

Typification and taxonomic notes of Smilacaceae species in Java

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ABSTRACT. Smilacaceae is known as a taxa with wide phenotypic variation and their taxonomical complexities remain unsolved. The three species of Smilacaceae housed in Java, are given nomenclature history. Since all the potential sources of original material have been investigated, but nothing has been identified, three neotypifications were designated here. Herbarium specimen of Koorders 34990β in Herbarium Bogoriense (BO) was chosen as the neotype of *Smilax klotzschii*. The de Groot & Wehlburg RD52 herbarium specimen in BO was chosen as the neotype of *S. nageliana* and Blume 463 herbarium specimen in L was chosen as the neotype of *S. odoratissima*.

Keywords: Canar; Java; neotype; *Smilax*

Article History: Received 12 November 2020; Received in revised form 13 February 2021; Accepted 30 May 2021; Available online 30 June 2021

How to Cite This Article: Sulistyaningsih LD, Abinawanto A, Ardiyani M, Salamah A, Haryadi A. 2021. Typification and taxonomic notes of Smilacaceae species in Java. *Biogenesis: Jurnal Ilmiah Biologi*. vol 9(1): 42-49. doi: <https://doi.org/10.24252/bio.v9i1.17218>.

INTRODUCTION

Smilacaceae was a family proposed by Ventenat in 1799 with *Smilax* L. as the genus type. This family consisted of more or less 200 climber species with tuberous or stoloniferous rhizomes, alternate leaves with reticulate venation. In addition, they had paired interpetiolar tendrils, mostly spinous stems, unisexual flowers with six tepals, and either six fertile stamens or staminodes in pistillate flowers, umbellate inflorescence, including fleshy berries. This family has a long nomenclature history and has been placed in various positions, such as in Liliales *sensu lato* (*s.l.*) (Hutchinson, 1979; Thorne, 1983; Goldberg, 1989; Cronquist, 1991), Dioscoreales (Dahlgren & Clifford, 1982; Thorne, 1992) or Asparagales (Hurber, 1969). Takhtajan (1987) considered Smilacaceae as a member of Smilacales which included three additional families, namely: Philesiaceae (*Philesia* Comm. ex Juss., *Lapogeria* Ruiz & Pav.), Ripogonaceae (*Ripogonum* J.R.Forst & G.Forst), and Luzuriagaceae (*Luzuriaga* Ruiz & Pav). Recent studies have confirmed that Smilacaceae is a member of a monophyletic Liliales, closely related to Philesiaceae, Ripogonaceae, and Liliaceae *sensu stricto* (*s.s.*) (Chase *et al.*, 1995; Patterson & Givnish, 2002;

Fay *et al.*, 2006; Kim *et al.*, 2013; Petersen *et al.*, 2013).

Taxonomical and systematic study of Smilacaceae is still ongoing because the problems remain complex. Moreover, the concept of the genus, species, or infraspecific taxa delimitation is still unclear and doubtful. Recent floristic and monographic studies of Smilacaceae showed that only about 200 from more than 350 species already described are currently known in the family with more than 40% considered synonyms (Qi *et al.*, 2013). This is due to the taxonomic confusion about Smilacaceae. The species determination of Smilacaceae is challenging because they are dioecious plants with considerable phenotypic variation within populations and even among leaves of the same individual plant (Cameron & Fu, 2006). Moreover, many herbarium specimens lack flowers of both sexes or even single-sex flowers.

In Asia, taxonomic studies of Smilacaceae was performed in some regions such as Papua New Guinea (Ridley, 1916), Philippines (Merrill, 1918), Peninsular Malaysia (Ridley, 1924), Java and Kalimantan (Backer & Bakhuizen v.d. Brink Jr., 1968; Ungson & Sastrapradja, 1976; Sofiah & Sulistyaningsih, 2019), Taiwan (Koyama, 1975), and China (Chen & Koyama, 2000). Revision studies of

the genus *Smilax* have been performed in Central America and the Caribbean (Ferrufino-Acosta & Greuter, 2010). Furthermore, Backer & Bakhuizen v.d. Brink Jr. (1968) have made an enormous monograph, titled “Flora of Java.” However, for the family Smilacaceae, there were unclear circumscriptions for each species including their typifications. The typification must be the starting point of any taxonomic study especially under challenging taxa such as Smilacaceae (Ferrufino-Acosta & Greuter, 2010; Altınordu, 2015). During this systematic study of Smilacaceae in Java, several names remained untypified. Although typifications are still needed since stabilizing the names will facilitate their use.

MATERIALS AND METHODS

This study was based on examination of relevant literature and specimens deposited in Herbarium Bogoriense (BO), Singapore Herbarium (SING), and type specimens images deposited in the following herbaria: The Natural History Museum (BM), Royal Botanic Garden (K), Naturalis (L) & Muséum National d'Histoire Naturelle (P) retrieved from JSTOR. For selecting types, protologues were compared with original material (mostly herbarium material) and the most complete and informative specimens were selected (Turland *et al.*, 2018). The new type designations were listed in alphabetical order and the names accepted as correct are in bold italic.

RESULTS AND DISCUSSION

Smilax klotzschii Kunth

Smilax klotzschii Kunth, Enum. Pl. (1850) 5: 245. —Type: Java, Djapara, 1899, Koorders 34990 β (Neotype, designated here, BO [1436082]) —Fig. 1.

Synonym: *Smilax klotzschii* var. *angulosa* A.DC.

Distribution — *Smilax klotzschii* only found in Central Java at the time of this study.

Notes — *Smilax klotzschii* is native to Java and distribution has been restricted around Central

Java. Kunth (1850) described these species in Enumeration Plantarum Omnium Hucusque Cognitarum, based on a single herbarium specimen collected from Java by Klotzsch in Herb. Reg. Berol. De Candolle (1878) in Monographiae Phanerogamarum cited Hoffmans 82 in Herb. DC and described a new variety of *Smilax klotzschii*, var. *angulosa* with Ploem no 17 in Herb. Kunth as holotype. All the original material cited above has not been traced. However, important Herbaria were known to house some of their duplicates such as K, L, BO, BM, BR, US, P, and even the Geneva Herbarium (G). The Geneva Herbarium has the specimens used for the preparation of the “Podrome” (1824–1873) and its continuation the “Monographie Phanerogamarum” (1874–1896). This also included the Augustin Pyramus De Candolle collections of Smilacaceae. Since all potential sources of original material have been investigated, but nothing was found, a neotype was proposed here (Art. 9.7 of the International Code of Nomenclature, Turland *et al.*, 2018). The selected specimen was in morphological agreement with the material studied since these specimen represented the species description in the protologue.

Smilax nageliana A.DC

Smilax nageliana A.DC. Monogr. Phan 1 (1878): 184 — Type: Java, Malang, Ranoe Daroengan, 19-22 Oct 1942, de Groot & Wehlburg RD52 (Neotype, designated here, BO [1597624]) —Fig. 2.

Distribution — These species found in East Java.

Notes — Alphonso de Candolle described a single specimen, Nagel no 27 in Herbarium Berlin (B) Germany as a newly described species, *Smilax nageliana*. Since the Herbarium Berlin was destroyed during World War II, the holotype is most likely lost. After careful tracking and observation of herbarium specimens including digital specimens in herbaria such as BM, BO, BR, G, K, L, SING, and US, no potential sources of original

material of *Smilax nageliana* was found. Since there is no original material still in existence or as long as it is missing, a neotype was proposed here (Art. 9.12, the International Code of Nomenclature, Turland *et al.*, 2018). East Java has restricted the distribution of *Smilax nageliana*. The Herbarium Bogoriense (BO) has just two specimen collection numbers, while de Groot & Wehlburg RD52 specimen represents the protologue description.

Smilax odoratissima **Blume**

Smilax odoratissima Blume, Enum. Pl. Javae (1831) 19; Alphonso de Candolle in Monogr. Phan. 1 (1878) 196; Stapf in Trans. Linn. Soc. Bot. 4 (1894) 242. Type — Java, Blume 463 (Neotype, designated here, L [L1462698]). — Fig. 3.

Distribution — It is native to Bangladesh, Borneo, Java, Lesser Sunda Island, Myanmar, and Thailand. These species are widespread in West Java, Central Java, and East Java.

Notes — *Smilax odoratissima* is distributed in the Malesia region, from Java to the Philippines. These species were first described by Blume (1831) in Enumeratio Plantarum Javae et insularum adjacentium without any

specimen cited. Alphonso de Candolle (1878) in Monographiae Phanerogamarum cited five specimens as lectotypes (i.e. Blume s.n. in Herb. Lugd. Bat., Jaeger 367 et 464 in Herb. Ber., Nagel 28, Lobb s.n. in K, Zoll 505 in Herb. Boiss). There were some *Smilax odoratissima* specimens in Herb. Lugd. Bat in L, but the Blume s.n. no longer exists. Similarly, Lobb s.n. was not found in K. Jaeger 367 was destroyed, while Zoll 505 in Herb. Boiss was not found at some herbaria such as BM, BO, BR, G, K, L, SING, and US. Since no original material linked to *Smilax odoratissima* could be traced, a neotype was proposed here (Art. 9.7, the International Code of Nomenclature, Turland *et al.*, 2018). There were some *Smilax odoratissima* specimens of Herb. Lugd. Bat. in BO and L: Mousset 638 (Java, BO), CA Backer 5663 (Pengalengan, BO & L), CA Backer 26146 (Pengalengan, 14 Oct 1918, BO & L), Koorders 37654 β (Ngadisari, 9 Oct 1899, BO & L), Koorders 28590 β (Pantjoer Idjen, 28 Aug 1897), Junghuhn 171 (Java, 1835-1863, L), and Blume 463 (Java, Mt Gede, L). Blume's collection was chosen as a neotype because one of the five specimens designated as lectotype by Alphonso de Candolle was a Blume specimen. Blume 463 represents the protologue description.



Fig. 1. Neotype of *Smilax klotzschii* Kunth, Koorders 34990β (BO).

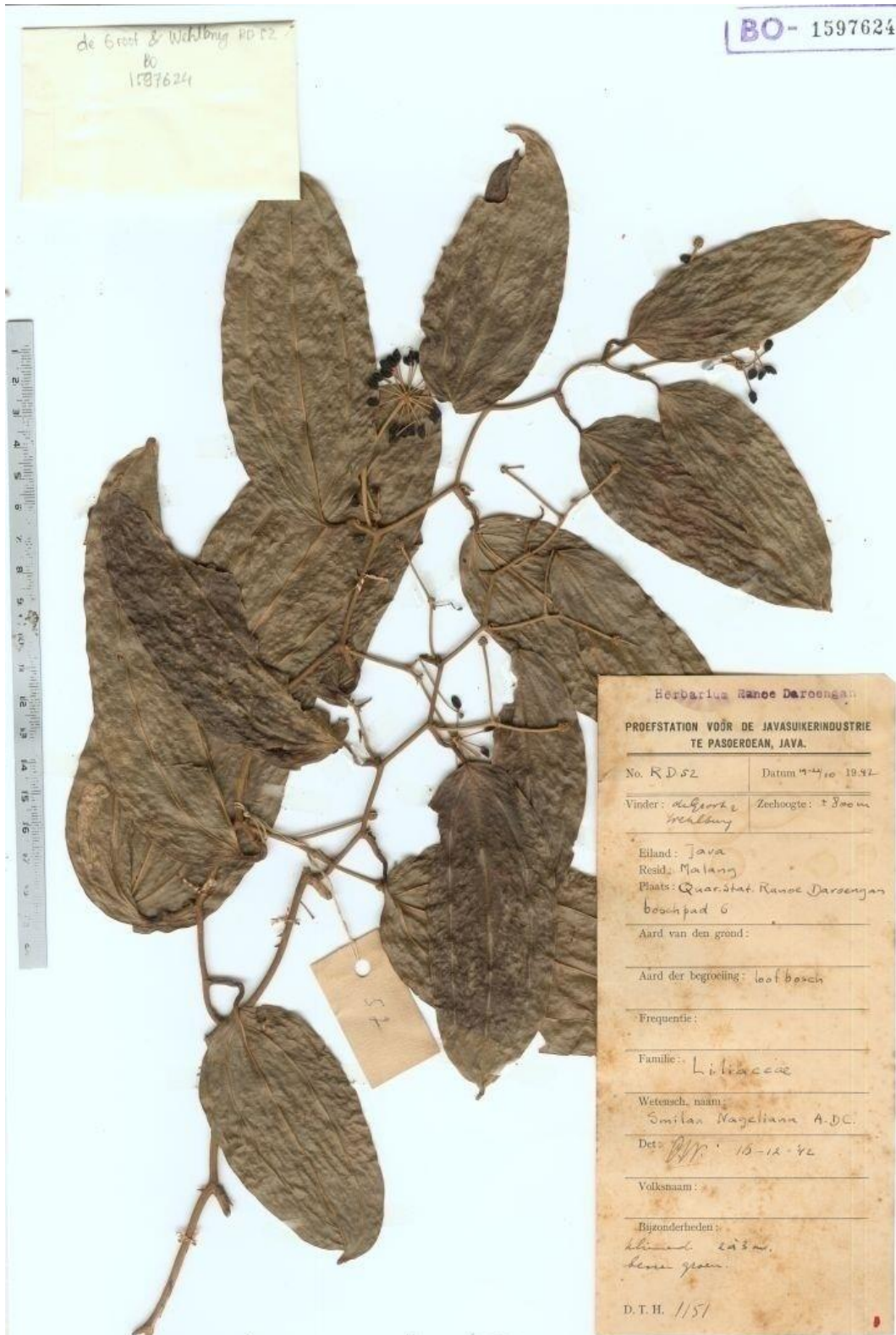


Fig. 2. Neotype of *Smilax nageliana* A. DC, de Groot & Wehlburg RD52 (BO).



Fig. 3. Neotype of *Smilax odoratissima* Blume, Blume 463 (L).

CONCLUSION

Three neotypification were made for the three species of Smilacaceae. Herbarium specimen of Koorders 34990 β was chosen as the neotype of *Smilax klotzschii*. The de Groot & Wehlburg RD52 herbarium specimen was chosen as the neotype of *S. nageliana*, while Blume 463 herbarium specimen was chosen as the neotype of *S. odoratissima*.

ACKNOWLEDGEMENTS

The authors thank to Herbarium Bogoriense, Research Centre for Biology, Indonesian Institute of Sciences, as well as all participants to make this research came to reality.

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