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‘Anni’ Flowering Crabapple

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The ornamental crabapple is a woody ornamental plant in the Rosaceae family and the genus *Malus*, with a fruit diameter of less than 5 cm. It is widely cultivated and studied in Eurasia and North America due to its excellent ornamental, economic, ecological, and cultural application values (Wan et al. 2015).

From the 18th century to the end of the 20th century, nearly 1200 cultivars of *Malus* were bred in Europe, the northern United States, and southern Canada. However, the progress of breeding has slowed down since then (Fiala 1994). In contrast, China’s emphasis on the breeding of new crabapple cultivars has gradually increased, with more than 100 new cultivars of crabapple authorized by National Forestry and Grassland Administration in the past 20 years. However, in all known crabapple cultivars, the proportion of double or semidouble-flower cultivars is less than 10%, with the proportion of highly double-flower cultivars being even rarer (Zhang et al. 2021). According to the latest guidelines for the conduct of tests for distinctness, uniformity and stability—ornamental crabapple (China Forestry and Grassland Administration 2024), the approval requirements for double-flower cultivars are more stringent, with the number of petals changed from greater than 10 to greater than 15. Additionally, according to existing standards, the original authorized cultivars are mostly semidouble flowers, which further increases the difficulty of breeding double-flower cultivars. Cultivars affected by this change include ‘Chahua Nv’ (white flowers, 12–16 petals) (Fan et al. 2023), ‘Kelsey’ (pink flowers, 9–15 petals) (Lu et al. 2023), and ‘Diamond’ (red flowers, 11–16 petals) (Zhou et al. 2019). We report a new crabapple cultivar, Anni.

Origin

Malus ‘Anni’ is a new cultivar obtained by open pollination. In Fall 2011, seeds were collected from nine *Malus* cultivars (Purple Prince, Indian Summer, Red Jade, Hargozam, Donald Wyman, Qian Cengjin, *M.* ×*zumi* Calocarpa, Sutyzam, and Cinzam) from the National Crabapple Germplasm Center in Yangzhou (lat. 32°42′N, long. 119°55′E, US Department of Agriculture Hardiness Zone 8). In Spring 2012, after cold stratification for 2 months, seeds were sown on raised beds (‘raised bed’ means that the soil level in the bed is higher than the surrounding soil). The sprouted seedlings were then transplanted to the well-drained sandy loam field plot. After observing the morphological characteristics of seedlings from 2015–16, a distinct plant exhibiting highly double pink flowers (18–22 petals) was selected. The cultivar exhibited prolific flowering and vigorous growth. We named it ‘Anni’ (*an* means “peace” and *ni* means “girl” in Chinese) (Division of Dictionary

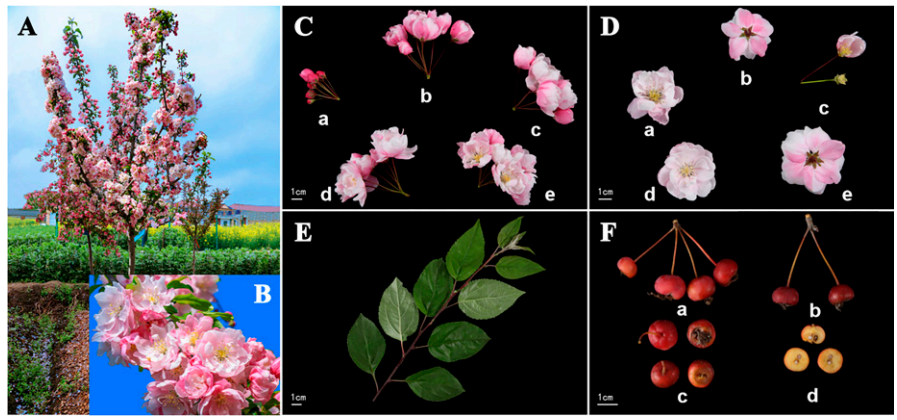

Fig. 1. Phenotypic characteristics of ‘Anni’. (**A**) The original tree at the beginning of the flowering stage. (**B**) Flowering branch with flowers at full bloom. (**C**) The different flowering stages of ‘Anni’: (**a** and **b**) flower bud stage; (**c**) initial flowering stage; (**d**) full flowering stage; and (**e**) final flowering stage. (**D**) Flowering petal dynamics: (**a**) front view of blooming flower; (**b**) back view of blooming flower; (**c**) longitudinal section view of blooming flower; (**d**) front view of mature flower; and (**e**) back view of mature flower. (**E**) Leaves. (**F**) Mature fruits: (**a**) back view of infructescence; (**b**) front view of infructescence; (**c**) polar view of fruits; and (**d**) longitudinal section (top) and transverse section (bottom) view of fruits.

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Table 1. Performance of *Malus* 'Anni' under various test sites with climate conditions.

Location	Climate condition (2013–23)			Grafting survival rate (%)	Foliar disease incidence (%)
	Max temp (°C)	Min temp (°C)	Rainfall (mm)		
Yangzhou, Jiangsu Province (32.40′N, 119.41E)	39	−7	1,055	92.8%	5.4%
Liaocheng, Shandong Province (36.45′N, 115.98′E)	38	−13	609	92.0%	4.4%
Hefei, Anhui Province (31.82′N, 117.22′E)	39	−8	1,176	91.5%	6.0%

Climate condition data from National Meteorological information center (http://data.cma.cn). Foliar disease incidence (%) = (n/N) × 100% where: n = number of infested or infected trees; N = total number of trees in one plot.

Compilation, Institute of Linguistics, CASS, 2016) (Fig. 1). From 2015 to 2018, bud grafts of 'Anni' with *M. hupehensis* (Pamp.) Rehder seedlings as rootstock were propagated in Yangzhou, yielding more than 200 individual plants. From 2016 to 2017, we also conducted regional experiments in Shandong and Anhui Provinces (Table 1). After 7 years of continuous observation (2016–22), the characteristics of 'Anni' have been confirmed as stable and are consistently reproduced in successive generations. Additionally, this cultivar exhibited favorable horticultural traits, including vigorous growth, adaptability to high temperatures, and notable resistance to common insect pests and diseases.

Description

The distinct characteristics of 'Anni' include its pink, highly double flowers with an average of 20 petals and abundant floral display. It exhibits a growth habit and flower shape similar to those of *M.* 'Van Eseltine'. However, they have differences in traits such as flower bud color, sepal color, and fruit shape. The flower bud of 'Anni' is pink, the sepal is green-red, and the side of the fruit shape is oblate. In contrast, the flower buds of 'Van Eseltine' are dark pink, the sepals are brownish red, and the fruit is pyriform (Table 2). 'Anni' is a highly double flower with significant commercial value in the ornamental market. The specific characteristics of 'Anni' are described here.

Habit. This cultivar has an upright growth habit with an ovate crown and main branches extending diagonally upwards (Fig. 1A).

Foliage. New leaves are green, while the mature leaves are medium green. The leaves are ovate (medium length, 7.10 ± 0.96 cm; medium width, 3.64 ± 0.44 cm), with an acuminate apex, serrated margins and medium glossiness (Fig. 1E).

Flower. The initial bloom (10% flowers open) of 'Anni' is in early April in Yangzhou, Jiangsu, China, which is considered midseason for flowering crabapples. 'Anni' exhibits a longer average flowering period of 15 d in comparison with existing cultivars which flower for an average of 10 d (Fig. 1B). Each umbel inflorescence has four to six flowers (Fig. 1C). Corollas have a deep cup shape, and each flower possesses 18 to 22 ovate petals, forming a highly double-flower morphology (Fig. 1D). Flowers are larger than 'Van Eseltine' (4.6 to 5.5 cm in diameter), with 12 to 38 pistils and 27 to 65 stamens. Flower buds are medium pink (RHS-N57C) (Royal Horticultural Society 2007). The petal color of the outer side is medium pink (RHS-N66D), the marginal zone and middle zone of the inner side is light pink (RHS-75C), and the basal zone of the inner side are white (RHS-69D) at the full flowering stage (Fig. 1D). Petal surfaces have prominent veins and irregular pigmentation. Pedicels are erect, glabrous, and 1.9 to 3.4 cm in length.

Fruit. The mature pomes are medium red (RHS-N34A), nonwaxy, and have a light yellow flesh (Fig. 1F). Fruits are oblate, nonglossy and relatively small (transverse diameter, 1.3 to 1.5 cm) with residual sepals. The fruit persists until late December in Yangzhou, Jiangsu, China.

Cultivation

'Anni' exhibits strong adaptability to diverse environmental conditions and shows high resistance to prevalent pests and diseases in Yangzhou. It performs best in full sun conditions and loose, loamy, well-drained soils. 'Anni' is primarily propagated by budding with *M. hupehensis* (Pamp.) Rehde as rootstock from August to September in Jiangsu (Sun et al. 2023). Usually, rootstocks ranging from 5 to 25 mm in diameter are used for budding. Budding tape is used to secure the scion bud while the bud union heals (Zhou et al. 2019), and the graft is allowed to be exposed to air until March of the following year by removing the budding tape. Meanwhile, attention should also be paid to timely cleaning of the garden and carrying out disinfection and sterilization work at all stages.

Availability

'Anni' is available from Nanjing Forestry University and Yangzhou Crabapple Horticulture Limited Company.

Table 2. Comparison of phenotypic characteristics between *M.* 'Van Eseltine' and *M.* 'Anni'.

Traits	Van Eseltine	Anni
Tree habit	Upright	Upright
Flower type	Double (15–20 petals)	Double (18–22 petals)
Flower diameter (cm)	4.26 ± 0.21	5.06 ± 0.47
Flower bud color	**Dark pink (RHS63A)**	**Medium pink (RHSN57C)**
Petal shape	Ovate	Ovate
Petal: color of marginal zone of inner side	**White (RHSN55B)**	**Light pink (RHS75C)**
Sepal color	**Red-brown**	**Red-green**
Leaf shape	Narrow elliptical	Ovate
Leaf blade, incisions of margin	Serrate	Serrate
Leaf length (cm)	8.76 ± 0.62	7.10 ± 0.96
Leaf width (cm)	3.98 ± 0.56	3.64 ± 0.44
Fruit size (cm)	1.32 ± 0.19	1.36 ± 0.10
Fruit shape in lateral view	**Pyriform**	**Oblate**

Bold indicates distinguished difference between the two cultivars. Data are expressed as the Mean ± standard deviation. RHS = Royal Horticulture Society colour chart.

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