

TAXONOMIC STUDY OF *Melastoma* L. IN
PENINSULAR MALAYSIA

BY

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ABSTRACT

Species identification based on hypanthium structure and herbarium samples were insufficient for *Melastoma*. *Melastoma* flowers are very delicate and tend to become incomplete specimens. Therefore, it is impossible to rely solely on flower characteristics and herbarium samples for the identification process. Hence, a comprehensive study was set up to identify varietal differences among *Melastoma* species found in Peninsular Malaysia. Our objectives can be restated as follows 1) to identify and describe the morphological characteristics of *Melastoma* species. 2) to identify and describe the anatomical and micromorphological characteristics of *Melastoma* species and 3) to identify and characterize the gene of *Melastoma* species. A total of 26 *Melastoma* accession were collected and given a final of 87 vegetative structures and 144 reproductive structures. This study has identified hypanthium, leaf, and twigs indumentum as important morphological structures for species identification. Meanwhile, 54 anatomical characters were identified and recorded among 20 selected taxa. Besides, 15 types of trichomes were determined to serve as supporting characters for *Melastoma* in the absence of reproductive structure. DNA analysis conducted on 11 selected taxa of *Melastoma* were subjected to DNA extraction, PCR with four new primers (triosephosphate isomerase (*tpi*) gene, photosystem II protein D1, partial cds; chloroplast (*psbA*) gene, granule-bound starch synthase (*gbss*) gene and vacuolar invertase (*vr*) gene), and DNA sequencing to obtain the final result. Nevertheless, only the *tpi* genes showed a promising result with convincing bootstrap support in the phylogenetic study. Of the eleven taxa, nine proved to be distinct species based on genetic characters. In conclusion, this study identified 14 taxa and seven *M. malabathricum* accessions. Out of 14 taxa, 6 were newly described, and three were reinstatement as species. These results reinforce the hypothesis that morphological structure will be the most important source of information for the identification of *Melastoma*.

خالصة البحث

أزهار *Melastoma* وعينات المعشبة لم تكن كافية للورم *hypanthium* لتحديد الأنواع على أساس هيكل الميلاستوما حساسة للغاية وتميل إلى أن تصبح عينات غير كاملة. لذلك ، من المستحيل الاعتماد فقط على خصائص الأزهار وعينات الأعشاب في عملية تحديد الهوية. ومن ثم ، تم إعداد دراسة شاملة لتحديد الاختلافات المتنوعة بين أنواع الورم الميلاني الموجود في شبه جزيرة ماليزيا. تم جمع ما مجموعه 26 مدخلاً وأعطيت نهائياً مكوناً من 87 بنية نباتية و 144 هيكلًا تناسلياً. حددت هذه الدراسة *Melastoma* للورم والأوراق ، والأغصان البنى المورفولوجية الهامة لتحديد الأنواع. وفي الوقت نفسه ، تم ، *hypanthium* تحديد وتسجيل 54 سمة تشريحية من بين 20 تصنيفاً مختاراً. إلى جانب ذلك ، تم تحديد 15 نوعاً من لتكون بمثابة أحرف داعمة للورم الميلاسي في غياب البنية التناسلية. تم إجراء تحليل الحمض *trichomes* النووي على 11 نوعاً مختاراً من الورم الميلاني تم إخضاعها لاستخراج الحمض النووي ، وتعرض تفاعل وروتين النظام الضوئي ، (tpi) البوليميراز المتسلسل بأربعة بادئات جديدة (جين ثلاثي فوسفات أيزوميراز وجين النشا المرتبط بالحبيبات ، (psbA) وأقرص مضغوطة جزئية ، وجين البلاستيدات الخضراء ، D1 الثاني وتسلسل الحمض النووي للحصول على النتيجة النهائية. ومع ذلك ، (vr) الجين وانفرتيز الفراغ (gbss) فقط نتيجة واعدة بدعم إقناع مقنع في دراسة علم الوراثة. من بين الأصناف الأحد tpi أظهرت جينات ، عشر ، ثبت أن تسعة أنواع متميزة بناءً على الصفات الجينية. في الختام ، حددت هذه الدراسة 14 صنفاً من أصل 14 صنفاً ، 6 تم وصفها حديثاً ، وثلاثة أعيدت إلى *M. malabathricum*. وسبعة مدخلات وضعها السابق كأشكال. تعزز هذه النتائج الفرضية القائلة بأن البنية المورفولوجية ستكون أهم مصدر للمعلومات لتحديد ورم الميلاستوما.

APPROVAL PAGE

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DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degree at IIUM or other institutions.

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