‘Dong Lin Zi’: A New *Iris sanguinea* Cultivar

Juan Yang, Fengyi Li, Sheng Zhou, Lijuan Fan, and Ling Wang

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

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Iris sanguinea, a perennial, cold-tolerant, herbaceous flower, is widely distributed in northeast China. It is a valuable ornamental landscaping plant because of its rich and unusual flower colors and patterns (Lian et al., 2016). With the increasing demands of the market, *I. sanguinea* is becoming a new and distinctive landscaping and cut flower. Using conventional breeding methods, we have successively bred and released 14 new cultivars of *I. sanguinea*. These include cultivars with new flower colors, such as Beautiful Lotus (Wang et al., 2016), Chun Xin (Wang et al., 2018), Dream of the Butterfly (Zhao et al., 2018), Ban Die (Wang and Wang, 2017), Flower Angel (Fan et al., 2021), and NEFU-1 (Qi et al., 2020), cultivars with new flower shapes, such as Mi Lian (Yang et al., 2019), White Skirt (Wang et al., 2019), Zi Meiren (Chen et al., 2019), Balei Nv (Tang et al., 2017), Forest Fairy (Kuwan-tai et al., 2018), and King (Zhang et al., 2019), and cultivars with novel plant shapes, such as Hanxu (Wan et al., 2019) and Tingdie (Wu et al., 2017).

A new cultivar, Dong Lin Zi, with purplish red flowers was released. It was developed from a cross of wild *I. sanguinea* and *I. sanguinea* f. *albiflora*. The flower color of *I. sanguinea* is blue-violet (Wang and Wang, 2017), and that of *I. sanguinea* f. *albiflora* is white (Wang et al., 2019). Both are the most used breeding parents.

Origin

Seeds of *I. sanguinea* and *I. sanguinea* f. *albiflora* were collected from Shenyang Botanical Garden in 2003, and sown in the nursery of Maoershan Experimental Forest Station, Northeast Forestry University, in Mar. 2004. In 2005, the pollen of *I. sanguinea* f. *albiflora* was pollinated to *I. sanguinea*.

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L.W. is the corresponding author. E-mail: wanglinghlj@126.com.

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The F1 hybrid seeds were collected in Aug. 2005 and sown in the same nursery in Mar. 2006. The open pollinated seeds (F2) of the F1 plants were collected in Aug. 2008 and sown in the same nursery in Mar. 2009. In 2010, an elite individual plant with unique flower color (i.e., purplish red) was identified in the F2 population. Clones were vegetatively propagated from this elite line from 2010 to 2016 for evaluation, followed by field trials with other cultivars for further evaluation from 2016 to 2020, during which this line showed stability in its purplish red flower color. In 2021, this new cultivar was named Dong Lin Zi, and it was officially authorized by the American Iris Society (accession no. 21-0388).

Our field has good drainage with moist soil that is rich in humus and under abundant sunlight. Generally, it can be watered once every 10 d during the nonrainy seasons. Sufficient antifreeze water should be poured in late autumn.

Description

In 2017, 100 plants of ‘Dong Lin Zi’ and each of its parents *I. sanguinea* and *I. sanguinea* f. *albiflora* were planted in an area of ≈ 60 m² in the nursery of Maoershan Experimental Forest Station, Northeast Forestry University, China. Thirty plants (3 replicates with 10 plants/replicate) were randomly selected from each of ‘Dong Lin Zi’, and its

parents and their morphological characteristics were recorded. These morphological characteristics included plant height, leaf length, leaf width, leaf length/width, bract length, bract width, bract length/width, flower diameter, inner perianth length, inner perianth width, inner perianth length/width, outer perianth length, outer perianth width, outer perianth length/width, flower period, and fruit period. Flower color was rated according to the Royal Horticultural Society (RHS) Color Chart. Statistical analysis was conducted by one-way analysis of variance using IBM SPSS Statistics 24.0.

As shown in Table 1, the plant height of ‘Dong Lin Zi’ (74.62 ± 1.18 cm) was significantly higher than those of its parents *I. sanguinea* (56.52 ± 0.40 cm) and *I. sanguinea* f. *albiflora* (57.13 ± 0.75 cm). The leaf length of ‘Dong Lin Zi’ was 70.55 ± 2.40 cm and ≈ 10 cm longer than those of *I. sanguinea* (58.51 ± 0.72 cm) and *I. sanguinea* f. *albiflora* (56.60 ± 0.62 cm). The leaf width of ‘Dong Lin Zi’ (1.35 ± 0.05 cm) was also significantly larger than those of its parents. However, ‘Dong Lin Zi’ had a significantly shorter bract length (5.06 ± 0.13 cm) and a significantly larger bract width (1.66 ± 0.07 cm) than its parents, indicating a significantly smaller bract length/width ratio of ‘Dong Lin Zi’ (Table 1).

The flower diameter of ‘Dong Lin Zi’ was 11.42 ± 0.14 cm, which was significantly larger than those of its parents (Table 1). The inner and outer perianths of ‘Dong Lin Zi’ have significant longer lengths and widths than those of its parents. The three inner perianths of ‘Dong Lin Zi’ tilt up $\approx 45^\circ$ when blooming, and the outer perianths droop at 30° when fully blooming; however, its two parents have nearly upright inner perianths (Fig. 1). The colors of the inner and outer perianths of ‘Dong Lin Zi’ are markedly unique from those of its two parents (Figs. 1 and 2). Its inner perianth is slender, purplish red (RHS 85A) in the center, and white

Table 1. Morphological traits of new cultivar Dong Lin Zi and its parents *I. sanguinea* and *I. sanguinea* f. *albiflora*.

Trait ^z	Dong Lin Zi	<i>I. sanguinea</i>	<i>I. sanguinea</i> f. <i>albiflora</i>
Plant height (cm)	74.62 ± 1.18 a	56.52 ± 0.40 c ^y	57.13 ± 0.75 b
Leaf length (cm)	70.55 ± 2.40 a	58.51 ± 0.72 b	56.60 ± 0.62 c
Leaf width (cm)	1.35 ± 0.05 a	1.26 ± 0.03 b	1.23 ± 0.03 c
Leaf length/width	52.58 ± 2.66 b	46.33 ± 1.19 c	60.04 ± 1.99 a
Bract length (cm)	5.06 ± 0.13 c	6.36 ± 0.39 a	6.10 ± 0.03 b
Bract width (cm)	1.66 ± 0.07 a	1.01 ± 0.03 b	1.00 ± 0.03 b
Bract length/width	3.06 ± 0.14 c	6.30 ± 0.43 a	6.08 ± 0.20 b
Flower diameter (cm)	11.42 ± 0.14 a	6.72 ± 0.20 b	6.58 ± 0.05 c
Inner perianth length (cm)	5.31 ± 0.04 a	4.33 ± 0.11 c	4.54 ± 0.05 b
Inner perianth width (cm)	2.61 ± 0.04 a	1.41 ± 0.04 c	1.46 ± 0.04 b
Inner perianth length/width	2.04 ± 0.03 c	3.07 ± 0.11 b	3.11 ± 0.09 a
Outer perianth length (cm)	6.88 ± 0.03 a	4.81 ± 0.18 b	4.89 ± 0.02 b
Outer perianth width (cm)	5.26 ± 0.04 a	1.68 ± 0.08 c	2.39 ± 0.05 b
Outer perianth length/width	1.31 ± 0.01 c	2.88 ± 0.15 a	2.05 ± 0.04 b
Flower period	26 May–16 June	5 June–25 June	5 June–25 June
Fruit period	1 Aug.–20 Sept.	10 Aug.–20 Sept.	10 Aug.–20 Sept.

^zData were collected at the flowering and fruiting stages of 30 randomly selected plants (10 plants/replication in 3 replications) of each genotype in a randomized designed field in Northeast Forestry University, Harbin, China, from 2017 to 2020.

^yDifferent letters indicate significant differences in the same traits between ‘Dong Lin Zi’ and its parents ($P < 0.05$).

Fig. 1. Single flower of new cultivar Dong Lin Zi (A) showing a larger flower size and distinct flower color when compared with its parents *I. sanguinea* (B) and *I. sanguinea* f. *albiflora* (C).

Fig. 2. The flower anatomic structure of new cultivar Dong Lin Zi and its parents *I. sanguinea* and *I. sanguinea* f. *albiflora*. Their outer perianths, inner perianths, style arms, and filaments and anther (from top to bottom) are shown.

(RHS NN155B) with purplish red (RHS 85A) spots in the margins. Its outer perianth is purplish red (RHS 85A) in the center and white (RHS NN155B) in the margins, with dark purple (RHS 81A) midribs. However, the inner and outer perianths of *I. sanguinea* and *I. sanguinea* f. *albiflora* are blue-violet (RHS N88A) and white (RHS N155C), respectively. Its style is white (RHS NN155B) with purplish red (RHS 85A) spots and margins (Fig. 1). The anther color of 'Dong Lin Zi' is light blue-violet (RHS 93B), which is in contrast to the blue-violet (RHS N92C) color of *I. sanguinea* and yellow (RHS 15A) color of *I. sanguinea* f. *albiflora* (Fig. 2). The flowering and fruit set time of 'Dong Lin Zi' are earlier than those of its parents by ≈ 10 d, with flowering and fruiting periods ranging from 26 May to 16 June and from 1 Aug. to 15 Sept., respectively.

In summary, there are many differences between 'Dong Lin Zi' and its parents *I. sanguinea* and *I. sanguinea* f. *albiflora*. The most obvious features are its flower diameter, flower color, plant height, and flowering period. Compared with its parents, 'Dong Lin Zi' has a larger flower size, distinct flower color, greater plant height, and earlier flowering period.

Landscape Applications

As a new cultivar, 'Dong Lin Zi' shows strong cold tolerance, has a long green period, has fast breeding speed, and requires

minimal management. Therefore, 'Dong Lin Zi' shows great potential for landscaping, cultivation, and application in severe cold regions such as northeast and northwest China. Because of its unique color and early blooming, 'Dong Lin Zi' can be planted together with *I. sanguinea* and *I. sanguinea* f. *albiflora* to extend the overall flowering time of *Iris*. It can be used as a grassy embellishment and for themed gardening at the waterside and under the forests. In addition, 'Dong Lin Zi' can be used as cut flowers and indoor potted ornamental plants.

Availability

Inquiries about research or request for plant materials can be made to Dr. Ling Wang (E-mail: wanglinghlj@126.com) at the College of Landscape Architecture, Northeast Forestry University, Harbin, China.

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