

Diversity and Distribution patterns of genus *Macaranga* (Euphorbiaceae) in PNG

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INTRODUCTION

The genus *Macaranga* (Euphorbiaceae: Crotonae: Mallotinae) is a highly diversified tree genus distributed mainly in Paleotropis (tropical zone of Africa & Asia), with several species present in N Australia (Fig. 1). Papua New Guinea, where there occurs about 80 from the total number of 280 species, is an important center of diversity of this genus which is an important component of primary and secondary forests occurring from the sea level up to around 3300 m. Although it is very probable that some regions of PNG are not sufficiently known, studied material permits us to make first approximation of the geographical distribution and species richness of *Macaranga* in PNG.

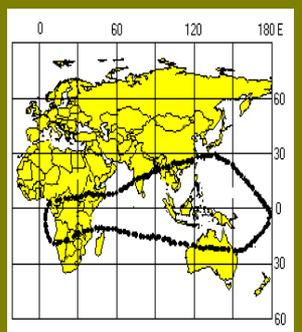


Fig. 1: Geographical distribution of genus *Macaranga*

MATERIAL & METHODS

- * About 1200 specimens of 69 PNG species of *Macaranga* were studied in LAE herbarium.
- * Geographical position of all localities was checked using "Encarta World Atlas 1998" and maps of distribution of all the species were plotted using the "OziExplorer" program.
- * Geographical distribution of different species were compared and basic distributional patterns were recognized.
- * Altitudinal range of distribution of all the species was established and altitudinal distribution of *Macaranga* in PNG was analyzed.
- * The territory of PNG was divided into "one degree squares" with the aim of comparing species richness of different regions and to detect regions with similar species composition. A presence/absence matrix of species studied in 46 "one degree squares" was prepared and analyzed using statistics program "SYNTAX" (analyses UPGMA).

RESULTS

Altitudinal distribution

The genus *Macaranga* occurs over a wide altitudinal range, between 0-3300 m. The distribution of species richness along the altitudinal gradient is not homogeneous (Fig.2) and we can distinguish two different species diversity maximum. First maximum occurs between 0-100 m (39 species) and the second

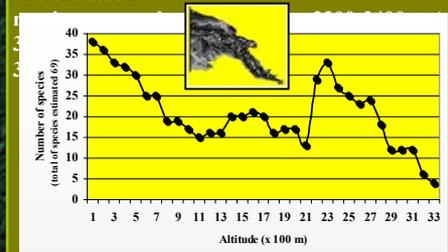
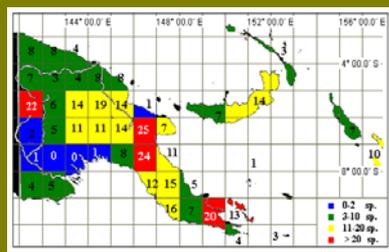


Fig. 2: Altitudinal distribution of species richness



Center of Diversity

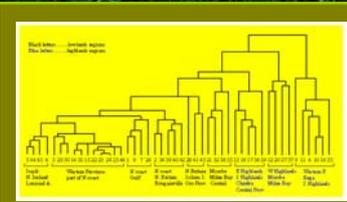
The geographical distribution of species richness of *Macaranga* in PNG is not homogeneous (Fig. 3). The highest number of species was detected in Lae – Wau region (Morobe, 25 species) and in Telefomin region (W Sepik, 22 species). The lowest species diversity is probably in Western province where less than 5 species were found. These results agree with Heads (2001) who

detected Wau region as important center of diversity for different plant genera (*Parsonia*, *Aglai*, *Ameyma*).

Regional affinities in species composition

Analysis of the distributional data of *Macaranga* makes it possible to detect affinities between different regions. Results of the UPGMA analyses of 46 "one degree squares" are shown in dendrogram (Fig. 4) and its map interpretation (Fig. 5). There, the squares of high affinity are marked by the same color. There is a clear difference in the species composition of the lowland and highland regions. Distinguishable is also the difference between the Western province and rest of the country and between NW coast and cost of Morobe, Central and Milne Bay province. Also interesting, is the much differentiated affinity of the various islands systems within different PNG regions.

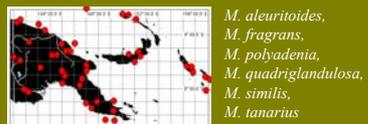
Fig. 4, 5: Dendrogram is a result of UPGMA analyses of species composition of different regions. Map is a image interpretation of dendrogram. Numbers in dendrogram and map signify the number of "one degree square". With the same color are marked squares with high mutual affinity.



Analyses of the distributional patterns

After the analysis of the maps of distribution for all species of *Macaranga*, nine general patterns of distribution (Fig.6-1/6-IX) in PNG were proposed. Further, all these patterns are illustrated and described. A list of the species which are characterized by this type of distribution is added. Eight species (*M. brachytricha*, *M. glandulifera*, *M. herculis*, *M. hofmaniana*, *M. kostermanii*, *M. philippinensis*, *M. suleensis*, *M. sterophylla*, *M. whitmorei*) were excluded from the analysis because of insufficient herbarium material, narrow endemic range of distribution, or unclear taxonomic status.

6-I. Characterized by wide distributional range including mainland as well as islands (New Britain, New Ireland, Solomon Islands) territory. Mainly lowland forest species occurring in altitude 0-600 m, some species exceptionally reaching 2000 m.



- M. aleuritoides*,
- M. fragrans*,
- M. polyadenia*,
- M. quadriglandulosa*,
- M. similis*,
- M. tanarius*

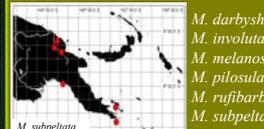
6-II. As 6-I but the species does not reach the islands territory. Lowland forest species (0-1000 m).



- M. bifoveata*, *M. punctata*

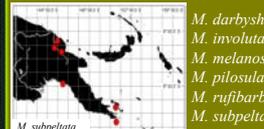
6-III. Lowland forest species occurring in altitude 0-700 (-1500) m in the island territory of PNG. Mostly known from Solomon Isl. and New Ireland, exceptionally from New Britain too.

- M. dioica*, *M. faiketo*
- M. gigantea*, *M. mappa*
- M. solomonensis*



- M. darbyshieri*
- M. involuta*
- M. melanosticta**
- M. pilosula*
- M. rufibarba**
- M. subpeltata*

6-IV. Species presenting disjunctive Distribution between Madang region & Ramu river valley and Oro & Milne Bay region. Sometimes occurring in Central Prov. too. Mainly lowland species (0-800 m), sometimes (*) in highlands (1400-3300 m).



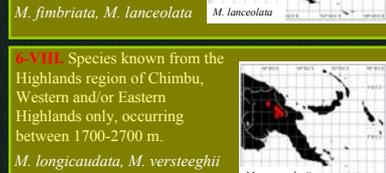
- M. subpeltata*

6-V. Species occurring in Sepik and further Milne Bay, Central and/or Oro Prov., sometimes in Morobe or Madang Prov. too. Absent in Fly River region. Mainly lowland forest species, some species (*) in altitude 1500-2000 m.



- M. angustifolia*, *M. brachytricha*, *M. caudata*
- M. br-floccosa**, *M. clemensiae**, *M. fallacina*
- M. glaberima*
- M. intonsa*
- M. n-guin/nsis*
- M. papuana*
- M. tessellata*
- M. trichanthera**
- M. vilosula*

6-VI. Prevalently lowland forest species known from the lowland of Sepik and Western province only.



- M. fimbriata*, *M. lanceolata*

6-VII. Species known from the Highlands region of Chimbu, Western and/or Eastern Highlands only, occurring between 1700-2700 m.

- M. longicaudata*, *M. versteeghii*
- M. womersleyi*

6-VIII. High-altitudinal species occurring in range 700-3000 m along (entire) mountain chain of PNG.

- M. albescens*
- M. carii*
- M. chrysotricha*
- M. domatiosa*
- M. gracilis*
- M. induta*
- M. inermis*
- M. leonardii*
- M. pleioneura*
- M. pleiostemona*
- M. reiteriana*
- M. strigosa*



6-IX. Species known from the N and SE coast of the mainland and from New Britain Island. Lowland forest sp., occurring between 0-1000 m.



- M. chlorolepis*, *M. clavata*
- M. dalechampsoides*
- M. densiflora*, *M. n-britan.*
- M. tentaculata*
- M. urophylla*,
- M. warburgiana*

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