

## ARSITEKTUR DAUN CENDANA (*Santalum album* L.) PADA BERBAGAI VARIASI BUNGA

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### INTISARI

Arsitektur daun merupakan istilah deskripsi karakter daun, yang penggunaannya memudahkan identifikasi tumbuhan tanpa kehadiran organ generatif. Karakter pola pertulangan daun pada arsitektur daun diturunkan stabil secara genetik sehingga menjamin keperluan sistematika botani. Cendana (*Santalum album* L.) diketahui memiliki berbagai variasi bunga namun belum ada yang mengamati arsitektur daunnya hingga pola pertulangan daun tingkat teratas. Tambahan informasi morfologi mendetail diharapkan membantu studi sistematika botani cendana pada berbagai variasi bunga di masa depan.

Penelitian ini bertujuan mengidentifikasi arsitektur daun cendana pada berbagai variasi bunga dan menentukan hubungan fenetiknya. Eksplorasi 10 individu cendana tiap variasi bunga dilakukan random, kemudian daun diluruhkan mesofilnya dan diidentifikasi mengacu *Manual of Leaf Architecture*. Dilakukan analisis kluster *agglomerative complete linkage* dengan jarak matriks *Gower* menggunakan Rstudio 4.3.1, dengan luaran dendrogram untuk mengetahui kelompok yang terbentuk serta hubungan fenetik cendana pada berbagai variasi bunga berdasarkan karakter arsitektur daunnya.

Ditemukan tiga variasi bunga cendana yaitu merah besar, merah kecil, dan kuning. Hasil identifikasi arsitektur daun cendana adalah hanya 7 dari 48 karakter yang nilainya beragam, 2 diantaranya memberikan petunjuk variasi bunga. Cendana pada variasi bunga merah kecil tidak memiliki karakter *base shape* berupa *straight* serta karakter *intersecondary veins: distal course* berupa *parallel to major secondary* atau *perpendicular to a subjacent secondary*. Dendrogram dengan *phenon line* pada jarak matriks 0,11 menghasilkan 3 kelompok beranggotakan cendana pada variasi bunga yang acak, menunjukkan arsitektur daun tidak dapat mengelompokkan cendana berdasarkan variasi bunganya serta arsitektur daun yang hampir sama menyimpulkan hubungan fenetik cendana pada berbagai variasi bunga berdasarkan karakter arsitektur daun adalah hampir sama.

*Kata kunci: Arsitektur daun, Santalum album L., Variasi bunga cendana, Analisis kluster, Jarak matriks Gower*

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## LEAF ARCHITECTURE OF SANDALWOOD (*Santalum album* L.) IN VARIOUS FLOWER VARIATIONS

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### **ABSTRACT**

Leaf architecture refers to the term of leaf character descriptions, aiding in the identification of plants even in the absence of generative organs. The genetically fixed of leaf venation patterns serve its purposes in systematic botany. Sandalwood (*Santalum album* L.) is recognized for its diverse flower variations, but there has been a lack of studies on the leaf architecture of each flower variation, extending up to the highest order venation. This detailed morphological information is expected to contribute future systematic botany studies of sandalwood in various flower variations.

This study aims to identify the leaf architecture of sandalwood in various flower variations and their phenetic relationship. Exploration of 10 individual sandalwoods for each flower variation was carried out randomly, the mesophyll was then removed from the leaves and identified using the *Manual of Leaf Architecture*. Cluster analysis agglomerative complete linkage with Gower's distance was carried out using Rstudio 4.3.1. The resulting dendrogram output was used to identify formed groups and understand phenetic relationships of sandalwood in various flower variations based on the leaf architecture characters.

Three variations of sandalwood flower were found, namely large red, small red and yellow. The analysis revealed that only 7 of 48 characters exhibited diversity, with 2 of them providing clues to a specific flower variation. Notably, sandalwood with small red flower lacks a straight base shape and intersecondary veins: distal course parallel to a major secondary or perpendicular to a subjacent secondary. The dendrogram with a phenon line at 0.11 distance matrix which formed 3 groups encompassing random flower variations, suggested limited grouping effectiveness based on flower variations. Overall, the phenetic relationship across sandalwood in various flower variations based on leaf architecture characters appear nearly identical.

*Keywords: Leaf architecture, Santalum album L., Sandalwood flower variations, Cluster analysis, Gower's Distance*

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