

# Three New Cultivars from the Interspecific Hybridization of *Iris ensata* and *Iris pseudacorus*

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*Iris* is the largest genus in the family Iridaceae, comprising ~300 species (Xiao and Hu 2021), including some of the most famous ornamental plants worldwide. There are almost 70,000 known *Iris* horticultural cultivars, with more than 1000 new cultivars produced annually via selection and hybridization (Hu and Xiao 2012). However, it is difficult to make significant breakthroughs in flower type, color, and stress resistance of irises. Interspecific distant hybridization can help generate new cultivars with excellent ornamental traits and stress resistance, making it indispensable for creating new plant cultivars (Deng et al. 2011). Progenies derived from crosses between wild *Iris* species are known as species hybrids (SPX; <https://wiki.irises.org/Main/Spx>). The hybrid parents are typically beardless irises, and Pseudatas is the most famous group of SPX.

Japanese irises (*Iris ensata* Thumb.) were developed in Japan via selective breeding, which results in limited variations among cultivars (Xiao and Hu 2018). Crosses between *I. ensata* and other *Iris* species can lead to increase genetic diversity and obtain new flower colors. Shinnosuki Osugi, a Japanese breeder, inserted a gene responsible for yellow flower coloration into Japanese irises by crossing *Iris pseudacorus* and *I. ensata*, which are known as Pseudatas. ‘Aichi no Kagayaki’ was the first cultivar of Pseudatas (<https://wiki.irises.org/Main/Spx>). Since then, more hybrids were derived from *I. pseudacorus* and *I. ensata* (Copeland 2009). There are currently ~60 registered cultivars of Pseudatas (<https://wiki.irises.org/Main/Spx/PseudataGallery>).

‘Jinsui’, ‘Mitao’, and ‘Feitao’ are three new cultivars obtained from a cross between *I. pseudacorus* and *I. ensata* by Shanghai Botanical Garden. Unlike their parents, these cultivars produce yellow-green new leaves in spring, and the flower pattern is similar to the female parent. Still, there are great differences in flower colors from their parents. The new cultivar ‘Jinsui’ has yellow petals with dark purple veins. The flowers of ‘Mitao’ are

creamy yellow with purple veins, and ‘Feitao’ lacks inner flower petals, but has creamy yellow falls with purple-red veins or sanded stripes. Additionally, the yellow spots on their falls are surrounded by a purple-black halo, completely different from the female parent. It greatly enhances the ornamental value of Japanese irises. In Shanghai, China, these cultivars bloom in late May.

## Origin

‘Jinsui’, ‘Mitao’, and ‘Feitao’ were selected from the progenies resulting from the hybridization between *I. pseudacorus* ‘Gubijin’ (female parent, Fig. 1B) and *I. ensata* ‘Sennyō No Mai’ (male parent, Fig. 1A) at Shanghai Botanical Garden. The parents were initially collected from Kamo Garden in Shizuoka Prefecture, Japan (<https://kamold.co.jp>). In May 2019, four flowers were pollinated, and two hybrid fruits were obtained from the cross of *I. pseudacorus* ‘Gubijin’ and *I. ensata* ‘Sennyō No Mai’. Seventy-five

hybrid seeds were sown in autumn to produce eight hybrid seedlings, which were examined in terms of plant shape, flower size and color, and flowering period, using ‘Gubijin’ and ‘Sennyō No Mai’ as controls in the field of Shanghai Botanical Garden. Among these seedlings, three that performed well and showed promise were observed continuously from 2022 to 2024; their characteristics were stable and consistent. They were registered as ‘Jinsui’, ‘Mitao’, and ‘Feitao’ by the American Iris Society in 2024.

## Description

A selection process was completed at the Conservation Nursery of Shanghai Botanical Garden in Shanghai, China. For each new cultivar and its parents, 20 clones obtained by division propagation were planted in Sep 2022. All plants were grown in arrays of 30 cm between the plants in the experimental field. They were grown under full sunlight and were fertilized similarly to other perennials. They were irrigated as required, with appropriately enhanced irrigation during vigorous growth and blooming periods. Each cultivar’s flowering period was recorded according to the dates of the first and last flowers in the population. Morphological characteristics, including plant height, leaf length and width, flower color, flower diameter, inner perianth length and width, outer perianth length and width, and the flowering period of the whole population, were recorded. Single flowers from five randomly selected plants per cultivar were analyzed. Leaf length and width were measured using the third leaf from the top of each plant. Flower colors were described according to the Royal Horticultural Society (2015) Color

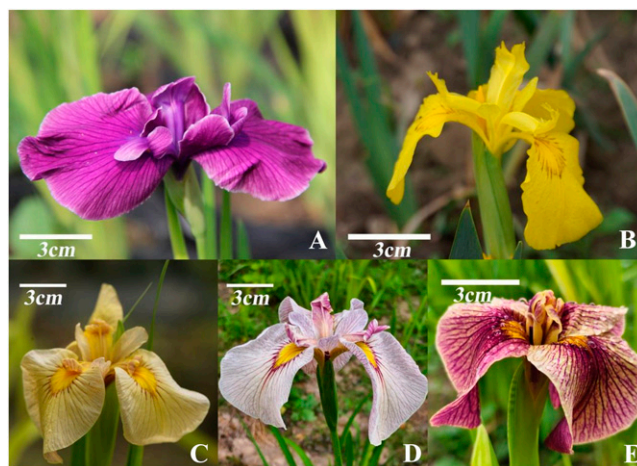


Fig. 1. Flowers of three new iris cultivars and their parents: (A) female parent *I. pseudacorus* ‘Gubijin’, (B) male parent *I. ensata* ‘Sennyō No Mai’, (C) ‘Jinsui’, (D) ‘Mitao’, and (E) ‘Feitao’. ‘Jinsui’ produces yellow (RHS 5C) standards and falls, dark purple (RHS 77B) veins, yellow (RHS 5B) style arms, dark purple (RHS 77B) veins, and yellow (RHS 9A) signal, with two flowers per stem. The plant is  $53.00 \pm 2.62$  cm in height (Table 1). ‘Mitao’ has white (RHS NN155) standards, purple (RHS 77C) veins, creamy yellow (RHS 4D) style arms, dark purple (RHS N79D) tips, purple (RHS 77C) sanded stripes, creamy yellow (RHS 4D) falls, purple (RHS 77C) veins, and a yellow (RHS 7A) signal surrounded by a dark purple (RHS N79C) halo with three flowers per stem. The plant is  $73.00 \pm 2.68$  cm in height (Table 1). ‘Feitao’ lacks inner flower petals but has light yellow (RHS 7D) style arms, red-purple (RHS 59B) tips, creamy yellow (RHS 10D) falls, dark red veins (59A) and red-purple sanded stripes (59B), a yellow (RHS 13A) signal veined red-purple (RHS 59B), with two flowers per stem. The plant is  $45.16 \pm 3.66$  cm in height (Table 1). RHS = Royal Horticultural Society.

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Table 1. Morphological characteristics of three new iris cultivars and their parents.

Cultivar	Plant ht (cm)	Leaf length (cm)	Leaf width (cm)	Flower crown size (cm)	Inner perianth length (cm)	Inner perianth width (cm)	Outer perianth length (cm)	Outer perianth width (cm)
<i>I. pseudacorus</i> 'Gubijin'	82.93 ± 2.66 a	80.77 ± 4.09 a	3.00 ± 0.16 a	6.56 ± 0.24 e	2.11 ± 0.15 c	0.86 ± 0.05 c	6.29 ± 0.35 c	3.45 ± 0.17 d
<i>I. ensata</i> 'Sennyō No Mai'	67.47 ± 2.09 c	60.75 ± 1.54 b	1.80 ± 0.15 c	10.24 ± 1.00 c	4.15 ± 0.09 b	1.49 ± 0.03 b	7.94 ± 0.39 b	6.61 ± 0.10 b
'Jinsui'	53.00 ± 2.62 d	48.54 ± 1.86 c	2.04 ± 0.11 b	12.06 ± 0.51 b	4.15 ± 0.08 b	1.42 ± 0.16 b	9.54 ± 0.22 a	5.88 ± 0.04 c
'Mitao'	73.00 ± 2.68 b	56.86 ± 3.67 b	2.13 ± 0.10 b	13.62 ± 0.51 a	4.52 ± 0.14 a	2.25 ± 0.11 a	10.08 ± 0.52 a	7.27 ± 0.16 a
'Feitao'	45.16 ± 3.66 e	38.22 ± 1.61 d	1.51 ± 0.07 d	8.26 ± 0.81 d	—	—	8.35 ± 0.19 b	5.69 ± 0.16 c

For each index, n = 5. Mean values followed by different letters in the same row are significantly different ( $P < 0.05$ ). Long dash (—) indicates absence of inner flower petals.

Charts. Quantitative flower indices were measured on the second day of full bloom. Data were analyzed using SPSS 17.0 (SPSS Inc., Chicago, IL, USA).

In Shanghai, 'Jinsui', 'Mitao', and 'Feitao' bloom from late May to early June. These cultivars are deciduous, with yellow-green new leaves emerging in spring. They start to lose their leaves in late November. In our trial, the plant height of the new cultivars ranged from 45.16 to 73.00 cm (Table 1). They produce one inflorescence branch with two or three flowers.

The three new iris cultivars differ from common pseudatas in flower colors and patterns (Fig. 1C–E). Their yellow flowers and rounded patterns are characteristics inherited from the female and male parents, respectively. These new cultivars have light or creamy yellow flowers with purple or red-purple veins or sanded stripes. During the 3-year observation period, the new cultivars had stable traits because they were selected from asexual strains in 2021.

Each flower of the three new cultivars blooms for 2 to 3 d. Moreover, flowers bloom continuously for up to 2 weeks. They thrive in full sunlight. All three cultivars have been free of pests and diseases since they were planted in Shanghai Botanical Garden in 2021. These cultivars have unique ornamental characteristics (e.g., flower colors and patterns).

In summary, we obtained three new iris cultivars that produce yellow-green leaves in spring and flowers in early summer. They are suitable for garden and courtyard plants but can also be grown in pots. Because the three new cultivars are infertile, they cannot be used as parents for crossbreeding.

#### Availability

'Jinsui', 'Mitao', and 'Feitao' are three new SPX cultivars for research or trials. Requests for samples of cloned plants may be addressed to Dr. Yue-E Xiao (E-mail:

xiaoyue@shbg.org), Research Center of Shanghai Botanical Garden, Shanghai, China.

#### References Cited

- Deng YM, Ye XQ, She JM, Tang RS. 2011. The research progress on distant hybridization of plant breeding. *Acta Agriculturae Boreali-Sinica*. 26(Supplement):52–55.
- Copeland J. 2009. What are Pseudatas? *Bull Am Iris Soc.* <http://wiki.irises.org/bin/view/Main/InfoClassificationGardenGroupsPseudatas>.
- Hu YH, Xiao YE. 2012. *The wetland irises: Appreciation, cultivation and application*. Science Press, Beijing, China.
- Royal Horticultural Society. 2015. *The Royal Horticultural Society Colour Chart* (6th ed.). RHS Media, Royal Horticultural Society, London, UK.
- Xiao YE, Hu YH. 2018. *The Ensata irises: Resources protection and cultivars appreciation*. Science Press, Beijing.
- Xiao YE, Hu YH. 2021. *Ex situ flora of China: Iridaceae*. China Forestry Publishing House, Beijing, China.