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Seed diversity in the Miconieae (Melastomataceae): morphological characterization and phenetic relationships

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Abstract

The seed morphology of 234 species distributed among 16 genera of the tribe Miconieae (Melastomataceae) was examined and documented with the use of scanning electron microscopy (SEM). Based on our observations and previously published investigations, we propose a set of 37 morphological characters for describing size, general shape, raphal zone, appendage, testa characters, and individual cell features of Miconieae seeds. Using these characters, we assembled detailed descriptions of all species in our sampling and constructed a data matrix for preliminary phenetic analysis (UPGMA algorithm; results to be presented elsewhere). In general, seed characters were easily identified and coded, although some of them presented difficulties, mostly due to the compression effects induced by fruit walls and neighboring seeds (e.g., shape). In contrast with other studies, we avoided the use of morphotypes, which have been shown to underutilize phenotypic variation. Our phenetic analysis does not agree with the traditional generic circumscription of the tribe, the sectional classification within *Miconia*, or with molecular phylogenetic analyses. This raises questions about the systematic and phylogenetic value of seed morphological characters in the tribe Miconieae.

Resumen

Con el uso del microscopio electrónico de barrido se examinó y documentó la morfología de las semillas de 234 especies, distribuidas en 16 géneros, de la tribu Miconieae (Melastomataceae). Con base en nuestras observaciones y apoyados en estudios previos, proponemos el uso de 37 caracteres morfológicos para describir el tamaño, la forma general, la zona rafal, el apéndice, los caracteres de la testa y las características de las células individuales de las semillas de Miconieae. Tales caracteres fueron utilizados para crear descripciones detalladas de todas las especies incluidas en nuestro muestreo y construimos una matriz de datos para efectuar un análisis fenético preliminar (algoritmo UPGMA). En términos generales, los caracteres de las semillas fueron identificados y codificados fácilmente, aunque algunos de ellos presentaron dificultades debido principalmente a los efectos de compresión inducidos por las paredes del fruto y las semillas adyacentes (p. ej., forma de la semilla). A diferencia de otros estudios, evitamos el uso de tipos morfológicos, ya que se ha demostrado que éstos subestiman la variación fenotípica. Nuestro análisis fenético no coincide con la circunscripción genérica tradicional de la tribu, ni con la clasificación seccional de *Miconia*, ni con los análisis filogenéticos moleculares. Estos resultados ponen en tela de juicio el valor sistemático y filogenético de los caracteres morfológicos de las semillas en la tribu Miconieae.

Introduction

Melastomataceae, with its 4,500–5,150 species in 166–179 genera (Claussing & Renner 2001, Almeda 2003, Mabberley 2008), is one of the largest plant families in the world (Renner 1993) and displays a diverse range of variation in vegetative and reproductive features (Renner 1993, Mendoza & Ramírez 2006). Seed morphology in the family is a noteworthy example of this diversity and has been used in the past in taxonomic and systematic investigations. Don (1823) used the general shape of the seed and the embryo for segregating