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‘Ning Qing 5’: A New Holly Cultivar with Meso-elliptic and Serrated Leaves

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The genus *Ilex L.* (holly), belonging to the monogeneric family Aquifoliaceae, comprises ~700 functionally dioecious species of evergreen or deciduous trees and shrubs (Chong et al. 2022; Su et al. 2020). Holly species are widely cultivated for their medicinal and culinary uses, ornamental value, and industrial applications (Cascales et al. 2017; Yao et al. 2022; Zhou et al. 2022). Many *Ilex* plants are notable for their distinctive evergreen foliage and persistent red fruits, even in the wild. Throughout the entire genus of holly, their flowers and fruits are fairly uniform compared with their leaves (Yao et al. 2016). Holly leaves display considerable variation in texture, shape, size, color, and margin characteristics, which are critical for germplasm identification and significantly enhance their commercial value (Chong et al. 2022). For instance, *Ilex dabieshanensis* ‘Ning Qing 1’ is distinguished by its broadly ovate leaf shape and shiny dark green (RHS NN137B) (Royal Horticultural Society 2015) leaves (Zhou et al. 2023). *Ilex dabieshanensis* ‘Ning Qing 4’ is characterized by its pyramidal growth habit and elliptic serrated leaves, contributing to its unique appearance (Zhou et al. 2024). Consequently, the leaf characteristics of *Ilex* plants are of great interest to breeders and consumers.

‘Ning Qing 5’ was selected and released by the Institute of Botany, Jiangsu Province and Chinese Academy of Sciences (Nanjing Botanical Garden Mem. Sun Yat-Sen). This cultivar has garnered considerable attention for its leathery leaf texture, serrated leaf margins, and greyish olive green (RHS NN137B) leaf color, significantly enriching *Ilex* germplasm diversity. To date, no serious pests or diseases have been observed. The cultivar is suitable for shade trees, parks, gardens, and many other landscapes.

Origin

In Spring 2014, *Ilex dabieshanensis* (♀) was crossbred with *Ilex latifolia* (♂) at the Repository of *Ilex* spp. Germplasm of Nanjing Botanical Garden Memorial Sun Yat-Sen, Jiangsu, China (32°03′N, 118°49′E). By winter, more than 300 cross-pollinated seeds were collected and subjected to sand storage to break seed dormancy. These seeds were subsequently sown in a seedbed containing a substrate mixture of perlite and peat. After germination, the seedlings were transplanted into the field with a spacing of 30 × 30 cm. In Jun 2017, an individual plant with leathery, serrated, meso-elliptic, and greyish olive green (RHS NN137B) leaves was identified and selected for further evaluation. This plant was named ‘Ning Qing 5’. After 5 years of semihardwood/hardwood stem cutting regeneration (2019–23) and 6 years of field observation (2019–24), the rooted cuttings exhibited the same morphological attributes as the mother plant, confirming their phenotypic stability. The seedlings grew vigorously in Jiangsu (32°03′N, 118°49′E, US Department of Agriculture plant hardiness zones ~9b/10a), tolerating high (37 to 41 °C) and low (−6 to 0 °C) temperatures. To date, only a few cases of leaf spot have been observed. The Forest Variety Certification Committee of China authorized the cultivar in 2024.

Description

Among existing *Ilex* germplasm, ‘Ning Qing 5’ most resembles *Ilex* ‘Ning Qing 3’ (Chong et al. 2023), which was also released by Nanjing Botanical Garden Mem. Sun Yat-Sen in 2022. ‘Ning Qing 3’ has oblong and moderate-olivaceous (RHS 146A) leaves, whereas ‘Ning Qing 5’ features meso-elliptic and greyish olive green (RHS NN137B) leaves. These two cultivars also differ in blade cross-section shape and petiole color. ‘Ning Qing 3’ has olive-green petioles and a V-shaped blade cross-section, whereas ‘Ning Qing 5’ features brown-red petioles and a nearly flat blade cross-section (Table 1, Fig. 1). Specific characteristics of ‘Ning Qing 5’ are as follows.

Tree. It is an evergreen tree with upright growth and an oval crown, reaching up to 2.0 m in height and spreading to 1.4 m at 5 years of age (Fig. 2A).

Branches and foliage. The young branches are purplish-red (Fig. 2B), while the current year’s branches are light green with a striped epidermis. The mature leaves are leathery and greyish olive green (RHS NN137B) (Fig. 2C), whereas the younger ones are thin, leathery, and yellowish green (RHS 144A) (Fig. 2B). Leaf blades are meso-elliptic (6.2 to 8.0 cm in length × 3.0 to 4.3 cm in width) with short petioles (0.8 to 1.2 cm). Leaf margins contain six to seven pairs of serrations. Leaf bases are broadly cuneate, and the apexes are acuminate.

Flower. Greenish yellow flowers (RHS 151A) are axillary and grow inconspicuously on the current year’s branchlets. Each flower has four obovate-oblong petals (3.9 to 4.1 mm in length × 2.2 to 2.4 mm in width), slightly connate at the base. Four stamens and a degenerate pistil are inside the petals (Fig. 2D). In Jiangsu Province, the plant starts to blossom

Table 1. Phenotypic comparisons of *Ilex* ‘Ning Qing 5’ and *Ilex* ‘Ning Qing 3’.

Phenotypic attributes	‘Ning Qing 5’	‘Ning Qing 3’
Leaf color	Greyish olive green (RHS NN137B)	Moderate-olivaceous (RHS 146A)
Leaf shape	Meso-elliptic	Oblong
Blade cross-section shape	Nearly flat	V-shaped
Petiole color	Brown-red	Olive-green
Epidermal stripes on current year’s shoots	Present	Absent

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Fig. 1. Leaf characteristics of *Ilex* 'Ning Qing 5' and *Ilex* 'Ning Qing 3'. (**A**) Leaves of 'Ning Qing 5'. (**B**) Leaves of 'Ning Qing 3'. (**C**) Leaf comparison between 'Ning Qing 5' and 'Ning Qing 3'.

Fig. 2. Phenotypic characteristics of *Ilex* 'Ning Qing 5'. (**A**) Upright growth habit with a semiopen canopy. (**B**) Purplish-red twigs and yellowish green (RHS 144A) young leaves. (**C**) Shiny, leathery, meso-elliptic, serrated, and greyish olive green (RHS NN137B) mature leaves. (**D**) Axillary cymose inflorescence and greenish yellow flowers.

in late April, with a flowering period lasting ~2 weeks. This cultivar is a male plant and does not bear fruit.

Propagation

The propagation of 'Ning Qing 5' is primarily achieved through semihardwood and hardwood stem cuttings. For semihardwood cutting, the current year's semilignified branches were selected from June to July in Jiangsu and cut into short cuttings (6 to 10 cm long) with two to three half leaves kept at the top. For hardwood stem cutting, it is better to select healthy annual branches from late November to late March before budbreak, and then cut them into short cuttings in a length of 12 to 15 cm, with an approximate cutting depth of 5 to 6 cm. To enhance rooting success, it is recommended to treat the cuttings with a 2000 ppm indole-3-butyric acid solution for 8 to 10 s. The treated cuttings should then be inserted into a peat:perlite (1:1, v:v) or similar propagation substrates, maintained at moderate humidity, and placed under sprinkler irrigation. Generally, the cuttings will root after 30 d, with a rooting percentage reaching up to 90%.

Cultivation

'Ning Qing 5' thrives in full sunlight and can tolerate partially shaded environments. It is recommended to cultivate it in well-drained acidic soil. Transplanting with some soil in early spring is recommended, followed by thorough irrigation. Light pruning and shaping can be carried out as needed. Timely drainage during the rainy season and fertilization in winter and spring are crucial for optimal growth. To date, only a few cases of leaf spot have been observed, and there are no significant concerns regarding diseases or pests.

Availability

The plant 'Ning Qing 5' is available from Dr. Chen Hong (chenhong@cnbg.net), Institute of Botany, Jiangsu Province and the Chinese Academy of Sciences (Nanjing Botanical Garden Mem. Sun Yat-Sen).

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