



Research article

Characteristics of Korean ginseng varieties of Gumpoong, Sunun, Sunpoong, Sunone, Cheongsun, and Sunhyang



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ABSTRACT

Background: Ginseng (*Panax ginseng* Meyer) is an important medicinal herbs in Asia. However, ginseng varieties are less developed.

Method: To developed ginseng varieties, a pure line selection method was applied in this study.

Results: Gumpoong was testing of 4-yr-old specimens in 2002, the proportions of the below-ground roots that were rusty colored for Gumpoong was 1.29 in Daejeon and 1.45 in Eumseong, whereas the proportions for its yellow berry variant were 2.60 and 2.45 in the two regions, respectively. Thus the Gumpoong was resistant to root rust. Sunpoong has a high yielding property. Its average root weight is 70.6 g for 6-yr-old roots. Its yield is 2.9 kg/1.62m² and the rate of heaven- and earth-grade product is 20.9%, which is very high compared to 9.4% for Yunpoong. Sunone is resistance to root rot and the survival rate of 4-yr-old roots was 44.4% in 1997, whereas that of the violet-stem variant landrace was 21.7%. Sunhyang has content of arginyl-fructosyl-glucose (AFG), which produces the unique scent of red ginseng, is 95.1 μmol/g and greater than the 30.8 μmol/g of Chunpoong in 6-yr-old plants. Sunun and Cheongsun are being nurtured to protect genetic resources.

Conclusion: Developed ginseng varieties will be used as the basis for the protection of genetic resources and breeding.

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1. Introduction

The study of ginseng (*Panax ginseng* Meyer) breeding began at the Gwacheon Experimental Station of the Central Research Institute, Monopoly Bureau (Gwacheon, Korea) in 1968 [1]. Early breeding studies concentrated on the growth characteristics of the aerial and below-ground sections of violet-stem variants according to the number of stems [2], the prevalence of multi-stems according to the region and the location of ginseng cultivation, the direct and indirect effects of the number of stems on the characteristics of the below-ground section (root weight, diameter, and length), and the fact that multi-stem variants are more significantly affected by genetic factors than by environmental factors [3].

In a study of the yellow berry variant of ginseng, the characteristics of the aerial and below-ground sections of the violet-stem variant and yellow berry variant were compared, whereas the lengths of the peduncles were compared to the relative growth rates and the changes in the mineral contents of the leaves and stems (N, P, K) (N, nitrogen; P, phosphate; K, potassium). Additionally, the saponin contents were compared by age. In another study, the mineral contents, photosynthesis, respiration, and diseases of the leaves and roots of the yellow berry variant and violet-stem variant were examined based on the amounts of fertilizers used during cultivation. The seed setting rates of the breeding yellow berry variant and violet-stem variant were examined and the characteristics of the aerial and below-ground sections of F1 were studied [4]. In the F2 of the yellow

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berry variant and violet-stem variant, the ratio of stem colors was purple (3):green (1) and the ratio of seed colors was red (3):yellow (1). It was identified that purple and red were dominant to green and yellow for both stems and seeds. There was no reciprocal effect of the yellow berry variant \times the violet-stem variant or the violet-stem variant \times the yellow berry variant F1. The aerial section characteristics of the red berry and the below-ground section characteristics of the green stem variant were first studied in 1983, and the separation of the stem colors of the two entities of the second generation offspring and 14 entities of the third generation offspring were studied in 1988. The stem color of eight third generation offspring was green, but the six entities were divided into purple and green stems, indicating that it was undergoing homogenization [5]. Superior entities were selected through a pure line selection breeding method and the five superior varieties were named KG101, 102, 103, 104, and 105 after Korean Ginseng (KG) in 1985 to initiate productivity tests and adaptation tests. It was reported that these varieties increased the yield of ginseng varieties by 15%. Among them, KG101 and KG102 were named and registered as *Panax ginseng* var. Chunpoong and var. Yunpoong, respectively, in 1998.

The major characteristics of the ginseng varieties that are currently grown by the Korea Ginseng Corporation (KGC)—Gumpoong, Sunun, Sunpoong, Sunone, Cheongsun, and

Sunhyang—have not yet been fully reported. This study reports on the characteristics of the aerial and below-ground sections, and the red ginseng quality characteristics of all six varieties.

2. Materials and methods

2.1. Study of the aerial section, below-ground section, and red ginseng quality

The study of the characteristics of the aerial and below-ground sections of the six varieties followed the guidelines set out by the Ginseng International Union for the protection of new varieties of plants [6]. Based on these guidelines, the anthocyanin color of the stem on the aerial section, the type of the inflorescence, the shape of the berry, and the presence of stolon roots on the below-ground section were studied among the qualitative characteristics. Among the pseudoqualitative characteristics, the anthocyanin distribution of the stem on the aerial section, the shape of the leaflet, the color of the fruit, and the color of the autumn leaves were studied, and the color of the roots was examined. Among the below-ground section characteristics, root length, root diameter, and root weight were indicated as an average based on 2–3 yr of productivity testing. The characteristics of the aerial sections of ginseng

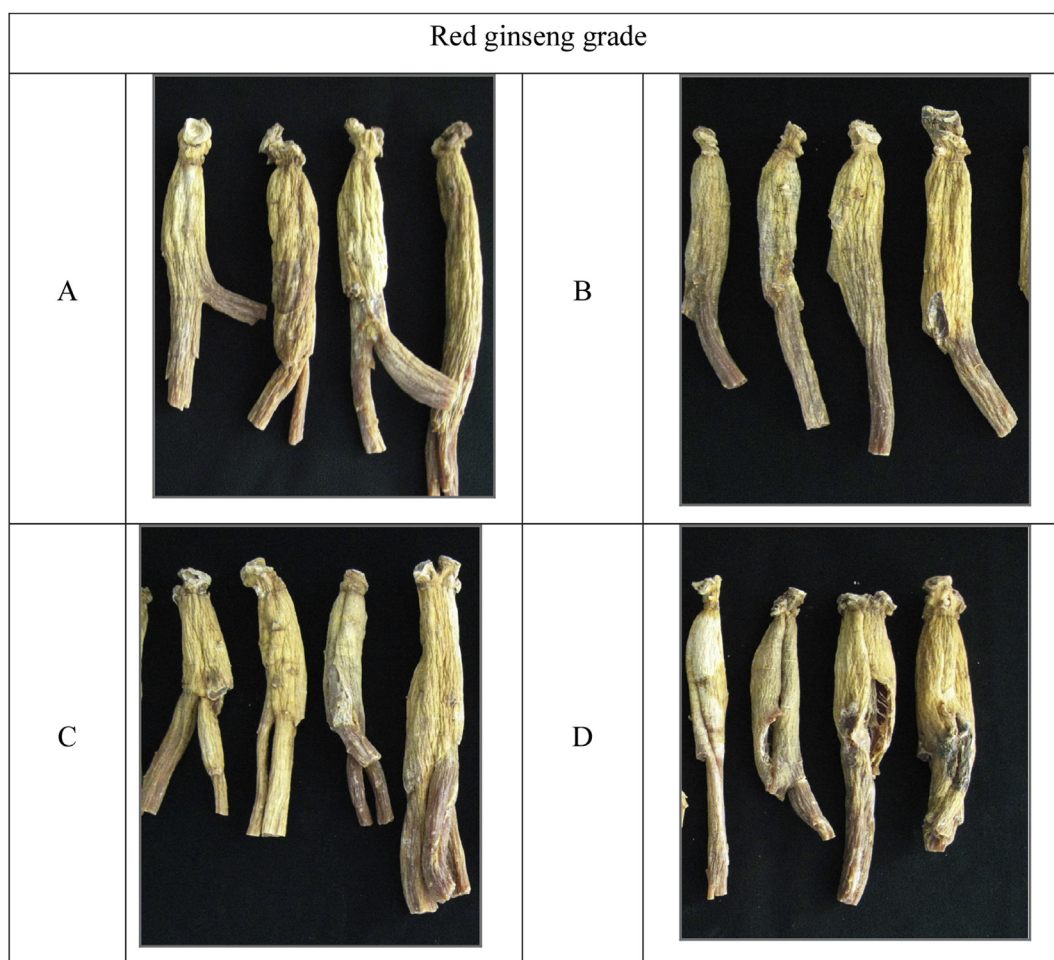


Fig. 1. Red ginseng grades are divided into four grades. (A) Heaven-grade product should not have cracks and scratches. For rootlets, one or more should be well developed and the rootlet length should be three quarters or less of the main root. On the rootlet, there must be a diameter of ≤ 0.5 mm of whitening and pitting and an affected length of ≤ 10 mm. The color of the textures must be maroon, brown, or dark brown. (B) Earth-grade product has cracks and scratches on the body of the total surface area of less than a quarter. Earth-grade rootlet development is the same as that of heaven-grade. There must be a diameter of ≤ 2.0 mm of whitening and pitting and the affected portion length of a quarter. The earth-grade textures/colors are similar to heaven-grade. (C) The yang-grade standard is not limited to the body. Rootlets are unbalanced. Whitening of the body length is one third or less, and the pitting of the body length is one half or less. Like the other two grades, the Yang-grade color is shiny, but the color is not uniform. (D) The jab-grade has no standard and grade. The heaven-, earth-, yang-, and jab-grades are given based on the parameters provided in the Korea Ginseng Industry Act.

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