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‘Ning Xiang 3’: A New Fragrant Cultivar in the Genus *Lagerstroemia*

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Crape myrtles (*Lagerstroemia*) are important ornamental woody plants, valued for their diverse tree habits, long-lasting midsummer blooms, and rich flower colors (Roy et al., 2015; Ye et al., 2019). Crape myrtles mainly occur naturally in eastern and southeastern Asia, and southern and northern Australia, with ∼55 species and at least 500 named cultivars (Cai et al., 2011; Qin et al., 2021). However, only a limited number of these taxa, such as *L. stenopetala*, *L. caudata*, *L.* ‘Xiang Xue Yun’, and *L.* ‘Bai Mi Xiang’, are recognized to have distinct fragrances (Zhang et al., 2007). Most of the *Lagerstroemia* have no odor, which negatively affects their economic value. Since the 1960s, large-scale crape myrtle breeding has been conducted in China and abroad, mainly focusing on disease resistance, tree habits, flower and leaf color, and flower shape (Hu et al., 2019; Li et al., 2015; Toki and Katsuyama, 2008; Wang et al., 2013), yet little efforts have been made to improve floral scent.

Floral scent plays a vital role in communication between plants and insects (Vega et al., 2014; Xiao et al., 2020), and affects ornamental plants and cut flowers marketability (Chandler and Brugliera, 2011; In et al., 2021; Sexton et al., 2005). Therefore, it is of great importance to breed new *Lagerstroemia* cultivars with aromatic odors. ‘Ning Xiang 3’ was selected and released by the Institute of Botany, Jiangsu Province and Chinese Academy of Sciences (Nanjing Botanical Garden Mem. Sun Yat-Sen). This cultivar has gained much attention for its fragrant flowers, enriching *Lagerstroemia* aromatic germplasm resources, and significantly improving their ornamental values. To date, no serious pests or diseases have been observed to affect this cultivar. The cultivar is suitable for street trees, courtyard beautification, public gardens, and other theme attractions construction.

Origin

In Summer 2014, *L. fauriei* (♀) was cross-bred with *L.* ‘Tuscarora’ (♂) at the Nanjing Botanical Garden, Jiangsu Province, China (32°03'N, 118°49'E). More than 500 cross-pollinated seeds were then collected in November for dry storage. In Spring 2015, seeds were sown in a seedbed (width: 1.5 m; length: 50 m; depth: 8.0–10.0 cm). After germination, seedlings were transplanted into the field with a 20.0 × 20.0 cm spacing. In Spring 2018, an individual plant with fragrant and red-purple (RHS 69B) (Royal Horticultural Society, 2015) flowers was observed and selected for further evaluation, which was named ‘Ning Xiang 3’. After 2 years of softwood/hardwood cutting (2018–19) and 5 years of successive observations (2018–22), more than 100 young cuttings produced the exact morphological characteristics of the mother (donor) plant, confirming their phenotypic stability. The seedlings grew vigorously and exhibited good adaptation to high (37 to 40 °C) and cold temperature (–5 to 0 °C) in Jiangsu (32°03'N, 118°49'E, U.S. Department of Agriculture plant hardiness zones ≈9b/10a); few incidents of brown spot, sooty blotch, and aphids were observed. This cultivar was authorized by the Forest Variety Certification Committee of China in 2022.

Description

Among existing *Lagerstroemia* germplasm, ‘Ning Xiang 3’ most resembles ‘Fen Furong’, which was also released by Nanjing Botanical Garden in 2022. Unlike ‘Fen Furong’, the flowers of ‘Ning Xiang 3’ exude a charming fragrance. Additionally, the two cultivars have a distinctive petal color: red-purple (RHS 70D) and red-purple (RHS 69B) for ‘Fen Furong’ and ‘Ning Xiang 3’, respectively (Fig. 1). The specific characteristics of ‘Ning Xiang 3’ are as follows (Table 1).

Tree. The tree is arbor-like and has a brown trunk grown with reddish brown branches. The canopy is semiupright, and the tree can reach up to 3.0 m in height with a 1.5-m spread at 4 years of age (Supplemental Fig. 1A).

Twigs and foliage. The twigs are red (RHS 46D) and four-edged covered with short wings and low-density pubescence. The leaves are papery and elliptic (7.0–8.0 cm in length × 5.0–5.5 cm in width) with short petioles (0.2–0.3 cm). The color of new leaves is red (RHS 179A) and of mature leaves is green (RHS NN137A) (Supplemental Fig. 1B), with low-density pubescence is found on the leaf subsurface.

Flower. The flowering time (10% open flowers) of ‘Ning Xiang 3’ is intermediate (approximately mid-July in Jiangsu, China) and can last for ≈3 months (July to September). The cultivar has green (RHS 139D) and cylindrical buds (length: 0.8–0.9 cm, width: 0.8–0.9 cm) grown with weak raised suture and apical protuberance (Supplemental Fig. 1C).

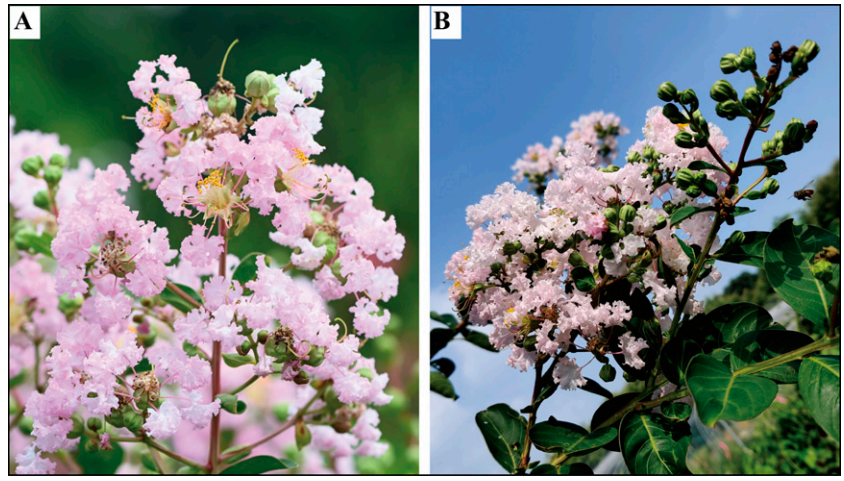

Fig. 1. *Lagerstroemia indica* ‘Fen Furong’ (**A**) and *Lagerstroemia fauriei* ‘Ning Xiang 3’ (**B**) floral attributes comparison. The pictures were taken in Nanjing Botanical Garden in Jul 2022.

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Table 1. *Lagerstroemia fauriei* 'Ning Xiang 3' phenotypic characteristics.

No.	Phenotypic traits	Description	No.	Phenotypic traits	Description	No.	Phenotypic traits	Description
1	Plant growth habit	Semi-upright	16	Leaf glossiness	Weak	31	Flower with fragrance	Yes
2	Plant life type	Arbor	17	Petiole length (cm)	0.26 ± 0.06	32	Flower with petaloid stamen	No
3	Trunk color	Brown	18	Sepal length (cm)	0.56 ± 0.08	33	Petal surface wrinkled	Yes
4	Four-edged twigs	Yes	19	Sepal edge	Micro-edged	34	Claw length (cm)	1.01 ± 0.06
5	Twig pubescence density	Low	20	Densely hairy sepals	No	35	Claw color	Red-purple (RHS 58B)
6	Wing length	Short	21	Bud Length (cm)	0.82 ± 0.07	36	Vertical diameter of fruits (cm)	1.02 ± 0.36
7	Leaf texture	Papery	22	Bud width (cm)	0.85 ± 0.03	37	Horizontal diameter of fruits (cm)	1.04 ± 0.45
8	Leaf length (cm)	7.52 ± 1.14	23	Bud shape	Cylindrical	38	Fruit shape	Circular
9	Leaf width (cm)	5.34 ± 0.96	24	Bud color	Green (RHS 139D)	39	Color of young fruits	Green (RHS 141C)
10	Leaf shape	Elliptic	25	Bud with raised suture	Weak	40	Color of mature fruits	Brown (RHS 200A)
11	Color of new leaves	Red (RHS 179A)	26	Bud with appendage	No	41	Fruit with depressed base	No
12	Color of mature leaves	Green (RHS NN137A)	27	Bud with apical protuberance	Yes	42	Fruit with depressed apex	No
13	Leaf surface covered with golden spots	No	28	Flower diameter (cm)	4.53 ± 1.26	43	Early flowering stage	Early July
14	Undulated leaf margins	No	29	Flower with multiple colors	No	44	Flowering phase	July to September
15	Leaf pubescence density in the subsurface	Low	30	Flower color	Red-purple (RHS 69B)	45	Defoliating period	November

The inflorescence is conical, consisting of some red-purple (RHS 69B) flowers (4.0–4.5 cm) that are fragrant with wrinkled petals and numerous stamens (25–30) (Supplemental Fig. 1D). Connected with petals, the slender claws (0.9–1.2 cm) are grown and having red-purple color (RHS 58B).

Fruit. 'Ning Xiang 3' young fruits are green (RHS 141C), circular and small (vertical diameter: 1.0–1.1 cm and horizontal diameter: 0.9–1.0 cm). The fruits turn brown (RHS 200A) when mature or dry (Supplemental Fig. 1E).

Cultivation

'Ning Xiang 3' is regenerated mainly by softwood cutting (July to August in Jiangsu) or hardwood cutting (late March to early April before sprouting). For softwood cutting, semilignified branches should be selected and then cut into short cuttings (≈10 cm in length) with two to three half leaves kept at the top, whereas for hardwood cutting, thick annual branches should be selected and then cut into cuttings of 10 to 15 cm in length, with cutting depth of ≈8 to 13 cm. After that, the cuttings should be thoroughly irrigated. To retain moisture and heat, the seedbed should be covered with a layer of plastic film, and a shading net is built for shading. Generally, the cuttings can root in ≈15 to 20 d and reach up to or more than 70 cm in length in the same year after removing the film, keeping the shading net, and watering it properly during the growth period.

Brown spot, sooty blotch, and aphids damage to young tips and leaves are not common. To prevent brown spot formation, leaf surfaces can be sprayed with 50% carbendazim wettable powder at 500× dilution. To prevent sooty blotches, leaves surface can be sprayed with 40% omethoate at 1000× dilution. For aphids prevention, surface leaves spraying with 50% pirimicarb at 3000× dilution is recommended.

Availability

'Ning Xiang 3' plant material and research information can be obtained from Dr. Hong, Institute of Botany, Jiangsu Province and the Chinese Academy of Sciences (Nanjing Botanical Garden Mem. Sun Yat-Sen).

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Supplemental Fig. 1. ‘Ning Xiang 3’ is regenerated mainly by *Lagerstroemia fauriei* ‘Ning Xiang 3’ phenotypic characteristics (**A**–**E**). (**A**) Semiupright growth habit. (**B**) Red new leaves and twigs. (**C**) Green (RHS 139D) and cylindrical buds. (**D**) Conical inflorescence and red-purple (RHS 69B) flowers in clusters. (**E**) Young and mature fruits. The pictures were taken in Nanjing Botanical Garden in May, Jul, and Nov 2022.