HortScience 60(6):816–817. 2025. https://doi.org/10.21273/HORTSCI18518-25

‘Juan Lian’: A New Holly Cultivar with Highly Curled Leaves

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Keywords. hybridization, ornamental plant, reverse blade tips

The genus *Ilex* L. (Aquifoliaceae) stands as the largest genus of woody dioecious plants in angiosperm, encompassing more than 600 species with diverse focal points situated in the tropical and subtropical regions of South America and Asia (Loizeau et al. 2016; Yao et al. 2022; Zhou et al. 2022). These species comprise both evergreen and deciduous trees or shrubs and are cultivated primarily for their substantial economic and aesthetic value (Su et al. 2020; Xu et al. 2025; Yao et al. 2021). Despite the high level of diversity within *Ilex* germplasm, the flowers and fruit exhibit remarkable uniformity when compared with leaf morphology (Yao et al. 2016). *Ilex* species vary remarkably in terms of leaf texture, size, shape, color, and serrations, providing a solid foundation for germplasm identification (Chong et al. 2022). For instance, *Ilex* ×*dabieshanensis* ‘Ning Qing 1’ is characterized by a leathery leaf texture, broadly ovate leaf shape, and shiny blackish green leaf color (Zhou et al. 2023). *Ilex* ×*dabieshanensis* ‘Ning Qing 2’ stands out with its dwarf tree habit, small leaf size, and serrated leaf margins (Chen et al. 2024). *Ilex* ×*dabieshanensis* ‘Ning Qing 3’ is distinctive for its unique, oblong leaf morphology (Chong et al. 2023).

Ilex ×*dabieshanensis* ‘Juan Lian’ was introduced by the Institute of Botany, Jiangsu Province and Chinese Academy of Sciences (Nanjing Botanical Garden Memorial Sun Yat-Sen). This cultivar has garnered considerable attention for its leathery leaf texture, elliptical leaf shape, serrated leaf margins, and highly curled leaf morphology, significantly enriching *Ilex* germplasm diversity. To date, no significant concerns have arisen regarding pests or diseases, enhancing its popularity as a focal point in gardens and landscapes.

Origin

Ilex ×*dabieshanensis* K. Yao & M. B. Deng is a species native to the Dabie Mountains of western Anhui, China. In Spring 2014, hybridization was carried out, using *I. dabieshanensis* (♀) and *Ilex latifolia* (♂) as parents at the Repository of *Ilex* spp. Germplasm of Nanjing Botanical Garden Memorial Sun Yat-Sen, Jiangsu, China (lat. 32°03′N, long. 118°49′E). More than 500 cross-pollinated seeds were collected in the winter and stored in moist (~20% moisture content) sand to break seed dormancy. In Spring 2015, these seeds were sown in a mixed substrate of peat, rice chaff ash, and perlite (2:2:1 by volume). After germination, all the seedlings were transplanted into the field with a 30- × 30-cm spacing. In May 2017, an individual plant with leathery, elliptical, serrated, and highly curled leaves was observed and selected for further evaluation, ultimately receiving the name ‘Juan Lian’. After 3 years of semihardwood/hardwood stem cuttings (2018–20) and 7 years of field observation (2018–24), plants resulting from clonal propagation exhibited consistent morphological characteristics with the mother plant, confirming their phenotypic stability. Notably, they grew vigorously in Jiangsu (lat. 32°03′N, long. 118°49′E; approximately US Department of Agriculture plant hardiness zones 8b/9a) during the observation period, tolerating high (37 to 41 °C) and low (–8 to 0 °C) temperatures, with only a few incidents of leaf spot observed. The Forest Variety Certification Committee of China authorized the cultivar in 2024.

Description

Among existing *Ilex* germplasm, ‘Juan Lian’ most closely resembles ‘Ning Qing 4’, which was also released by the Institute of Botany, Jiangsu Province and Chinese Academy of Sciences in 2023. The cultivar Ning Qing 4 has elliptical leaves that are flat and extend straight, with shallow, dense serrations, whereas ‘Juan Lian’ leaves exhibit a high degree of curvature and medium serrations along the margins (Table 1, Fig. 1). Specific characteristics of ‘Juan Lian’ are described in the following paragraphs.

Habit. The plant is evergreen and grows with an ellipsoidal canopy, reaching up to 1.4 m in height with a 0.6-m spread at 9 years of age.

Branches and foliage. The branches are light green [Royal Horticultural Society (RHS) 146C] (Royal Horticultural Society 2015), measure 2.66 to 3.22 mm in diameter, and have internodes of 1.3 to 2.6 cm. Lenticels are absent from the surface. The mature leaves are leathery and medium green (RHS 148A), whereas the younger leaves are thin, leathery, and brownish green (RHS 152C). ‘Juan Lian’ leaf blades are elliptical (6.2–8.4 cm in length and 3.3–4.8 cm in width) and highly curled, and are attached to short petioles (0.4–0.7 cm). The leaf bases are cuneiform, and the apices are acuminate. Leaf veins are visible on the surface, but are not particularly pronounced. The serrations along the leaf margins exhibit medium depth and density (Fig. 2B).

Flower. Each cyme bears 6 to 10 small, greenish yellow (RHS 151A) axillary flowers, discreetly positioned on the current year’s branchlets. Each flower has four obovate–oblong petals (3.8–3.9 mm in length and

Table 1. Comparison of leaf morphology between *Ilex* ‘Ning Qing 4’ and *Ilex* × ‘Juan Lian’.

Phenotypic attribute	*I.* ‘Ning Qing 4’	*I.* × ‘Juan Lian’
Curvature degree of blade tips	Flat	Reverse
Blade cross-sectional shape	Straight	Twisted
Depth of marginal serrations	Shallow	Medium
Density of marginal serrations	Dense	Medium

Received for publication 11 Feb 2025. Accepted for publication 5 Mar 2025.
Published online 30 Apr 2025.
This study was funded by the Central Financial Forestry Science and Technology Demonstration Fund [grant no. SU(2023)TG08], the Opening Fund of the State Key Laboratory of Subtropical Forest Cultivation (grant no. SKLSS-KF2023-07), and the Opening Fund of the Jiangsu Key Laboratory for the Research and Utilization of Plant Resources (grant no. JSPKLB202209).
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Fig. 1. Comparison of leaf attributes between *Ilex* 'Ning Qing 4' (**left**) and *Ilex* × 'Juan Lian' (**right**).

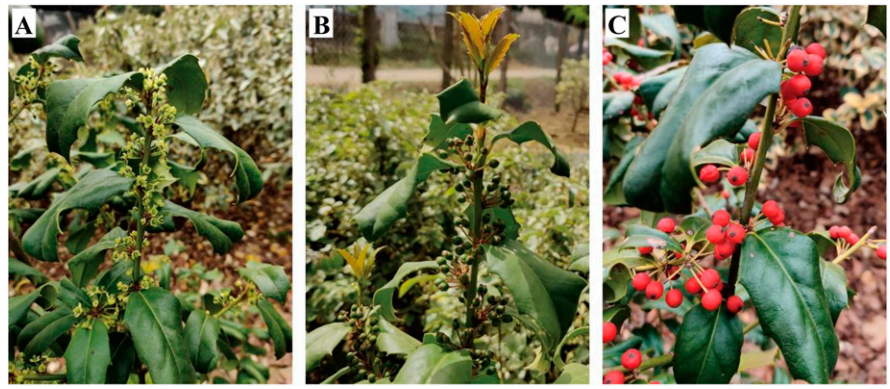

Fig. 2. Phenotypic characteristics of *Ilex* × 'Juan Lian'. (**A**) Cymose inflorescence and highly curled leaves. (**B**) Brownish green [Royral Horticultural Society (RHS) 152C] young leaves and green immature fruit. (**C**) Red (RHS 43A) and circular mature fruit with discoid stigmas.

1.9–2.1 mm in width) that are slightly connate at the base. Inside the petals, a large pistil is accessible, surrounded by four degenerated stamens (Fig. 2A). In Jiangsu Province, the plant begins to blossom in early April, with a flowering period lasting ∼2 weeks.

Fruit. The tree sets abundant fruit that persist throughout the winter. These fruit are of medium size (0.6–0.9 cm in vertical diameter and 0.7–0.9 cm in horizontal diameter) and are circular, typically maturing in late October. Upon full maturity, the fruit turn red (RHS 43A), and discoid stigmas remain (Fig. 2C).

Propagation

'Juan Lian' is propagated primarily via semihardwood stem cuttings (June to July in Jiangsu) or hardwood stem cuttings (late November to late March before sprouting). For semihardwood stem cuttings, select the current year's semilignified branches and then cut into short cuttings (∼5–8 cm long), retaining two to three half leaves at the top. For hardwood cuttings, select thick, healthy annual branches and cut them into lengths of 8 to 12 cm. The cutting depth for 'Juan Lian' should be ∼3 to 5 cm. To improve the survival rate, the cuttings can be pretreated with 2000 ppm indole-3-butyric acid for 8 to 10 s, then inserted into the substrate, maintained at moderate humidity, and placed under sprinkler irrigation. Typically, more than 90% of cuttings will root after 30 d.

Cultivation

'Juan Lian' grows sturdily in full sun and tolerates semishaded conditions. Acidic soil is recommended for optimal cultivation. During early spring, plants should be transplanted with a sufficient soil ball, ensuring thorough irrigation. Minimal pruning and reshaping are required because of its slow growth rate, which can be improved significantly by timely drainage and fertilizer applications during the rainy seasons of winter and spring. To date, only a few incidents of leaf spot have been observed, and there are no significant concerns regarding pests or diseases.

Availability

The cultivar Juan Lian is available from Chen Hong, Institute of Botany, Jiangsu Province and the Chinese Academy of Sciences (Nanjing Botanical Garden Mem. Sun Yat-Sen).

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