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‘Zi Xia’: A New Purple-flowered Holly Cultivar

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Hollies are shrubs and trees in the genus *Ilex* (Aquifoliaceae), comprising ∼600 dioecious species distributed from the tropics to temperate regions worldwide (Yao et al. 2021; Zhou et al. 2023). For decades, *Ilex* species have been used as ornamentals and nectar plants, and as sources of beverages and medicines (Bailes 2006; Hume 1953; Yao et al. 2022). Some hollies attract attention due to their diverse fruit colors, distinctive leaves, and adaptability to various environmental conditions (Galle 1997; Resch 2019). Consequently, foliage and berries have become the primary focus in holly breeding. The flowers of holly are generally uniform, typically small and predominantly white, often considered rather inconspicuous (Yao et al. 2022). As a result, breeders have paid less attention to the flower traits of *Ilex* plants.

Lord’s Holly (*I. rotunda* Thunb.) is an evergreen ornamental tree and traditional Chinese medicinal plant native to the subtropical regions of East Asia, including southern China, Japan, Korea, and Vietnam (Chen et al. 2008; Le et al. 2024; Wang et al. 2024). In China, *I. rotunda* is cultivated as garden, park, and street trees (Ruan et al. 2022). This species is an excellent nectar plant due to its abundant and densely clustered flowers. However, to date, few varieties of the species have been developed. Leveraging China’s extensive wild germplasm resources (Chen et al. 2008), selecting novel individuals from seedling populations is a crucial approach for acquiring new holly cultivars. Floral coloration has become a potential focus in holly breeding programs, particularly favoring purple flowers due to their representation of nobility, elegance, and luxury in many cultures. *I. rotunda* ‘Zi Xia’ was selected and released by Jiangsu Academy of Forestry. This male variety of the species features light purple (RHS 77C) (Royal Horticultural Society 2015) flowers, significantly enhancing its ornamental value and enriching the *Ilex* germplasm resources. Furthermore, the cultivar is an ideal nectar and pollinator tree species because its bright-colored flowers are easily noticeable to bees.

Origin

An individual with distinct flower traits compared with wild male plants of *I. rotunda* was discovered in a seedling population in Putuo Mountain, Zhoushan City, Zhejiang, China. The plant was carefully transplanted and grown in the national holly germplasm bank of China located at Jiangsu Academy of Forestry in 2018 by Mr. Zhou Peng. From 2019 to 2023, the plant was split-grafted to 2-year-old *I. rotunda* seedling rootstocks to obtain additional clonal plants. The grafted seedlings exhibited vigorous growth and began to flower from the second year. After field observation, the asexual generations produced consistent morphological traits with the mother plant and maintained their phenotypic stability after grafting propagation, which corresponded to the demands of the new varieties. Over the past 5 years, no serious pests or diseases have been observed. Therefore, we believe it has value for popularization and application as a new variety.

Description

Given the dioecious nature of *I. rotunda*, the wild male plants were selected as controls. Compared with the wild male plants of *I. rotunda*, the distinguishing characteristics of ‘Zi Xia’ are its light purple flowers and dark purplish red petioles and twigs (Table 1; Fig. 1). The morphological descriptions are as follows.

Habit. ‘Zi Xia’ is an evergreen tree with gray-brown bark. It sprouts in early April. Within 4 years, the tree can grow to a height of 2.5 m and a width of 1.5 m.

Twigs and Foliage. The twigs are dark purplish red (RHS 79C) without lenticels (Fig. 1A). The leaves are simple, entire, and slightly leathery. The leaf blades are elliptic (5 to 6 cm × 3 to 4 cm) with short petioles (1.0 to 1.8 cm). The color of leaves is strong yellowish green (RHS 134B).

Male inflorescences. Umbellate inflorescences with four to seven flowers are solitarily axillary on the current year’s branchlets (Fig. 1A). The light purple (RHS 77C) flowers are small but conspicuous and showy, distinctly different from the yellowish white (RHS 155B) flowers of wild male plants of *I. rotunda* (Fig. 1C). The flowers are usually four-merous, rarely five-merous. Petals are obovate (2.5 mm in length × 1.5 mm in width) and reflexed at anthesis (Fig. 1C). The pistil is degenerated. The cultivar begins to blossom in early May and lasts for 14 d in Jiangsu Province, China.

Propagation. ‘Zi Xia’ can be primarily propagated by grafting or cutting. Branch grafting is performed from late March to early April in early spring. Two-year-old *I. rotunda* seedlings are used as rootstock, and 1-year-old dormant branches with healthy and plump buds are used as scions. The grafted union is wrapped in plastic, which should be dismantled after scion and stock plants are firmly connected. The survival rate of grafting generally reaches 90%. Hardwood stem cuttings are the preferred materials and are collected from late November to late March. Cuttings are wounded and treated with 2000 mg·L^{-1} indole-3-butyric acid quick-dip for 8 to 10 s. The rooting media consisting of 1 peat:1 perlite (by volume) worked well. Generally, the cuttings can take root after 30 d, with a rooting percentage of 55%.

Table 1. Comparison of new cultivar Zi Xia and wild male plants of *I. rotunda*.

Comparison items	New cultivar Zi Xia	Wild male plants of *I. rotunda*
Flower color	Light purple (RHS 77C)	Yellowish white (RHS 155B)
Twig color	Dark purplish red (RHS 79C)	Moderate purplish pink (RHS N74D)
Petiole color	Dark purplish red (RHS 79C)	Strong yellow green (RHS 144B)

RHS = Royal Horticultural Society (2015).

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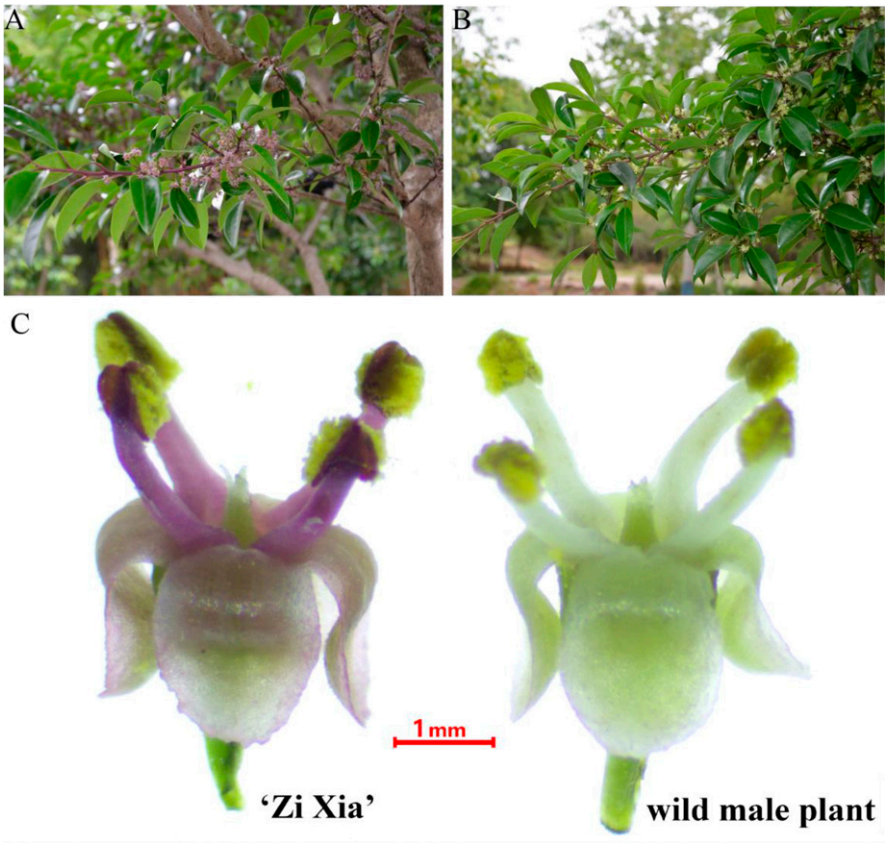

Fig. 1. Comparison of morphological characteristics of the new cultivar Zi Xia and wild male plant of *I. rotunda*. Flowering branches of (**A**) new cultivar Zi Xia and (**B**) wild male plant. (**C**) Flower phenotype.

Cultivation. This cultivar can grow in full sun and tolerates partial shade conditions. It is recommended to plant the cultivar in well-drained acidic soil. Timely drainage is crucial during the rainy season. A 2 × 3 m cultivate spacing provides plants with adequate light and ventilation. Young trees need to be pruned to create one dominant trunk.

Availability. The voucher specimens are stored in the national holly germplasm bank of China located at Jiangsu Academy of Forestry (Nanjing, Jiangsu, China; accession number JAF2024029). Plant material and research information can be obtained from Jiangsu Academy of Forestry. Contact Peng Zhou (zpjsslky@163.com) for inquiries.

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