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'Summer Dream', an Early Season Apple Cultivar with Excellent Taste

Soon-Il Kwon[1], Mok-Jong Kim[1], Jung-In Kim[1], In-Kyu Kang[2], and Cheol Choi[2]

Abstract

'Summer Dream' is an early-season, high-quality, light red apple (*Malus* x *domestica* Borkh.) with excellent appearance. The original seedling was derived from a cross between 'Tsugaru' and 'Natsumidori' in 1989 at the National Institute of Horticultural and Herbal Science (NIHHS) of the Rural Development Administration (RDA). It was initially selected in 2001 for its high fruit quality and very early ripening time. After regional adaptability testing at five sites over three years from 2002 to 2005 as 'Wonkyo Ga-26', it was finally selected in 2005. It ripens in early August about one week earlier than the parent 'Tsugaru' and two weeks earlier than 'Gala'. The fruit is small to medium in size and has a crisp texture with abundant juiciness. The fruit is oblate in shape with a yellowish-brown background skin color overlaid with a light red blush. Average fruit weight is 199 g and total soluble solids concentration is 12.8°Brix at maturity. Acidity of 'Summer Dream' is 0.4%, higher than the 0.31% recorded for 'Tsugaru'. 'Summer Dream' shows good cross compatibility with other major apple varieties in Korea including 'Fuji', 'Hongro', and 'Tsugaru'. Based on natural infection in the field, 'Summer Dream' apple is susceptible to anthracnose (*Colletotrichum gloeosporiodes* (Penz) Sacc.) and aphid (*Ovatus malisuctus* Mats.).

Major apple cultivars in Korea include early-season 'Tsugaru,' mid-season 'Hongro' (the first cultivar released from the breeding program in 1988, (9)) and late-season 'Fuji'. In terms of cultivated area, these three types account for over 81% of apple production (5, 7). 'Tsugaru' was initially raised at the test field in Aomori, Japan in 1975 and later introduced to Korea (1, 6). It ripens in late August, and is currently one of the major apple cultivars in Korea being grown in 1,600 ha (5). However, 'Tsugaru' apples are released in the market from late July each year in an unripe state and without proper coloration, often disappointing customers who buy them as the first apples of the year. The National Institute of Horticultural & Herbal Science (NIHHS), Rural Development Administration (RDA) developed 'Seogwang' in 1995 and 'Sunhong' in 2000 in order to replace 'Tsugaru' (2, 8). 'Seogwang' has a very early ripening time, is large in size, and can be picked in early August. However, its flesh tends to become mealy very quickly and its acidity is rather high - accordingly, the variety has not been widely distributed. In comparison, 'Sunhong' ripens in late August, is large in size with excellent appearance and taste, and is a popular new variety. However, with its rather late ripening time, it cannot meet the early August demand. In addition to these two cultivars, 'Sansa' is an early-season apple developed in Japan in 1986 (10). It has very good fruit quality, a good appearance, and is liked by consumers. However, trees of 'Sansa' tend to have poor vigor and yields are relatively low. Under these circumstances, NIHHS worked on developing new apple cultivars that would satisfy early season demand. Consequently, it developed and completed the registration of plant variety rights for 'Summer Dream' that ripens in early August, has an ideal level of acidity and an excellent taste.

Origin

The original seedling was derived from a cross between 'Tsugaru' and 'Natsumi-

[1] Apple Research Station, National Institute of Horticultural & Herbal Science, Rural Development Administration, Gunwi 716-812, Korea
[2] Department of Horticulture, Kyungpook National University, Daegu 702-701, Korea, cc31@knu.ac.kr

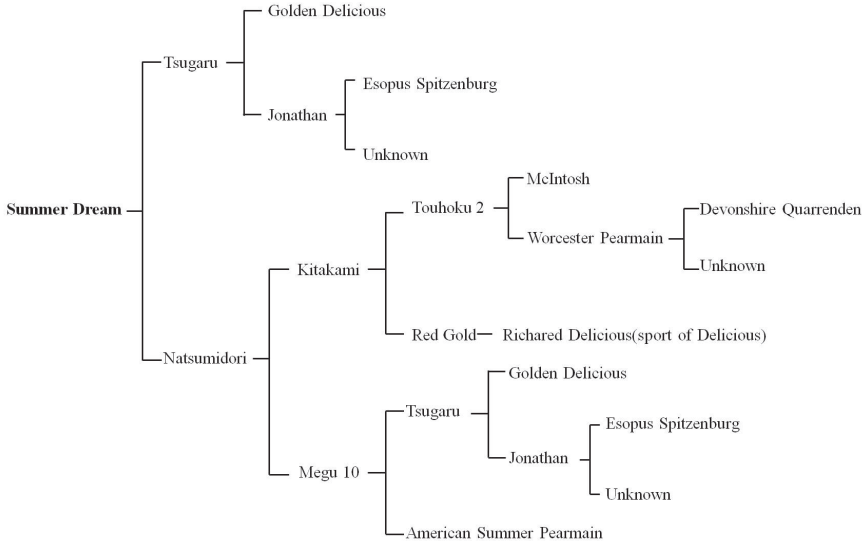

Fig. 1. Pedigree of 'Summer Dream' apple

dori' made at the NHRI, RDA, Korea in 1990 (Fig. 1). Seedlings were first cropped in 1998, and screened for early ripening and high eating quality. It was initially selected as 'Wonkyo Ga-26' in 2001, and was tested for regional adaptability from 2002 to 2005 at five sites grafted with M.9 rootstocks. The description (latitude/longitude/average elevation) of the test sites is as follows: Gunwi (36°16'36.14"N/128°27'59.55"E/65m), Chuncheon (37°57'20.52"N/127°46'35.64"E/147m), Hwaseong (37°13'20.50"N/127°2'33.80"E/31m), Iksan (35°56'35.38"N/126°59'39.03"E/15m), and Daegu (35°57'27.37"N/128°33'40.86"/E59m). It turned out to be an excellent, mid-season apple cultivar for "Chuseok", or Korean Thanksgiving Day. Accordingly, it was selected for advanced testing in 2005 under the designation 'Summer Dream'.

Description

Main Characteristics

The tree shape is a semi-spreading type and has medium-bearing branches (Table 1). The tree has high vigor during the young, non-cropping period but vegetative vigor reduces after the onset of fruiting. Full bloom occurs on about 24 April at Gunwi, Korea, similar to 'Tsugaru.' This timing is two to three days later than 'Hongro,' and similar to 'Fuji' (4, 9). 'Summer Dream' shows good cross compatibility as the fruit-set rate was higher than 63% when pollinated with either 'Fuji', 'Tsugaru' or 'Hongro' (Table 2). Each of these three cultivars were cross-compatable with 'Summer Dream.' In terms of the timing of full-bloom, 'Summer Dream' might not be ideal for pollinating 'Hongro,' but be more suitable for 'Tsugaru' and 'Fuji'.

The fruit of 'Summer Dream' is oblate in shape and has a light red skin color (Fig. 2)

Fig. 2. Fruit of 'Summer Dream' apple.

Table 1. Tree characteristics and resistance to diseases of 'Summer Dream' in 2005.

Cultivar	Tree habit	Tree vigor	Full bloom date	Harvest time	Pollen quantity	Disease Index[z] Anthracnose	Aphid
Summer Dream	Semi-upright	Medium	Apr. 24	Aug. 10	Abundant	2	2
Tsugaru	Semi-upright	Medium	Apr. 24	Aug. 19	Abundant	3	3

[z] Rate of disease resistance was determined by natural infection in the field; 1: absent or very weak - 5: very strong.

Table 2. Cross compatibility of 'Summer Dream' with 'Fuji', 'Tsugaru' and 'Hongro'[z].

Cross combination	Fruit set[y] (%)	No. of seeds (no./fruit)
Summer Dream × Fuji	81	6.6
Summer Dream × Tsugaru	63	7.3
Summer Dream × Hongro	70	7.1

[z] Data were pooled during four years (from 2002 to 2005) at Gunwi, Korea.
[y] Fruit set was calculated as the number of fruit per 100 blossom clusters.

Table 3. Fruit characteristics of 'Summer Dream' at Gunwi from 2004 to 2005 at harvest.

Cultivar	Fruit shape	Skin color	Flesh color	Fruit wt. (g)	SSC[z] (°Brix)	Firmness[y] (kg)	TA[x] (%)
Summer Dream	Obloid	Light red	White	199	12.8	4.4	0.40
Tsugaru	Conical	Light red	White	219	12.3	3.0	0.31

[z] Soluble solids content.
[y] Flesh firmness was evaluated with a 8mm diam plunger.
[x] TA measurement have been described in previously (4).

where average temperature during the month before ripening was about 21.8°C in the night and 28.8°C in the day. It is suggested that red coloration would be much greater in cooler climates. Average fruit weight is 199 g, while its firmness, sweetness and titratable acidity are high (Table 3). Both fruit firmness and titratable acidity are higher than those of 'Tsugaru' (Table 3). However, it is susceptible to anthracnose (*Colletotrichum gloeosporiodes*) on the fruit and to aphids (*Ovatus malisuctus*) on the foliage (Table 1).

According to UPOV criteria, the cultivar showed many differences to comparable cultivars. For example, 'Summer Dream' was pale pink (3) at the flower bud stage, while that of 'Tsugaru' was deep pink (4); fruit height and diameter of 'Summer Dream' was determined to be medium-sized (3), and obloid in shape, while 'Tsugaru' was "very large" in both dimensions, with a cone shape; and "fruit width" and "russet" for 'Summer Dream' were recorded as "wide (6)" and "none or very little (1)", respectively, while 'Tsugaru' recorded "medium (4)" for both.

Considerations and Future Prospects

During the young, non-cropping period, trees are quite vigorous and, if lateral branches become dominant, growth of the main trunk may be suppressed, leading to fewer lateral branches and a poor tree shape. Thus, the growth of lateral branches must be properly managed and, if necessary, they need to be scored in order to form a tree with the desired shape. As 'Summer Dream'

produces abundant flowers and its fruit are medium-sized, both flower and fruit thinning are required in order to produce high quality fruit, while maintaining tree vigor. During the test periods, the cropping of fruit was consistent over time where proper thinning management was maintained.

'Summer Dream' can be cultivated throughout South Korea. Fruit taste is excellent when the fruit are colored to greater than 40% of the fruit surface area. Selective picking over two or three harvests is desirable. Considering the medium size of the fruit, it is recommended that fruit is only set on medium-bearing branches that are 5 cm or longer in length. Weak trees may be subject to the white rot fungus (*Botryosphaeria dothidea*) or to winter injury if deacclimation occurs, and this can be avoided by coating the dormant tree with water-soluble reflective paint.

'Summer Dream' can be harvested two to three weeks earlier than 'Tsugaru' and 'Gala' that are usually harvested in late August. Many very early-ripening cultivars tend to become "mealy" during storage, and have low marketability whereas 'Summer Dream' has relatively good storability. During the test period, there were no particular symptoms shown from apple storage disorders. With its excellent taste, balanced sweetness and acidity, and good storability, 'Summer Dream' is expected to be very successful as an early-season cultivar.

Availability

After a two-year evaluation period at the Korea Seed and Variety Service Center based on the Seed Industry Act, 'Summer Dream' was registered for a plant variety right (No.2384) on June 25, 2008. 'Summer Dream' is licensed in Korea by YoungSeang Fruit Nursery Co., Youngjoo, Korea.

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