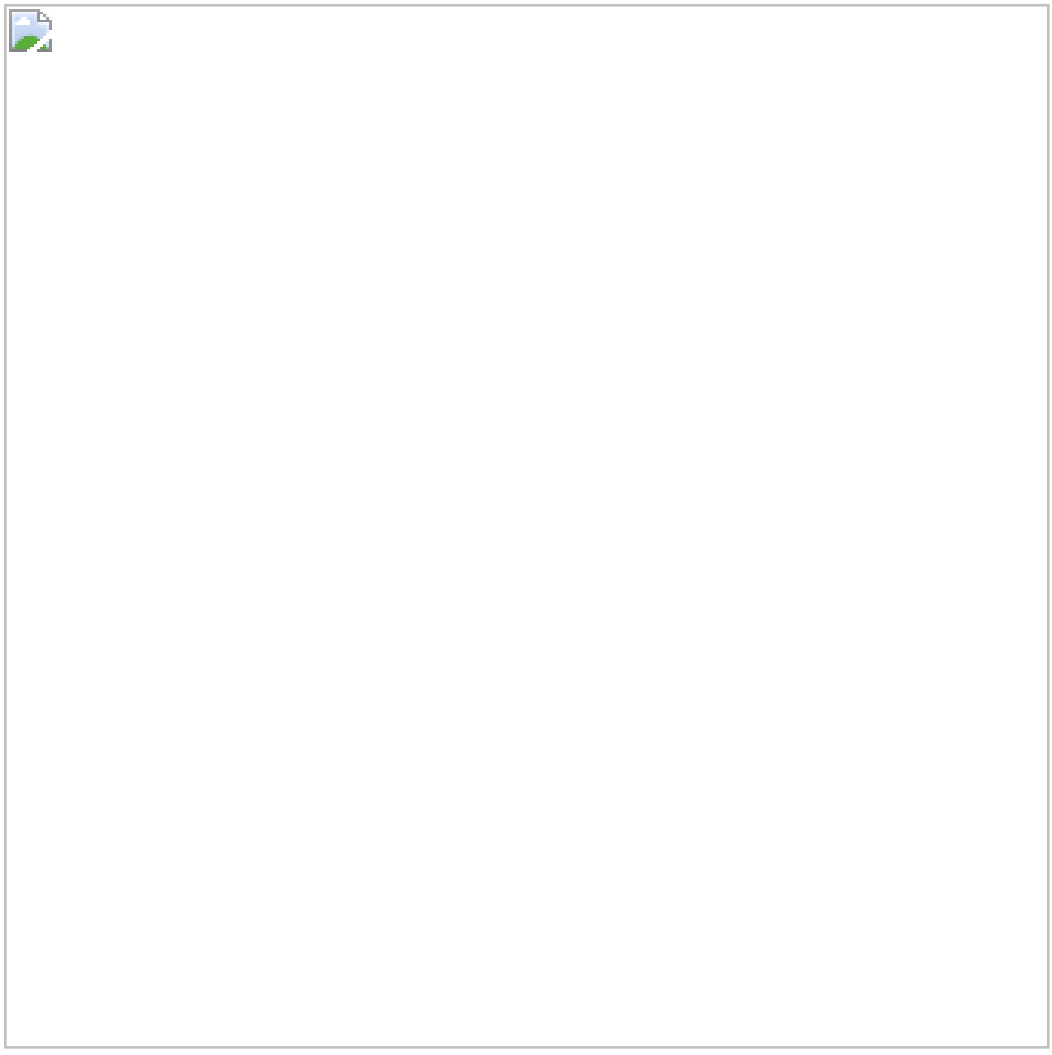

Grewia Gautieri Wahlert & Nusb. (Malvaceae, Grewioideae): a New Species from Madagascar

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Grewia gautieri Wahlert & Nusb. (Malvaceae, Grewioideae): a new species from Madagascar

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Abstract

WAHLERT, G. A., L. NUSBAUMER & P. RANIRISON (2014). Grewia gautieri Wahlert & Nusb. (Malvaceae, Grewioideae): a new species from Madagascar. *Candollea* 69: 149-155. In English, English and French abstracts.

Grewia gautieri Wahlert & Nusb. *(Malvaceae, Grewioideae)*, a new species from Madagascar, is described and illustrated. This new species is similar to *Grewia brideliifolia* Baill. by its 4-merous flowers, 3-flowered cymes, and drupaceous fruits, but differs by its chartaceous leaves, petals that usually lack a nectariferous gland, and fruits that contain a single pyrene. The distribution and ecology of the species are presented, and an IUCN conservation status is provided.

Key-words

MALVACEAE – GREWIOIDEAE – Grewia – Madagascar – Daraina forest complex – Loky-Manambato – Taxonomy – IUCN Red List

Résumé

WAHLERT, G. A., L. NUSBAUMER & P. RANIRISON (2014). Grewia gautieri Wahlert & Nusb. (Malvaceae, Grewioideae): une nouvelle espèce du nord de Madagascar. *Candollea* 69: 149-155. En anglais, résumés anglais et français.

Grewia gautieri Wahlert & Nusb. *(Malvaceae, Grewioideae)*, une nouvelle espèce de Madagascar, est décrite et illustrée. Cette espèce nouvelle est proche de *Grewia brideliifolia* Baill. de par ses fleurs tétramères, ses cymes triflores et ses fruits drupacés mais elle en diffère par ses feuilles papyracées, par ses pétales ne présentant généralement pas de glande nectarifère et par son fruit contenant un seul pyrène. La distribution et l'écologie de l'espèce sont présentées et son statut de conservation UICN est proposé.

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Introduction

The Old World genus *Grewia* L. is composed of ca. 150 species of trees, shrubs, and lianas, and in Madagascar it is represented by 66 published species that occur in a wide variety of vegetation types and bioclimatic regions (Schatz, 2001; Chung, 2005; Randrianasolo & al., 2013; Madagascar Catalogue, 2014). *Grewia* was never treated in the "Flore de Madagascar et des Comores" series (Humbert & al., 1936-), but René Capuron (1921-1971) was actively working towards a revision of the genus in Madagascar at the time of his death (Mabberley & Capuron, 1999).

Two different infrageneric classifications have been proposed for the genus: Burret (1926) divided the genus into four sections, whereas Capuron (1963) divided *Grewia* into three subgenera. Both classifications are badly outdated and are of limited taxonomic value because only a few continuous and overlapping characters were used to delimit taxa. Nevertheless, some infrageneric taxa from Madagascar have been revised: *Grewia* subg. *Grewia* sect. *Axillares* Burret (Capuron, 1964), *Grewia* subg. *Vincentia* (Benth.) Capuron (Capuron & Mabberley, 1999), and *Grewia* subg. *Burretia* (Hochr.) Capuron (Mabberley & Capuron, 1999). The lack of a useful infrageneric classification in *Grewia* makes taxonomic study of the Malagasy species difficult, especially given the large amount of unidentified specimens at some herbaria (e.g., G, MO, and P). As a result, the taxonomic position of Malagasy species based on the classification of Capuron (1963) must be considered tentative until the entire genus can be comprehensively revised - a situation also recognized by Mabberley (Mabberley & Capuron, 1999).

The authors of this paper, as well as an anonymous curator at TEF, had independently identified as a new species an unnamed *Grewia* with 4-merous flowers from the Loky-Manambato forest complex (in the Daraina region) and Montagne d'Ambre. Representative herbarium specimens of the new species were similar to other species in *Grewia* subg. *Burretia*, which is loosely delimited by two characters: the subulate branches of the stigma and the fruit composed of ca. 4-8 single-seeded pyrenes (Capuron, 1963; Mabberley & Capuron, 1999). In Madagascar, the subgenus contains 14 species, most of which have 5-merous flowers, but also includes at least three species with 4-merous flowers: *G. ambongoensis* Baill., *G. brideliifolia* Baill., and *G. microcyclea* (Burret) Capuron & Mabb. (Mabberley & Capuron, 1999). Subsequent study by the authors of all available herbarium material at G, MO, P, TAN, and TEF confirmed that the specimens represented a new species. In this paper, we describe this new species of *Grewia*, provide an illustration and distribution map, and make a preliminary conservation assessment using the IUCN Red List criteria (IUCN, 2012).

Taxonomic treatment

Grewia gautieri Wahlert & Nusb., **spec. nova** (Fig. 1-3).

Typus: Madagascar. Prov. Antsiranana: sous-préfecture de Vohemar, Daraina, forêt d'Antsahabe, 13°12'50''S 49°31'47''E, 468 m, 25.I.2006, bud, fl., *Nusbaumer & Ranirison 1983* (holo-: G [G00090340]!; iso-: MO!, K!, P!, TEF, research herbarium of Daraina).

Grewia gautieri Wahlert & Nusb. is similar to G. brideliifolia Baill. by its 4-merous flowers, 3-flowered cymes, and fibrous, indehiscent, drupaceous fruits, but differs by its chartaceous leaves that dry green-brown to light brown (vs. coriaceous leaves that dry dark brown to black-brown in G. brideliifolia), petals that lack, or only very rarely have, a nectariferous gland (vs. a well-developed nectariferous gland), and fruits that contain a single pyrene (vs. fruits that contain 4-8 pyrenes).

Shrub or small tree up to 9 m tall; young stems sparsely to moderately pubescent with white simple trichomes up to 0.6 mm long and minute stellate trichomes up to 0.8 mm long; young branches without leaves and covered with stipules. *Stipules* linear, 1.5-5.5 × 1-3 mm, persistent, brown in vivo, sparsely to moderately pubescent with simple trichomes like those of the stem, apex acute. *Leaves* alternate, chartaceous; petiole 0.5-2.5 mm long, sparsely to moderately pubescent; blade 1.6-5.8 × 0.7-2 cm, elliptic-lanceolate to ± rhombic, green-brown when dry, glabrous to sparsely pubescent with simple trichomes on both surfaces, sparsely to moderately pubescent on the primary and secondary veins on both surfaces, base cuneate to rounded, margin serrate to serrulate, apex acute to rounded; blade sub-palmatinerved but appearing penninerved, with 2-5 pairs of secondary veins, the basal two secondary veins subopposite and extending upwards ca. ½ the length of the blade, tertiary veins reticulate, midvein, secondary and tertiary veins slightly raised on both surfaces; domatia sometimes present in the axils of the midvein and secondary veins. *Inflorescence* an axillary umbellate 3-flowered cyme; peduncle 0.2-3.7 mm long, sparsely to moderately pubescent with simple trichomes; pedicels 4-8 mm long, sparsely to moderately pubescent with simple trichomes; pedicel bracts narrowly triangular-linear, 0.8-2 mm long, abaxial surface sparsely to moderately pubescent with simple trichomes, margin ciliolate, apex acute, recurved. *Flowers* 4-merous, very rarely 5-merous; *calyx* erect in bud, sepals valvate, strongly reflexed at anthesis, 3.8-5 × 0.6-1.8 mm, oblong to oblanceolate, often slightly constricted near the middle, abaxial surface sparsely to moderately pubescent with simple and stellate trichomes, densely stellate-pubescent along the margin, adaxial surface glabrous to sparsely pubescent with simple and stellate trichomes, margin entire, revolute, apex acute, creamy-white to light green in vivo, with a light red, rose or orange patch at the base of the adaxial surface; *petals*

Fig. 1. – Inflorescence of *Grewia gautieri* Wahlert & Nusb. [*Ranirison & Nusbaumer 1109*] [Photo: P. Ranirison]

3-4 × 0.3-1 mm, oblong to oblanceolate, glabrous to sparsely pubescent with simple and stellate trichomes abaxially and adaxially, sometimes moderately to densely pubescent towards the base on the adaxial surface, margin entire, apex bifid, white to cream in vivo, drying brown-orange, nectariferous gland absent or only very rarely present in a reduced or vestigial state on the lower adaxial surface; *androgynophore* 0.4-0.9 mm, glabrous, receptacle densely pubescent; *stamens* ca. 20 to 35, filament 1.5-3 mm long, laterally flattened, often fluted in cross section, glabrous, yellow-white in vivo, anther ellipsoid, 0.3-0.4 × 0.2-0.3 mm, yellow to orange in vivo; *ovary* densely hirsute with whitish simple trichomes, style 2-3 mm long, stigma 4-lobed. *Fruit* a fibrous, indehiscent drupe containing a single pyrene, ± round to irregularly shaped, wrinkled, 5-7 mm long, 4-7 mm in diam., moderately pubescent with whitish simple trichomes, whitish-green to whitish-yellow in vivo, pyrene obovoid-discoid, 3.9-4.1 mm × 2.2-3.5 mm, 1.2-1.5 mm thick, beige-brown, foveolate.

Distribution. – The species is known primarily from Antsiranana Province in the Loky-Manambato region (Daraina), but also on the slopes of Montagne d'Ambre and Bezavona Massif near the southwest of Vohemar in the North of Madagascar. A single individual *(Ratovoson & al. 642)* is disjunctly distributed ca. 450 km to the south, near the NE portion of Alaotra Lake in Toamasina Province (Fig. 4).

Habitat and ecology. – *Grewia gautieri* occurs in humid forests, semi-deciduous forests, and along streams or rivers in dry forests up to 1,100 m elevation. It grows on a variety of geological substrates, including metamorphic rocks, basalts, lake deposits, and sandstones. In the Loky-Manambato region, where a detailed vegetation study and floristic inventory was conducted (Gautier & al., 2006; Ranirison, 2010; Nusbaumer, 2011), the species was found in forests with canopies reaching up to 14 m, with some emergent trees reaching up to 18 m. The species most frequently recorded together

Fig. 2. – Fruiting plant of *Grewia gautieri* Wahlert & Nusb. [*Nusbaumer & Ranirison 1209*] [Photo: L. Nusbaumer]

with *Grewia gautieri* are, in decreasing order: *Dracaena xiphophylla* Baker, *Strychnos madagascariensis* Poir., *Drypetes perrieri* Leandri, *Mallotus oppositifolius* (Geiseler) Müll. Arg., *Pandanus analamerensis* Huynh, and *Diospyros olacinoides* (H. Perrier) G. E. Schatz & Lowry.

Phenology. – Based on herbarium specimen label data, the species flowers from January to March and fruits from February to March.

Notes. – The new species described here is tentatively placed in *Grewia* subg. *Burretia* as circumscribed by Capuron (1963). The subgenus is poorly delimited using just two characters (the shape of the stigma and the morphology of the fruit), yet we have included *G. gautieri* in the subgenus based mainly on its morphological similarity to *G. brideliifolia*. There are at least two other species in the subgenus that have 4-merous flowers *(G. ambongoensis* and *G. microcyclea),* but much further study is needed to understand how this character state is distributed among other species of *Grewia* in Madagascar, if at all.

One of the most striking morphological features of *G. gautieri* is the complete lack of a nectiferous gland on the basal adaxial portion of the petal. Among all of the flowering material studied for the new species, only a single specimen from the forêt d'Antsahabe *(Nusbaumer 1066)* had a nectiferous gland, which was somewhat vestigial or reduced in size. The combination of characters for *G. gautieri* (i.e., absence of a gland, chartaceous leaves that dry green-brown, and fruits that contain a one single-seeded pyrene), should serve to readily delimit it from *G. brideliifolia* and other unnamed specimens from nearby littoral forests in Antsiranana Province (e.g., *Ratovoson & al. 827; Rabehevitra & al. 929* and *4493; Rabenantoandro & al. 1082* and *1285*). The specimen, *Ratovoson & al. 642,* from Toamasina Province, is far out of the range of the core area of distribution for the species, but it closely matches the other specimens from Antsiranana Province, including the lack of a nectiferous gland.

One herbarium specimen *(Meyers 40)* records that the leaves are eaten by a lemur, the Golden-crowned Sifaka *(Propithecus tattersalli)*.

Vernacular name. – The common name "*sely*" was recorded from one herbarium specimen *(Meyers 256);* a name that has been applied to other species of *Grewia* in Madagascar.

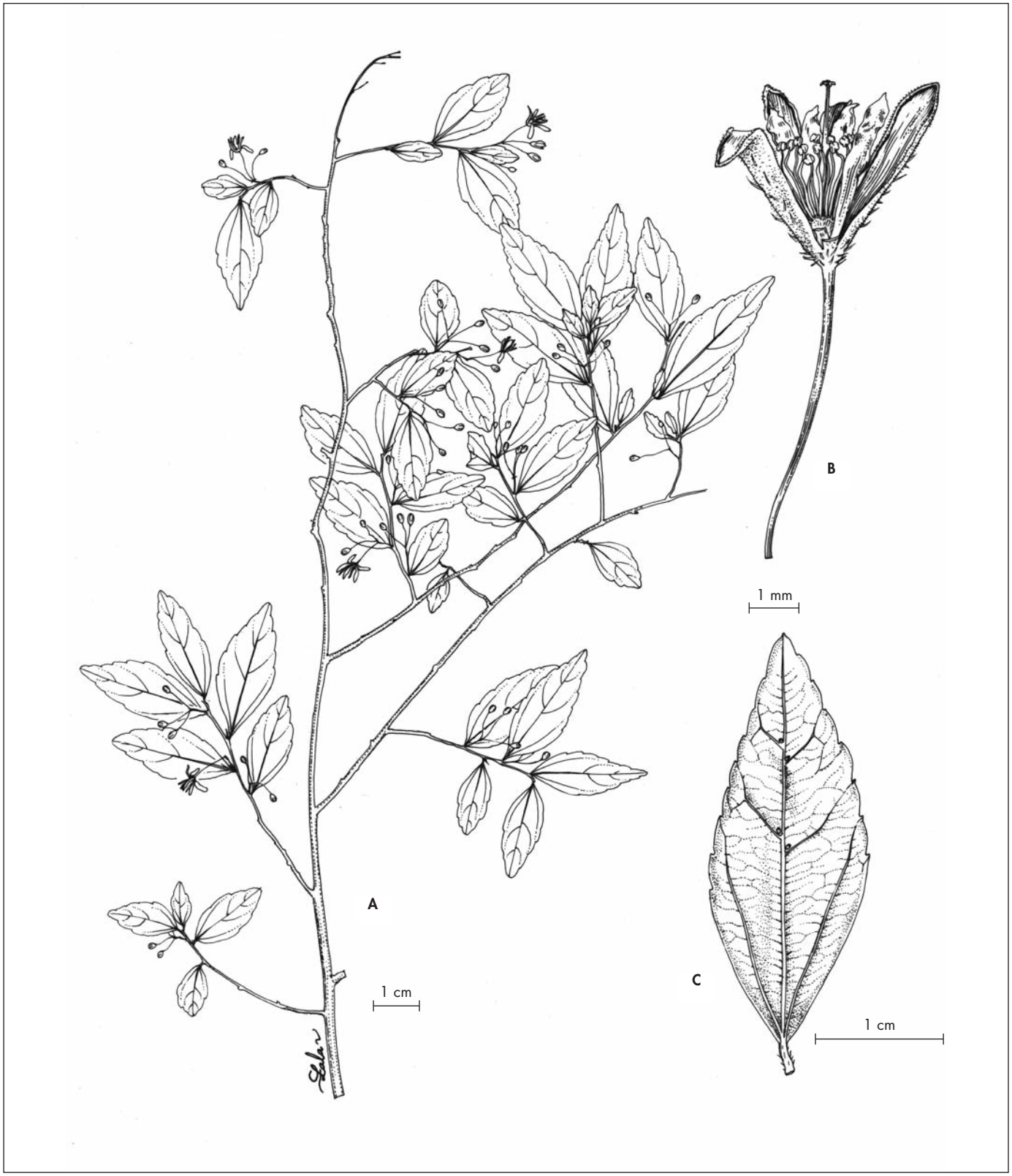

Fig. 3. – *Grewia gautieri* Wahlert & Nusb. **A.** Flowering branch ; **B.** Flower ; **C.** Leaf.
[*Service Forestier 20048*, P] [Drawn by R. L. Andriamiarisoa]

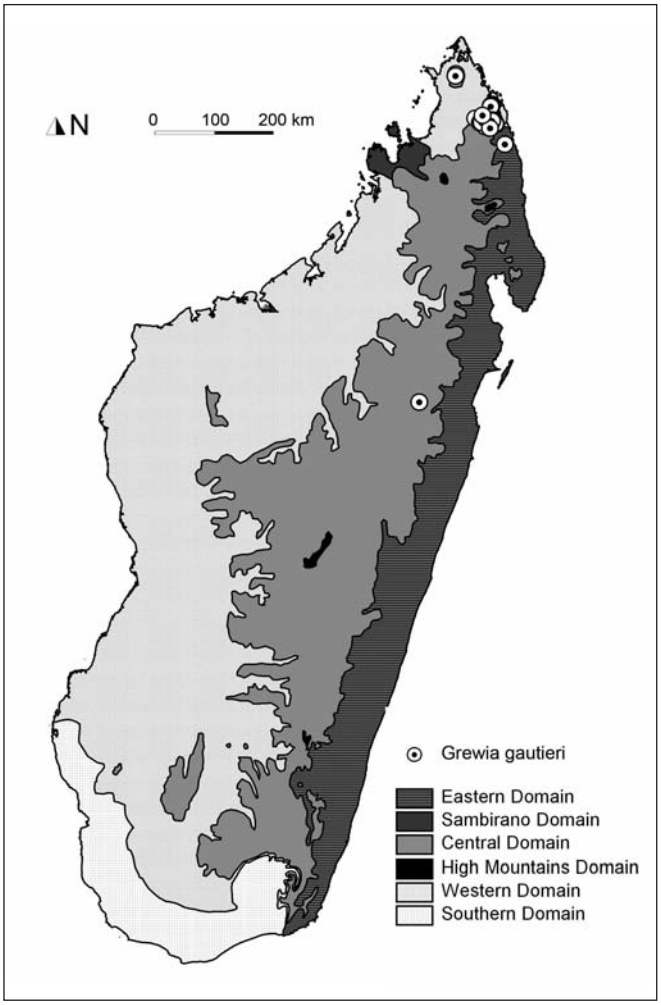

Fig. 4. – Map showing the distribution of *Grewia gautieri* Wahlert & Nusb. in Madagascar (circles), plotted on the map of phytogeographical domains sensu HUMBERT (1955).

Conservation status. – With an AOO of 180 km² and an EOO of 25675 km² and 67 occurrences known (including 15 herbarium specimens collected and 52 occurrences based on previous vegetation studies) among 13 subpopulations of which 12 occur in protected areas, *G. gautieri* is assigned a preliminary status of "Near Threatened" (NT) following the IUCN Red List Categories and Criteria (IUCN, 2012, calculation following CALLMANDER & al., 2007; MOAT, 2007).

Etymology. – The new species is named in honor of Laurent Gautier (G) who initiated the Loky-Manambato botanical project. Gautier also provided LN and PR the opportunity to carry out research for their dissertation in the Daraina region and instilled in them his passion for the study and conservation of the Malagasy flora.

Paratypi. – **MADAGASCAR. Prov. Antsiranana:** Montagne d'Ambre, silva Montana procera, 1000 m, 20-21.XII.1967, fl., *Bernardi 11969* (G [G00170781]!); Analamazava, part of Binara Range, SW of Daraina (Vohemar), 200-1180 m, 23.II.1990, y. fr., *Meyers 40* (MO, P!, TAN); *ibid. loc*., 23.I.1991, buds, *Meyers 256* (MO!, P!); Antsahalalina, part of Bobankora Range, 12 km E of Daraina, 13°14'S 49°46'E, 205-607 m, 15.III.1990, fr., *Meyers & Boltz 67* (MO, TAN); Daraina, forêt d'Antsahabe, 13°13'10"S 49°33'5"E, 855 m, 20.I.2004, buds, fl., *Nusbaumer 1066* (G [G00006507]!, K!, MO!, P!, TEF, research herbarium of Daraina); Daraina, forêt d'Ankaramy, 13°17'15''S 49°40'44''E, 250 m, 23.II.2004, fr., *Nusbaumer & Ranirison 1209* (G [G00028467]!, K!, MO!, P!, TEF, research herbarium of Daraina); Daraina, forêt d'Ampondrabe, 12°57'44''S 49°41'13''E, 450 m, 18.II.2005, fr., *Nusbaumer & Ranirison 2133* (G [G00086433]!); *ibid. loc.*, 12°56'59''S 49°42'38''E, 423 m, 20.II.2005, fr., *Nusbaumer & Ranirison 2134* (G [G00070033]!); bord du Makys, vers 800 m, XI.1932, fl., *Perrier de la Bâthie 18836* (G, MO, P [P00262016, P00262017]!, TAN); Daraina, forêt d'Ambilondamba, 13°09'39''S 49°38'47''E, 390 m, 1.II.2004, imm. fr., *Ranirison & al. 375* (G [G00028054]!, K!, MO!, P!, TEF, research herbarium of Daraina); Daraina, forêt d'Antsahabe, 400 m, 13°12'58''S 49°31'36''E, 24.I.2006, fl., *Ranirison & Nusbaumer 1109* (G [G00090537]!, K!, MO!, P!, TEF, research herbarium of Daraina); Montagne d'Ambre, env. de la Station Forestière des Roussettes et du Petit Lac, [12°31'30''S 49°10'20''E], vers 1000-1100 m, 18-20.XI.1958, fl., *Service Forestier 20029* (G, K, MO, NY, P [P00262026, P00263160]!, WAG); Massif de la Montagne d'Ambre, rive droite de la Rivière des Makis en aval de la grande cascade, [12°31'S 49°10'E], 18-20.XI.1958, fl., *Service Forestier 20048* (G, K, MO, P [P00262027, P00262028, P00263159]!, WAG); Massif du Bezavona, entre la Fanambana et la Manambery, pentes inférieures de la rive droite de l'Andilana, [13°32'S 49°54'E], 20.III.1967, buds, *Service Forestier 27542* (G, K, MO, P [P06641824]!). **Prov. Toamasina:** Amparafaravola, Vohimena-Ambodisakoana à 7 km de Vohimenakely, 17°20'05''S 48°38'21''E, 10.I.2002, fl., *Ratovoson & al. 642* (MO, P!, TAN).

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References

Burret, M. (1926). Beiträge zur Kenntnis der Tiliaceen. *Notizbl. Bot. Gart. Berlin* 9 : 592-880.

Callmander, M. W., G. E. Schatz, P. P. Lowry II, M. O. Laivao, J. Raharimampionona, S. Andriambololonera, T. Raminosoa & T. Consiglio (2007). Application of IUCN Red List criteria and assessment of Priority Areas for plant conservation in Madagascar : rare and threatened Pandanaceae indicate sites in need of protection. *Oryx* 42 : 168-176.

Capuron, R. (1963). Révision des Tiliacées de Madagascar et des Comores. *Adansonia* ser. 2, 3 : 91-127.

Capuron, R. (1964). Révision des Tiliacées de Madagascar et des Comores (suite). Les Grewia de la section Axillares Burret. *Adansonia* ser. 2, 4 : 269-300.

Capuron, R. & D. J. Mabberley (1999). Révision des Malvaceae-Grewioideae ("Tiliacées", p.p.) de Madagascar et des Comores. III. Les Grewia du sous-genre Vincentia (Benth.) Capuron. *Adansonia* ser. 3, 21 : 7-23.

Chung, R. C. K. (2005). Revision of Grewia (Malvaceae-Grewioideae) in peninsular Malaysia and Borneo. *Edinburgh J. Bot.* 62 : 1-27.

Gautier, L., P. Ranirison, L. Nusbaumer & S. Wohlhauser (2006). Aperçu des massifs forestiers de la région Loky-Manambato. *In :* Goodman, S. M. & L. Wilmé (ed.), *Inventaires de la faune et de la flore du Nord de Madagascar dans la région Loky- Manambato, Analamerana et Andavakoera :* 81-99. CIDST, Ministère de l'Education Nationale et de la Recherche Scientifique, Antananarivo.

Humbert, H. (1955). Les territoires phytogéographiques de Madagascar. *Année Biol.* ser. 3, 31 : 439-448.

Humbert, H., J. F. Leroy & P. Morat (ed.) (1936-). *Fl. Madagascar Comores*. Muséum national d'Histoire naturelle, Paris.

IUCN (2012). *IUCN Red List Categories and Criteria : Version 3.1.* 2nd edition. IUCN Species Survival Commission, Gland & Cambridge.

Mabberley, D. J. & R. Capuron (1999). Révision des Malvaceae-Grewioideae ("Tiliacées", p.p.) de Madagascar et des Comores. IV. Les Grewia de sous-genre Burretia (Hochr.) Capuron. *Adansonia* ser. 3, 21 : 283-300.

Madagascar Catalogue (2014). *Catalogue of the Vascular Plants of Madagascar.* Missouri Botanical Garden, Saint-Louis & Antananarivo [http://www.efloras.org/madagascar].

Moat, J. (2007). *Conservation assessment tools extension for Arc View 3.x, version 1.2.* GIS Unit, Royal Botanic Gardens, Kew [http://www.rbgkew.org.uk/gis/cats].

Nusbaumer, L. (2011). *Species distribution patterns in steep environmental gradients : downscaling of a biogeographical framework* (*Loky-Manambato Region, NE Madagascar*). Ph.D. thesis, University of Geneva.

Randrianasolo, A., P. P. Lowry II, G. E. Schatz, P. B. Phillipson & G. A. Wahlert (2013). The lianescent species of Grewia L. (Malvaceae s.l., formerly Tiliaceae) in Madagascar. *Adansonia* ser. 3, 35 : 73-85.

Ranirison, P. (2010). *Les massifs forestiers de la région de la Loky-Manambato* (*Daraina*)*, écorégion de transition Nord : caractéristiques floristiques et structurales. Essai de modélisation des groupements végétaux*. Thèse de Doctorat, Université d'Antananarivo.

Schatz, G. E. (2001). *Generic Tree Flora of Madagascar*. Royal Botanical Gardens, Kew & Missouri Botanical Garden, St. Louis.