‘Yan Ya’: A New Cultivar of *Xanthoceras sorbifolium* Bunge

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Yellow-horn (*Xanthoceras sorbifolium* Bunge), a member of the family Sapindaceae, is a traditional woody oil tree species that occurs naturally in northern China. It is a deciduous tree or shrub with ecological, economic, and ornamental value. The raw seeds of yellow-horn are edible. The high oil content of the kernels and the leaves can be used to produce biofuel and tea, respectively (Ao and Ma, 2012). In addition, its beauty, upright shape, dense racemes with large numbers of fragrant flowers, and long florescence make it an ideal tree species for landscaping (Huang, 2004; Wang, 2002).

Substantial progress has been made in its development and use as a biomass energy tree species. However, little is known about the ornamental characteristics of yellow-horn (Zhang et al., 2016). Dr. Yan Ao's research group cultivated ‘Yan Ya’ successfully by grafting in Mar. 2019. ‘Yan Ya’ is a novel cultivar with excellent traits. This cultivar is drought resistant, cold tolerant, and light-loving, and can be planted in northern regions and grown into shrubs or trees. ‘Yan Ya’ is characterized by strong branches covered with pubescence and the presence of more

than five petals (six to eight petals) in most flowers. It has abundant flowers and stable genetic traits. Therefore, the cultivar is the ideal landscaping tree species.

Origin

‘Yan Ya’ was selected from a variety of morphological variants of yellow-horn, and obtained by grafting. ‘Yan’ is named after the discoverer: Dr. Yan Ao. ‘Ya’ means “graceful” in Chinese. In 2018, the yellow-horn team led by Yan Ao discovered the maternal parent plant in an orchard in Chaoyang City, Liaoning Province, and the cultivar was maintained vegetatively through grafting. The rootstocks are 1-year-old yellow-horn seedlings. The scions were collected from the mother tree for grafting in July 2018. Second-generation grafting was carried out in Mar. 2019. The scions were obtained from the plants of the first generation. The survival rates of the two generations were more than 95%. After many generations, the grafted seedlings have blossomed. The traits of the new cultivar are consistent with the maternal parent. ‘Yan Ya’ has stable genetic traits and was cultivated successfully.

Fig. 1. Morphological characteristics of ‘Yan Ya’: (A) branches, (B) leaves, and (C) flowers.

‘Yan Ya’ can be widely planted in northern China. It is a small to medium-size deciduous tree, with a height of 2 to 7 m and a rounded crown. The branches of ‘Yan Ya’ are sturdy. The current-growth branches are green ($L^* = 44$, $a^* = -9$, $b^* = 32$) or purple-red ($L^* = 32$, $a^* = 31$, $b^* = 15$) and are covered with dense pubescence (Fig. 1A). The broad lanceolate leaves are green ($L^* = 53$, $a^* = -19$, $b^* = 32$) and slightly curled, and the leaf back is gray-green ($L^* = 71$, $a^* = -5$, $b^* = 20$) (Fig. 1B). The flowers are single petal. The lobed petals are obovate, rolled horizontally, and crinkly. Most of the flowers have six to eight petals (Fig. 1C). The base of the petals is yellow-green ($L^* = 79$, $a^* = -8$, $b^* = 58$) at the early flowering stage (Fig. 2A). The upper part of the petals is white ($L^* = 100$, $a^* = -1$, $b^* = 4$) (Fig. 2A). At full-bloom stage, the base part of the petals becomes a light-purple-red ($L^* = 64$, $a^* = 37$, $b^* = 9$) (Fig. 2B), and the upper part is still white ($L^* = 97$, $a^* = 1$, $b^* = 9$) (Fig. 2B). In Chaoyang City, Liaoning Province, the flowering period of the cultivar starts in early May and usually lasts for 20 d. Thus, ‘Yan Ya’ is suitable for urban afforestation. In addition, the fruit and kernels of the novel cultivar can be used to extract oil, which is extremely valuable for food, cooking, medicine, and biofuel. The fruit is rounded with three carpels. When the pericarps change from green ($L^* = 68$, $a^* = -11$, $b^* = 44$) to yellowish brown ($L^* = 34$, $a^* = 2$, $b^* = 31$) and the apex cracks in early August, the fruit should be harvested.

Currently, more than 30 excellent cultivars have been cultivated, including ornamental types and high-yield types. ‘Zhongshi 1’ is one of them, with excellent ornamental value, and is similar to ‘Yan Ya’. The different characteristics of ‘Yan Ya’ and ‘Zhongshi 1’ are shown in Table 1.

Dissemination of the Cultivar

‘Yan Ya’ is cold tolerant, drought resistant, and sun-loving. It prefers fertile, well-drained, and neutral to slightly alkaline soil. The roots will rot if overwatered. This cultivar is suitable for propagation in China from Xinjiang in the west to Liaoning in the east and from Inner Mongolia in the north to Henan in the south. It is mainly distributed from lat. 28°34′ to 47°20′N and from long.

Fig. 2. Different flowering stages of ‘Yan Ya’: (A) Early flowering stage and (B) full flowering stage.

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Table 1. Different characteristics of ‘Yan Ya’ and ‘Zhongshi 1’.

Variety	No. of petals	Color of leaf back	Thickness of current-growth branches
Yan Ya	6–8	Gray-green	Stout
Zhongshi 1	5	Gray	Medium

73°20' to 120°25'E, with a continental and monsoon climate. The annual average temperature ranges from 3.3 to 15.6 °C. The lowest and highest temperatures are –36.4 °C and 38.9 °C, respectively. The average annual precipitation ranges from 43 to 969 mm, and the frost-free period ranges from 120 to 233 d. In Chaoyang, Liaoning, China, the cultivar is used as a local urban greening tree species. In addition, when it enters full fruit period, the seed yield will be about 1500 kg/ha with ideal field management.

‘Yan Ya’ is a deep-rooted cultivar with a strong budding ability. Stalk grafting or bud grafting of ‘Yan Ya’ is generally carried out in spring and summer, using 1-year-old yellow-horn as rootstock. It is also possible to choose related species as rootstocks. Furthermore, the cultivar can also be propagated by hardwood cuttings. The planting density of large seed-

lings is 2 × 3 m, with 1650 plants/ha. It is suggested that seedling transplanting be carried out in winter or early spring. The roots need to be protected when transplanting seedlings in spring.

Fertilization is required twice a year, usually before flowering and during the rapid fruit-growth period. Fertilization should be applied at the rate of 0.5 to 1 kg/tree. Fertilization and irrigation should be carried out together. Proper irrigation is required during the new-shoot growth period. Water three times a year, generally before flowering; during the rapid fruit-growth period; and before soil freezing. Timely drainage is of great significance during the rainy season. Excessively dense branches, overlapping branches, crossed branches, delicate branches, and diseased branches should be pruned. Branch thinning, shortening, and culti-

vating are recommended for old trees with poor growth performance to promote regeneration.

Availability

A small number of samples of ‘Yan Ya’ is available commercially from Beijing Forestry University. Requests for cuttings for research purposes may be addressed to Dr. Yan Ao (E-mail: aoyan316@163.com).

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