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'Cheonghyang': a Green Seedless Table Grape

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Abstract

'Cheonghyang', a hybrid of 'Red Pearl' (4x) x 'Muscat Bailey A' (2x), is a new green table grape cultivar, which was developed and cultivated by the Gangwon Provincial Agricultural Research and Extension Services, from a cross made in 1999. It is a triploid grape of which the chromosome number is 2n = 3x = 57. The color of the upper surface of young leaves is dark bronze, mature leaves have five blades with a deep upper lateral sinus, and berries have a strong muscat aroma. Average phenological data in the Chuncheon region over the 2006-09 seasons revealed that the bud burst date was 25 April, full bloom occurred on 5 June, and fruit ripened on 25 August. Consequently, it is classified as an early- to mid-season seedless fruit cultivar. The cluster weight was 283.4 g, the soluble solids concentration (SSC) was 17.0°Brix, and the titratable acidity (TA) was 0.45%. This cultivar requires some special management techniques: it is a triploid that has vigorous growth which must be contained, thinning the flower clusters is necessary at the 50% flowering stage, and a single treatment of 100 ppm GA_3 at the flower thinning stage is essential for achieving effective fruit set.

Grape cultivars currently grown in Korea are mostly seeded, such as 'Tankeumchu' (Noh et al., 2011) or 'Doonuri' (Yun et al., 2011). However, recent consumption tendencies for table grapes around the world are trending towards the seedless type. A seedless cultivar, 'King De La' is grown in small areas in Korea, but because of the high temperatures in summer, it has delayed color development and its harvest is late. Development of an earlier, new seedless cultivar has, therefore, been in demand.

Materials and Methods

In 1999, a seedless triploid cultivar, 'Cheonghyang' was developed at the Gangwon Provincial Agricultural Research and Extension Services, Chuncheon. The seed parent was 'Red Pearl', a tetraploid (2n = 4x = 76) which has a red skin color with high SSC. The pollen parent was the diploid (2n = 2x = 38) 'Muscat Bailey A' (MBA), a juicy and high quality table grape with favorable muscat aroma.

'Cheonghyang' was initially grown in 2000, and selected for testing its characteristics in 2006 because of its green fruit skin, high sugar content, and early-season harvest season (25 August). It was originally named Gangwon-12. After continuous development and testing of its fruit characteristics from 2006 to 2009, it was named as 'Cheonghyang' in 2009.

For the assessment of characteristics, grapevines were planted 3.5 m (between rows) x 5 m (between plants). Periodic investigation of fungal disease and pest occurrences was carried out based on the standards for diseases and pests defined by the Korea Rural Development Administration. For the four years of investigation, no special irrigation was applied, and the soil surface was managed by sod culture. Bearing branches were spur pruned to two-buds in February, and the flowers were thinned 10 days before bloom. A single treatment of 100 ppm of gibberellic acid was applied at full bloom. Harvest time was established based on fruit maturity. Fruit cluster weight was determined from the mean total weight of five clusters.

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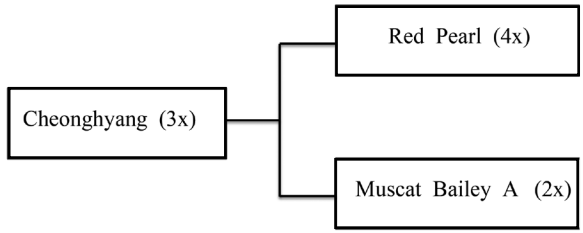

Fig. 1. Pedigree of 'Cheonghyang'. 'Red Pearl' originated from a tetraploid sport of the diploid cultivar 'Delaware'.

Berry weight was measured on ten berries that were randomly selected from the five fruit clusters. Fruit juice was extracted from five randomly selected fruit clusters, and filtered. The soluble solids concentration (SSC) was measured with a digital refractometer (Atago PR-101, Japan), and titratable acidity (TA) with an automatic titrator (Schott Titroline alpha, Mainz, Germany), where the juice was titrated to an endpoint of pH 8.2 using 0.1 N sodium hydrogen phthalate.

Description

Flowers. The flowers of 'Cheonghyang' are perfect, but the pollen on pollen germination media is abortive with a 0% germination rate. In Chuncheon, Korea, bud burst is at the end of April (25 April), and full bloom occurs in early June (5 June).

Fruit. When the fruit of 'Cheonghyang' are fully ripened, the skin is green-yellow colored. Berries are round and small sized, with a mean berry weight of 1.5 g. Seed traces cannot be found. In the harvest season, 'Cheonghyang' has a muscat aroma which is similar to that of 'Muscat Bailey A'. The harvest season in Chuncheon, Korea is from 25 to 30 August, which means its harvest is about seven to ten days earlier than that of 'King De La'. The SSC of 'Cheonghyang' is 19.5°Brix which is 2.5°Brix higher than that of 'King De La' (Table 1.) The titratable acidity (TA) is 0.35%, which is 0.1% lower than that of 'King De La'. The fruit skin is relatively thicker than that of 'King De La', which makes the berry highly resistant to cracking during the harvest period. The flesh is tender.

Clusters. The mean cluster weight of 'Cheonghyang' is 283.4 g. The mean number of berries per cluster is about 83. Cluster shape is cylindrical and its fruit bearing is highly compact (Fig. 2). The clusters are almost evenly sized, and each cluster volume is abundant. The yield is 8 g more than that of 'King De La' (data not presented).

Vines. 'Cheonghyang'' is very vigorous, and cold hardy - no freeze or frost bud injury have been observed down to a temperature of –15°C in Chuncheon. The upper surface of the blade of a young leaf is dark copper in color. The mature leaf has five lobes. Col-

Table 1. Fruit characteristics of the grape cultivars, 'Cheonghyang' and "King De La'. Values are means (+S.E.) recorded from 2006-2009 in Chuncheon, Republic of Korea.

Cultivar	Harvest date	Cluster weight (g)	Berry weight (g)	Soluble solids (%)	Seedlessness (%)	Tartaric acid (%)	Berry skin color
Cheonghyang	25 Aug.	283.4±34	2.3±0.8	19.5±1.3	100	0.35±0.12	Yellow-green
King De La	3 Sept	230.4±25	2.1±0.7	17.0±1.2	100	0.45±0.16	Red

Fig. 1. Fruit of 'Cheonghyang' grape.

oration of the main vein on the upper side of mature leaves is depended on anthocyanin content which is medium in intensity.

Diseases. 'Cheonghyang' is relatively susceptible to downy mildew (*Plasmopara viticola* Berl. & de Toni), but is moderately more resistant than European cultivars. It is relatively resistant to both *Glomerella cingulata* (Stoneman) Spauld. et H. Schrenk and to crown gall (*Rhizobium* spp.) and, even if its roots are infected, it can normally be cultivated.

It is believed that 'Cheonghyang' will be cultivated in many vineyards in Korea due to the fact that consumers currently prefer seedless grapes with a high sugar concentration.

Availability

A Variety Protection Application was made for 'Cheonghyang' in June 2009, and it has been registered as a new cultivar in Korea. For research purposes, the grapevine cuttings can be obtained from Young Sik Park (yspark06@korea.kr).

Acknowledgement

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Literature Cited

Noh, J.H., K.S. Park, H.K. Yun, Y.Y. Hur, S.J. Park, S.H. Kim, S.M. Jung, and H.C. Lee. 2011. 'Tankeumchu': a black fruited, seeded table grape. J. Amer. Pomol. Soc. 63(3):170-172

Yun, H.K., J.H. Noh, K.S. Park, and S.H. Kim. 2011. Developing the new black table grape cultivar, 'Doonuri'. J. Amer. Pomol. Soc. 65:(3):173-175.