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'Sooyoung': A Mid-season Pear (*Pyrus pyrifolia* Nakai) Cultivar With High Soluble Solids and Medium Size

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Abstract

'Sooyoung' pear (*Pyrus pyrifolia* Nakai) originated from a cross between 'Niitaka' and 'Soohwangbae' made in 1989 at the National Horticultural Research Institute of the Rural Development Administration in Korea. It was first selected as '89-24-6' in 1994 for its high fruit quality with good eating characteristics for a mid-season cultivar. After regional adaptability tests at 10 sites for 8 years from 1999 to 2006 as 'Wonkyo Na-36', it was named in 2006. It blooms three days later than 'Niitaka', a leading pear cultivar in Korea. 'Sooyoung' is medium in tree vigor and upright-spreading in tree habit. 'Sooyoung' is classified as susceptible to pear scab (*Venturia nashicola*) like 'Niitaka'. 'Sooyoung' is pollen incompatible with 'Hanareum' but it is cross-compatible with 'Niitaka' and 'Wonwhang'. The optimum harvest time of 'Sooyoung' was Sept. 30, 8 days earlier than 'Niitaka'. The fruit is roundish oblate in shape and bright yellowish green in skin color. Average fruit weight is 429 g and soluble solids content is 15.0°Brix. The fruit flesh juiciness is medium-high and it has negligible grit.

Asian pear (*Pyrus pyrifolia* Nakai), one of the most important temperate fruit crops produced in Korea, is grown on 21,807 ha, with a production of 443,265 tonnes in 2005. Among major fruit species, pear ranks third in cultivation area after apples and grapes, and second in fruit production after citrus. In 2006, 16,357 tonnes (worth US $36,753,000) of pears were exported to 28 countries including the USA, Indonesia, Taiwan and Japan, making pear Korea's leading export fruit (2). The most widely grown cultivar is 'Niitaka', a cultivar with high yield potential, attractive appearance and good storage, which ripens in mid-October in Suwon. However 'Niitaka' is too large to be acceptable to foreign consumers including those in the USA, EU and Southeast Asia. Therefore it is necessary to diversify the range of pear varieties with respect to size and ripening time while maintaining good quality. 'Sooyoung' (Fig. 1), a mid-season cultivar with medium size, high eating quality and good appearance, was developed and released to meet the needs of consumers and exporters.

Figure 1. Fruit of pear cultivar 'Sooyoung'.

Materials and Methods

A population of 251 seedlings from a cross between 'Niitaka' and 'Soohwangbae' (Fig. 2) was planted in a breeding field at the National Horticultural Research Institute in Suwon in 1994. Trees were evaluated for flower, tree and fruit characteristics according to the manual for agricultural investigation (8) and guidelines for the conduct of tests for distinctness, uniformity and stability for Japanese pear (10). Each spring, flower thinning and

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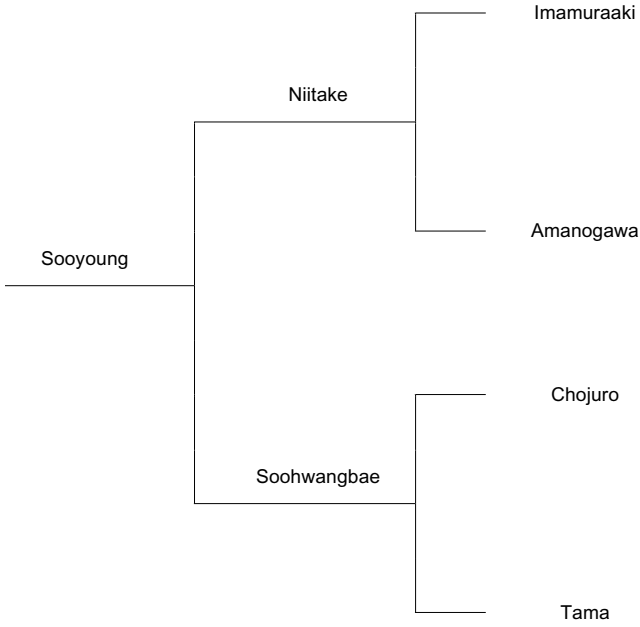

Figure 2. Pedigree of 'Sooyoung' pear.

fruit thinning were carried out to prevent biennial fruiting. Final distance between fruits at harvest was maintained at a minimum of 20 cm. As trees came into bearing, two or three fruits were taken from four trees at three times to ascertain the exact ripening time. After the fruits were weighed, they were cut in half. Flesh firmness was measured with a fruit hardness tester (Takemura FHM-5) equipped with a 5 mm diameter plunger. Thereafter, soluble solids were measured using a digital refractometer (Atago PR-101). Sensory evaluation for grit and flesh juiciness was carried out by three trained people.

To evaluate scab resistance, *V. nashicola* inoculum was prepared by rinsing spores collected from scab-infected leaves of 'Niitaka', 'Chojuro' and seedlings planted at three major pear growing regions (Naju, Ulsan and Anseong) into autoclaved water. A conidial suspension of *V. nashicola* (1×10^5 conidia/ml with 0.1% sucrose + Tween 80) was sprayed on ten fully expanded leaves of 3 nursery plants grafted on *P. pyrifolia* stock planted in 7.6 L plastic pots according to the method of Abe and Kurihara (1). After inoculation, plants were held at 20°C and 100% relative humidity for 48 h, then transferred to a greenhouse covered with shading material for protection against high temperatures. Disease symptoms were rated using the scale described by Langford and Keitt (5) from two weeks after inoculation to seven weeks.

The degree of black necrotic leaf spot caused by apple stem grooving virus was investigated by grafting test scions onto infected 'Niitaka' trees. After approximately five months, symptom occurrence (abundant black necrotic spots) was determined on all leaves developing from the test scion.

Description

'Sooyoung' is medium in tree vigor and upright-spreading in tree habit (Table 1). It blooms 4 days later than 'Niitaka'. 'Sooyoung' has long and medium length 1-year-old shoots; lenticels on 1-year-old

Table 1. Tree characteristics and scab resistance of pear cultivars 'Sooyoung' and 'Niitaka' at Suwon, Korea, 2004-2006.

Cultivar	Full bloom date	Tree vigor	Tree habit	Number of spurs per branch	Pollen quantity	Black necrotic leaf spot[z]	Scab resistance[y]
Sooyoung	Apr. 26	Medium	Upright spreading	Many	Medium	Symptomless	5
Niitaka	Apr. 22	Strong	Upright spreading	Many	Low	Symptom	7

[z] Symptomless : No visible symptoms on any leaves, Symptom : Abundant black necrotic spots on all leaves.
[y] Rated on a 0 to 9 scale were 0 = highly resistant (no visible symptoms on any leaves) and 9 = highly susceptible (abundant sporulating lesions on several leaves or petioles).

shoots are fewer than those of 'Niitaka', but similar in size (data not presented). Spurs are abundant. Precocity is similar to 'Niitaka' on *P. pyrifolia* rootstock, with the onset of fruiting in the third year. No yield data were collected. Flowers have 24 stamens per flower (medium number), similar to 'Niitaka'. 'Sooyoung' can be used as a pollinizer due to high fruit set (over 78%, data not shown). In pollination compatibility tests, 'Sooyoung' was more compatible with 'Chuhwangbae' (4) and 'Niitaka' than other cultivars, but incompatible with 'Hanareum' (3). 'Sooyoung' requires optimal chemical control of scab (*V. nashicolia*), since it is as susceptible to the disease as 'Niitaka'. However 'Sooyoung' was classified into the symptomless group against apple stem grooving virus.

Optimum fruit harvest time in Suwon is Sept. 30, 7 days earlier than 'Niitaka' during 1996-2006 (Table 2). The fruit is roundish oblate in shape and bright yellowish brown in skin color (Fig. 1). Average fruit weight is 429 g, soluble solids average 15.0 °Brix and titratable acidity is 0.095%. Fruit flesh is firmer than that of 'Niitaka', very juicy and has negligible grit. The fruit can be stored successfully for 120 days after harvest at 2 to 4°C.

Table 2. Fruit charactersitics and ripening time of pear cultivars 'Sooyoung' and 'Niitaka' at Suwon, Korea, 1996-2006.

Cultivar	Date of Maturity	Fruit shape	Fruit skin color	Fruit weight (g)	Soluble solids (°Brix)	Acidity (%)	Grit	Firmness (kg)	Flesh juiciness
Sooyoung	Sept. 30	Roundish oblate	Bright yellowish brown	429 b[z]	15.0 a	0.095	Low	1.40 a	High
Niitaka	Oct. 7	Roundish oblate	Bright yellowish brown	652 a	12.5 b	0.093	Low-medium	1.08 b	High

[z] Mean separation within columns by least significant difference (LSD) test at P = 0.05.

Availability

We will apply for protection for 'Sooyoung' in 2007 for registration in 2010 after two years of records on distinctness, uniformity and stability by Korean Seed Industry Law. Propagation material of 'Sooyoung' will be available after cultivar registration.

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The Wilder Medal is presented to individuals or organizations that have rendered outstanding service to horticulture in the area of pomology. Special consideration is given to work relating to the origination and introduction of meritorious fruit cultivars. Individuals associated with either commercial concerns or professional organizations will be considered if their introductions are truly superior and have been widely planted. Significant contributions to the science and practice of pomology other than through fruit breeding will also be considered. Such contributions may relate to any important area of fruit production such as rootstock development and evaluation, anatomical and morphological studies, or noteworthy publications in any of the above subjects. Information about the award, past recipients, etc. can be found on the APS web site at http://americanpomological.org/wilder1.html.

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Nominations must be submitted by May 1, 2008.