

Documents

Aini Che Amri, C.N.^a, Zakaria, S.M.^a, Shahari, R.^a, Binti Mohd Tajudin, A.A.^a, Talip, N.^b, Abdul Rahman, M.R.^b, Siam, N.A.^c

COMPARATIVE LEAF ANATOMY AND MICROMORPHOLOGY OF ASYSTASIA GANGETICA T.ANDERSON SUBSP. MICRANTHA (NEES) ENSERMU AND RHINACANTHUS NASUTUS (L.) KURZ (JUSTICIINAE, ACANTHACEAE) FROM PENINSULAR MALAYSIA

(2023) *Reinwardtia*, 22 (2), pp. 79-89.

DOI: 10.55981/reinwardtia.2023.4638

^a Department of Plant Science, Kulliyah of Science, International Islamic University Malaysia, Jalan Sultan Ahmad Shah, Pahang, Kuantan, 25200, Malaysia

^b School of Environment and Natural Resource Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, Selangor, Bangi, 43600, Malaysia

^c Forest Product, Forest Research Institute Malaysia, Selangor, Kepong, 52109, Malaysia

Abstract

Acanthaceae family has been used traditionally for medicinal purposes, especially amongst the native communities in Peninsular Malaysia. Nowadays, many taxonomists have difficulties in the identification of the Acanthaceae species due to its morphological similarities and when there is an incomplete part of plants obtained from the field sampling. But until now, there is no comprehensive study that has been documented especially on the Acanthaceae family, specifically for *A. gangetica* subsp. *micrantha* and *R. nasutus*. To avoid incorrect species identification, a systematic study that involved the leaf anatomy and micromorphology parts is being used for the identification and classification of plants in the Acanthaceae. Therefore, the main objective of this present study is to identify the leaf anatomical and micromorphological characteristics that can be used in plant identification and for supportive data in plant classification. The leaf anatomical and micromorphological studies that are conducted on species studied involve several procedures such as cross-section using a sliding microtome, and observation under a light microscope and scanning electron microscope. The anatomical and micromorphological characteristics observed that have been used to identify each species studied include patterns of petiole and midrib vascular bundles, leaf margin, leaf lamina, presence of cuticular striae, and the presence of trichomes. The results of this study showed that the cystolith cells can be found only in midrib of *A. gangetica* subsp. *micrantha* while it also recorded in petiole, midrib, and the leaf lamina of *R. nasutus*. Observation under the light microscope revealed nine types of trichomes in *R. nasutus* meanwhile seven trichomes were recorded in *A. gangetica* subsp. *micrantha*. Other than that, the present of cuticular striae only recorded at the abaxial epidermis of *A. gangetica* subsp. *micrantha*. In conclusion, results showed that anatomical and micromorphological characteristics have taxonomic significance that can be used in the identification and classification, especially at the species level. © 2023 Authors. All rights reserved.

Author Keywords

Acanthaceae; *Asystasia gangetica* subsp. *micrantha*; cystolith; *Rhinacanthus nasutus*

References

- AMIRUL-AIMAN, A. J., NORAINI, T., NURUL -AINI, C. A. C., RUZI, A.
Trichomes morphology on petals of some Acanthaceae species
(2014) *Reinwardtia*, 14 (1), pp. 79-83.
- AMRI, C. N. C. A., TAJUDIN, N. S., SHAHARI, R., AZMI, F. M., TALIP, N., MOHAMAD, A. L.
Comparative leaf anatomy of selected medicinal plants in Acanthaceae
(2018) *The International Medical Journal*, 17 (2), pp. 17-23.
(spec)
- AMRI, C. N. C. A., TALIP, N., MOHAMAD, A. L., CHUNG, R. C. K., NURHANIM, M. N., RUZI, A. R.
Systematic significance of petiole anatomical characteristics in *Microcos L.* (Malvaceae: Gresswoioideae)
(2013) *Malayan Nature Journal*, 65, p. 145170.
(2&3)
- AMRI, C. N. C. A., TALIP, N., MOHAMAD, A. L., JUHARI, M. A. A. A., RUZI, A. R., IDRIS, S.

Taxonomic significance of leaf micromorphology in some selected taxa of Acanthaceae (Peninsular Malaysia)

(2014) *AIP Conference Proceedings*,
Universiti Kebangsaan Malaysia, Selangor

- BARTHLOTT, W.
Epidermal and seed surface characters of plants: systematic applicability and some evolutionary aspects
(1981) *Nordic Journal of Botany*, 1 (3), pp. 345-354.
- BARTHLOTT, W.
Scanning electron microscopy of the epidermal surface in plants
(1990) *Scanning Electron Microscopy in Taxonomy and Functional Morphology*, pp. 69-94.
CLAUGHER, D. (Ed). Clarendon Press Oxford
- BARTHLOTT, W., NEINHUIS, C., CUTLER, D., DITSCH, F., MEUSEL, I., THEISEN, I., WILHELMI, H.
Classification and terminology of plant epicuticular waxes
(1998) *Botanical Journal of the Linnean Society*, 126 (3), pp. 237-260.
- BAAS, P., GREGORY, M.
A survey of oil cell in the dicotyledons with comments on their replacement by and joint occurrence with mucilage cell
(1985) *Israel Journal Botany*, 34, pp. 167-186.
- BORG, A. J., McDADE, L. A., SCÖNENBERGER
Molecular phylogenetics and morphological evolution of Thunbergioideae (Acanthaceae)
(2008) *Taxon*, 57 (3), pp. 811-822.
- GOPAL, T. K., MEGHAL, G., CHAMUNDEESWARI, C., REDDY, C. U.
Phytochemical and pharmacological studies on whole plant of *Asystasia gangetica*
(2013) *Indian Journal of Research in Pharmacy and Biotechnology*, 1 (3), p. 365370.
- HAMID, A. A., AIYELAAGBE, O. O., AHMED, R. N., USMAN, L. A., ADEBAYO, S. A.
Preliminary phytochemistry, antibacterial and antifungal properties of extracts of *Asystasia gangetica* Linn T.Anderson grown in Nigeria
(2011) *Advances in Applied Science Research*, 2 (3), pp. 219-226.
- HARE, C. L.
On the taxonomic value of the anatomical structure of the vegetative organs of the dicotyledons: the anatomy of the petiole and its taxonomic value
(1942) *Proceedings of the Linnean Society of London*, 555 (3), pp. 223-229.
- HSU, T. W., CHIANG, T. Y.
***Asystasia gangetica* (L.) T. Anderson subsp. *micrantha* (Nees) Ensermu (Acanthaceae), a newly naturalized plant in Taiwan**
(2005) *Taiwania*, 50 (2), p. 117122.
- HU, C. C., DENG, Y. F., WOOD, J. R. I., DANIEL, T. F.
Acanthaceae
(2011) *Flora of China*, 19, p. 369477.
WU, Z. Y., RAVEN, P. & HONG, D. Y. (Eds). Missouri Botanical Garden Press, St. Louis
- INAMDAR, J. A.
Epidermal structure and ontogeny of caryophyllaceous stomata in some Acanthaceae
(1970) *Botanical Gazette*, 131 (4), pp. 261-268.

- JOHANSEN, D. A.
(1940) *Plant Microtechnique*,
McGraw-Hill Book Co, Inc, New York and London
- JUHARI, M. A. A. A., NORAINI, T., AMRI, C. N. A. C., RAHMAN, M. R. A.
Trichomes morphology in flower petal of Acanthaceae species
(2014) *Reinwardtia*, 14 (1), pp. 79-83.
- KENG, H.
(2003) *Orders and Families of Malayan Seed Plants*,
Singapore University Press, Singapore
- KUPRADINUN, P., SIRIPONG, P., CHANPAI, R., PIYAVIRIYAGUL, S., RUNGISIPIPAT, A.,
WANGNAITHAM, S.
Effects of *Rhinacanthus nasutus* Kurz on colon carcinogenesis in mice
(2009) *Asian Pacific Journal of Cancer Prevention*, 10 (1), pp. 103-106.
- LEROUX, O.
Collenchyma: a versatile mechanical tissue with dynamic cell walls
(2012) *Annals of Botany*, 110 (6), pp. 1083-1098.
- LEVIN, F. A.
**The taxonomic value of veinislet areas based upon a study of the genera *Barosma*,
Cassia, *Erythroxyton* and *Digitalis***
(1929) *Journal of Pharmacy and Pharmacology*, 2, pp. 17-43.
- MANZITTO-TRIPP, E. A., DARBYSHIRE, E., DANIEL, T. F., KIEL, C. A., MCDADE, L. A.
Revised classification of Acanthaceae and worldwide dichotomous keys
(2021) *Taxon*, 71 (1), pp. 103-153.
- MC DADE, L. A., DANIEL, T. F., KIEL, C. A.
**Toward a comprehensive understanding of phylogenetic relationships among
lineages of Acanthaceae S.L. (Lamiales)**
(2008) *American Journal of Botany*, 95 (9), pp. 1136-1152.
- METCALFE, C. R., CHALK, L.
(1965) *Anatomy of the Dicotyledons*, 1.
The Clarendon Press, Oxford
- METCALFE, C. R., CHALK, L.
(1979) *Anatomy of the Dicotyledons*, 1.
The Clarendon Press, Oxford
- MUNAVVAR, A. S., ABDULLAH, N. A., ABDUL, H. K., NOOR, A. M.
**Evaluation of anti-fungal and anti-bacterial activity of a local plant *Rhinacanthus
nasutus* (L.)**
(2004) *Journal of Biological Sciences*, 4 (4), pp. 498-500.
- NURHANIM, M. N., TALIP, N., CHUNG, R. C. K., AMRI, C. N. C. A., RUZI, A. R.
**Nilai taksonomi ciri anatomi daun genus *Schoutenia* Korth. (Malvaceae subfam.
Brownlowioideae)**
(2014) *Sains Malaysiana*, 43 (3), pp. 331-338.
- O'NEILL, C. S.
Anatomy of the shrimp plant, *Justicia brandegeana* (Acanthaceae)
(2010) *Studies by Undergraduate Researchers at Guelph*, 3 (2), pp. 41-47.
- PATIL, A. M., PATIL, D. A.
Occurrence and significance of cystoliths in Acanthaceae
(2011) *Current Botany*, 2 (4), pp. 1-5.

- RASHID, Z. S. A., AMRI, C. N. A. C., SHAHARI, R.
Leaf anatomy of the medicinal plant *Sphagneticola trilobata* (L.) Pruski
(2020) *Journal of Sustainability Science and Management*, 17 (3), p. 112129.
- ROJANAPO, W., TEPUSUWAN, A., SIRIPONG, P.
Mutagenicity and antimutagenicity of Thai medicinal plants
(1990) *Basic Life Sciences*, 52, pp. 447-452.
- ROJO, J. P.
Petiole anatomy and infrageneric interspecific relationship of Philippine Shorea (Dipterocarpaceae)
(1987) *Proceedings of Third Round Table Conference on Dipterocarps*,
KOSTERMANS, A. J. G. H. (Ed). Papers presented at an International Conference held at the Mulawarman University. Indonesia
- RUZI, A. R., HUSSIN, K., TALIP, N.
Systematic significance of the petiole vascular bundles types in *Dipterocarpus Gaertn. f.* (Dipterocarpaceae)
(2009) *Malaysian Applied Biology*, 38 (2), pp. 11-16.
- SASS, J. E.
(1958) *Botanical Microtechnique*,
(3rd ed). Iowa State University, Ames
- SCHWARZBACH, A. E., MCDADE, L. A.
Phylogenetics relationships of the mangrove family Avicenniaceae based on chloroplast and nuclear ribosomal DNA sequences
(2002) *Systematic Botany*, 27 (1), pp. 84-98.
- SCOTLAND, R. W., SWEERE, J. A., REEVE, P. A., OLMSTEAD, R. G.
Higher level systematics of Acanthaceae determined by chloroplast DNA sequences
(1995) *American Journal of Botany*, 82 (2), pp. 266-275.
- STEVENS, P. F.
(2017) *Angiosperm phylogeny website*,
Missouri Botanical Garden
- TALIP, N.
(2006) *Systematic studies of Shorea, Hopea, Parashorea and Neobalanocarpus (Dipterocarpaceae)*,
University of Reading. [PhD. Thesis]
- TALIP, N., HUSSIN, K. H., IBRAHIM, H.
Comparative leaf anatomy of *Alpinia* species (Zingiberaceae)
(2003) *Nordic Journal of Botany*, 23 (4), pp. 463-483.
- VERDAM, M. C. S., OHANA, D. T., ARA-UJO, M. G. P., GUILHON-SIMPLICIO, F., DE MENDONCA, M. S., PEREIRA, M. M.
Morphology and anatomy of *Justicia acuminatissima* leaves
(2012) *Revista Brasileira de Farmacognosia*, 22 (6), pp. 1212-1218.
- VOLLESEN, K.
(2008) *Flora of Tropical East Africa: Acanthaceae*,
Royal Botanic Gardens, Kew
- ZAKARIA, S. M., AMRI, C. N. A., TALIP, N., LATIFF, A., JUHARI, A. A. A., SHAHARI, R., TAJUDIN, N. S., RAHMAN, M. R. A.
The variation of cystoliths and its taxonomic significance in Acanthaceae of Peninsular Malaysia
(2020) *Malaysian Applied Biology*, 49 (5), pp. 25-31.

ISSN: 0034365X
Language of Original Document: English
Abbreviated Source Title: Reinwardtia
2-s2.0-85182556113
Document Type: Article
Publication Stage: Final
Source: Scopus

ELSEVIER

Copyright © 2024 Elsevier B.V. All rights reserved. Scopus® is a registered trademark of Elsevier B.V.

 **RELX** Group™