

Taxonomic notes on the genus *Najas* (Hydrocharitaceae) in Thailand: addition of *N. major* and exclusion of *N. minor*

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ABSTRACT

The genus *Najas* (Hydrocharitaceae) was treated for the Flora of Thailand in 2001 with four species recorded. Through field and herbarium observations, it is proposed to exclude one of these four species, *N. minor*. A further species, *N. marina*, is reported for the first time. An updated key to the species is provided.

KEYWORDS: aquatic monocots, Hydrocharitaceae, *Najas* L., taxonomy, Thailand.

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INTRODUCTION

The floristic treatment for the genus *Najas* L. (Hydrocharitaceae) was published as one of the eight genera of Hydrocharitaceae in Thailand (Haynes, 2001). The following four species were included: *Najas graminea* Delile var. *graminea*, *N. kingii* Rendle, *N. malesiana* W.J. de Wilde, and *N. minor* All. Among them *N. minor* is of particular interest because this species is mainly distributed in cool-temperate regions in the Northern hemisphere, and is only rarely or doubtfully reported from tropical region. For example, it is in India recorded only from northern and northeast states (Assam, Bihar, and Punjab; Cook, 1996). In Malesia, the species “seems very doubtfully native” because the only collection in this region is originate from Bogor Botanic Garden which therefore is assumed to be “contamination with imported water plants” (de Wilde, 1962).

Najas minor was described as “one of the more distinctive species of *Najas*” due to its leaf and seed coat morphology, with, “its mature leaves recurved and ... its areolae broader than long and arranged in longitudinal rows like the rungs of a ladder” by Haynes (2000). In Flora of Thailand, this species was recorded from Chaiyaphum province (Haynes, 2001). Although no herbarium specimens were cited in Haynes (2001), a single specimen annotated as

“*Najas minor* All.” by Haynes in 1985 was found in BKF herbarium (SN076057; Fig. 1A). This specimen, however, exhibits neither of the diagnostic characters of *N. minor* and instead has non-recurved leaves and hexagonal areolae (Fig. 1A, B). With its sloping leaf sheath (Fig. 1C), the specimen is within the circumscription of *N. kingii* in the key to the species in Haynes (2001), as it was annotated by L. Triest in 1991 (Fig. 1A). Ito & Barfod (2014), in their preliminary checklist of aquatic plants of Myanmar and Thailand, treated this specimen under the wider concept of *N. indica* (Willd.) Cham., that includes *N. kingii* (de Wilde, 1962), but here I follow Triest’s (1988) and Cook’s (1996) concept of *N. kingii*, in which this species is distinguished from *N. indica* in leaf sheath morphology.

Some aquatic plant species are known to have cosmopolitan distributions, among which is *Najas marina* (Sculthorpe, 1967; Les *et al.*, 2003). In tropical Asia, *N. marina* is widely distributed in China (Wang *et al.*, 2010), India (Cook, 1996), Indonesia (de Wilde, 1962), Pakistan (Cook, 1996), Sri Lanka (Cook, 1996) and Taiwan (Yang, 2000), but not recorded from Thailand (Haynes, 2001). Through field observations and herbarium surveys, I have encountered individuals and herbarium specimens of *N. marina*.

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Here I propose to exclude *Najas minor* from Flora of Thailand and report *N. marina* as a new record and the fourth species. An emended key to the species of *Najas* for Flora of Thailand is provided.

MATERIALS AND METHODS

This study is based on observations in the field (Central and South-Western Thailand) and on the examination of eleven *Najas* collections from the following herbaria: AAU, BKF, K, TNS. All specimens cited have been seen by the author, unless otherwise annotated as *n.v.*

NEW RECORD

Najas marina L. in Sp. Pl.: 1015. 1753; Rendle in Trans. Linn. Soc. Lond. Bot. 5: 389. 1899, Pfl.-reich 7(IV-12): 7. 1901; Ohwi, Fl. Jap.: 58. 1953, ed. Engl.: 124. 1965; W.J.J. de Wilde, Fl. Males., Ser. 1, Spermat. 6(2): 162. 1962, var. *marina*; Hatus., Fl. Ryukyus: 647. 1971; H.I. Aston, Aquatic Plants of Australia: 260. 1973; Y.P. Yang, Fl. Taiwan 5: 37. 1978, ed. 2, 5: 33. 2000; Dandy, Fl. Europ. 5: 13. 1980; C.D.K. Cook, Aquatic and Wetland plants of India: 271, f. 281. 1996; R.R. Haynes, Fl. N. Amer. (1993+). 22: 79. 2000; Q.F. Wang et al., Fl. China 23: 92. 2010, var. *marina*; S.W.L. Jacobs & McColl, Fl. Australia 39: 100. 2011. Type: Finland, Aland, *Linnaeus 1156.1* (LINN [digital image!]) consulted at <http://linnean-online.org/11885/>; lectotype designated by Viinikka in Ann. Bot. Fenn. 13: 128. 1971).

— *Najas intermedia* Wolfg. ex Gorski in Eichwald, Naturhist. Skizze: 126. 1830. — *Najas marina* subsp. *intermedia* (Wolfg. ex Gorski) Casper in Feddes Repert. 90: 236. 1979. Type: [Lithuania]. In lacu Nawy prope Wysoki-Dwor (10. miliaria a Vilna) et in stagno circa Strawa (4. miliaria a Vilna) districto Trocensi legit *M.M. Gorski 1826* (lectotype **WI**,

designated by Bräuchler 2015 in Taxon 64: 1029. 2015. Fig. 2. *n.v.*).

Herbs, submerged, robust, annual, to 3 m long. *Plants* dioecious. *Stems* to 2 mm diam.; internodes spinescent. *Leaves* subopposite or in pseudowhorls of 3–7, linear, flat, to 5 x 0.5 cm (including spines), apex acute; septa and fibres always absent; margins with numerous large multicellular spine-tipped teeth to 2 mm long; midrib usually with similar teeth; sheath without auricles. *Flowers* unisexual. *Male flowers* spatheate, 3–4 mm long; anther 1–3 mm long, tetrasporangiate. *Female flowers* espatheate, 3–4 mm long; ovary 1–3.5 mm long; style 0.3–1.6 mm long; stigma usually 3-lobed. *Seed* 3.5–6 mm long, with remnants of style attached; testa with irregularly arranged areoles.

Thailand.— SOUTH-WESTERN: Prachuap Khiri Khan [Khao Sam Roi Yot National Park, 13 Nov. 2012, *Ito et al. Y11071* (**BKF**: SN201562!)] ; PENINSULAR: Phatthalung [Peninsular Botanical Garden, Thale Noi Bord reservoir, 7 Oct. 2005, *Esser et al. 05-91* (**BKF**: SN185278!); *Tillich 5094* (**BKF**: SN175225!)] .

Distribution. — Worldwide.

Ecology.— Fresh to brackish water lakes.

Conservation status. — Least Concern (LC).

Vernacular.— Sai nam (สายหนาม) (var. *sumatrana* W.J. de Wilde; Pooma & Suddee, 2014).

Note. — All names listed in the synonymy of *Najas marina* subsp. *intermedia* (Wolfg. ex Gorski) Casper by Triest (1988) are to be included here.

Triest (1988) distinguished 12 subspecies and four varieties under *Najas marina* based primarily on sizes of seed, ovary, style, stigma, and anthers. Because the three specimens at BKF lack any reproductive characters, no positive intraspecific identifications were made.

EMENDED KEY TO THE SPECIES OF NAJAS IN THAILAND

1. Stems and the abaxial side of the midribs armed with spines; leaf blades fleshy and often brittle; seeds 3.5 mm long or longer ***N. marina***
1. Stems and the abaxial side of the midribs armed without spines; leaf blades flat and usually flexible; seeds less than 3 mm long
 2. Leaf sheath sloping, rounded to broadly rounded, never auriculate ***N. kingii***
 2. Leaf sheath truncate or lacerate to auriculate
 3. Anthers 4-sporangiate; seeds 1.5–2.5 mm long ***N. graminea***
 3. Anthers 1-sporangiate; seeds 1.2–1.3 mm long ***N. malesiana***



Figure 1. *Najas kingii* (BKF: SN076057): A. a whole plant; B. seed coat morphology; C. leaf sheath morphology. Scale bar = 1 mm.

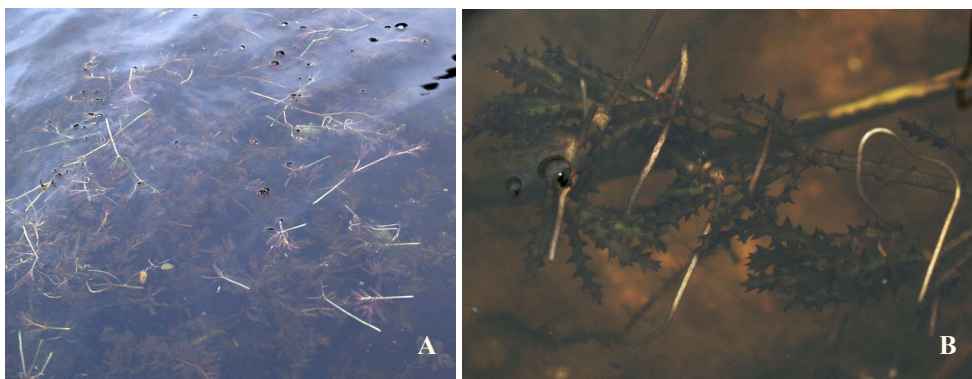


Figure 2. *Najas marina* (BKF: SN201562): A. habitat; B. habit. Photos by Y. Ito.

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