



Taxonomic revision of the genus *Massularia* (Rubiaceae, Gardenieae), with a new species from Central Africa

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Abstract

Based on a careful examination of more than 700 herbarium specimens and field investigation, a comprehensive revision of the genus *Massularia* is given. *Massularia stevartiana*, a new species from Central African Republic, Cameroon and Gabon is described and illustrated. The novelty is distinguished from *M. acuminata*, the only other species previously recognized in the genus, by its smaller leaves and flowers. For the two species recognized we provide a morphological description, distribution, habitat, phenology and IUCN conservation status assessment. Distribution maps and a dichotomous key are also provided.

Abstract (French)

Sur base de l'examen minutieux de plus de 700 spécimens d'herbier et de travaux de terrain, une révision complète du genre *Massularia* est réalisée. *Massularia stevartiana*, une nouvelle espèce collectée en République Centrafricaine, au Cameroun et au Gabon, est décrite et illustrée. Cette nouveauté se distingue de *M. acuminata*, la seule autre espèce jusqu'alors reconnue dans le genre, par ses feuilles et ses fleurs plus petites. Pour les deux espèces reconnues, nous donnons une description morphologique, la distribution, l'habitat, la phénologie et l'évaluation du statut de conservation selon l'IUCN. Des cartes de répartition et une clé d'identification sont également données.

Key words: Cameroun, Central African Republic, Gabon, Guineo-Congolian Region, IUCN Red List Categories and Criteria, shrub, taxonomy, tropical African flora

Introduction

Massularia (K. Schumann 1897 "1891": 76) Bullock ex Hoyle in Burtt-Davy & Hoyle (1937: 110) is an exclusively African genus of the family Rubiaceae. Until now, *Massularia* was known from a single species, i.e. *M. acuminata* (G. Don 1834: 499) Bullock ex Hoyle. The species was initially described as *Gardenia acuminata* G. Don (1834: 499). In 1849, Bentham moved it to the genus *Randia* Linnaeus (1753: 1192). Schumann (1891) recognized *Massularia* as one of seven section of *Randia*. Later, Bullock (in Burtt-Davy & Hoyle 1937) separated this section and treated as a new genus, *Massularia*. This new status was confirmed by Keay (1958) in the new edition of *Flora of West Tropical Africa*. The genus was traditionally included in the tribe Gardenieae (Keay 1963, Robbrecht 1988), and this positioning was confirmed by recent molecular studies (Andreasen & Bremer 1996, 2000; Robbrecht & Manen 2006), or relegated to its own lineage (Mouly *et al.* 2014).

Fieldwork for a survey of Rubiaceae in central Gabon, in 2012 and 2013, lead to the gathering of an interesting specimen of *Massularia*. Examination of literature, type specimens, and specimens conserved in most of main herbaria

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References

- Andreasen, K. & Bremer, B. (1996) Phylogeny of the subfamily Ixoroideae (Rubiaceae). *Opera Botanica Belgica* 7: 119–138.
- Andreasen, K. & Bremer, B. (2000) Combined phylogenetic analysis in the Rubiaceae-Ixoroideae: morphology, nuclear and chloroplast DNA data. *American Journal of Botany* 87: 1731–1748.
<http://dx.doi.org/10.2307/2656750>
- Bachman, S., Moat, J., Hill, A.W., de la Torre, J. & Scott, B. (2011) Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. *In*: Smith, V. & Penev, L. (Eds.) e-Infrastructures for data publishing in biodiversity science. *ZooKeys* 150: 117–126.
<http://dx.doi.org/10.3897/zookeys.150.2109>
- Burt-Davy, J. & Hoyle, A.C. (1937) *Check-Lists of the forest trees and shrubs of the British Empire No. 3, Draft of the first Descriptive Check-List of the Gold Coast*. Imperial Forestry Institute, Oxford, 153 pp.
- Don, G. (1834) *General history of the dichlamydeous plants III. Calyciflorae*. Rivington, London, 867 pp.
- Hallé, N. (1970) *Flore du Gabon. Vol. 17. Rubiacées (2e partie)*. Muséum National d'Histoire Naturelle, Paris, 335 pp.
- Hooker, J.D. (1849) *Niger Flora*. London, 587 pp.
- IUCN (2012) *IUCN Red List Categories and Criteria*, Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK. Available from: <https://portals.iucn.org/library/efiles/documents/RL-2001-001-2nd.pdf> (accessed 3 September 2014).
- IUCN (2014) *Guidelines for Using the IUCN Red List Categories and Criteria*. Version 11. Prepared by the Standards and Petitions Subcommittee. Available from: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>. (accessed 3 September 2014).
- Keay, R.W.J. (1958) *Randia* and *Gardenia* in West Africa. *Bulletin Jardin Botanique État Bruxelles* 28: 15–72.
<http://dx.doi.org/10.2307/3667018>
- Keay, R.W.J. (1963) Rubiaceae, *Massularia*. *In*: Hepper, F.N. (Ed.) *Flora of Tropical Africa*, vol. 2. Crown Agents for Oversea Governments and Administrations, Millbank, London, pp. 1–14.
- Linnaeus, C. (1753) *Species Plantarum. Systema sexuale*, vol. 2. Holmié, Laurentii Salvii, 1200 pp.
- Mouly, A., Kainulainen, K., Persson, C., Davis, A.P., Wong, K.M., Razafimandimbison, S.G. & Bremer, B. (2014) Phylogenetic structure and clade circumscriptions in the Gardenieae complex (Rubiaceae). *Taxon* 63: 801–818.
<http://dx.doi.org/10.12705/634.4>
- Robbrecht, E. (1988) Tropical woody Rubiaceae. Characteristics, features and progressions. Contribution to a new subfamilial classification. *Opera Botanica Belgica* 1: 1–271.
- Robbrecht, E. & Manen, J.-F. (2006) The major evolutionary lineages of the coffee family (Rubiaceae, angiosperms). Combined analysis (nDNA and cpDNA) to infer the position of *Coptosapelta* and *Luculia*, and supertree construction based on rbcL, rps16, trnL-trnF and atpB-rbcL data. A new classification in two subfamilies, Cinchonoideae and Rubioideae. *Systematic and Geography of Plants* 76: 85–146.
- Schumann, K. (1891) Rubiaceae. *In*: Engler, A. & Prantl, K. (Eds.) *Die Natürlichen Pflanzenfamilien* vol. 4, part 4. W. Engelmann, Leipzig, pp 1–155.
- Thiers, B. (2014) Index Herbariorum: *A global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. Available from: <http://sweetgum.nybg.org/ih/> (accessed 26 December 2014).
- Wernham, H.F. (1916) New Gamopetalae from the south Cameroons. *Journal of Botany, British and Foreign* 54: 226–231.
- White, F. (1979) The Guineo-Congolian Region and its relationships to other phytochoria. *Bulletin du Jardin Botanique National de Belgique* 49: 11–55.
<http://dx.doi.org/10.2307/3667815>