

# Scanning Electron Microscopy (SEM) Studies of *Passiflora* Species Available in Peninsular Malaysia.

R. Veeramohan<sup>1\*</sup> and N. W. Haron<sup>1</sup>

<sup>1</sup>Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia.

\*Corresponding author: Email [rubashinyv.b@siswa.um.edu.my](mailto:rubashinyv.b@siswa.um.edu.my)

**Abstract Summary:** Micromorphological characteristics of four *Passiflora* species were distinguished by Scanning Electron Microscopy (SEM) studies. Stomata, trichomes, and epidermal surfaces' structure of leaves of each species were observed using a scanning electron microscope.

**Introduction:** *Passiflora* is numerically and economically the most important genus of the Passifloraceae family which consists of shrubs and herbs, mostly climbers with auxiliary tendrils. There are about 500 species of *Passiflora* worldwide [1] & [2], but only less than 10 species are native to Brazil [1]. They are distributed in the warm temperate and tropical regions of the world; they are much rarer in Asia, Australia, and tropical Africa. Taxonomic studies on *Passiflora* species are scanty especially on the micromorphological aspects. In this research, taxonomic studies of four selected *Passiflora* species; *Passiflora edulis* Sims (Passion fruit), *Passiflora coccinea* Aubl. (Scarlet passion flower), *Passiflora foetida* Linn. (Stinking passion flower) and *Passiflora incarnata* Linn. (Fragrant passion flower) were carried out to distinguish their morphological characteristics. There are about six species of *Passiflora* in Peninsular Malaysia.

## Methodology:

**Scanning Electron Microscopy techniques:** Leaves were cut in square shape with measurement of approximately 3 mm x 3 mm. Samples were then soaked in a mixed solution of 8% Glutaraldehyde and Sorencen's Buffered Phosphate with a ratio of 1:1 for an hour. Leave samples were then subsequently washed with Sorencen's Buffered Phosphate solution and distilled water with a ratio of 1:1 for 5 minutes and soaked in a mixed solution of 4% Osmium and distilled water with a ratio of 1:1 for about 14 hours at low temperature. Then, the samples were soaked in a series concentration of ethanol. Samples were soaked in mixture of 100% ethanol and 100% acetone with ratios of 3:1, 1:1, and 1:3 for 20 minutes respectively. The samples were then soaked in 100% acetone solution for 20 minutes, repeating them for four times. Next, the method of Critical Drying Point was conducted using Bal-Tec CPD 030 Critical Point Dryer. Specimens were mounted on aluminium with diameter of 12.5 mm using Conducting Carbon Cement (LEIT-C) and kept in a drying jar. Finally, the leave specimens were coated with a thin layer of gold (40-60 nm) by using BIO-Rod SEM Coating System.

**Results:** Observation on the abaxial surface of the leaves shows various characteristics. *Passiflora edulis* Sims has papillose epidermal, where the anticlinal wall is slightly undulate. It is not covered by a thick epicuticular wax. Stomata are paracytic (Fig. 1). *Passiflora coccinea* Aubl. has a papillose epidermal surface as well, but it is covered by a thick epicuticular wax unlike *Passiflora edulis* Sims. The presence of anomocytic stomata and unicellular trichomes could also be observed on the epidermal surface (Fig. 2). *Passiflora foetida* Linn. has a rugose epidermal surface which is not covered by a very thick layer of epicuticular wax. Stomata are amphiparacytic (Fig. 3a). There are glandular and simple unicellular trichomes present on the margin and apex of the leaf (Fig. 3b). *Passiflora incarnata* Linn. has a papillose epidermal surface. Stomata is amphipericytic (Fig. 4a) and unicellular trichomes are present on the epidermal surface (Fig. 4b).

**Discussion:** The present study shows that each *Passiflora* species varied in the types and sizes of stomata, epidermal surfaces, and the presence of trichomes.

**Conclusion:** This study has added new taxonomic information especially on the micromorphological aspects of these four *Passiflora* species which has never been studied by previous researches.

### Acknowledgements

This work has been supported by the University of Malaya's financial grants, PPP PS299/2010B and UMRG RG037/09SUS.

### References

- [1] A. J. C. Viana, M. M. Souza, I. S. Araujo, R. X. Correa, and D. Ahnert, "Genetic diveristy in *Passiflora* species determind by morphological and molecular characteristics," *Biologica Plantarum*, 3rd ed., vol 54, pp. 535-530, 2010.
- [2] D. F. Waterhouse, "Biological control of weeds: Southeast Asian prospects," *Monographs*, Australian Centre for International Agricultural Research, 1994.

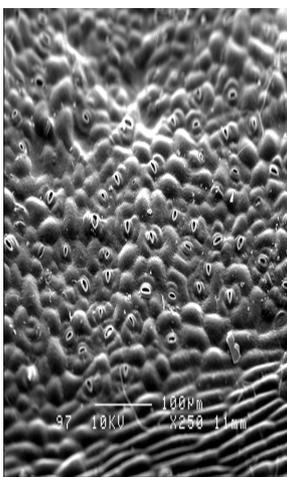


Fig. 1. Abaxial epidermal surface of *Passiflora edulis* Sims.

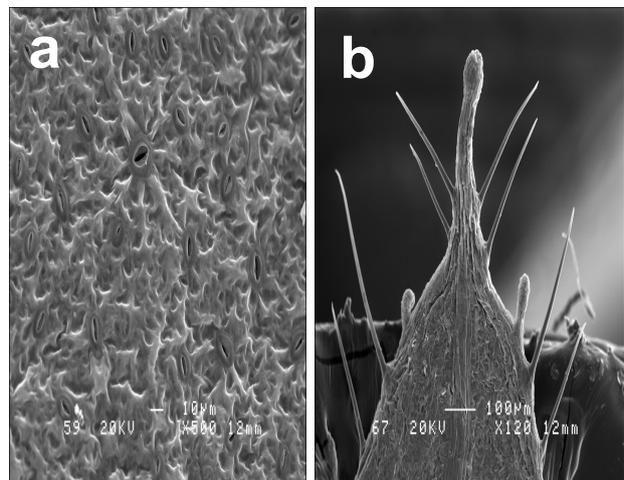


Fig. 3. Abaxial epidermal surface of *Passiflora foetida* Linn.

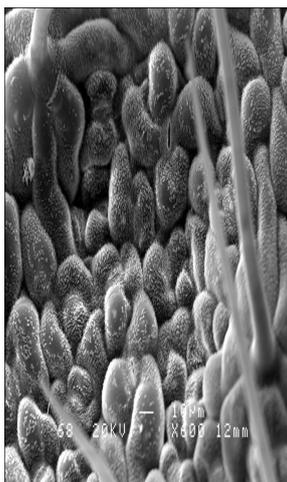


Fig. 2. Abaxial epidermal surface of *Passiflora coccinea* Aubl.

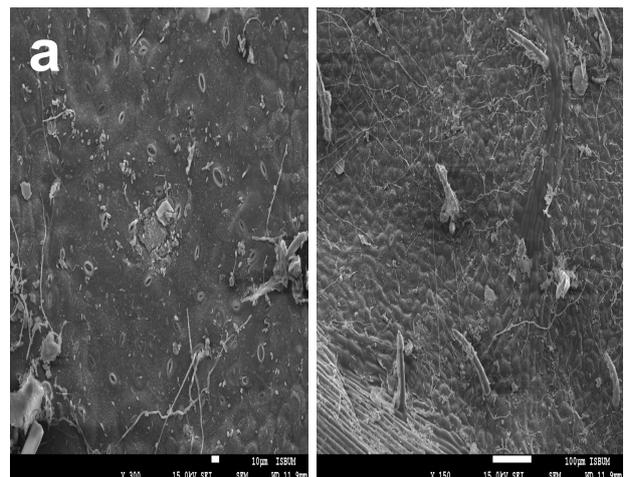


Fig. 4. Abaxial epidermal surface of *Passiflora incarnata* Linn.