

‘Jimei’—A Late-maturing Pear Cultivar

Hongbao Wang, Yongbo Wang, Yaru Wang, Jin Wang, Yuekun Yang, Shuo An, Xiao Li, Yingtao Wang, and Yong Li
Shijiazhuang Institute of Pomology, Hebei Academy of Agriculture and Forestry Sciences, Shijiazhuang 050061, China

Fengling Zhao
Shijiazhuang No. 24 High School, Shijiazhuang 050051, China

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Pear (*Pyrus* spp.) is cultivated and consumed globally (Gong et al. 2020). Many cultivars of *Pyrus pyrifolia* P. × *bretschneideri* and some other pear species are characterized by a sweet flavor with low acidity (Xu et al. 2023). China, the origin for the genus *Pyrus*, possesses abundant pear germplasm resources and leads in global production, with 69% of the pear cultivation area and 68% of pear production worldwide (<https://www.fao.org/faostat/en/#home>; Gong et al. 2023). Hebei Province, as the center of origin for *Pyrus bretschneideri* Rehder in China, has consistently ranked first in the country in terms of pear tree cultivation area and production volume. With the advancement of society and the economy, the demand for pome fruits has been increasing. To meet the needs of different consumer groups, pear breeders worldwide are prioritizing new and diverse varieties of pears with superior traits. Starting in 1970, more than 200 pear germplasm resources have been preserved to date at Shijiazhuang Institute of Pomology, Hebei Academy of Agriculture and Forestry Sciences (SIP-HAAFS; Shijiazhuang, Hebei Province, China). Germplasm conservation has led to the cultivation of superior varieties, such as ‘Yali’, ‘Huangguan’, ‘Jixiu’ (Wang et al. 2020), and ‘Jijin’ (Wang et al. 2021), which have gradually emerged as the dominant cultivars in terms of production.

In 2006, cross-breeding for seedling selection was initiated, with the breeding goal of achieving desired traits, including late maturity, superior quality, rich flavor, red fruit surface, and dwarf and compact tree shape. Through the hybridization between ‘Huangguan’ and ‘Zhongai 1’, we have successfully obtained F1 progeny. Moreover, through long-term evaluation and selection of the hybrid progenies, we report Jimei as a new cultivar.

Origin

The Jimei cultivar was bred through an artificial cross between ‘Huangguan’ and ‘Zhongai 1’ at SIP-HAAFS in 2006 (Fig. 1). Huangguan is a hybrid pear cultivar that was developed in 1997 through a cross between the pear cultivars Xuehua (*Pyrus* × *bretschneideri* Rehd.) and Shinseiki [*P. pyrifolia* (Burm.) Nakai] at SIP-HAAFS (Sun et al. 1997). ‘Huangguan’ fruits are long globose, weighing 296.8 ± 7.13 g on average, and these fruits mature in mid-August. Additionally, the fruits have greenish-yellow skin, and their flesh is pure white, juicy, crisp, and extremely fine in texture, with the total soluble solid content being $12.3\% \pm 0.17\%$ (Supplemental Table 1). These fruits exhibit superior overall organoleptic quality. The pear tree exhibits vigorous growth and begins to bear fruit at an early stage, primarily on short branches. Moreover,

pear trees tend to exhibit a regular bearing habit in their fruiting pattern.

Zhongai 1, the second parental cultivar, was originally selected by the Research Institute of Pomology of Chinese Academy of Agricultural Sciences, from an open-pollinated seedling of ‘Jinxiang’ [*P. ussuriensis* Maxim.] × ‘Bartlett’ (*P. communis* L.) (Jiang et al. 2000). Its fruits are oval, weighting 203.7 ± 3.92 g on average and maturing in early September. At maturity, the fruits exhibit greenish-yellow skin, with a slight blush on the surface exposed to sun. The harvested fruits are hard but soften as they undergo ripening. The ripened fruits are sweet and juicy, of medium coarse texture, with the total soluble solid content of $13.5 \pm 0.36\%$ (Supplemental Table 1). The trees have an open canopy and a dwarf, compact structure, bearing fruits mainly on medium-length branches.

In 2006, sexual hybridization was conducted, which yielded 665 hybrid seeds. Before sowing, these seeds were subjected to low-temperature stratification, and the resulting seedlings were preselected primarily for seedling resistance traits and growth vigor. In Spring 2008, 456 of these seedlings were planted in a “cluster” cultivation pattern at the seedling selection nursery of SIP-HAAFS. In 2011, the hybrid seedlings were examined for their fruit traits, in the same year, was grafted onto Birchleaf Pear (*Pyrus betulifolia* Bunge) rootstock. The accession, numbered 08-22-67-5, exhibited excellent fruit characteristics, including a rich flavor, a smooth and attractive surface, a reddish blush on the sun-exposed side, and high quality. Therefore, 08-22-67-5 was selected as a preliminary elite selection. In 2016, 08-22-67-5 was propagated through grafting in regions with varied climatic conditions, including Shijiazhuang City, Xingtai City, and Handan City, with each trial plot covering 2 ha, ‘Huangguan’ served as control variety. From 2021 to 2023, observations and comprehensive evaluations were conducted on the selection characteristics, including botanical traits, phenological phases, fruit economic properties, stability, and disease

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H.W. and Y.L. are the corresponding authors. E-mail: 1252146220@qq.com (H.W.) and liyuzhongszj@163.com (Y.L.).

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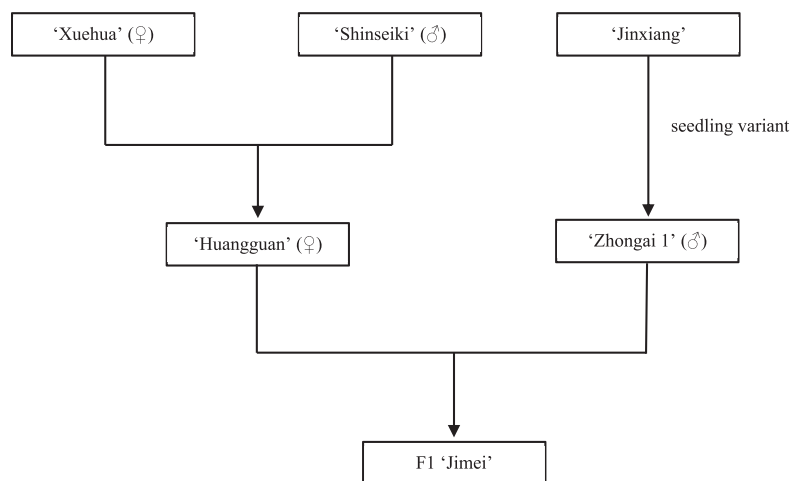


Fig. 1. Pedigrees of the new late-maturing pear cultivar Jimei.



Fig. 2. The trees (A) and fruits (B) of the pear cultivar Jimei.

resistance. The results demonstrate that this selection exhibits stable genetic traits and excellent cultivation performance. Following the evaluation in 2024, accession 08-22-67-5 was approved by the Approval Committee for Improved Varieties of Forest Trees of Hebei Province and officially named ‘Jimei’.

Description

Trees. Trees of ‘Jimei’ exhibit a compact structure, with a semispreading posture and a small canopy (Fig. 2A). The trunk and perennial branches are gray-brown with smooth bark. The annual branches are also gray-brown, possessing small, dense lenticels and internodes of length 3.12 cm. The germination buds ratio is moderate (52.7%), and the trees exhibit strong branching ability. Fruiting on the trees begins early, usually within 2–3 years of planting under normal management conditions. Fruiting branches are generally long, with the percentages of long, medium, and short fruiting branches being 69.04%, 11.52%, and 19.44%, respectively. Under natural pollination conditions, the trees produce 4.33 fruits per inflorescence, on average, indicating good yield potential.

Leaves. The leaves of ‘Jimei’ are elliptic and dark green. On average, the leaves are 10.0 cm long and 5.3 cm wide. Vegetative buds are located slightly outward in relation to the shoot. Leaves exhibit a fastigiate growth

pattern, with a wedge-shaped base, a sharp-acuate apex, and a serrated margin with seta. In Shijiazhuang, sprouting of leaf buds in ‘Jimei’ begins at the end of March, with the growth of new shoots starting in mid-April and ceasing in mid- to late June. The leaf fall period is early November.

Flowers. ‘Jimei’ flowers have crowns of diameter 2.3 cm and white-colored corolla. Most flowers have five to seven petals, with light pink buds and purple-red anthers. Each inflorescence contains five to eight flowers, and an average of 4.33 fruits set per inflorescence under natural pollination conditions. In Shijiazhuang, the floral buds bloom in mid-March, with the full bloom occurring in early April, and flower fall starting from mid-April. The flowering period spans 7 to 9 d.

Fruits. ‘Jimei’ fruits are oval, weighing 259.9 ± 7.3 g on average and a maximum of 378 g, with the fruit shape index being 1.04. At maturity, the ground color of the skin of the fruits is greenish-yellow, and the fruits have a blush of 25% to 45% on the sun-exposed side (Fig. 2B). The skin is thin, with abundant wax and obscure dots. The flesh is white, fine-textured, crisp, and juicy, with a sweet and sour taste and a slight hint rose fragrance. The fruits have a small core, with a few stone cells and residuals. The soluble solid content, soluble sugar content, titratable acid content, and vitamin C content of the fruits are $13.1 \pm 0.23\%$, $9.26 \pm 0.18\%$, $0.11 \pm 0\%$, and 4.42 ± 0.16 mg/100 g FW, respectively. Flesh firmness is 6.32 ± 0.11 kgfcm⁻² (Supplemental Table 1). In Shijiazhuang, fruit maturation in early September, spanning a period of 150 d.

Cultivation

Environmental conditions prevailing in Hebei Province and regions with similar climate are conducive to ‘Jimei’ cultivation. ‘Jimei’ can be planted in plains, mountainous areas, and hilly regions with good drainage. It has shown normal growth and fruiting when introduced in suitable pear cultivation areas such as north China, northwestern China, and the old Yellow River course. The recommended plant spacing is 0.75 to 2.5 m \times 3.0 to 4.0 m. For pollination, ‘Jimei’ requires compatible trees such as ‘Xuehua’, ‘Huangguan’, and ‘Korla’. The results demonstrated fruit set rates exceeding 70% across all pollination combinations (Table 1). The trees can be established in a columnar or spindle growth habit. To improve fruit quality, flower and fruit thinning should be carried out in a timely manner, retaining only one fruit per inflorescence, and the ideal spatial distance between young fruits is ~ 25 cm. Research findings indicate that the bagging effect of double-layer bags and plastic film bags is not ideal, primarily manifested as reduced single fruit weight; in contrast, fruits bagged with single-layer white-wax paper bags show no significant difference from nonbagged fruits in terms of peel color, smoothness, soluble solids content, and single fruit weight. To ensure improved internal quality of fruits to meet the growing market demand, packaging

the fruits in single-layered, white-wax paper bags is recommended (Supplemental Table 2). Moreover, applying base fertilizer in autumn and high-quality organic fertilizer combined with an appropriate amount of compound fertilizer after fruit harvest are the recommended fertilization regimens. During the growing season, quick-acting fertilizers should be applied in varying amounts depending on the growth stage to fulfill the growth requirements for trees and fruits. For trees in the full fruit-bearing period, quick-acting nitrogen fertilizer should be applied after flowering. Measures should be taken to ensure adequate supply of water in the early stages, while controlling its supply in the later stages. ‘Jimei’ exhibits relatively strong stress resistance, demonstrating high resistance to scab disease. Years of field observations have found no occurrences of damage from black spot disease or anthracnose. The main concerns related to pests and diseases is ring rot, fruit moths, pear psyllids, among others. We should adhere to the principle of prevention first and comprehensive control, while selecting efficient, low-toxicity, and low-residue pesticides.

Availability

‘Jimei’ has been approved by the Approval Committee for Improved Varieties of Forest Tree of Hebei Province (Hebei S-SV-PB-035-2024) (Supplemental Fig. 1). Limited quantities of bud budwood are available upon request for trial, research, and commercial propagation.

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Table 1. Pollination trial results.

Maternal parent	Paternal parent	Fruit set rate (%)
Jimei	Xuehua	71.78 \pm 1.98 b
	Huangguan	74.55 \pm 0.95 b
	Korla	89.81 \pm 1.31 a