

Hemerocallis ‘Xuan Cai Jin Huang’: A New Daylily Cultivar

Fengyi Li and Ling Wang

College of Landscape Architecture, Northeast Forestry University,
Harbin 150040, China

Zhiyang Liu

Harbin Academy of Agricultural Science, Harbin 150030, China

Wangbin Ye, Lei Yan, and Juan Yang

College of Landscape Architecture, Northeast Forestry University,
Harbin 150040, China

Xi Chen and Wanjie Men

Harbin Academy of Agricultural Science, Harbin 150030, China

Lijuan Fan

College of Landscape Architecture, Northeast Forestry University,
Harbin 150040, China

Additional index words. germplasm release, new cultivar, ornamental plant

Genus *Hemerocallis* (daylilies) is composed of 14 species with yellow, orange, and red flower colors (Cui et al., 2019). Daylilies are among the most popular ornamental herbaceous perennials (Griesbach, 2004) and are widely cultivated all over the world because of their attractive appearance, excellent drought tolerance, pest and disease resistance, and survival in a wide range of soils under full sun or slight shade conditions (Blythe et al., 2015; Li et al., 2021; Podwyszyńska et al., 2015). More than 90,000 *Hemerocallis* cultivars have been registered in the American Daylily Society database. These cultivars have various blooming times (from early May to late October), colors (near-white, yellow, orange, pink, green, purple, and many color blends and multicolored patterns), inflorescence heights (from <30 cm to >120 cm), and flower sizes (from <5 cm to >20 cm) (American Daylily Society, 2021; Keene et al., 2020).

Flower size is an important indicator of the economic and ornamental values of

ornamental plants. Large-flowered plants are often more attractive to consumers; therefore, they are sold at higher prices than small-flowered plants. To encourage the breeding and release of large-flowered cultivars, the American Daylily Society established the Extra Large Diameter Award in 2005 to recognize outstanding and charming cultivars with flowers larger than 7 inches (≈ 17.78 cm) in diameter. So far, the winners have included ‘Megatron’, ‘Linda Bell’, ‘Jordan’, and ‘Jazz’ (American Daylily Society, 2021).

Although China is the distribution center of *Hemerocallis* and has cultivated daylilies for more than 2000 years (Li et al., 2021), the breeding and release of elite daylily cultivars have progressively slowed (Jiao et al., 2016; Zhao et al., 2017). Instead, various cultivars with high ornamental values have been introduced into China, even though most of these cultivars do not grow well in China (Jiao et al., 2016; Zhao et al., 2017). Daylily cultivars with larger flowers that are suitable for local cultivation in China are much needed.

After years of selection, we bred a new cultivar named Xuan Cai Jin Huang, which

has flowers larger than 18 cm in diameter and flower scapes of 101 cm in height. Its sepals and petals are golden yellow (RHS 14A). It is very suitable for growing in northern China or other areas with similar climatic conditions.

Origin

New cultivar Xuan Cai Jin Huang is a progeny of an open-pollinated population of the *Hemerocallis* cultivar Da Jin Bei. Dan Jin Bei has small golden flowers and was introduced from Jilin Province. It was planted in the cold perennial flower germplasm resource nursery (lat. 45.85°N, long. 126.46°E) in the modern agriculture demonstration area of the Harbin Academy of Agricultural Sciences in 2013. In 2014, open-pollinated seeds were collected from cultivar Da Jin Bei and sown in the same nursery. In 2016, one of the plants was found to be taller and stronger than the other progenies and its parent. It was 101 cm in height with large flowers 18 cm in diameter. It also had excellent cold tolerance in Harbin, China. From 2016 to 2017, the plant was propagated by ramets in the same nursery. Field trials were conducted in Harbin (lat. 45.85°N, long. 126.46°E), Wuchang (lat. 45.11°N, long. 127.17°E), Mudanjiang (lat. 44.59°N, long. 129.61°E), Yichun (lat. 46.99°N, long. 128.04°E), and other places in Heilongjiang Province in 2018 and 2019. The plant characteristics were stable and consistent in these locations. In 2019, the new cultivar was named Xuan Cai Jin Huang and registered with the American Daylily Society. In 2019–21, the second field trials to collect more data were conducted in Harbin.

Description

The female parent of ‘Da Jin Bei’ was selected as the control to evaluate the morphological characteristics of ‘Xuan Cai Jin Huang’ because it most closely resembles the new cultivar. From 2019 to 2021, 60 plants of each of ‘Xuan Cai Jin Huang’ and ‘Da Jin Bei’ were planted in the experimental field comprising ≈ 60 m² in the cold perennial flower germplasm resource nursery of the Harbin Academy of Agricultural Sciences for phenotypic analysis and data collection.

Table 1. Comparisons of plant characteristics of ‘Xuan Cai Jin Huang’ and ‘Da Jin Bei’ were collected from 30 plants (10 plants \times 3 replications) planted in an area comprising ≈ 60 m² in Harbin, China, from 2019 to 2021.

Traits	Xuan Cai Jin Huang	Da Jin Bei
Plant height (cm)	70.62 \pm 0.72***	51.96 \pm 0.68
Leaf length (cm)	72.43 \pm 0.61**	55.38 \pm 0.61
Leaf width (cm)	2.68 \pm 0.04	2.58 \pm 0.03
Scape height (cm)	101.92 \pm 0.63**	74.67 \pm 1.07
Scape thickness (cm)	0.78 \pm 0.02*	0.72 \pm 0.02
Flower diameter (cm)	18.22 \pm 0.11**	13.35 \pm 0.13
Sepal length (cm)	11.75 \pm 0.07**	8.31 \pm 0.04
Sepal width (cm)	3.95 \pm 0.04**	3.19 \pm 0.04
Petal length (cm)	11.90 \pm 0.08**	8.76 \pm 0.06
Petal width (cm)	6.32 \pm 0.07**	3.91 \pm 0.08
Flower bud count	9.13 \pm 0.31	8.83 \pm 0.22

^zThe mean \pm SE of three replications. Significant differences were determined by independent sample *t* tests. *Significant ($P < 0.05$). **Highly significant ($P < 0.01$).

Received for publication 10 Nov. 2021. Accepted for publication 27 Jan. 2022.

Published online 3 March 2022.

This study was supported by the Science and Technology Basic Resources Investigation Program of China (2019FY100500), the National Science Foundation (31670344), the Fundamental Research Funds for the Central Universities (2572021DX04), the Natural Fund Project of Heilongjiang Province (LH2020C044), and the Science and Technology Co-operation Projects of the Harbin Science and Technology Bureau (2021ZSZNS05).

F.Y.L., L.W., and Z.Y.L. contributed equally to this work.

L.J.F. is the corresponding author. E-mail: fjwww@126.com.

This is an open access article distributed under the CC BY-NC-ND license (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).

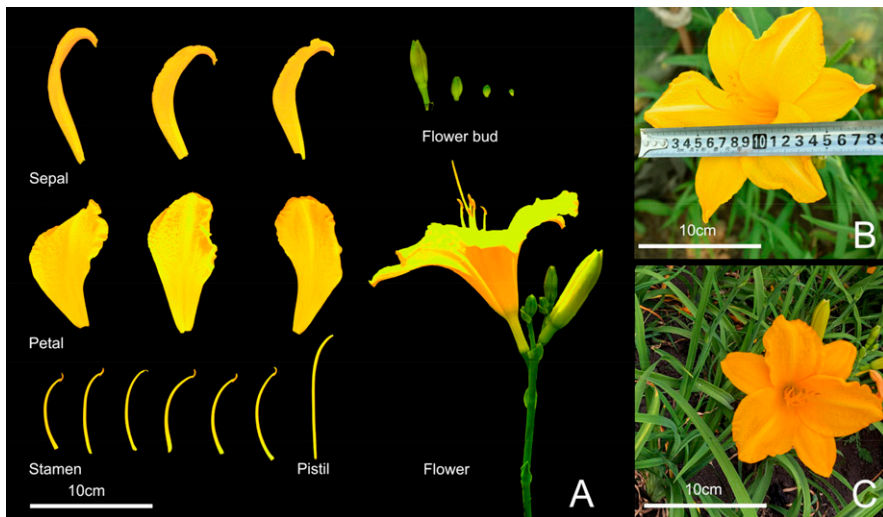


Fig. 1. The flower anatomic structure (A) and single flower (B, C) of 'Xuan Cai Jin Huang' and 'Da Jin Bei'. 'Xuan Cai Jin Huang' has larger flowers and a different flower color. Bar = 10 cm.

The experimental field was arranged in a randomized complete block design with three replications, with each containing 20 plants of each cultivar. Thirty plants of each cultivar (10 plants \times 3 replications) were randomly selected to measure plant height, leaf length, leaf width, scape height, scape thickness, bud count, flower diameter, sepal length, sepal width, petal length, and petal width (Table 1). The data analysis was conducted using SPSS 22.0 software, and the significant difference was determined by performing independent sample *t* tests. All colors were recorded according to the Royal Horticultural Society (RHS) Color Chart.

'Xuan Cai Jin Huang' flowers from July to August in Harbin, China. Each flower has three petals and three sepals, which aggregate into a trumpet shape (Fig. 1A). Its plant height and leaf length are significantly greater than those of 'Da Jin Bei'. The most striking features of the new cultivar Xuan Cai Jin Huang are the large flower and tall scape. Flowers are 18.22 ± 0.11 cm in diameter and scapes are 101.92 ± 0.63 cm in height, which are significantly greater than those of 'Da Jin Bei' (13.35 ± 0.13 and 74.67 cm, respectively) (Table 1; Fig. 1B and C). The length and width of its sepals and petals are also significantly longer than those of 'Da Jin Bei' (Table 1). Its sepals and petals are golden yellow (RHS 14A), whereas those of 'Da Jin Bei' are orange-yellow (RHS N25D; Fig. 1).

Additionally, the color of the ribs on the petals of 'Xuan Cai Jin Huang' (RHS 14D) is lighter than that of the parent (RHS 13B; Fig. 1).

In summary, 'Xuan Cai Jin Huang' is a unique cultivar with a tall and strong scape, extra-large flowers, and bright color. These characteristics make it an attractive cultivar and a valuable resource for further breeding of large-flowered daylilies.

Cultivation Techniques

'Xuan Cai Jin Huang' has strong cold tolerance and is suitable for planting in northern China and other areas with similar climatic conditions because it survives in cold winters in Harbin, Wuchang, Mudanjiang, and the southern part of Yichun, which correspond to hardiness zones 3 and 4 (mean annual minimum temperature ranges are -40.0 to -34.5 °C and -34.4 to -28.9 °C) in China (Widrechner, 1997). It is easily propagated via ramets in spring or fall. It can bloom in fall if the ramets are reproduced in spring. Each plant can produce from 3 to 10 shoots per year and should be divided every 2 to 3 years to adjust the growth density. It grows well in moist soil that is rich in humus and has good drainage. No apparent disease infestations or pest infestations have occurred with 'Xuan Cai Jin Huang'.

Availability

Plant materials of 'Xuan Cai Jin Huang' are available from Zhiyang Liu (E-mail: 113559183@qq.com) at the Harbin Academy of Agricultural Science.

Literature Cited

- American Daylily Society. 2021. The American Daylily Society online daylily database. 1 Nov. 2021. <<https://daylilies.org/DaylilyDB/>>.
- Blythe, E.K., C. Pounders, M. Anderson, E. Watts, and B. Watts. 2015. Survey of 575 daylily cultivars for severity of daylily rust in a southern Mississippi landscape. *HortTechnology* 25: 551–564, <https://doi.org/10.21273/horttech.25.4.551>.
- Cui, H.L., Y.A. Zhang, X.L. Shi, F.F. Gong, X. Xiong, X.P. Kang, G.M. Xing, and S. Li. 2019. The numerical classification and grading standards of daylily (*Hermercallis*) flower color. *PLoS One* 14:e0216460, <https://doi.org/10.1371/journal.pone.0216460>.
- Griesbach, R.J. 2004. *Hermercallis* L. 'Chesapeake Belle'. *HortScience* 39:190–191, <https://doi.org/10.21273/hortsci.39.1.190>.
- Jiao, F., Q. Liu, G.F. Sun, X.D. Li, and J.Z. Zhang. 2016. Floral fragrances of *Hermercallis* L. (daylily) evaluated by headspace solid-phase microextraction with gas chromatography-mass spectrometry. *J. Hortic. Sci. Biotechnol.* 91: 573–581, <https://doi.org/10.1080/14620316.2016.1193427>.
- Keene, S.A., T.S. Johnson, C.L. Sigler, T.N. Kalk, P. Genho, and T.A. Colquhoun. 2020. A survey of the floral volatile profiles of daylily species and hybrids. *J. Amer. Soc. Hort. Sci.* 145:120–130, <https://doi.org/10.21273/jashs04833-19>.
- Li, S., H. Cui, J. Wang, F. Hou, X. Xiong, X. Kang, and G. Xing. 2021. Qualitative and quantitative analysis on flavonoid distribution in different floral parts of 42 *Hermercallis* accessions. *Front. Plant Sci.* 12:670506, <https://doi.org/10.3389/fpls.2021.670506>.
- Podwyszyńska, M., E. Gabryszewska, B. Dyki, A.A. Stepowska, A. Kowalski, and A. Jasiński. 2015. Phenotypic and genome size changes (variation) in synthetic tetraploids of daylily (*Hermercallis*) in relation to their diploid counterparts. *Euphytica* 203:1–16, <https://doi.org/10.1007/s10681-014-1212-3>.
- Widrechner, M.P. 1997. Hardiness zones in China. (Color map - scale ca. 1:16,360,000.) 19 Jan. 2022 <<https://www.ars.usda.gov/midwest-area/ames/plant-introduction-research/home/maps/page-2/>>.
- Zhao, J., L. Xue, X. Bi, and J. Lei. 2017. Compatibility of interspecific hybridization between *Hermercallis liloasphodelus* and daylily cultivars. *Scientia Hort.* 220:267–274, <https://doi.org/10.1016/j.scienta.2017.04.014>.