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A New Thornless Black Raspberry Cultivar Qianberry 1

Gang Shen
Guiyang Kangyang Vocational University, Guizyang 550025, China

Shiyuan Liu and Jiangqin Yu
Guizhou University of Traditional Chinese Medicine, Guiyang 550025, China

Zhonyi Zhu
Guiyang Kangyang Vocational University, Guizyang 550025, China

Tinyang Li, Xiaobo Wu, and Jian Yang
Guizhou Subtropical Crop Research Institute, Xiangyi 562400, China

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‘Qianberry 1’ thornless black raspberry is a new cultivar discovered in Aug 2016 from a wild thorny *Rubus niveus* Thunb population in Bihen Village, Bihen Town, Qinglong County, Qianxinan Buyi and Miao Autonomous Prefecture, Guizhou Province. It was granted the national new cultivar right on 29 Dec 2022. The fruits of this variety are hollow semispherical in shape, and it features strong adaptability, large fruits, good taste, excellent quality, and high yield.

Raspberry (*Rubus corchorifolius* L. f.) species belong to the Rosaceae family and encompass a wide variety of shrubs and vines characterized by biennial stems and perennial crowns and root systems. China serves as the center of diversity for raspberry species, hosting the greatest number of native varieties (Zhang and Jin 2007). Raspberry can be divided into red raspberry, black raspberry, yellow raspberry, and purple raspberry, among others, based on its fruit color and has rich nutritional and medicinal value (Harshman et al. 2014). Raspberry fruits are rich in functional substances such as anthocyanins, superoxide dismutase (SOD), and ellagic acid. Especially in recent years, raspberries have proven to be increasingly favored by people and have been recommended as the third-generation fruit by the Food and Agriculture Organization of the United Nations (Wang and Zhang 2010).

Black raspberries (*Rubus coreanus* Miquel, BR) are rich in bioactive substances, such as anthocyanins, SOD, flavonoids, polyphenols, anthocyanins, ellagic acid, and are highly favored by people (Song et al. 2021). In recent years, based on its high nutritional and medicinal value, the black raspberry industry has developed rapidly both domestically and internationally, especially in China. However, because of its late start, the market space is relatively large. However, the black raspberry varieties currently planted in production are mainly introduced from abroad. These varieties not only have limited planting areas and low yields but are also covered with thorns, which makes them difficult to pick and manage. This has significantly restricted the development of the black raspberry industry. There is an urgent need for new high-quality raspberry varieties in production. The black raspberry species *R. niveus* is a native of China and usually has a greater density of thorns than *R. occidentalis*. Therefore, the discovery of a thornless form of *R. niveus* has tremendous potential for increased black raspberry production and improvement around the world. ‘Qianberry 1’ is a new thornless variety of *R. niveus*.

‘Qianberry 1’ (Fig. 1) is a new variety of thornless black raspberry discovered by authors G. Shen and J. Yang in Aug 2006 in Bihen Village, Bihen Town, Qinglong County, Qiannan Buyi and Miao Autonomous Prefecture, Guizhou Province, from a wild population of thorny black raspberry. It was granted the national new variety right on 29 Dec 2022. This variety not only has no thorns but also has larger fruits, better taste, better quality, higher yield, wider adaptability, and advantages such as cold resistance, drought resistance, and disease resistance. ‘Qianberry 1’ thornless black raspberry, a new variety, effectively breaks through the problem of the lack of excellent varieties in the current domestic raspberry industry development. This variety can bear fruit 1 year after planting. In the second year, it enters the peak production period and has been successfully tested in more than 10 provinces across the country, especially in the southwestern region where it has performed well. In addition, the fruit juice, fruit wine, enzymes, and other products produced from this variety are highly favored by consumers. Therefore, this variety has good development prospects.

Variety Characteristics and Features

‘Qianberry 1’ thornless black raspberry is a shrub, 1 to 2 m tall, with newly sprouted branches (Fig. 2B) covered in a small amount of glauesence that gradually falls off. Mature branches are often purple-red, and there are no thorns throughout the entire growth period. Feathered compound leaves, often 9 to 11 leaflets, have no hair on top or only soft hairs along the veins, and gray white hairs on the bottom. The edges often have irregular coarse serrations. The apical leaflets are oval or elliptical, slightly longer than the lateral leaflets; the lateral leaflets are nearly sessile. The base of the calyces is broad and soft haired and fused with the petiole. Cymose panicle with numerous flowers (Fig. 2A). The fruit is composed of drupelets that gather on the receptacle to form a aggregates fruit, which is hemispherical in shape. When mature, it turns dark red to black and is densely covered with gray-white hairs. The

A **B**

Fig. 1. A new thornless black raspberry: ‘Qianberry 1’ high-yield characteristics (**A**) and fruit morphology (**B**).

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G.S. and S.L. are co-first authors.
G.S. is the corresponding author. E-mail: shengang404@163.com.

A B

Fig. 2. 'Qianberry 1' flower morphology (**A**) and thornless branch (**B**).

flowering period is from March to May, and the fruiting period is from April to June. 'Qianberry 1' thornless black raspberry has an average of 336.44 fruiting branches per plant, with an average of 21.89 fruiting branches per fruiting branch. The average weight of a single fruit is 1.13 g, and the average annual yield of fresh fruit per plant is 8.32 kg, with an average annual yield of 1165.09 kg per mu.

Key Points of Cultivation Techniques

The 'Qianberry 1' thornless black raspberry is suitable for cultivation in deep fertile sandy soil, and good drainage. Before planting, deeply plow the land, level the ground, apply sufficient base fertilizer, and apply ~750 kg of decomposed organic fertilizer per acre. The planting time is generally from March to June, and healthy and pest-free seedlings are selected for planting (after years of continuous observation and research, both the parents and offspring of cuttings and seed seedlings showed stable stingless status). The spacing between plants is 3 m × 2 m, and sufficient water is maintained during planting. Fertilizer should be applied two to three times a year, the first time in the spring germination period. The second application is done during the fruit expansion period, and the third during winter. Organic fertilizer should be the main fertilizer, supplemented by chemical fertilizer, and phosphorus and potassium fertilizers should be added in moderation. Weeds should be removed in a timely manner to keep the soil loose. The main concerns related to pests and diseases is stem rot (*Ralstonia solanacearum*, *Fusarium* spp., *Phytophthora* spp.), aphids, and others. We should adhere to the principle of prevention first and comprehensive control, while selecting efficient, low-toxicity, and low-residue pesticides. For pruning, old branches should be removed in a timely manner, and dead branches, weak branches, and crossed branches should be cut off to maintain open canopy. Regarding harvesting, when the fruits are for fresh consumption, they should be harvested when they are 90% ripe or turn purple-black. Try to avoid damaging the fruits during harvesting, and retain the fruit stalks. After harvesting, grade, package, and sell them in a timely manner. When the fruits are for processing, they should be harvested 1 to 2 d after ripening.

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