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Palynology of the genus *Lagerstroemia* (Lythraceae) in Thailand

SURAPON SAENSOUK[1], PIYAPORN SAENSOUK[2,♥]

[1]Diversity of Family Zingiberaceae and Vascular Plant for Its Applications Research Cluster, Biodiversity Program, Walairukhavej Botanical Research Institute, Mahasarakham University. Khamriang, Kantarawichai 44150, Maha Sarakham, Thailand
[2]Diversity of Family Zingiberaceae and Vascular Plant for Its Applications Research Cluster, Department of Biology, Faculty of Science, Mahasarakham University. Khamriang, Kantarawichai 44150, Maha Sarakham, Thailand. Tel.: +66-437-54247, ♥email: pcornukaempferia@yahoo.com

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Abstract. *Saensouk S, Saensouk P. 2023. Palynology of the genus* Lagerstroemia *(Lythraceae) in Thailand. Biodiversitas 24: 3222-3229.* Pollen morphology of *Lagerstroemia* (Lythraceae) from Thailand was poorly reported. This study aimed to study the pollen morphology of 17 species of the genus *Lagerstroemia* in Thailand by applying acetolysis under a light microscope and scanning electron microscope. Pollen of the genus *Lagerstroemia* in Thailand was described with the distinctive features of the pollen morphology, i.e., size, shape, exine sculpturing, the character of the aperture, polar, and symmetry. All pollen grains were monad with and polar view length of 43.83±2.84 µm, and equatorial view length of 26.33±2.05 µm. The shape of pollens was prolate spheroidal, subspheroidal, spheroidal, and subprolate. The pollens in this study were recognized as bilateral, radial, and sub-radial symmetries. All pollen grains were apolar and polar. The aperture of all pollen species in this study was reported with tricolpate and tricolporate. Exine sculpturing was exine sculpturing and scabrate-granulate. The pollen morphology of this study can be divided into groups based on shape, exine sculpturing, the character of the aperture, polarity, and symmetry. Pollen sizes of all species were medium size. The pollen of all species from Thailand are reported as *Lagerstroemia indica*-type. The pollen morphology in this study cannot be used for species identification. Pollen of 16 *Lagerstroemia* species were studied here for the first time.

Keywords: *Lagerstroemia*, Lythraceae, palynology, pollen, Thailand

INTRODUCTION

The family Lythraceae is classified as belonging to the order Myrtales, clade Rosids of Dicotyledoneae (The Angiosperm Phylogeny Group et al. 2016). The family has reported worldwide about 552 species, 28 genera, and 5 subfamilies (Graham and Cavalcanti 2013; Graham and Graham 2014; POWO 2022). De Wilde and Duyfjes (2013) reported the family Lythraceae in Thailand consisted of 11 genera, including 3 introduced genera (*Cuphea, Lawsonia*, and *Punica*) and 38 species (two endemics in *Lagerstroemia*). This genus *Lagerstroemia* is of great economic importance, especially in India and Malaysia, where it is highly exploited. The genus *Lagerstroemia* or crape myrtle belonging to the subfamily Lythroideae includes 48 accepted species distributed in tropical and subtropical Asia and north Australia (POWO 2022). The member of this genus were found to be trees and shrubs in deciduous forest and evergreen forest (de Wilde and Duyfjes 2013; POWO 2022).

Some species of *Lagerstroemia* have large scaly when peeling the bark (de Wilde and Duyfjes 2013). Six species of which were presented in the IUCN red list of threatened species (IUCN 2023). This genus reported about 18 species in Thailand (de Wilde and Duyfjes 2013; POWO 2022). All species in this genus were fine solid wood and often hollow in the center. It is used for bearing structures, columns, floorboards, and agricultural implements, and is popularly planted as an ornamental plant, such as *Lagerstroemia floribunda* Jack, *Lagerstroemia indica* L., *Lagerstroemia loudonii* Teijsm. & Binn., *Lagerstroemia speciosa* (L.) Pers., and *Lagerstroemia marcrocarpa* Kurz (de Wilde and Duyfjes 2013; Phatlamphu et al. 2021; POWO 2022). Moreover, some species have strong wood with naturally durable, such as *Lagerstroemia calyculata* Kurz, *L. speciosa*, and *Lagerstroemia tomentosa* C.Presl (Junsongduang et al. 2020; Numpulsuksant et al. 2021; Phatlamphu et al. 2021).

Plant morphology can be used for plant classification and plant identification in general. It was also found that other techniques in biology, such as plant anatomy, chromosome study, molecular techniques, and pollen morphology can be also used to support plant identification (Doaigey et al. 2018; Xiong et al. 2019; Saensouk and Saensouk 2020, 2021a, 2021b, 2022; Saensouk et al. 2021). Moreover, the pollen morphological characteristics based on their exine sculpturing, pattern, aperture, pore characters, size, or shape) were valuable data to complement or even define genus and species taxonomically (Leython and Jáuregui 2008; Souza et al. 2016; Xu et al. 2016; Kajornjit et al. 2018; Rakarcha et al. 2018; Moreira et al. 2019; Junsongduang et al. 2020; Lechowicz et al. 2020; Saensouk and Saensouk 2020, 2021b, 2022).

Several studies on the pollen morphology of the family Lythraceae have been reported worldwide. Erdtman (1966) studied pollen morphology of 21 genera and 23 species of the family Lythraceae and found oblate-subprolate, reticulate pattern sculpturing with multiple openings and tricolporate. Later, Perveen and Qaiser (2005) studied pollen morphology under light and scanning electron

microscopy of 7 species to classify 5 genera of the family Lythraceae in Pakistan. Facco et al. (2021) studied a new section of *Trispermum* Koehne, genus *Cuphea* P. Browne (Lythraceae) from Brazil, based on pollen morphology. Whereas, the pollen morphology of the genus *Lagerstroemia* was poorly known. According to Perveen and Qaiser (2005), the pollen morphology of *L. indica* was prolate, rugulate to foveolate or densely regulate. Halbritter et al. (2021) also described pollen morphology of *L. indica* as monad, medium-sized (26-50 µm), colporate, isopolar, prolate-shaped, and tricolporate.

Prolate, rugulate to foveolate or densely regulate according to de Wilde and Duyfjes (2013), identification of the genus *Lagerstroemia* (Lythraceae) was commonly conducted based on plant morphology, such as the number of leaves and leaf blades, leaf size, size and shape of the calyx, flower color, flower structures and characters of the fruit and seed. Information related to pollen morphology for identifying some species of *Lagerestroemia* is the focus of this current study. Therefore, this study aimed to study the pollen morphology of the genus *Lagerstroemia* in Thailand.

MATERIALS AND METHODS

Plant materials

Seventeen species of the genus *Lagerstroemia* from Thailand were studied between 2014 and 2021. The list of voucher specimens in the genus *Lagerstroemia* was deposited in the Mahasarakham University Herbarium, Thailand (Table 1).

Plant diversity, voucher specimens, species locality, and coordinate altitude were taken from the field. The specimens in this study were compared with herbarium specimens that were kept at overseas herbaria, i.e., BK: Bangkok Herbarium, Department of Agriculture, Thailand; BKF: The Forest Herbarium, National Parks, Wildlife and Plant Conservation Department, Thailand; CMU: Faculty of Pharmacy, Chiang Mai University Herbarium; CMUB: Department of Biology, Faculty of Science, Chiang Mai University Herbarium; KKU: Khon Kaen University Herbarium Thailand; PSU: Prince of Songkla University; QBG: Queen Sirikit Botanic Garden Herbarium, Thailand, available taxonomic literature or digital images available online.

Palynology analysis procedures

Light microscopy

The pollen grains of all specimens were studied from material fixed in 70% ethanol. All samples were analyzed using standard methods (acetolysis) described by Erdtman (1966). The pollen morphological characteristics (size, shape) were observed by light microscopy. Furthermore, the pollen grains were measured for 30 grains from each individual.

Scanning electron microscopy

The pollen material was placed on specific metal supports which covered with double-sided carbon tape. After that, the pollen grains were dried, and coated with a sputter coater. Then, the pollen morphological characteristics, such as size, shape, exine sculpturing, the characteristic of the aperture, polarity, and symmetry were parameters observed with a scanning electron microscope, JEOL: JSM 6460 LV.

Table 1. The 17 species of the genus *Lagerstroemia* from Thailand studied

Species	Voucher	Species locality (District, Province)	Altitude (m asl.)	Coordinate
Lagerstroemia calyculata Kurz	P. Saensouk 01/15	Pak Chong, Nakhon Ratchasima	737	14°24'42"N,101°25'18"E
Lagerstroemia cochinchinensis Laness.	P. Saensouk 02/15	Na Chaluai, Ubonratchathani	450	14°32'0"N, 105°23'9"E
Lagerstroemia duperreana Pierre ex Gagnep.	P. Saensouk 03/15	Na Chaluai, Ubonratchathani	450	14°32'0"N, 105°23'9"E
Lagerstroemia floribunda Jack	P. Saensouk 04/15	Phanom, Surattani	400	8°51'18"N, 98°48'48"E
Lagerstroemia huamotensis W.J.de Wilde & Duyfjes	P. Saensouk 05/15	Umphang, Tak	700	16°1'0"N, 98°51'46"E
Lagerstroemia indica L.	P. Saensouk 06/15	Don Mueang, Bangkok	6	13°54'49"N, 100°35'23"E
Lagerstroemia loudonii Teijsm. & Binn.	P. Saensouk 07/15	Kaeng Krachan, Phetchaburi	600	12°54'27"N, 99°38'53"E
Lagerstroemia macrocarpa Kurz	P. Saensouk 08/15	Fang, Chiang Mai	500	19°55'8"N, 99°12'49"E
Lagerstroemia noei Craib	P. Saensouk 09/15	Khong Chiam,Ubonratchathani	300	15°19'8"N, 105°29'44"E
Lagerstroemia ovalifolia Teijsm. & Binn.	P. Saensouk 10/15	Ban Ta Khun, Surattani	400	8°54'18"N, 98°53'6"E
Lagerstroemia speciosa (L.) Pers.	P. Saensouk 11/15	Mae Rim, Chiang Mai	500	18°54'50"N, 98°56'42"E
Lagerstroemia spireana Gagnep.	P. Saensouk 12/15	Nam Som, Udorn Thani	400	17°46'14"N, 102°11'23"E
Lagerstroemia subangulata (Craib) Furtado & Montien	P. Saensouk 13/15	Pang Mapha, Mae Hong Son	600	19°31'21"N, 98°14'46"E
Lagerstroemia tomentosa C.Presl	P. Saensouk 14/15	Wiang Pa Pao, Chiang Rai	500	19°50'54" N, 100°9'12"E
Lagerstroemia undulata Koehne	P. Saensouk 15/15	Sirindhorn, Ubonratchathani	350	15°12'6"N, 105°23'54"E
Lagerstroemia venusta Wall. ex C.B.Clarke	P. Saensouk 16/15	Samoeng, Chiang Mai	600	18°50'53"N, 98°43'57"E
Lagerstroemia villosa Wall.ex Kurz	P. Saensouk 17/15	Ban Phaeng, Nakhon Phanom	300	17°58'5"N, 104°12'57"E

Data analysis

The results of light microscopy and SEM observations were analyzed descriptively. Palynological terminology was followed by Erdtman (1966), Punt et al. (1994), Souza et al. (2016), Xu et al. (2016), and Hanchana et al. (2023).

RESULTS AND DISCUSSIONS

General description of pollen morphology

Pollen grains of 17 species of the genus *Lagerstroemia* in Thailand were monad, bilateral, radial, sub radial symmetry, spheroidal, prolate spheroidal, sub spheroidal, sub prolate in shape with polar view length of 43.83±2.84 µm, equatorial view length of 26.33±2.05 µm, apolar and polar, tricolporate and tricolpate apertures, and exine sculpturing scabrate-granulate.

The pollen morphology of this study differs from Erdtman (1966) who studied the pollen morphology of 21 genera and 23 species of the family Lythraceae worldwide which found pollen present oblate-subprolate, reticulate pattern sculpturing with multiple openings and tricolporate. While, this study was consistent with Perveen and Qaiser (2005) and Halbritter et al. (2021) who studied the pollen morphology of *L. indica*. Moreover, Perveen and Qaiser (2005) proposed two pollen type - *Lagerstroemia indica*-type (pollen grains tricolporate) and *Ammannia baccifera* L.-type (tectum grains heterocolpate).

Pollen description of each species

The pollen of 17 species of *Lagerstroemia* from Thailand based on light and scanning electron microscopy were described below (Figures 1, 2).

Lagerstroemia calyculata Kurz (Table 2; Figures 1A, 2A1, 2A2).

Pollen grains were monad, radial-bilateral symmetry, subspheroidal in shape with polar view length of 43.83±2.84 µm, equatorial view length of 43.92±3.26 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing scabrate-granulate.

Lagerstroemia cochinchinensis Laness. (Table 2; Figures 1B, 2B1, 2B2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 33.25±1.63 µm, equatorial view length of 32.50±1.14 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing scabrate-granulate.

Lagerstroemia duperreana Pierre ex Gagnep. (Table 2; Figures 1C, 2C1, 2C2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 33.58±1.82 µm, equatorial view length of 33.58±1.82 µm, medium size pollen, polar, tricolporate apertures, and exine sculpturing psilate-scabrate.

Lagerstroemia floribunda Jack (Table 2; Figures 1D, 2D1, 2D2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 29.67±1.09 µm, equatorial view length of 26.75±2.19 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing psilate.

Lagerstroemia huamotensis W.J.de Wilde & Duyfjes (Table 2; Figures 1E, 2E1, 2E2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 29.33±1.30 µm, equatorial view length of 26.83±2.07 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing psilate-scabrate.

Lagerstroemia indica L. (Table 2; Figures 1F, 2F1, 2F2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 36.17±2.34 µm, equatorial view length of 35.17±1.96 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing foveolate.

Lagerstroemia loudonii Teijsm. & Binn. (Table 2; Figures 1G, 2G1, 2G2).

Pollen grains were monad, radial-bilateral symmetry, sub spheroidal in shape with polar view length of 27.08±1.33 µm, equatorial view length of 28.67±1.27 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing scabrate-granulate.

Lagerstroemia marcrocarpa Kurz (Table 2; Figures 1H, 2H1, 2H2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 28.08±1.26 µm, equatorial view length of 27.50±1.14 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing scabrate-granulate.

Lagerstroemia noei Craib (Table 2; Figures 1I, 1J, 2I1, 2I2, 2J1, 2J2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 37.00±3.24 µm, equatorial view length of 37.08±3.01 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing foveolate.

Lagerstroemia ovalifolia Teijsm. & Binn. (Table 2; Figures 1K, 2K1, 2K2).

Pollen grains were monad, radial symmetry, spheroidal in shape with a diameter of 27.50±1.47 µm, medium size pollen, apolar, tricolpate apertures, and exine sculpturing psilate-scabrate.

Lagerstroemia speciosa (L.) Pers. (Table 2; Figures 1L, 2L1, 2L2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 34.42±2.04 µm, equatorial view length of 34.42±2.04 µm, medium size

pollen, polar, tricolpate apertures, and exine sculpturing scabrate-granulate.

Lagerstroemia spireana Gagnep. (Table 2; Figures 1M, 2M1, 2M2).

Pollen grains were monad, bilateral symmetry, sub prolate in shape with polar view length of 36.17±2.05 µm, equatorial view length of 31.08±2.04 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing scabrate.

Lagerstroemia subangulata (Craib) Furtado & Montien (Table 2; Figures 1N, 2N1, 2N2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 36.33±2.84 µm, equatorial view length of 34.00±2.42 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing scabrate-granulate.

Lagerstroemia tomentosa C. Presl (Table 2; Figures 1O, 2O1, 2O2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 28.25±1.49 µm, equatorial view length of 27.58±1.54 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing fossulate.

Lagerstroemia undulata Koehne (Table 2; Figures 1P, 2P1, 2P22).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 29.17±1.52 µm, equatorial view length of 26.33±2.05 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing psilate-scabrate.

Lagerstroemia venusta Wall**.** ex C.B. Clarke (Table 2; Figures 1Q, 2Q1, 2Q2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 32.67±1.60 µm, equatorial view length of 31.67±1.52 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing fossulate.

Lagerstroemia villosa Wall**.** ex Kurz. (Table 2; Figures 1R, 2R1, 2R2).

Pollen grains were monad, bilateral symmetry, prolate spheroidal in shape with polar view length of 30.50±1.66 µm, equatorial view length of 29.08±2.13 µm, medium size pollen, polar, tricolpate apertures, and exine sculpturing scabrate-granulate.

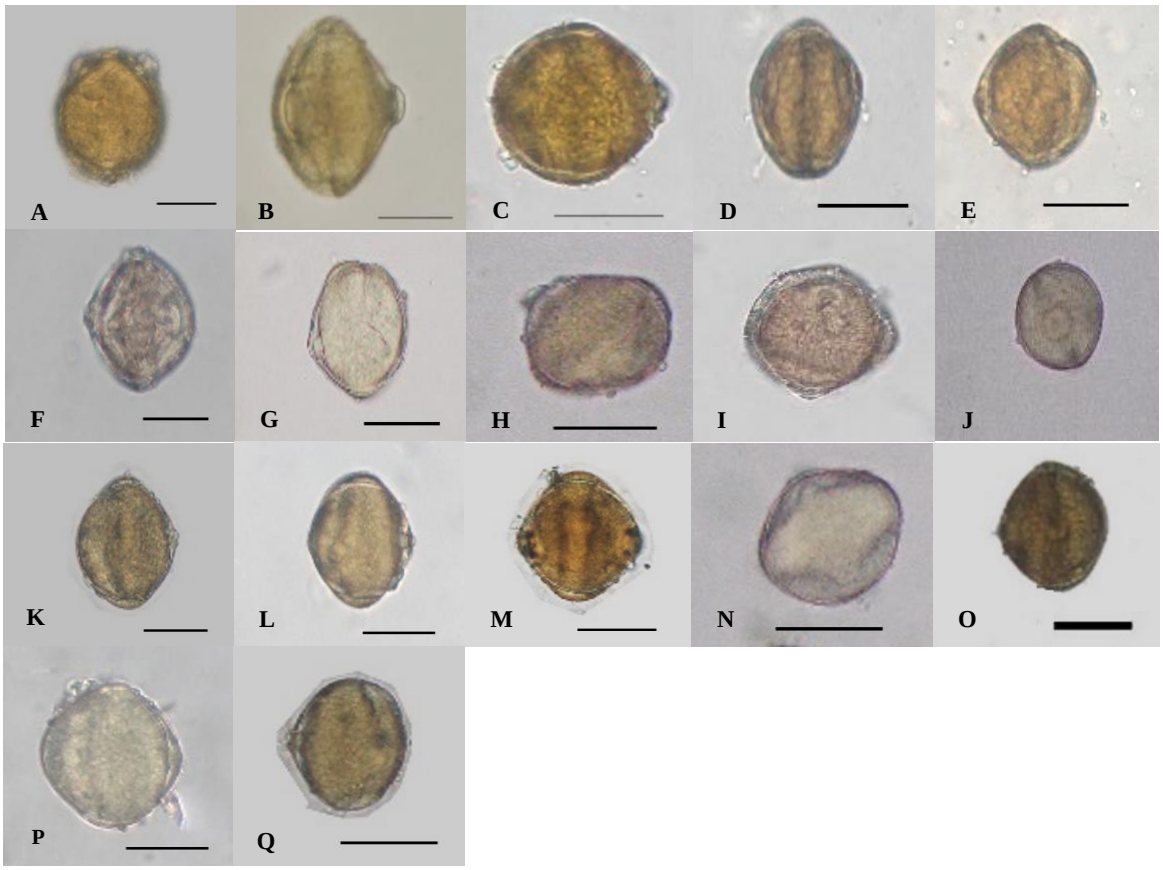

Figure 1. Light micrographs of pollen grains of: A. *Lagerstroemia calyculata*, B. *L. cochinchinensis*, C. *L. duperreana*, D. *L. floribunda*, E. *L. huamotensis*, F. *L. indica*, G. *L. loudonii*, H. *L. marcrocarpa*, I. *L. noei*, J. *L. ovalifolia*, K. *L. speciose*, L. *L. spireana*, M. *L. subangulata*, N. *L. tomentosa*, O. *L. undulata*, P. *L. venusta*, Q. *L. villosa*. (Scale bars: 20 µm)

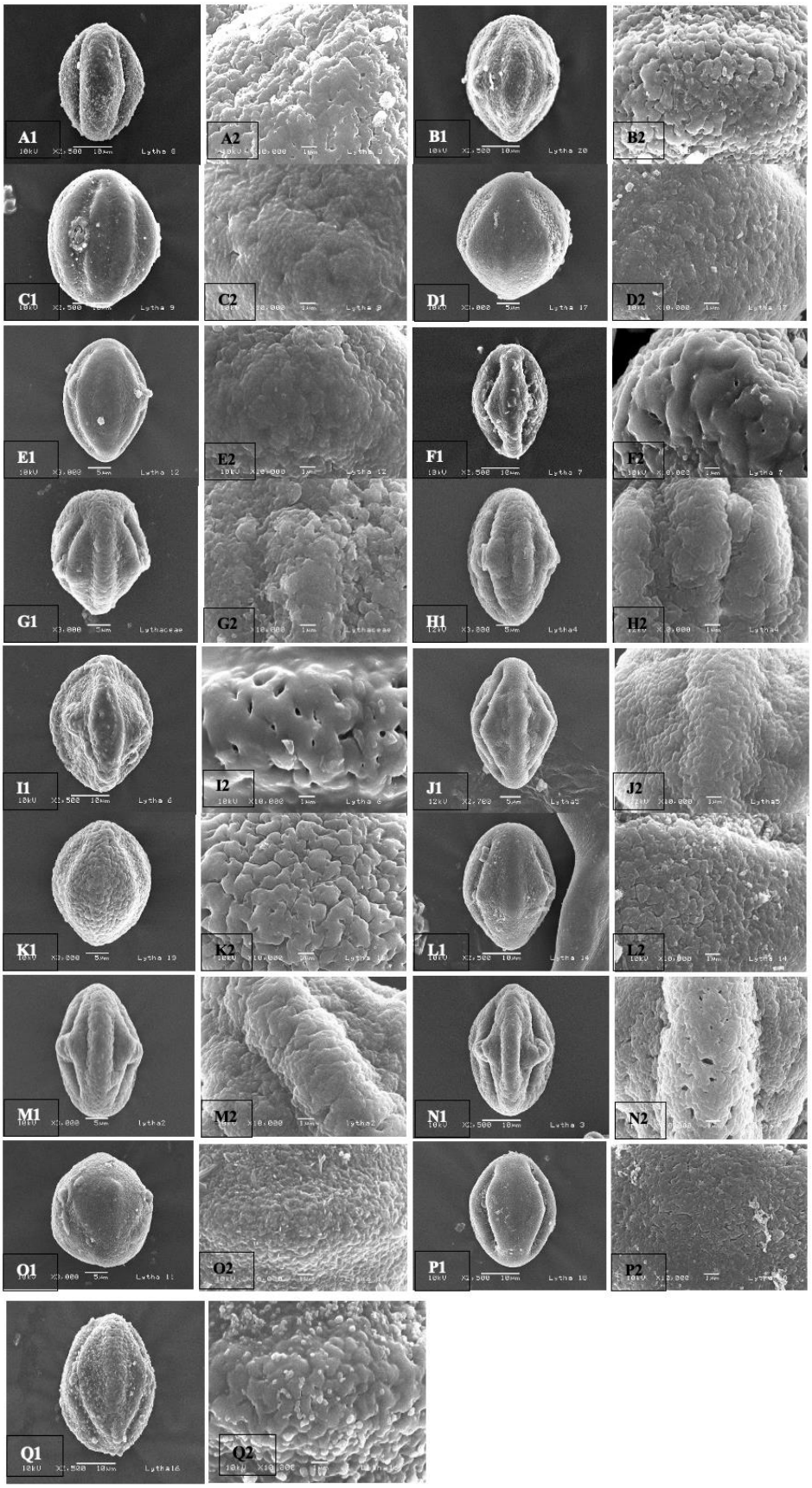

Figure 2. SEM micrographs of pollen grains. A1-A2: *Lagerstroemia calyculata*, B1-B2: *L. cochinchinensis*, C1-C2: *L. duperreana*, D1-D2: *L. floribunda*, E1-E2: *L. huamotensis*, F1-F2: *L. indica*, G1-G2: *L. loudonii*, H1-H2: *L. marcrocarpa*, I1-I2: *L. noei*, J1-J2: *L. ovalifolia*, K1-K2: *L. speciose*, L1-L2: *L. spireana*, M1-M2: *L. subangulata*, N1-N2: *L. tomentosa*, O1-O2: *L. undulata*, P1-P2: *L. venusta*, Q1-Q2: *L. villosa*. Note: 1: pollen grain, 2: exine sculpturing

Table 2. Pollen morphology data of 17 species of the genus *Lagerstroemia* from Thailand

Species	Symmetry	Polar	Aperture character	Shape	Pollen size (µm) P/E	Type of size pollen	Exine sculpture	Note
Lagerstroemia calyculata Kurz	Radial- bilateral	Polar	Tricolpate	Subspheroidal	43.83±2.84/43.92±3.26	Medium	Scabrate-granulate	The first reported
Lagerstroemia cochinchinensis Laness.	Bilateral	Polar	Tricolpate	Prolate spheroidal	33.25±1.63/32.50±1.14	Medium	Scabrate-granulate	The first reported
Lagerstroemia duperreana Pierre ex Gagnep.	Bilateral	Polar	Tricolporate	Prolate spheroidal	33.58±1.82/33.58±1.82	Medium	Psilate-scabrate	The first reported
Lagerstroemia floribunda Jack	Bilateral	Polar	Tricolpate	Prolate spheroidal	29.67±1.09/26.75±2.19	Medium	Psilate	The first reported
Lagerstroemia huamotensis W.J.de Wilde & Duyfjes	Bilateral	Polar	Tricolpate	Prolate spheroidal	29.33±1.30/26.83±2.07	Medium	Psilate-scabrate	The first reported
Lagerstroemia indica L.	Bilateral	Polar	Tricolpate	Prolate spheroidal	36.17±2.34/35.17±1.96	Medium	Foveolate	Perveen and qaiser (2005); halbritter et al. (2021)
Lagerstroemia loudonii Teijsm. & Binn.	Radial- bilat;.eral	Polar	Tricolpate	Subspheroidal	27.08±1.33/28.67±1.27	Medium	Scabrate-granulate	The first reported
Lagerstroemia marcrocarpa Kurz	Bilateral	Polar	Tricolpate	Prolate spheroidal	28.08±1.26/27.50±1.14	Medium	Scabrate-granulate	The first reported
Lagerstroemia noei Craib	Bilateral	Polar	Tricolpate	Prolate spheroidal	37.00±3.24/37.08±3.01	Medium	Foveolate	The first reported
Lagerstroemia ovalifolia Teijsm. & Binn.	Radial	Apolar	Tricolpate	Spheroidal	27.50±1.14/27.50±1.47	Medium	Psilate-scabrate	The first reported
Lagerstroemia speciosa (L.) Pers.	Bilateral	Polar	Tricolpate	Prolate spheroidal	34.42±2.04/31.25±2.61	Medium	Scabrate-granulate	The first reported
Lagerstroemia spireana Gagnep.	Bilateral	Polar	Tricolpate	Subprolate	36.17±2.05/31.08±2.04	Medium	Scabrate	The first reported
Lagerstroemia subangulata (Craib) Furtado & Montien	Bilateral	Polar	Tricolpate	Prolate spheroidal	36.33±2.84/34.00±2.42	Medium	Scabrate-granulate	The first reported
Lagerstroemia tomentosa C.Presl	Bilateral	Polar	Tricolpate	Prolate spheroidal	28.25±1.49/27.58±1.54	Medium	Fossulate	The first reported
Lagerstroemia undulata Koehne	Bilateral	Polar	Tricolpate	Prolate spheroidal	29.17±1.52/26.33±2.05	Medium	Psilate-scabrate	The first reported
Lagerstroemia venusta Wall. ex C.B. Clarke	Bilateral	Polar	Tricolpate	Prolate spheroidal	32.67±1.60/31.67±1.52	Medium	Fossulate	The first reported
Lagerstroemia villosa Wall.Ex Kurz.	Bilateral	Polar	Tricolpate	Prolate spheroidal	30.50±1.66/29.08±2.13	Medium	Scabrate-granulate	The first reported

Note: P: polar view, E: Equatorial view, P/E: polar view/Equatorial view

The pollen morphology of all *Lagerstroemia* species studied are reported for the first time, except *L. indica* (Table 2; Figures 1, 2). Based on the pollen morphology observation, all species presented similar results with Perveen and Qaiser (2005) and Halbritter et al. (2021), but differ in shape and exine sculpturing. This pollen type of *L. villosa* is *L. indica*-type which is consistent with Perveen and Qaiser (2005).

The pollen size of all *Lagerstroemia* species in this study was presented as medium **(**Table 2; Figure 1, 2**).** Therefore, this character cannot be used for identification in this study**.** Moreover, the pollen characters of this study can be divided into several groups based on shape, exine sculpturing, the character of the aperture, polar, and symmetry. The pollen grains of all species were found to be monad and polar view length of 43.83±2.84 µm, equatorial view length of 26.33±2.05 µm in size which was consistent with previous studies by Perveen and Qaiser (2005) and Halbritter et al. (2021). The shape of pollen of the genus *Lagerstroemia* from Thailand can be divided into four groups (Table 2; Figure 2), namely prolate spheroidal-shaped group (13 species), sub-spheroidal-shaped group (2 species: *L. calyculata* and *L. loudonii*), spheroidal-shaped group (1 species; *L. ovalifolia*), and subprolate-shaped group (1 species; *L. spireana*). The exine sculpturing of pollen in the genus *Lagerstroemia* from Thailand can be divided into six groups (Table 2; Figure 2): scabrate-granulate group (7 species), psilate-scabrate group (4 species), foveolate group (2 species), fossulate group (2 species), psilate group (1 species), and scabrate group (1 species). The characteristics of the aperture of pollen in the genus *Lagerstroemia* (Lythraceae**)** from Thailand in this study can be divided into two groups (Table 2; Figure 2), the tricolpate group (16 species) and the tricolporate group (1 species). The polar pollen in the genus *Lagerstroemia* from Thailand can be divided into two groups (Table 2; Figure 2), namely the polar group (16 species) and the apolar group (1 species).

All species of *Lagerstroemia* studied had similar results with Perveen and Qaiser (2005) and Halbritter et al. (2021), but differs in shape and exine sculpturing. It might be due to environmental factors, such as microclimate of the areas, altitude, geography, etc. The symmetry of pollen in the genus *Lagerstroemia* from Thailand can be divided into three groups (Table 2; Figure 2), bilateral symmetry group (14 species), radial- bilateral symmetry group (2 species), and radial symmetry group (1 species). This pollen type of all species in this study based on aperture is reported as *Lagerstroemia indica*-type which is consistent with Perveen and Qaiser (2005). Therefore, the pollen morphology of *Lagerstroemia* in Thailand can not be used for identified species level which differs from Perveen and Qaiser (2005) who reported that the pollen morphology of the family Lythraceae is significantly helpful at generic and specific levels.

In conclusion, the pollen morphology of 17 species except *L. indica* was studied for the first time. It was found that the distinctive features of the pollen morphology of the genus *Lagerstroemia* from Thailand were size, shape, exine sculpturing, the characteristic of the aperture, polarity, and symmetry. The pollen morphology of this study can be divided into groups based on shape, exine sculpturing, the character of the aperture, polarity, and symmetry. All pollen of all species from Thailand are reported as *Lagerstroemia indica*-type. Therefore, the pollen morphological characteristics such as size, shape, exine sculpturing, the characteristic of the aperture, polarity, and symmetry cannot be used for species identification.

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