

# ‘Donglin Zikui’: A New *Chrysanthemum* Cultivar

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*Chrysanthemum morifolium*, a perennial herbaceous member of Asteraceae, is a widely used decorative plant known for its full shape, diverse flower types, bright colors, and strong adaptability (Wen et al. 2022). As one of the four major cut flowers in the world, chrysanthemum has a strong competitiveness in the global market. Moreover, chrysanthemum serves various purposes, including its use in flower tea, medicinal materials, pot plantings, and garden landscapes, offering both medicinal and ornamental value (Gu et al. 2022; Hao et al. 2022). Over more than 3000 years of evolution and cultivation, chrysanthemum has transformed from its original species into a vast array of ornamental varieties, capturing the preference of consumers (Barreda et al. 2015; Xu et al. 2023).

To meet the demand in regional markets, the primary breeding goal in cold regions such as northern China is to develop new chrysanthemum varieties with enhanced cold resistance and vibrant color (Chen et al. 2023; Liao et al. 2023). *Chrysanthemum* ‘Donglin Zikui’ is an exemplary cultivar released by the College of Landscape Architecture at Northeast Forestry University. Noteworthy for its superior cold resistance, it boasts distinct floral characteristics that enhance its ornamental value, making it a standout choice for flower appreciation during the colder seasons.

## Origin

*C. Donglin Zikui* is an excellent new cultivar bred by artificial hybridization, produced from *C. ‘Zhandi Huanghua’* (paternal parent) and *C. ‘Zi Qiushang’* (maternal

parent). Artificial hybridization was carried out in Autumn 2014, and a batch of seeds were harvested in the winter at the flower breeding area of the College of Landscape Architecture, Northeast Forestry University, Harbin, China (lat. 45°43′ N, long. 126°37′ E). In the second year, through potting seedling cultivation, field planting, and trial evaluation, 14-Z-08 attracted attention for its unique flower pattern. From 2016 to 2020, 14-Z-08 showed stable traits and strong reproductive ability after vegetative propagation and homologous population observation. Moreover, it had the characteristics of luxuriant flowers, unique flower type, long flowering period, and strong cold resistance, among others, which met the breeding requirements. In Nov 2022, after carrying out tests for distinction, uniformity, and stability of a new cultivar, it officially obtained the certificate of new cultivar status issued by the Ministry of Agriculture and Rural Affairs of China and was named *C. Donglin Zikui* (CNA20201003017).

## Description

*C. Ding Fen* is similar to *C. Donglin Zikui* based on the consistency and specificity of the different cultivars; therefore, it is identified as

the control species. Under the same cultivation conditions, morphological characteristics of the two cultivars were collected to compare the similarities and differences, and the results showed that there were many differences between the two, such as plant height, corolla diameter, and ray floret length (Table 1).

Specifically, the plant height of *C. ‘Donglin Zikui’* is ~56 cm, which is significantly higher than *C. ‘Ding Fen’*. It has nearly 20 branches, making the whole plant look compact and full (Fig. 1A). The leaves are broadly oval, 4.83 cm long and 3.50 cm wide. The leaf margin is divided, generally five lobes with sparse obtuse serrations (Fig. 1C). Numbers of flowers per branch and ray florets per flower of *C. ‘Donglin Zikui’* were ~22 and 49, respectively. It has single-type flowers with dark pink ray florets and a yellow flower center (Fig. 1A and B). In detail, the surface of the ray florets is dark pink, whereas the back is light pink. It is worth emphasizing that the ray florets of *C. ‘Donglin Zikui’* have only two layers, whereas *C. ‘Ding Fen’* has five to seven layers. The corolla diameter and ray floret length were 61.00 and 24.33 mm. The ray florets are in a strip shape, curled inward, with a blunt rounded apex (Fig. 1B and D). The unique flowers enhance the ornamental value of *C. ‘Donglin Zikui’*. It is of note that the flowering period of *C. ‘Donglin Zikui’* may last up to 35 d because it is able to resist the cold in late autumn and early winter. According to biological characteristics of chrysanthemum, the flower opening process is divided into five stages: budding, visible color, ray florets opening, early opening, and full opening stages (Fig. 1E). By contrast, the flowering period of *C. ‘Ding Fen’* is short, from 15 Sep to 15 Oct. The artificial breeding of *C. ‘Donglin Zikui’* has important practical significance for expanding the selection and application scope of flowers in cold regions.

## Cultivation Technology

In practical production, *C. ‘Donglin Zikui’* seedlings with stable ornamental characteristics can be quickly obtained by vegetative propagation such as tillering and cutting. It can be both potted and planted in the field. It prefers loose, fertile, well-drained sandy loam. In addition, it grows well in warm and sunny environments. It belongs to short-day plants, which exhibit vegetative growth under

Table 1. Comparison of morphological characteristics of *Chrysanthemum* ‘Donglin Zikui’ and ‘Ding Fen’.

Characteristics	<i>C. ‘Donglin Zikui’</i>	<i>C. ‘Ding Fen’</i>
Plant height (cm)	55.83 ± 1.80	36.47 ± 4.11**
Branch number	19.67 ± 3.21	18.33 ± 1.15
Leaf length (cm)	4.83 ± 0.21	5.30 ± 0.36
Leaf width (cm)	3.50 ± 0.26	2.67 ± 0.15**
Leaf length/width	1.39 ± 0.12	1.99 ± 0.06**
Flowers per branch	22.00 ± 2.65	15.33 ± 1.53*
Ray florets per flower	49.33 ± 3.06	168.67 ± 7.51**
Corolla diameter (mm)	61.00 ± 3.00	39.33 ± 3.79**
Ray floret length (mm)	24.33 ± 1.15	15.67 ± 1.53**
Ray floret color	Dark pink	Dark pink
Flower period	28 Sep–1 Nov	15 Sep–15 Oct

Statistical difference between *C. ‘Donglin Zikui’* and *C. ‘Ding Fen’* at \* $P < 0.05$  and \*\* $P < 0.01$ , respectively. All data were analyzed by independent samples  $t$  test, using SPSS 26.0.

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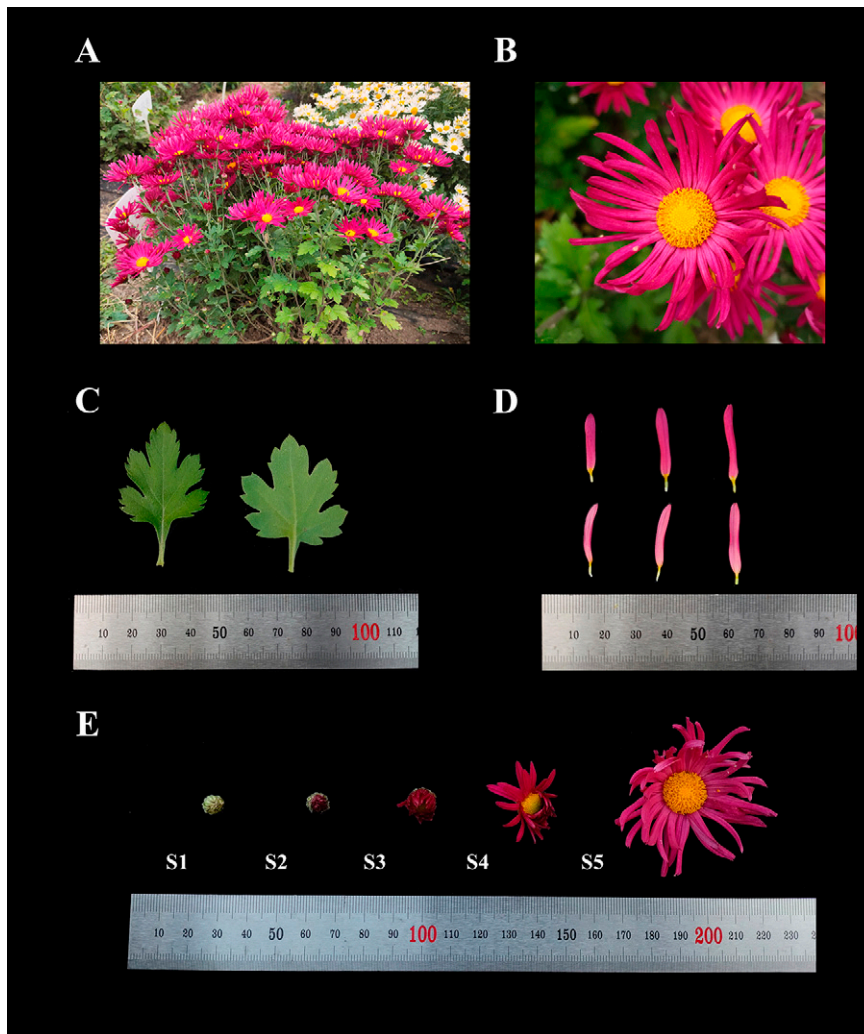


Fig. 1. Morphological characteristics of *Chrysanthemum* 'Donglin Zikui': (A) full bloom of flowers; (B) close-up of an individual flower; (C) leaves; (D) ray florets; (E) flower morphology in different stages—S1 budding stage, S2 color visible stage, S3 ray florets opening stage, S4 early opening stage, and S5 full opening stage.

long day and early flowering under short day. To obtain a compact and full plant, three or four individual plants are usually planted together. It is necessary to loosen the soil and weed multiple times to increase the soil permeability during the vegetative growth period and apply a small amount of fertilizer and promptly clean up dead branches and yellow leaves during the flowering period. *Chrysanthemum* rust and aphids are common pests and diseases (Gao et al. 2022; Li et al. 2023). Once it is discovered that plants have been harmed, carbendazim and imidacloprid should be sprayed immediately.

#### Habit and Application

*C.* 'Donglin Zikui' is drought tolerant and water efficient and possesses strong adaptability, but it is intolerant of waterlogging. In particular, it is both ornamental and cold resistant, which can withstand a minimum of  $-10^{\circ}\text{C}$ . It has been successfully planted and grown well in the fields of northeast China. It is not only suitable for potted plantings but is also an excellent material for fresh cut flowers. Moreover, it can be used to landscape courtyards, green roads, and parks, because of its lush flowers, unique flower types, gorgeous coloration, and long flowering period.

#### Availability

*C.* 'Donglin Zikui' is cultivated and managed by Northeast Forestry University (Harbin, China). Request for plant materials should be addressed to Professor Miao He (E-mail: hemiao@nefu.edu.cn).

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