

An Account of the Asparagaceae in Thailand

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ABSTRACT.— A revision of the family Asparagaceae in Thailand is presented. One genus, *Asparagus* L., with two native species is recognized viz. *A. filicinus* Buch.-Ham. ex D. Don and *A. racemosus* Willd. Five introduced species commonly cultivated in Thailand are included; *A. aethiopicus* L., *A. densiflorus* (Kunth) Jessop, *A. officinalis* L., *A. setaceus* (Kunth) Jessop and *A. simulans* Baker. A key to these seven species with descriptions, distribution, ecology and vernacular names of each species are provided.

KEY WORDS: Taxonomy, Asparagaceae, *Asparagus*, Thailand

INTRODUCTION

The family Asparagaceae was first proposed by de Jussieu (1789) and included 16 genera. These genera were often treated within the family Liliaceae by several authors (Kunth, 1850; Hutchinson, 1934; Melchior, 1964 and Cronquist, 1981). However, the status of the family Asparagaceae has been subject to review over the past two centuries.

The most complete revision of the family was Baker's classification (1875), who divided the natural order Liliaceae into three suborders; Liliaceae proper, Colchicaceae and Asparagaceae, based on the fruit and stamen characteristics. The Asparagaceae was characterized by baccate fruit and introed stamens and then subdivided into eight tribes, 35 genera and 285 species. The tribe Asparageae contained only *Asparagus*, in which 98 species were placed in three subgenera: *Euasparagus* Baker (= *Asparagus* Kunth), *Asparagopsis* (Kunth) Baker and *Myrsiphyllum* (Willd.) Baker. This treatment was followed by most subsequent taxonomists until Dahlgren and Clifford

(1982) delimited the family Asparagaceae in narrow sense. They accepted three separate genera of *Asparagus* s.l. viz. *Asparagus* s.s., *Asparagopsis* and *Myrsiphyllum*, and include other three genera: *Ruscus*, *Danae* and *Semele*, within Asparagaceae, making a total of six recognized genera in the family.

Obermeyer (1983) followed Dahlgren and Clifford's classification and erected the genus *Protasparagus* Oberm. to replace the homonym *Asparagopsis* Kunth, and revised the genus *Myrsiphyllum* in the next year (Obermeyer, 1984).

In 1985, Dahlgren et al. transferred *Ruscus*, *Danae* and *Semele* to Ruscaceae, and recognized Asparagaceae with three genera: *Asparagus*, *Myrsiphyllum* and *Protasparagus*. However, Malcomber and Demissaw (1993) determined that the characters used to separate the three genera were inconsistent and so pointed out that these genera should at best be treated as subgenera of the *Asparagus* s.l. Then, the family Asparagaceae was proposed with only one genus *Asparagus*, and subdivided into two subgenera: *Asparagus* and *Myrsiphyllum*. Subsequently, Fellingham

and Meyer (1995), who investigated southern African *Asparagus* species, did not accept the existence of subgenera.

In addition, *Hemiphyllacus*, a small genus restricted to Mexico, was recently included in the family based on the evidence from embryology, cytology, and molecular studies (Heywood et al., 2007). Currently the family Asparagaceae is considered as a distinct family with two genera: *Asparagus* and *Hemiphyllacus*.

In Thailand, Asparagaceae is represented by one genus, *Asparagus*, which is treated in a wide sense without subgenera, following that of Fellingham and Meyer (1995). The family is recognized by having scale-like, cladodes (leaf-like stems) and axillary flowers or axillary inflorescences.

MATERIALS AND METHODS

This study was based mainly on the available taxonomic literature and on the study of herbarium specimens at the following herbaria: AAU, BCU, BK, BKF, BM, C, CMU, K, KKU, QBG, TCD and Herbarium of Biology Department, Chiang Mai University. Herbaria are abbreviated according to the Index Herbariorum (Thiers, 2011), plus HBD-CMU for the Herbarium of the Biology Department of Chiang Mai University. In addition, the distribution of each species (and surveys for any additional species) were assessed by fieldwork that was carried out throughout Thailand during 2006-2010. Distributional and ecological data were compiled, and the descriptions and a key to species were made.

SYSTEMATICS

Family Asparagaceae

Asparagaceae Juss., Gen. Pl.: 40. 1789.

Type: *Asparagus* L.

Perennial herbs or subshrubs with short rhizomes. *Aerial stem*: generally much-branched. *Cladodes*: axillary, solitary or fascicled, green, flattened, triquetrous, subterete or filiform. *Leaves*: reduced to scales, scarious, often with a spine at the base. *Flowers*: bisexual or unisexual, solitary or in clusters or racemes. *Perianth*: in two series of three segments each. *Stamens*: six; filaments usually adnate to perianth segments; anthers usually dorsifixed. *Ovary*: trilocular. *Fruit*: a berry.

Two genera, *Asparagus* distributed in the Old World and *Hemiphyllacus* endemic to Mexico.

Genus *Asparagus* L.

Asparagus L., Sp. Pl.: 313. 1753; Baker, J. Linn. Soc. Bot. 14: 594. 1875; Hook.f., Fl. Brit. Ind. 6: 314. 1892; Baker in Fl. Cap. 6: 256. 1896; Ridl., Fl. Mal. Pen. 5: 331. 1925; Gagnep. in Fl. Indo-Chine 6: 777. 1934; Jessop, Bothalia 9: 39. 1966 & in Fl. Malesiana 9: 215. 1979; Backer & Bakh.f., Fl. Java 3: 92. 1968; Noltie, Fl. Bhutan 3: 60. 1994; Dassanayake in Fl. Ceylon 14: 94. 2000; Xinqi & Tamanian in Fl. China 24: 208. 2000; Demissew in Fl. Trop. E. Afr.: 1. 2006; Ali & Wali Khan, Fl. Pakistan 217: 1. 2009. Type: *A. officinalis* L. (lectotype). *Myrsiphyllum* Willd., Ges. Naturf. Freunde Berlin Magazin 2: 25. 1808; Kunth, Enum. Pl. 5: 15. 1850; Oberm., Bothalia 15: 7. 1984. Type: *M. asparagoides* (L.) Willd.

Asparagopsis (Kunth) Kunth, Abh. Königl. Akad. Wiss. Berlin: 35. 1842 & Enum. Pl. 5: 76. 1850. Type: *A. albus* (L.) Kunth.

Protasparagus Oberm., S. Afr. J. Bot. 2: 243. 1983.

Perennial herbs or subshrubs with short rhizomes. *Roots*: thick, often tuberous. *Aerial stem*: erect, scandent or climbing, softly woody, glabrous, sometimes ridged. *Cladodes*: axillary, in fascicles, green, flattened, triquetrous, subterete or filiform. *Leaves*: spiral, scaly, appressed to stem, scarious, usually brown, often with a spine from the base; spine usually absent in leaf of the branchlets. *Flowers*: bisexual or unisexual, solitary or in a raceme; pedicel articulated, subtended by membranous bracteoles. *Perianth*: campanulate or subglobose, in two series of three segments each, free or occasionally connate at base. *Stamens*: six, opposite to segments; filaments usually adnate to perianth segments; anthers two-celled, dorsifixed, rarely versatile. *Ovary*: trilocular; ovules 1-4 per locule. *Berry*: one, many-seeded, with persistent perianth segments.

About 120 species, widespread in temperate and tropical regions of Africa, Asia, Australia and Europe. Seven species are known in Thailand, two indigenous and five introduced species.

Key to the Thai *Asparagus* species

1. Secondary branches present..... 2
 - Secondary branch absent..... 6
2. Cladodes flattened..... 3
 - Cladodes filiform, triquetrous or trigonous 4
3. Cladodes in one plane, falcate.....
 - *A. filicinus*
 - Cladodes more than one plane, elliptic, oblong or slightly curved..... *A. simulans*
4. Cladodes filiform..... 5
 - Cladodes triquetrous or trigonous..... *A. racemosus*

5. Flowers axillary and unisexual.....
 - *A. officinalis*
 - Flowers terminal and bisexual..... *A. setaceus*
6. Cladodes flattened..... *A. aethiopicus*
 - Cladodes triquetrous or trigonous *A. densiflorus*

Asparagus aethiopicus L. (Figure 1A)

Asparagus aethiopicus L., Mant. Pl. 1: 63. 1767; Baker, J. Linn. Soc. Bot. 14: 626. 1875; Baker in Fl. Cap. 6: 271. 1896; Jessop, Bothalia 9: 67. 1966; Dемисев in Fl. Trop. E. Afr.: 2. 2006. Type: South Africa; *Herb. Linn.* No. 434.6 (neotype-NBG, PRE-photos).

Protasparagus aethiopicus (L.) Oberm., S. Afr. J. Bot. 2(3): 243. 1983.

Asparagus sprengeri Regel., Act. Hort. Petrop. 11: 302. 1890; Baker in Fl. Cap. 6: 271. 1896; Backer & Bakh.f., Fl. Java 3: 93. 1968.

Erect subshrubs, 40-60 cm high. *Roots*: thick, with distantly ellipsoid tubers. *Main stem*: glabrous, rounded, distinctly striate-ridged; primary branches spiral, 3-9 cm long, 3-5-angled; secondary branch absent. *Cladodes*: in 2-3 fascicles, in more than one plane, flattened, linear, 8-16 mm long, 1.5-2 mm wide, with distinct midvein. *Leaves*: spinescent; scarious part triangular, 2-3 mm long, appressed to stem; spine reflexed, straight, 2.5-3 mm long, usually absent on branches. *Flowers*: bisexual, in a raceme; pedicels articulated near the middle, 2-5 mm long. *Perianth segments*: subequal, white with pink line on the midvein, ovate, 2.5-3 mm long, 1-1.5 mm wide. *Stamens*: adnate at the base of perianth segments; filaments 1.2-1.5 mm long, white; anthers ovate, 0.2-0.3 mm long, yellow. *Ovary*:

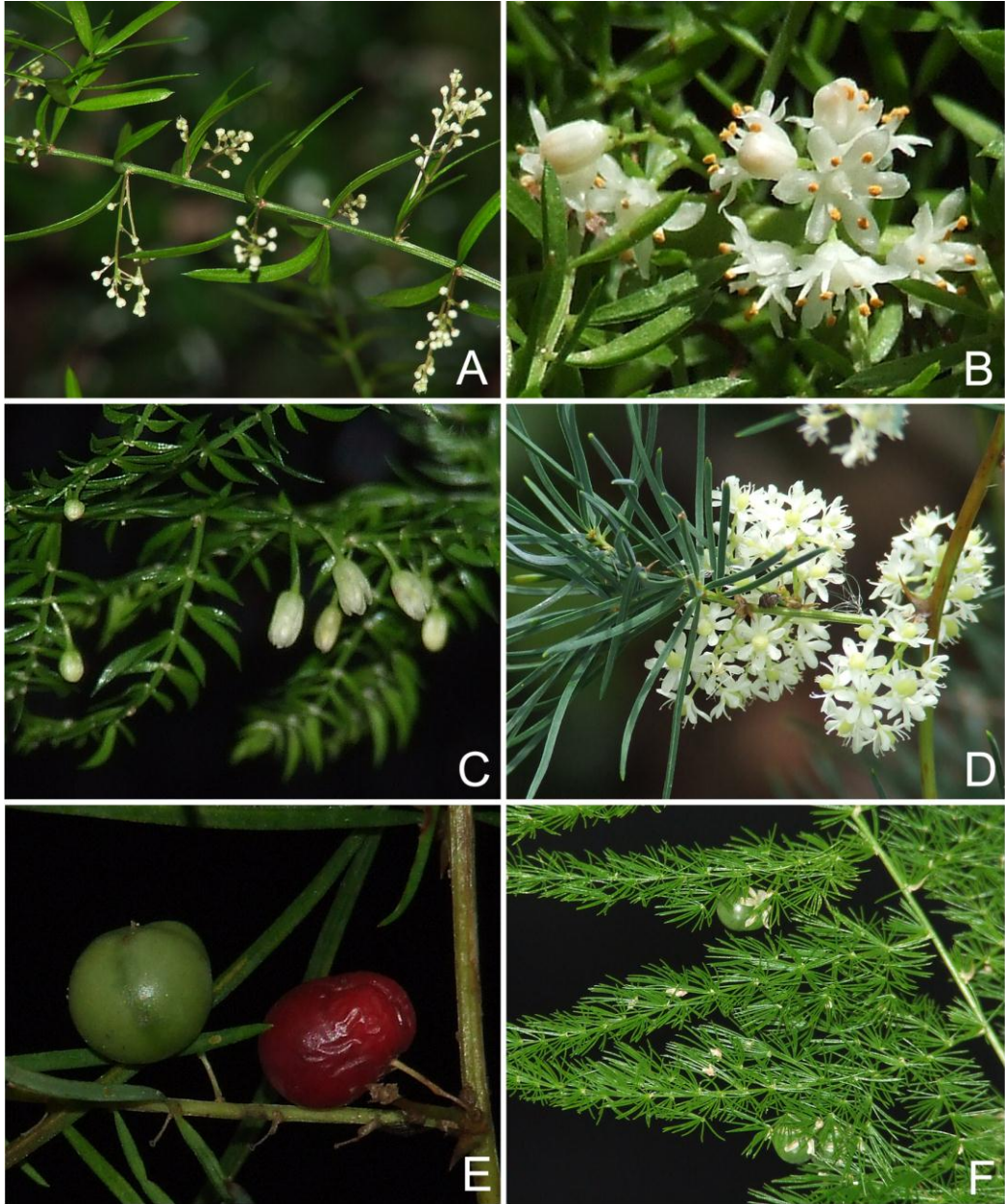


FIGURE 1. (A) *Asparagus aethiopicus*, (B) *Asparagus densiflorus*, (C) *Asparagus filicinus*, (D-E) *Asparagus racemosus* and (F) *Asparagus setaceus*.

ovoid, 0.6–1 mm long, with 1 ovule per locule; style absent; stigma trilobed. Berry: globose, 6–8 mm diam., 1–3-seeded, black when ripe. Seeds: globose, 2–3 mm long, black.

Thailand.— All provinces.

Distribution.— Southern Africa.

Ecology.— Introduced and cultivated as ornamentals.

Vernacular.— Prik.

Specimens examined.— *R. Thong-ngam* 12 (BCU), *A. Swasdilat* 31 (BCU) and *W. Tanming* 351 (KKU).

Notes.— This species is widely grown under the name *Asparagus sprengeri* or *A. densiflorus* (Kunth) Jessop cv. 'Sprengeri'. A review of authority of the species name confirms that the correct name is *A. aethiopicus* L. cv. 'Sprengeri'.

***Asparagus densiflorus* (Kunth) Jessop
(Figure 1B)**

Asparagus densiflorus (Kunth) Jessop, *Bothalia* 9: 65. 1966; Xinqi & Tamanian in *Fl. China* 24: 210. 2000. Type: Cape, *Lalande* s.n. (lectotype-P, PRE-photo).

Asparagopsis densiflora Kunth, *Enum. Pl.* 5: 96. 1850.

Protasparagus densiflorus (Kunth) Oberm., *S. Afr. J. Bot.* 2(3): 243. 1983.

Asparagus densiflorus (Kunth) Jessop cv. 'Myers'

Asparagus sarmentosus sensu Baker, *J. Linn. Soc. Bot.* 14: 625. 1875; Baker in *Fl. Cap.* 6: 270. 1896.

Asparagus myriocladus Baker, *J. Bot. Lon.* 18: 43. 1889 & in *Fl. Cap.* 6: 271. 1896. Type: Natal, Inanda, *Wood* 355 (holotype-K!, PRE-photo).

Asparagus meyersii Hort., *nom. nud.*

Erect subshrubs, 40–60 cm high. *Roots*: thick, with ellipsoid tubers. *Main stem*: glabrous, rounded, distinctly striate-ridged; primary branches spiral, 3–7 cm long, subequally along main stem, 3–5-angled; secondary branch absent. *Cladodes*: in 2-3

fascicles, in more than one plane, triquetrous, linear, 6–10 mm long, 0.9–1.2 mm wide, with distinct midvein. *Leaves*: spinescent; scarious part triangular, 2–3 mm long, appressed to stem; spines recurved, 0.5–1.2 mm long. *Flowers*: bisexual, in a raceme; pedicels articulated near the middle, 2–5 mm long, with persistent base. *Perianth segments*: unequal, white; inner segments linear, 2–2.5 mm long, 0.8–1 mm wide; outer segments elliptic, 2–2.5 mm long, 0.8–1.2 mm wide. *Stamens*: adnate at the base of perianth segments; filaments white, unequal, 1–1.2 mm long on inner perianth segments, 1.5–1.8 mm long on outer perianth segments; anthers oblong, 0.5–0.8 mm long, yellow. *Ovary*: widely ellipsoid or ovoid, 0.8–1 mm long, with three ovules per locule; style 8–10 mm long; stigma 3-branched. *Berry*: trilobed, 6–8 mm diam., 1–3-seeded, black when ripe. *Seeds*: trigonous, 2-3 mm long, black.

Thailand.— All provinces.

Distribution.— Southern Africa.

Ecology.— Introduced and cultivated as ornamentals.

Vernacular.— Prik, Fox Tail, Prik Hang Krarok and Prik Nam Kang.

Specimens examined.— *C. Chermisiriwatana* 20 (BCU), *T. Chitmaitree* 1 (BK), *P. Keosongsee* 15 (BCU) and *W. Tanming* 328 (KKU).

***Asparagus filicinus* Buch.-Ham. ex D. Don
(Figure 1C)**

Asparagus filicinus Buch.-Ham. ex D. Don, *Prodr. Fl. Nep.*: 49. 1825; Baker, *J. Linn. Soc. Bot.* 14: 605. 1875; Hook.f., *Fl. Brit. Ind.* 6: 314. 1892; Gagnep. in *Fl.*

Indo-Chine 6: 781. 1934; Noltie, Fl. Bhutan 3: 61. 1994; Xinqi & Tamanian in Fl. China 24: 210. 2000; Ali & Wali Khan, Fl. Pakistan 217: 11. 2009. Type: Nepal; *Buchanan* s.n. (holotype, BM 000521462).

Erect herbs or scandent shrubs, up to 2 m high. *Roots*: thick, with a cluster of fusiform tubers. *Main stem*: terete, glabrous; primary branches tetragonous or four-winged, slightly distichous, 15–18 cm long, leading towards the apex; secondary branches four-winged, distichous, 3–4 cm long, leading towards the apex. *Cladodes*: 2–4 unequal fascicles, in more one plane, flattened, curved or falcate, 3–6 (–10) mm long, 0.8–1.2 mm wide, with distinct midvein. *Leaves*: scarious, triangular, 3–5 (–7) mm long, descended on primary and secondary branches, appressed to stem. *Flowers*: bisexual, solitary or paired, on normal branches; pedicels articulated near the middle, 2–5 mm long, with persistent base. *Perianth segments*: subequal, elliptic, 1.5–2 mm long, 1–1.5 mm wide, white. *Stamens*: adnate at the base of perianth segment; filaments unequal, white, 0.7–1 mm long on inner perianth segments, 1.2–1.5 mm long on outer perianth segments; anthers ovate, 0.2–0.3 mm long, yellow. *Ovary*: ovoid, 0.6–1 mm long, with one ovule per locule; style trilobed, ca. 0.3 mm long; stigma 3-lobed. *Berry*: trilobed, 6–8 mm in diam., black when ripe. *Seeds*: 1–3, trigonous, 2–3 mm long, black.

Thailand.—NORTHERN: Chiang Mai (Ban Kong, Mae Rim, Bo Luang, Doi Chiang Dao, Doi Hua Sua, Doi Inthanon, Doi Ngao, Doi Pui, Doi Sutep, Mae Sa, Ob Luang and Om Koi), Chiang Rai (Doi Luang National Park, Doi Pacho and Mae Sai), Lampang, Lamphun (Doi Khun Tan), Phayao and Nan;

NORTH-EASTERN: Phetchabun (Nam Nao) and Loei (Phu Kradung, Phu Rua and Phu Tong); SOUTH-WESTERN: Kanchanaburi.

Distribution.—Nepal, Bhutan, India, Myanmar.

Ecology.—In mixed pine-deciduous or dry evergreen forest.

Vernacular.—Ma Sam Ton.

Specimens examined.—*K. Bunchuai* & *B. Nimanong* 1376 (BKF, K); *BjØrnland* & *Schumacher* 340 (BKF, C); *C. Charoenphol* 49 (BKF); *Dee* 893 (BKF); *H.B.G. Garret* 309 (K); *M. Hara* & *M. Kanzaki* 8394 (HBD-CMU); *K. Iwatsuki* & *N. Fukuoka* 3658 (BKF); *A.F.G. Kerr* 5434 (BK, C, K), 5589 (BK, BM, C, K), 8849 (BK, C, K); *F. Konta*, *C. Phengklai* & *S. Khao-iam* 4637 (BKF), 11286 (BKF); *K. Larsen*, *S.S. Larsen*, *C. Tonge* & *D. Sookchaloem* 46574 (AAU), 46640 (AAU); *K. Larsen*, *T. Santisuk* & *E. Warncke* 1917 (BKF), 2021 (BKF), 2857 (BKF); *J.F. Maxwell* 90-773 (AAU, CMU), 91-316 (CMU), 91-547 (CMU), 92-250 (HBD-CMU), 93-557 (BKF, HBD-CMU), 93-776 (BKF, HBD-CMU), 95-663 (HBD-CMU), 97-546 (BKF, HBD-CMU), 97-1497 (HBD-CMU), 98-554 (BKF, HBD-CMU), 06-345 (HBD-CMU); *C. Niyomdham* 5034 (AAU, BKF); *O. Petrmitr* 210 (HBD-CMU); *C. Phengklai et al.* 743 (BKF), 6859 (BKF), 7431 (BKF); *W. Pongamornkul* 100 (QBG); *R. Pooma* & *W. Werner* 16 (BKF); *Prayad* 831 (BK); *Th. S. et al.* 261 (BKF); *T. Smitinand* 12211 (BKF); *Th. Sørensen*, *K. Larsen* & *B. Hansen* 1279 (BKF, C, K), 4038 (AAU, BKF), 4215 (C), 5255 (C); *P. Srisanga* 2670 (QBG); *W. Sankamethakul* 174 (HBD-CMU); *BGO. Staff* 1258 (QBG), 1382

(QBG), 1948 (QBG), 6994 (QBG); *P. Suksathan* 1109 (QBG); *W. Tanming* 157 (KKU), 204 (KKU), 205 (KKU), 206 (KKU), 207 (KKU), 251 (KKU), 275, (KKU), 276 (KKU), 277 (KKU), 318 (KKU); *C.F. van Beusekom* & *C. Phengklai* 1089 (BKF, C, K); *Th. Wongprasert* s.n. (BKF-128943).

Notes.— The original publication did not describe the sexuality of the flower. Baker (1875) noted that flowers were polygamous. Xinqi and Tamanian (2000) reported this species as dioecious. However, we have observed for all examined flowers they have both stamens and pistil. Thus the function of the flowers will need to be investigated.

Asparagus officinalis L.

Asparagus officinalis L., Sp. Pl.: 313. 1753; Baker, J. Linn. Soc. Bot. 14: 598. 1875; Backer & Bakh.f., Fl. Java 3: 94. 1968; Noltie, Fl. Bhutan 3: 62. 1994; & Tamanian in Fl. China 24: 214. 2000; Demissew in Fl. Trop. E. Afr.: 1. 2006; Ali & Wali Khan, Fl. Pakistan 217: 14, fig. 3. 2009. Type: *Herb. Linn.* No. 434.1 (lectotype-LINN).

Erect herbs, or shrubby, up to 3 m high. *Roots*: thick, with a cluster of fusiform tubers. *Main stem*: glabrous, rounded; primary branches slightly distichous, 15–18 cm long, leading towards the apex, four-angled or four-winged; secondary branches slightly distichous, 3–4 cm long, leading towards the apex, four-angled or four-winged. *Cladodes*: 3–6 fascicles, in more than one plane, filiform, 5–25 mm long, ca. 0.2 mm wide. *Leaves*: scarious, triangular, 3–5 (–7) mm long, descended on primary and secondary branches, appressed to stem, sometimes with short spine. *Flowers*:

unisexual, solitary or paired, on normal branches; pedicels articulated near the middle, 0.8–1.2 (–1.4) cm long, with persistent base. *Male flowers*: perianth yellowish-green, campanulate, 5–6 mm; filaments adnate to perianth segments for ca. 1/2 their length; anthers oblong, 1–1.5 mm, yellow. *Female flowers*: perianth ca. 3 mm. *Berry*: globose, 7–8 mm diam., red when ripe. *Seeds*: 2–3, globose, 2–3 mm diam.

Thailand.— All provinces

Distribution.— Europe, northern Africa to western Asia.

Ecology.— Introduced from Europe and cultivated as vegetable.

Vernacular.— Nor Mai Farang.

Specimens examined.— *T. Boonkong* 26 (BCU), *W. Tanming* 342 (KKU), 350 (KKU) and *Umpai* 459 (BK).

Asparagus racemosus Willd. (Figure 1D, E)

Asparagus racemosus Willd., Sp. Pl. 2: 152. 1799; Wight, Ic. Pl. Or.: t. 2056. 1853; Baker, J. Linn. Soc. 14: 623. 1875; Hook.f., Fl. Brit. Ind. 6: 316. 1892; Ridl., Fl. Mal. Pen. 5: 331. 1925; Jessop, Bothalia 9: 72. 1966 & in Fl. Malesiana 9: 215. 1979; Backer & Bakh.f., Fl. Java 3: 93. 1968; Noltie, Fl. Bhutan 3: 60. 1994; Dassanayake in Fl. Ceylon 14: 95. 2000; Xinqi & Tamanian in Fl. China 24: 210. 2000; Demissew in Fl. Trop. E. Afr.: 12. 2006; Ali & Wali Khan, Fl. Pakistan 217: 16, fig. 5. 2009. Type: India, *Herb. Willdenow* (holotype-B-W, PRE-photo).

Asparagus acerosus Roxb., [Hort. Beng.: 24. 1814, *nom. nud.* ex] Fl. Ind. 2: 150. 1832; Baker, J. Linn. Soc. Bot. 14: 624. 1875; Hook.f., Fl. Brit. Ind. 6: 317. 1892. Gagnep. in Fl. Indo-Chine 6: 778. 1934. *Asparagopsis acerosa* Kunth, Enum. Pl. 5: 102. 1850. *Protoasparagus racemosus* (Willd.) Oberm., S. Afr. Journ. Bot. 2: 244. 1983.

Climbers. *Roots*: thick, with a cluster of elongate fusiform tubers. *Main stem*: glabrous, terete; primary branches spiral, 20–50 (–70) cm long, leading towards the apex, terete; secondary branches spiral, 5–10 cm long, tetragonous. *Cladodes*: 2–4 fascicles, triquetrous or trigonous, linear or slightly curved, 10–30 (–45) mm long, *ca.* 1 mm wide. *Leaves*: spinescent; scarious part triangular, 4–7 (–10) mm long, appressed to stem; spine recurved, 5–10 mm long, usually absent on the final branches. *Flowers*: bisexual, solitary or paired, usually on branches 5–20 mm long, lacking cladode, rarely on the normal branches; pedicels articulated near the middle, 3–5 mm long. *Perianth segments*: oblong to obovate-oblong, 2–4 mm long, white with a middle green band, spreading. *Stamens*: adnate at the base of perianth segment; filaments 2–3.5 mm long; anthers ovate, *ca.* 0.3 mm long, versatile. *Ovary*: obovoid, *ca.* 1.5 mm long; style 0.5–1 mm, with three short stigmatic branches; ovules 2–4 per locule. *Berry*: globose or unequally 2–3-lobed, 4–6 mm diam., red when ripe. *Seeds*: 1–3, globose, 2–3 mm diam.

Thailand.– NORTHERN: Chiang Mai (Ban Pong Noi and Doi Tung Cha), Phrae and Tak (Umpang); NORTH-EASTERN: Phetchabun (Dong Pak and Nam Nao), Loei (Phu Kradung), Sakon Nakhon, Maha Sarakham (Wapi Pratum) and Khon Kaen;

EASTERN: Chaiyaphum, Nakhon Ratchasima (Khao Yai, Pak Chong and Pak Thongchai), Buri Ram (Sateuk), Roi Et (Ban Nam Om and Kasetwisai) and Ubon Ratchathani (Det Udom); SOUTH-WESTERN: Kanchanaburi (Ta Salao and Ta Takua), Ratchaburi (Suan Phueng, Chom Bung and Thung Kang Yang), Phetchaburi (Thor Thip waterfall, Kaeng Krachan) and Prachuap Kiri Khan (Khao Sam Roi Yod, Pranburi); CENTRAL: Saraburi (Khao Khaow, Khao Song Pi Nong and Tap Kwang); SOUTH-EASTERN: Sa Kaeo (Aranya Pratet), Chon Buri (Koh E-La; Koh Kram, Sattahip; Laemchabang, Sriracha and Toong Brong, Sattahip) and Rayong; PENINSULAR: Surat Thani (Kanchanadit) and Phangnga (Khao Kalat).

Distribution.– Widespread in Africa, Guinea, Madagascar, through China, southern Asia and Australia.

Ecology.– In dry dipterocarp forest, salty sandy soil, open scrub, secondary seasonal forest, or seaside limestone hill.

Vernacular.– Chan Din, Chuang Krua, Phak She Chang, Sam Sib.

Specimens examined.– *Adisai* 784 (BK); *D. Bunpheng* 347 (BKF); *C. Chermisrivathana* 1923 (BK); *D.J. Collins* 139 (K), 302 (K, TCD), 1847 (BK, BM), 1848 (K); *Damrongsak* 713 (BKF); *FS. & CB.* 8827 (BKF); *N. Fukuoka* T-36178 (BKF); *KB.* 170 (BKF); *R. Geesink, T. Hattink & C. Phengklai* 6939 (C, K); *A.F.G. Kerr* 1961 (BM, K, TCD), 2096 (AAU, BM, K), 2626 (BM, K, TCD), 4274 (BM, K, TCD), 4594 (BK, C, K), 6117 (BK, BM, C, K), 6195 (BK), 13112 (BK, BM, C, K), 16195 (BM, K), 17325 (BK, K), 19515 (BK, BM, K), 19947 (BM, C, K), 19987 (BK); *K.*

Kertsawang 322 (QBG); *C.B. Kloss* s.n. (K-October 1916); *K. Larsen* 8124 (C), 8819 (C), 9014 (C), 10430 (BKF); *K. Larsen, T. Santisuk & E. Warncke* 1255 (BKF), 3338 (BKF, C, K); *M.C. Lakshnakara* 1002 (BK, BM, C, K); *A. Marcan* 334 (BM, K), 1048 (K), 2523 (BM, K); *J.F. Maxwell* 72-222 (BK), 91-992 (AAU, HBD-CMU); *D.J. Middleton, S. Suddee, S.J. Davies & C. Hemrat* 850 (BKF, HBD-CMU, K), 1185 (BKF); *G. Murata, C. Phengklai, S. Mitsuta, H. Nagamasu & N. Nantasan* T-37591 (BKF); *Nai Noimao* s.n. (BK); *M.F. Newman, T. Boonthavikoon, C. Hemrat & D.J. Middleton* 1166 (AAU, BKF); *Y. Paisooksantivatana & S. Sutheesorn* s.n. (BK); *C. Phengklai* 582 (BKF); *C. Phengklai et al.* 11907 (BKF), 11980 (BKF), 13249 (BKF); *Pradit* 488 (BK); *Put* 17 (BK, BM, C, K), 2041 (BM, C, K), 2081 (BK); *Sanoa* 593 (BKF); *R. Schomburck* 250 (K); *T. Smitinand & C. Phengklai* 8643 (BKF); *T. Smitinand & H. Sleumer et al.* 1341 (BKF, K), 1361 (BKF, K); *T. Sutheesorn* 672 (BK); *W. Tanming* 156 (KKU), 203 (KKU), 243 (KKU) and 278 (KKU).

***Asparagus setaceus* (Kunth) Jessop
(Figure 1F)**

Asparagus setaceus (Kunth) Jessop, *Bothalia* 9: 51. 1966; Noltie, *Fl. Bhutan* 3: 62. 1994; Xinqi & Tamanian in *Fl. China* 24: 210. 2000; Demissew in *Fl. Trop. E. Afr.*: 9. fig. 1: 4-6, 2006; Ali & Wali Khan, *Fl. Pakistan* 217: 18. 2009.

Asparagopsis setacea Kunth, *Enum. Pl.* 5: 82. 1850. Type: South Africa, *Drège* 8584 (holotype-B†, lectotype-KIEL, isolectotype-K!).

Asparagus plumosus Baker, *J. Linn. Soc.* 14: 613. 1875; Baker in *Fl. Cap.* 6: 260. 1896; Backer & Bakh.f., *Fl. Java* 3: 93.

1968. Syntypes: South Africa, Port Natal, *Drège* 4482 (K!); British Kaffraria, *T. Cooper* 202 (K!); Natal, *Gerrard et McKen* 754 (TCD).

Asparagus zanzibaricus Baker, *J. Linn. Soc.* 14: 614. 1875. Type: Tanzania, Zanzibar Island, *Hildebrandt* 1048 (holotype-BM, isotype-K!).

Protasparagus setaceus (Kunth) Oberm., *S. Afr. J. Bot.* 2(3): 244. 1983.

Protasparagus plumosus (Baker) Oberm., *S. Afr. J. Bot.* 2(3): 244. 1983.

Twining shrubs, up to 5 m. *Roots*: thick, with a cluster of fusiform tubers. *Main stem*: terete, glabrous; primary branches terete, slightly distichous, 13–16 cm long; secondary branches terete, distichous, 3–6 cm long, leading towards the apex; tertiary branches present on basal part of secondary branches, filiform, distichous, 1–2 cm long. *Cladodes*: 1–15 unequal fascicles, in one plane, filiform, 3–6 mm long. *Leaves* scarious, spinescent; scarious part triangular, 2–3 mm long on main stem, descended on branches, appressed to stem; spine *ca.* 0.2 mm long, absent on branches. *Flowers*: bisexual, solitary, terminal, on normal branches; pedicels articulated, 2–5 mm long. *Perianth segments*: subequal, oblong, 1.5–2 mm long, 1–1.5 mm wide, white. *Stamens*: adnate at the base of perianth segments; filaments 1–1.2 mm long, white; anthers ovate, 0.2–0.3 mm long, yellow. *Ovary*: ovoid, 0.6–1 mm long, with one ovule per locule; style trilobed, *ca.* 0.3 mm long; stigma trilobed. *Berry* 3-lobed, 6–8 mm diam., 1–3-seeded, purplish black when ripe. *Seeds*: globose, 2–3 mm long, black.

Thailand.— All provinces.

Distribution.— Southern Africa.

Ecology.— Introduced and cultivated as ornamentals.

Vernacular.— Prong Fa, Son Rachini.

Specimens examined.— *T. Boonkong* 15 (BK), *K. Bunchuai* 659 (C, K), 1083 (BKF), *W. Tanming* 342 (KKU) and *P. Sirirugsa* 84 (BCU).

***Asparagus simulans* Baker**

Asparagus simulans Baker, J. Linn. Soc. Bot. 14: 609. 1875. Type: Madagascar, *Gerrard* 66 (K!).

Asparagus madagascariensis Baker, J. Linn. Soc. 16: 206. 1878. Type: Madagascar, *H. Gilpin* s.n. (holotype-K!).

Subshrubs, up to 1 m high. *Roots*: thick. *Main stem*: terete, glabrous; primary branches terete to tetragonous, 3–10 cm long, leading towards the apex; secondary branches tetragonous to tetraquetrous, 2.5–6 cm long, leading towards the apex; tertiary branch absent. *Cladodes*: 2-5 fascicles, often three, in more than one plane, flattened, elliptic to oblong, slightly curved with a distinct midvein, 8–15 mm long. *Leaves*: scarious, triangular, 1–2 mm long on main stem, descended on branches, appressed to stem; spine absent. *Flowers*: not seen. *Berry*: globose, 6–10 mm diam., red when ripe. *Seeds*: globose, 2–5 mm long.

Thailand.— NORTHERN: Chiang Mai; NORTH-EASTREN: Khon Kaen (Khon Kaen University); CENTRAL: Bangkok (Suan Luang Rama IX).

Distribution.— Madagascar.

Ecology.— Introduced and cultivated as ornamentals.

Vernacular.— Prik Madagascar.

Specimens examined.— *W. Tanming* 330 (KKU).

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