# Pollen Ultrastructure of *Kopsia pauciflora* Hook.f. var. pauciflora



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# Pollen Ultrastructure of *Kopsia pauciflora* Hook.f. var. pauciflora

**Janis Damaiyani[1*] and R. Hendrian[2]**

[1]Purwodadi Botanic Garden, Indonesian Institute of Sciences, Indonesia
[2]Cibodas Botanic Garden, Indonesian Institute of Sciences, Indonesia

*j.damaiyani@gmail.com

**Abstract.** The Pollen grains are the male reproductive units of many types of plants. They vary in shape and ornamentation. The Morphology of pollen grains can be used for distinguishing species and cultivar in tree fruit species. Pollen morphology has been effectively applied in solving several problem of taxonomy. Pollen morphology also can be applied for various area, such as evolutionary studies, allergy studies, melissopalynology, forensic science, tracing plant geography, geology, climate change studies and study of past human impact on vegetation. Pollen morphology can be used for identification species. In this study, ultrastructure of pollen morphology of *Kopsia pauciflora* Hook.f. var. Pauciflora in Purwodadi Botanic Garden, was investigated using scanning electron microscope. Several morphological parameters including symetry, shape, size, aperture, also ornamentation shape. The type of pollen grains are monads, isopolar, sized 69.40 µm - 80.08 µm x 42.71 µm - 50.72 µm, shape prolate (P/E E 1.61-1.76). Their apertures are tricolporate. Pollen infolding, interaperture area sunken. The ornamentation is perforate.

Key words: ultrastructure, pollen, *Kopsia pauciflora* Hook.f. var. pauciflora

## 1. Introductions

The male reproductive units of many types of plants are called as pollen. They vary in shape and ornamentation [2]. The Morphology of pollen can be used for distinguishing species and cultivar in tree fruit species [9]. Pollen morphology has been effectively applied in solving several problem of taxonomy. Pollen morphology also can be applied for various area, such as evolutionary studies, allergy studies, melissopalynology, forensic science, tracing plant geography, geology, climate change studies and study of past human impact on vegetation [5].

Genus Kopsia belong to tribe Vinceae, subfamilies Rauvolfioideae of Apocynaceae [6]. It includes 27 species found in tropical forest from India to Vanuatu and from Yunan to Java [8]. In the tribe Vinceae, character of the pollen grains are monads, medium-sized to large (29-95 µm, mostly subsperoidal (P/E = 0.65-1.28), 3-(or 4-) colporate. Ectoapertures usually long colpi, but sometimes short colpi (brevicolporate) or colpi fused at the poles (syncolporate). Ornamentation usually psilate to perforate, sometimes also reticulate or with verrucae that diminish towards the mesocolpium centres (*Ochrosia*). In *Catharanthus, Kopsia, Petchia, Rauvolfia* and *Visca* the mesocolpium centres are more or less depressed and have a slightly coarser ornamentation [6].

The information about morphology of Kopsia pollen very rare. Based on the literature survey, pollen grains of *Kopsia* were studied by Nilsson in 1990 for two species, *K. flavida* and *K. Fruticosa* [7]. Its 3-colporate pollen grains with homogeneous exine differ from *Ochrosia* pollen grains [8]. Study of *K. flavida* by Transmission Electrone Microscope (x 14.800) showed the exine was homogenous and intine stratified, fibrillar [7].

*Kopsia pauciflora* Hook.f. is member of genus Kopsia that have 2 varieties, var. mitrephora and var. pauciflora. No information about the pollen both of them. Based on that, pollen morphology characterization of this type is important to do to fill the information gap.

## 2. Materials and Methods

### *2.1. Plant material*

Samples in this research were pollen of *Kopsia pauciflora* Hook.f. var. pauciflora that grow at Purwodadi Botanic Garden (East Java, Indonesia). The plant collection from South East Sulawesi.


**Figure 1.** *Kopsia pauciflora* Hook.f. var. Pauciflora. (a) habitus, (b) the flower

### *2.2. Methods*

Pollen from fresh anthers were collected to identified the morphological character by Scanning Electron Microscope (SEM). For SEM, the specimens were mounted on holder by carbon tip and were coated with gold-palladium by Sputter coater for 30 min. The specimens were examined and photographed with SEM ('FEI type Inspects 25'). The terminology follows mainly Hesse *et al*. (2009) [3], Bhojwani & Bhatnagar (1999) [1], and Kapp (1969) [4].

## 3. Result and Discussions

The morphological character that were investigated included parameters of symetry, shape, size, apertures (number, position, and character of apetures), also ornamentation. They were shown in fig 2.

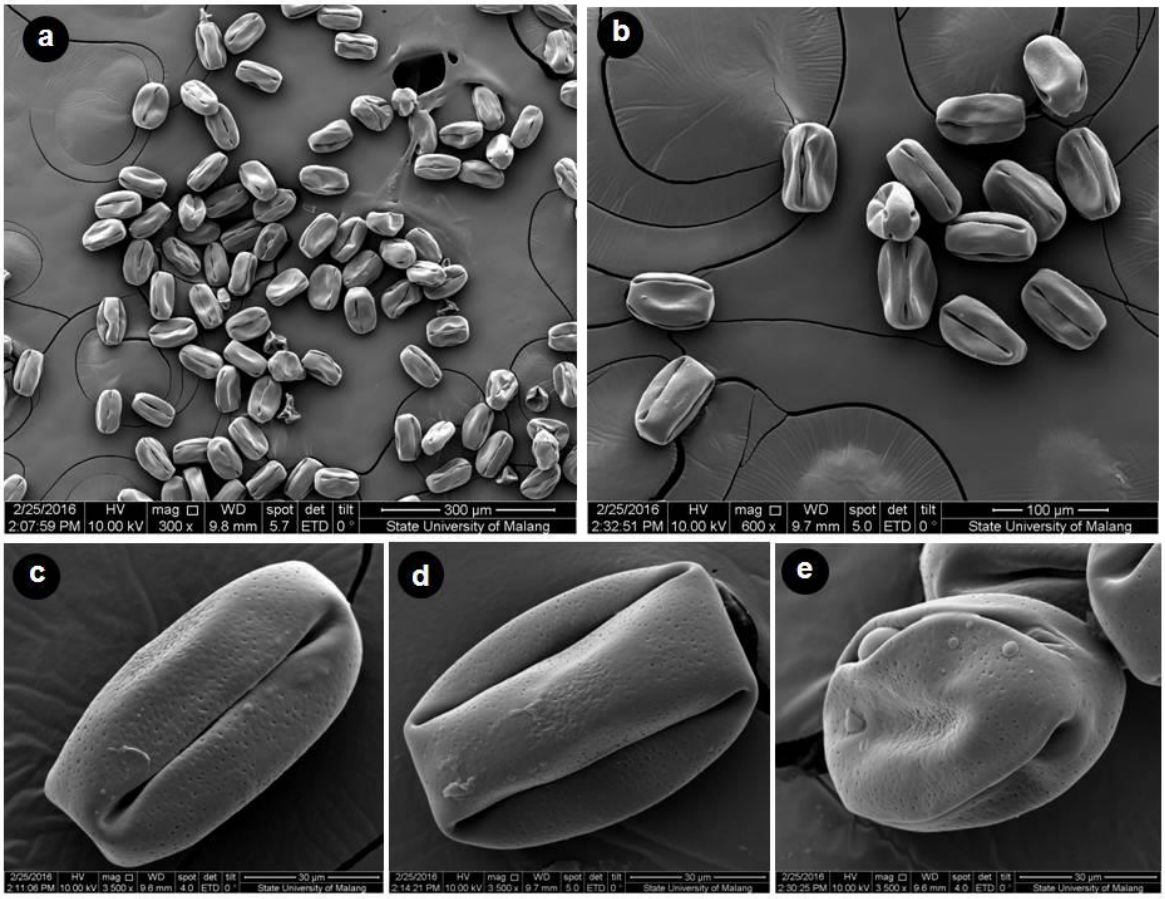


**Figure 2.** Scanning electron microscope (SEM) of pollen grains of *Kopsia pauciflora* Hook.f. (a) x 300, (b) x 600, (c,d,e) x 3500

Under SEM, the pollen grains of *K. pauciflora* were monads and isopolar. Isopolar pollen grains had identical proximal and distal poles, thus the equatorial plane was a symetry plane. In the polar view, pollen grains seemed circular.

Pollen grains length varied from a minimum of 69.40 µm to 80.08 µm and pollen grains width ranged from 42.71 µm to 50.72 µm. The shape was prolate (P/E 1.61-1.76). Based on their size ( < 100 m), this type can be considered potentially cause allergies . The pollen grains will be easy carried by the wind and inhaled respiratory tract.

An apertures is a region of the pollen wall that differs significantly from the rest of the wall in its morphology and/or anatomy, and is presumed to function usually as the site of germination and to play a role in harmomegathy. The character of apertures were combination of porus and colpus. Number, type and position of apertures were genetically determined and usually fixed within a species, however it may sometimes vary [3]. Based on the NPC-system (Number (N), Position (P) and Character (C) of apertures), apertures of pollen *K. pauciflora* were $N_3$ (tritreme), $P_4$ (zonotreme), and $C_5$ (colporate). It had three apertures. The centres of apertures are located on the equatorial.

In this study, pollen of *K. pauciflora* were infolding and interaperture area sunken. Water loss take placed in this infolded [3]. Pollen infolding and interaperture area sunken also found in *Alnus glutinosa* (Betulaceae), *Bupleurum rotundifolium* (Apiaceae), *Leucadendron discolor* (Proteaceae), *Erica arborea* (Ericaceae), *Melampyrum arvense* (Scrophulariaceae), and *Verbena officinalis* (Verbenaceae) [3].

The ornamentation mean the scupturing of the exine layer of pollen grains. It was important characteristics for identification. In this study, the ornamentation of pollen grains were perforate. The holes of the pollen wall less than 1 µm in diameter.

## 4. Conclusion

Pollen of *Kopsia pauciflora* Hook.f. var. pauciflora are monads, isopolar, sized 69.40 µm - 80.08 µm x 42.71 µm - 50.72 µm, shape prolate (P/E E 1.61-1.76). Their apertures are tricolporate. Pollen infolding, interaperture area sunken. The ornamentation is perforate

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