

New *Zelkova schneideriana* Hand.-Mazz. Cultivar Gold Goblin

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Additional index words. dwarf plant, golden fall foliage, new cultivar

Zelkova schneideriana Hand.-Mazz. is a member of Ulmaceae (elm family), and is valued for its beautiful habit (up to 30 m in height and about 100 cm at diameter at breast height), huge crown, and gorgeous foliage (Dirr, 2010). It is widely distributed in southern China, although with very limited individuals and is listed as an endangered species (eFlora, 2020; Naciria et al., 2019). Its high-density wood is hard and elastic, which is in demand for high-quality furniture and other special uses. *Zelkova* is famous for its valuable timber and its popularity in landscaping as a shade tree (Nakamura, 1983). The plant can grow in arid conditions. It had also been reported that *Zelkova* can tolerate smoke and dust, and is resistant to toxic gases, which lead to its ability to function as an air purifier (Sun et al., 2018). Because of its rich cultural heritage, strong environmental adaptability, and attractive ornamental value, *Zelkova* has been widely cultivated in landscapes and forests around the world (Wang et al., 2016). There are ≈40 species of the genus *Zelkova*, which are mainly distributed from the Himalayas to Japan (Nakamura, 1983).

Although the plant is native to China, it has been introduced to the United States and has similar climatic regions as a landscape plant. The plant is well suited for USDA cold hardiness zones 6a to 9b. With the pressure of smaller yards and limited landscape space, small trees are in high demand. To breed better adapting and performing cultivars of *Z.*

schneideriana, we selected unique clones from seedling populations, starting with the nursery beds. With strong drought resistance, good ecological benefits, and outstanding landscape performance in mind, we selected a dwarf plant, ‘Gold Goblin’, for further evaluation.

Origin

In Fall 2010, ‘Gold Goblin’ was selected from the nursery of Longyan, Fujian Province, China. Because *Z. schneideriana* grows fast and has wide environmental adaptability, the nursery produced millions of its seedlings for forestation. A dwarf seedling with golden fall foliage was selected for further evaluation.

From early Mar. 2013, ‘Gold Goblin’ bud-grafted plants with *Z. schneideriana* rootstock were trialed in both the Central South University of Forestry and Technology in Changsha, Hunan, China, and the University of Georgia in Athens, GA. After 2 years, ‘Gold Goblin’ showed good stability, with a dwarf habit and outstanding golden fall foliage. Since 2015, field and pot trials have been conducted in different regions. Height, number of branches, number of leaves on a branch, node length, fall foliage color, and growth habit were measured and observed.

Description

Compared with the original species *Z. schneideriana*, ‘Gold Goblin’ has the characteristics of slow height growth rate, more

branches, a short internode, and longer foliage retention in the fall (Table 1).

Growth habit. ‘Gold Goblin’ is a small deciduous tree with a nearly V-shaped growth habit (Fig. 1). The average annual growth in height was 24.3 cm. The branches were grayish green or brownish green. The average length of the primary branches was 20 to 25 cm, and the average number of new branches annually from each previous primary branch was 8 to 12. The internode was very short, from 1.2 to 1.4 cm (Table 1).

Foliage. Young leaves were light green and mature leaves were yellow. The leaf apex was acuminate (occasionally acute), and the base was caudate and oblique. The internode (average distance between leaves) was 1.32 cm. Foliage started to change color in late November, and leaves began to drop in early January (Fig. 2). Leaf color was golden yellow in the fall [yellow group 13B to orange-red group 33B (Royal Horticultural Society, 2015)]. No flowers or fruit have been observed at this point.

Additional note. The drought and salt resistance of ‘Gold Goblin’ were stronger than that of *Z. schneideriana*, and the new cultivar satisfied the requirements of rooftop gardening and general landscape rehabilitation.

Propagation

‘Gold Goblin’ can be regenerated by bud and branch grafting during the spring (late February–early March) using 1- to 2-year-old seedlings of *Z. schneideriana* straight species as the rootstock. The length of scion wood should include three to five nodes and one to two viable vegetative buds. The survival rate of bud grafting was greater than 95%. After the new scion wood bud appears, any sprouting from the rootstock should be removed. To promote the vigorous growth of the grafted liners, weeding and proper fertilization should be scheduled and undertaken. Both softwood and hardwood stem cuttings were rooted. For softwood stem cuttings, 1000 mg·L⁻¹ indole-3-butyric acid potassium salt liquid quick dip or 3000 mg·L⁻¹ indole-3-butyric acid powder are recommended for ≈40.6% rooting percentage. For hardwood cuttings (stems without leaves collected in December), more than a 50.6% rating percentage can be reached using the hormones mentioned.

Availability

‘Gold Goblin’ is available for restricted test trial only. Please contact Donglin Zhang,

Received for publication 2 Nov. 2021. Accepted for publication 1 Dec. 2021.

Published online 25 January 2022.

This work is funded by the Key Discipline of China Forestry Bureau (2016 21) and Double First-class Initiative Cultivation Discipline in Hunan Province (2018469).

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Table 1. Selected morphological characteristics of *Zelkova schneideriana* ‘Schneideriana’ and the new cultivar Gold Goblin.

Trait	Schneideriana	Gold Goblin
Habit	Tall tree	Small tree or shrub
Annual growth (cm)	110	24.3
Branching height (cm)	60–90	Grafting union height
Branch length (cm)	60–80	20–25
New branches (yearly)	2–3	8–12
Internode length (cm)	3.0–3.3	1.2–1.4

Data are the mean of three replicates.



Fig. 1. Fall foliage (yellow group 13B to orange-red group 33B) (A, B) of *Zelkova schneideriana* 'Gold Goblin' with (A) a height of 120 cm after 5 years.



Fig. 2. (A) Fall and (B) winter habit of 'Gold Goblin' planted in the field 6 years after grafting.

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Literature Cited

- Dirr, M.A. 2010. Manual of woody landscape plants. 6th ed. Stipes Publishing, Champaign, IL, <https://doi.org/10.5860/choice.37-1547>.
- eFlora. 2020. Flora of China – *Zelkova*. Missouri Botanical Garden, St. Louis, MO. 12 Feb. 2020. <http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=135278>.
- Naciria, Y., C. Christe, S. Bétrisey, Y.-G. Song, M. Deng, G. Garfi, and G. Kozłowski. 2019. Species delimitation in the East Asian species of the relict tree genus *Zelkova* (Ulmaceae): A complex history of diversification and admixture among species. *Mol. Phylogenet. Evol.* 134:172–185, <https://doi.org/10.1016/j.ympev.2019.02.010>.
- Nakamura, T. 1983. Latest gardening dictionary 12. Cheng Wutang Shin Kong, Japan.
- Royal Horticultural Society. 2015. RHS colour chart. 6th ed. Royal Horticultural Society, London, UK, <https://doi.org/10.21273/hortsci.27.12.1256>.
- Sun, J.J., A.H. Shen, Y.J. Huang, W.G. Yuan, C.P. Wu, R.N. Ye, J.R. Zhu, H.J. Qiu, J.J. Jiao, and B. Jiang. 2018. Quantitative classification and ordination of *Zelkova schneideriana* habitat in Zhejiang Province. *J. Nanjing For. Univ.* 43(4): 85–93, <https://doi.org/10.3969/j.issn.1000-2006.201809027>.
- Wang, X.L., Y. Tan, J.B. Wu, W. Xing, Y.P. Zhang, and X.L. Jin. 2016. Physiological responses of *Zelkova schneideriana* to sodium bicarbonate stress. *Acta Agriculturae Jiangxi* 32(2):448–45, <https://doi.org/10.3969/j.issn.1000-4440.2016.02.032>.