Ornamental Poplar ‘Zhongshancaiyn’

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Poplar, which plays important roles in urban and rural greening, windbreak and sand fixation, and industrial materials is the main tree species planted in northern China (Qu et al., 2014). With the progress of society and economic development, colored-leaf plants, which have a wide range of applications in courtyard embellishment, road greening, garden set King, and so on, are increasingly popular (Zhuang et al., 2019). Since the first colored-leaf poplar cultivar *Populus deltoides* ‘Zhonghong’ in China was cultured in 2006 (Zhu and Cheng, 2008), several colored-leaf poplars have been developed, such as *Populus deltoides* ‘Quanhong’ and *Populus deltoides* ‘Caihong’. However, more cultivars of colored-leaf poplar are still needed. Here we report a new colored-leaf poplar named as *Populus deltoides* ‘Zhongshancaiyn’, which could provide more choices for the landscape or garden.

Origin

In 2014, a natural colored-leaf bud mutant of *P. deltoides* ‘Zhongshancaiyn’ was found at the Institute of Botany, Jiangsu Province and Chinese Academy of Sciences, China (CNBG). The mutant was isolated from the cultivar *P. deltoides* ‘Caihong’ and was reproduced through grafting in June 2014. The grafted mutant is consistent with the former mutant. To evaluate the consistency and stability of this bud mutant further, the mutants were evaluated in the nursery of CNBG from 2014 to 2020. The leaf color of all clones has been consistent and stable for the past 7 years. ‘Zhongshancaiyn’ was authorized by the State Forestry Administration of the People’s Republic of China in 2020 with accession no. 20200240.

Description

Populus deltoides ‘Zhongshancaiyn’ is a deciduous, colored-leaf poplar. Its growth rate is slower than the green-leaf poplar. The height of ‘Zhongshancaiyn’ can reach up to 2.8 m, and the ground diameter is 2.5 cm in

the third year (Fig. 1). Leaf color is evaluated according to the standard of the Royal Horticultural Society (RHS) (2001). In spring, the leaf color of ‘Zhongshancaiyn’ is dark red (RHS 47B) (Fig. 2). In summer, the leaf color of ‘Zhongshancaiyn’ is different from the upper leaves to lower leaves. The leaf color of the upper leaves was RHS 67B; the middle and lower leaves were RHS 189C and RHS N189B (Fig. 3). Because leaf length and width are variable at different locations, we determined the length and width of the upper, middle, and lower leaves. For each type of leaf, we selected three leaves to determine their length and width, and obtained an average length and width. The data were obtained from five biological repli-

Fig. 1. Three-year-old cutting of ‘Zhongshancaiyn’.

Fig. 2. Leaf color of ‘Zhongshancaiyn’ and ‘Caihong’ in spring.

cates. The length of leaves is 3 to 14 cm; the width of leaves is 2 to 12 cm. The leaf petiole of ‘Zhongshancaiyn’ is 2.5 to 6.5 cm. The color of the upper branches is purplish red (RHS 59A); the color of the lower branches is gray-green (RHS 148A) (Fig. 4). The length of leaf buds is 0.2 to 0.7 cm; the width of leaf buds is 0.1 to 0.3 cm. Because ‘Zhongshancaiyn’ is a mutant from a male poplar, it does not produce poplar catkins, which means it has great application prospects in urban and rural greening.

Culture

‘Zhongshancaiyn’ is propagated two ways: grafting and cutting reproduction. For grafting reproduction, *P. deltoides* ‘Zhonghong’ and *Populus deltoides* ‘L2025’ are commonly used as rootstocks (survival rate, >90%). Cutting reproduction can be conducted with hardwood or softwood branches. Hardwood cuttings are carried out primarily in the spring, and 1-year-old seedlings with a length of 12 cm and a thickness of 0.8 cm or more can be used for conventional nursery cuttings to propagate (survival rate, >95%).

Fig. 3. Leaf color of ‘Zhongshancaiyn’ and ‘Caihong’ in summer.

Fig. 4. The upper and lower branches of ‘Zhongshancaiyn’ and ‘Caihong’.

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Softwood cuttings are performed mainly from June to July. Branches with the same thickness and specifications were soaked in 100 g·L⁻¹ ABT (aminobenzotriazole) rooting powder solution for 5 min. After that, selected softwood branches were put into the cutting garden. After cutting, the selected softwood branches were sprayed with water once every 30 min. The survival rate is more than 85%.

Comparative Data

Performance in the field. ‘Zhongshancaiyun’ and ‘Caihong’ were grown in the nursery of Nanjing Botanical Garden, Mem. Sun Yat-sen (lat. 32°03′20.79″N, long. 118°49′53.377″E; elevation, 48 m), Nanjing, China, in 2019. The experiment was a completely randomized design, with three replications and 10 cutting-grown plants per replication. The leaf color of ‘Zhongshancaiyun’ and ‘Caihong’ was evaluated in the spring and summer, and other phenotypic traits were measured in December. Data were analyzed using SPSS 19.0 (IBM SPSS Statistics Inc., Chicago, IL). The leaf color of ‘Zhongshancaiyun’ in spring is dark red (RHS 47B), whereas the leaf color of the control cultivar ‘Caihong’ is RHS 41C. The leaf color of ‘Zhongshancaiyun’ in

Table 1. Phenotypic traits of ‘Zhongshancaiyun’ and ‘Caihong’.

Traits	Caihong	Zhongshancaiyun
Plant height (m)	2.76 ± 0.32	2.83 ± 0.26
Ground diameter ^z (cm)	2.48 ± 0.13	2.52 ± 0.16
Bud length (cm)	0.52 ± 0.11	0.28 ± 0.08**
Bud width (cm)	0.27 ± 0.06	0.15 ± 0.04**

^zMeasured stem 5 cm aboveground.
**Significant at *P* < 0.01 by Dunnett’s test.

summer is RHS 67B, RHS 189C, and RHS N189B for the upper, middle, and lower leaves, respectively, whereas the leaf color of the control cultivar ‘Caihong’ is RHS N57B, RHS 30A, and RHS 23B for the upper, middle, and lower leaves, respectively. The upper branch color of ‘Zhongshancaiyun’ (RHS 59A) is different from that of ‘Caihong’ (RHS N200B), and the lower branch color of ‘Zhongshancaiyun’ (RHS 148A) is almost similar with that of ‘Caihong’ (RHS 148B). The leaves of ‘Zhongshancaiyun’ are wrinkled compared with those of ‘Caihong’ (Figs. 2 and 3). The size of leaf buds on ‘Zhongshancaiyun’ is much smaller than those on ‘Caihong’ (Table 1). However, there is no

significant difference in plant height and ground diameter in the third year between the cultivars Zhongshancaiyun and Caihong (Table 1).

Availability

‘Zhongshancaiyun’ is available through the Institute of Botany, Jiangsu Province and Chinese Academy of Sciences, Nanjing, China, or by written request to the corresponding author (weibingzhuangnj@sina.com).

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