

VARIASI DAN ANALISIS FENETIK GARUT (*Maranta arundinacea* L.)
DI YOGYAKARTA BERDASARKAN KARAKTER MORFOLOGIS,
ANATOMIS DAUN, DAN MOLEKULER MENGGUNAKAN ANALISIS ISSR

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Intisari

Garut (*Maranta arundinacea* L.) merupakan tanaman pangan alternatif yang terdistribusi luas di Daerah Istimewa Yogyakarta. Penelitian ini bertujuan untuk mempelajari variasi dan analisis fenetik garut berdasarkan karakter morfologis, anatomis dan molekuler sebagai dasar dalam pengembangan budidaya garut. Sampel tanaman dikoleksi melalui metode survei eksplorasi di beberapa kecamatan di 4 kabupaten yaitu Gunungkidul, Kulon Progo, Bantul, dan Sleman. Pengamatan karakter morfologis dilakukan pada seluruh bagian tanaman, sementara karakter anatomis diamati dari bagian daun menggunakan sediaan transversal helaian dan pulvinus, serta sediaan paradermal helaian. Pengamatan karakter molekuler menggunakan analisis hasil isolasi DNA menggunakan CTAB Buffer dan amplifikasi dengan 4 primer ISSR (Inter Specific Sequence Repeats). Analisis kluster dan analisis komponen utama hasil pengamatan dilakukan menggunakan program Multi Variety Statistical Program (MVSP), metode algoritma Underweighted Pair Group Methods using Arithmetic average (UPGMA) dan koefisien similaritas Baroni-Urbani and Busser Coefficient. Survei berhasil menemukan 30 aksesi yang terdiri atas 5 kultivar lokal: ‘Sembowo’, ‘Sili’, ‘Teropong’, ‘Kebo’, dan ‘Sugo’, serta 17 aksesi tipe liar. Variasi karakter morfologis tertinggi diperlihatkan oleh bagian rimpang dan daun. Variasi karakter anatomis daun yang paling mecolok berupa bentuk sel hipodermis dan tebal lapisan oblique cells. Analisis molekuler pada 5 sampel kultivar lokal berhasil memperlihatkan variabilitas genetik garut dengan nilai polimorfisme tinggi. Dendrogram hasil analisis fenetik menggunakan karakter morfologis-anatomis menghasilkan 5 kluster, masing-masing mengelompokkan satu jenis kultivar lokal dengan beberapa aksesi tipe liar dan dicirikan dengan karakter utama tertentu berdasarkan analisis komponen utama. Analisis kluster menggunakan karakter molekuler menghasilkan 4 kluster dengan kultivar lokal ‘Sugo’ dan ‘Sembowo’ yang tergabung dalam satu kluster. Kedua dendrogram menunjukkan pola percabangan yang sama, dengan kluster kultivar ‘Sili’ terpisah jauh dari kluster kultivar lokal lainnya.

Kata kunci: Analisis fenetik, Garut, Klasifikasi infraspecies.

VARIATION AND PHENETIC ANALYSIS OF ARROWROOT
(*Maranta arundinacea* L.) IN YOGYAKARTA PROVINCE BASED ON
MORPHOLOGICAL, LEAF ANATOMICAL, AND MOLECULAR
CHARACTERS USED ISSR ANALYSIS

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Abstract

Arrowroot (*Maranta arundinacea* L.) is a widely distributed alternative food crop in Yogyakarta Province, Indonesia. This study aimed to learn the variation and phenetic analysis based on morphological, leaf anatomical, and molecular characters as a prior step in the development of arrowroot cultivation. Samples were collected through exploratory survey methods in several sub-districts in 4 districts which were Gunungkidul, Kulon Progo, Bantul, and Sleman. Observation of morphological characters are carried out in all parts of the plant, while anatomical characters are observed from the leaves using preparation of leaf blade and pulvinus transverse section, as well as leaf paradermal. Molecular character observations were done through the analysis of DNA fingerprints with 4 ISSR molecular markers using DNA samples result from isolation using CTAB buffer solution. Cluster analysis and principal component analysis (PCA) were done using MVSP with UPGMA algorithm method and the Baroni-Urbani and Busser's similarity coefficient. The survey managed to find 30 accessions, including five local cultivars: 'Sembowo', 'Sili', 'Teropong', 'Kebo', and 'Sugo', and 17 wild-type accessions. The highest morphological characters variation shown by the rhizome and leaves part. The most striking variations of leaf anatomical characters were the shape of the adaxial hypodermal cells and the oblique cells layer thickness. Molecular analysis on 5 samples of local cultivars have succeeded in showing the genetic variability of arrowroot with high polymorphism value. Dendrogram from the phenetic analysis using morphological-anatomical characters showed 5 clusters, each grouping one local cultivar type with several wild-type samples, and characterized by a certain principal character that resulted from PCA. Cluster analysis using molecular characters generate 4 clusters in the dendrogram, with 'Sugo' and 'Sembowo' cultivars in one cluster. Both dendrograms showed the nearly similar branching pattern.

Key words: Arrowroot, infraspecific classification, phenetic analysis.