) and brown rot (*Monilinia fructicola*) were assessed at harvest by examining 30 fruit samples in Wanju, Republic of Korea, during 2023 and 2024 (Table 4). The field infection rate of 'Jelly Heart' was relatively low compared with the other cultivars. Approximately 1.5% of the fruit of 'Jelly Heart' was infected with bacterial spot; the other cultivars showed infection rates ranging from 1.2% ('Purple Queen') to 3.4% ('Santa Rosa'). For brown rot, 'Jelly Heart' had an infection rate of 0.6%, whereas the other cultivars showed infection rates ranging from 0.7% ('Purple Queen') to 1.2% ('Santa Rosa').

Local performance. Phenological characteristics such as full bloom and ripening dates of 'Jelly Heart' and 'Oishiwase' were recorded at four locations (Cheongdo, Cheongju, Chuncheon, and Wanju, Republic of Korea) from 2021 to 2024 (Table 5). Full bloom was defined as the stage when ∼80% of the flowers were open; ripening date was determined based on fruit color development and flesh firmness. The full bloom dates were different up to 13 d among locations. The earliest full bloom of 'Jelly Heart' was observed on 28 Mar at Cheongdo, located in the southern region of the Republic of Korea, whereas the latest full bloom occurred on 10 Apr at Chuncheon, in the northern region of the country. The ripening date of 'Jelly Heart' was Jul 20 in Wanju, the earliest among all regions. The latest harvest occurred in Chuncheon, on Aug 4. In most regions, the harvest took place ∼112 to 121 d after full bloom.

Availability

Plant Variety Protection for 'Jelly Heart' was achieved in 2019, and registration was achieved Nov 2022 after 3 years of evaluations on distinctness, uniformity, and stability according to Korean Seed Industry Law. Requests for virus nonindexed scions for research purposes may be addressed to Jung Hyun Kwon (kwon1101@korea.kr).

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