Entada (Leguminosae subfam. Mimosoideae) of Taiwan

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(Manuscript received 1 January 2010; accepted 25 January 2010)

ABSTRACT: The genus *Entada* (Leguminosae subfam. Mimosoideae) in Taiwan is revised. Two species, *Entada phaseoloides* (L.) Merr. and *E. rheedei* Spreng. are recognized, of which the former is divided into subsp. *phaseoloides* and subsp. *tonkinensis* (Gagnep.) H. Ohashi (new combination). *Entada phaseoloides* subsp. *phaseoloides* corresponds to *E. koshunensis* Hayata & Kaneh. and *E. parvifolia* Merr. previously recognized in Taiwan, while *E. phaseoloides* subsp. *tonkinensis* is identical with *E. phaseoloides* as recorded from northern and central Taiwan. *Entada formosana* Kaneh. is referable to *E. rheedei* Spreng., which is the correct name for *E. pursaetha* DC. adopted in previous works in Taiwan. *Entada koshunensis* Hayata & Kaneh. is typified. *Entada pursaetha* var. *formosana* (Kanehira) F. C. Ho is an illegitimate name.

KEY WORDS: *Entada*, *E. phaseoloides* subsp. *phaseoloides*, *E. phaseoloides* subsp. *tonkinensis*, *E. rheedei*, new combination, Leguminosae, Taiwan.

INTRODUCTION

Entada, Leguminosae subfamily Mimosoideae, consists of about 30 species in the tropics and subtropics (Nielsen, 1992; Huang and Ohashi, 1997; Luckow, 2005; Yang et al., 2005). The taxonomy of *Entada* in Taiwan has been complicated, however, and the number of species has been uncertain: three species were recorded by Hayata (1921), Sasaki (1928), Kanehira (1936), Liu (1960) and Yang et al. (2005), but they were reduced to one (Li, 1963) or two (Chang, 1965; Huang and Ohashi, 1977; Liu et al., 1998). Furthermore, three species with one variety were recorded by Ho (1985). Recently, a fourth species was recorded from Taiwan (Tateishi et al., 2008). In this paper, based on a review of previous taxonomic works of *Entada* in Taiwan and critical reexamination of herbarium specimens of related taxa, a new taxonomic treatment is proposed.

Entada scandens was the first species of the genus to be recorded from Taiwan. Henry (1896) cited two specimens: "Bankinsing (a village some 30 miles east of Takow). Playfair" and "South Cape. Henry 951". The first specimen, Playfair is in K (Fig. 1) and is referable to *E. rheedei*, although it has been considered to be *E. phaseoloides* (L.) Merr. since it was treated by Matsumura (1899) and Ohashi et al. (1984). It should be noted that the specimen is referable also to *E. formosana* Kanehira, now a synonym of *E. rheedei*, which was described as being endemic to Taiwan. Independent of Henry's (1896) report, Matsumura and Hayata (1906) and Hayata (1911) recorded *E. scandens* from Keibisan (or Keibizan), presently Chingmei in Taipei County, collected by S. Yano in 1897 (Fig. 2). This is the first record of *Entada* from Taiwan by Japanese botanists.

Kanehira (1917) first adopted the name *E. phaseoloides* (L.) Merr. instead of the previously used *E. scandens* for the Taiwanese plant, because he regarded *E. scandens* as a collective species including various elements. He considered true *E. scandens* to be distributed in India, Ceylon, Malaya, Burma, China and elsewhere, while *E. phaseoloides* was distributed in Taiwan and the Pacific islands. Judging from his description and illustrations of the pinna, fruit and seed, these plants are correctly referred to *E. phaseoloides*. Kanehira (1917) reported *E. phaseoloides* to be distributed north of Kagi (present Chiayi).

Kanehira (1917) discovered the second species of *Entada* in Taiwan and named it *E. formosana* Kanehira based on a specimen collected by Yoshizo Yanagida at Kosenpo [present Chiachen] in Ako [present Pingtung County] in December 1916 (Figs. 3-5). In comparing *E. formosana* with *E. phaseoloides*, Kanehira (1917) characterized it mainly by the number, shape and size of the leaflets (4 or 5 pairs, base obtuse or rounded, apex obtuse and emarginate, 3.5-4 cm long, 1.8-2 cm wide in *E. formosana*; leaflets usually 2 pairs and slightly falcate, base rounded, apex obtuse, 6-8 cm long, 3-4.5 cm wide in *E. phaseoloides*), petiolules (1-2 mm long in *E. formosana*, while 3 mm long in *E. phaseoloides*), pods (8 cm wide, constricted between seeds in *E. formosana*, while 9-12 cm wide, more or less constricted in *E. phaseoloides*), and seeds (4 cm in diameter, margin sulcate margin, while 6-7 cm in diameter and margin entire in *E. phaseoloides*).

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Fig. 1. *Entada scandens* Benth. Bankinsing. Playfair *s. n.* (K). The first collection of *Entada* from Taiwan.

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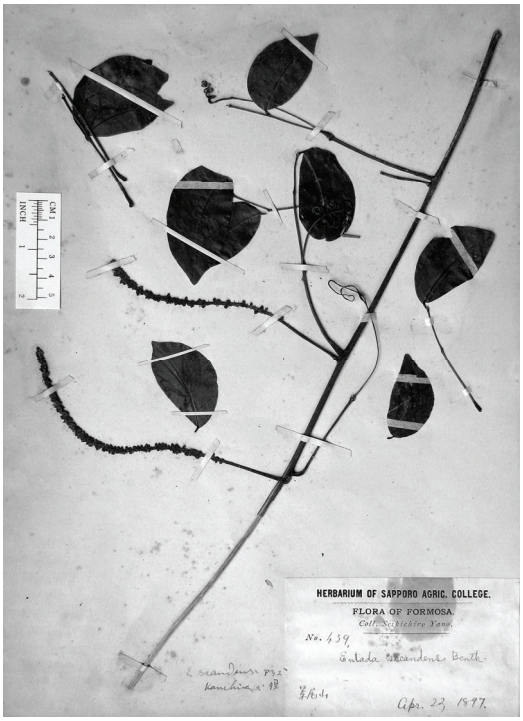


Fig. 2. *Entada scandens* Benth. Keibisan. S. Yano in 1897 (TI). The first collection of *Entada* by a Japanese in Taiwan.



Fig. 3. *Entada formosana* Kaneh. Holotype (TAIF 13204).

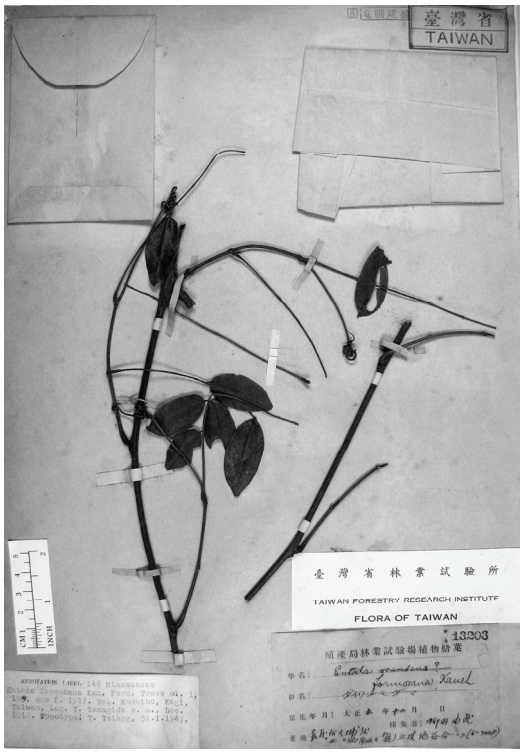


Fig. 4. *Entada formosana* Kaneh. Kanehira *s. n.* (TAIF 13203). Authentic leafy specimen of *E. formosana* used but not cited in its original publication.



Fig. 5. *Entada formosana* Kaneh. Seed from holotype (TAIF 13204).

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Kanehira (1917) added the pericarp of *E. formosana* is firmer than that of *E. phaseoloides* in the Japanese description.

The third species, *Entada koshunensis* Hayata & Kaneh. was published by Hayata (1921) based on a specimen collected by Kanehira at Kaupan (present Chiopeng) on the Hengchun peninsula on 9 December 1918 (Figs. 6-9). *Entada koshunensis* was characterized by having 2 or 3 pairs of obliquely ovate leaflets, linear pods 35-50 cm long, 7 cm wide and convex seeds with the margin slightly sulcate (Kanehira, 1936).

The three species have generally been recognized as being native in Taiwan (Hayata, 1921; Sasaki, 1928; Kanehira, 1936; Masamune, 1936; Liu, 1960). Li (1963), however, merged *Entada formosana* and *E. koshunensis* with *E. phaseoloides* and, as a result, he recognized only a single species in Taiwan. Huang and Ohashi (1977) revived *E. formosana* as distinct from *E. phaseoloides*, but referred it to *E. pursaetha* DC. They recognized two species in Taiwan: *E. phaseoloides*, including *E. koshunensis* as a synonym, and *E. pursaetha* DC. Ohashi et al. (1984) regarded *E. koshunensis* as a synonym of *E. phaseoloides*.

Ho (1985) revised Taiwanese *Entada* based mainly on morphological differences in the seeds and recognized three species and one variety: *E. parvifolia* Merr., *E. phaseoloides*, and *E. pursaetha* with varr. *pursaetha* and *formosana* (Kaneh.) F. C. Ho. Following the treatment of *E. koshunensis* by Hatusima (1956, 1971), Ho also regarded this species as identical with *E. parvifolia* from the Philippines. This treatment is, however, incorrect because *E. parvifolia* differs from *E. koshunensis* (Kanehira 1936) in having 8-11 pairs of leaflets per pinna (2 or 3 pairs in *E. koshunensis*), smaller pods less than 30 cm long and 5.5 cm wide (more than 30 cm long and 7 cm wide in *E. koshunensis*), and smaller seeds 1.8-2 by 1.6-1.9 cm in diameter (ca. 4 by 3 cm in *E. koshunensis*). Huang and Ohashi (1994) adopted Ho's treatments of *Entada* in Flora of Taiwan second edition. Liu et al. (1998) recognized two species in Taiwan: *E. phaseoloides* and *E. rheedei* (as *E. rheedii)*, but erroneously attributed *E. parvifolia* to *E. rheedei*. Yang et al. (2005) recognized three species of *Entada* in Taiwan, i.e. *E. phaseoloides*, *E. koshunensis* and *E. rheedei* (as *E. rheedii*), on the basis of differences in number of leaflet pairs per pinna, texture of endocarp, and size and surface features of seeds.

Wakita et al. (2005, 2008) conducted a molecular analysis of *Entada phaseoloides* and allied species, including *E. koshunensis*, to determine the number of species of *Entada* in Japan, where one, two or three species have been reported. Wakita et al. (2008) found two phylogenetic groups, of which one corresponds to *E. phaseoloides* and the other to *E. tonkinensis* Gagnep. *Entada koshunensis* from Taiwan was found to be indistinct from *E. phaseoloides*. Analysis of samples of *E. phaseoloides* from Tahtung and Juntou in Ilan County, northern Taiwan, placed it in the same phylogenetic group that includes *E. tonkinensis*. Tateishi et al. (2008) analyzed morphological characters of leaflets, pods and seeds among the two phylogenetic groups with *E. parvifolia* and *E. rheedei* (as *rheedii*). They concluded that *E. koshunensis* is referable to true *E. phaseoloides* and plants previously identified as *E. phaseoloides* in northern Taiwan are identical with *E. tonkinensis*.

Entada phaseoloides and *E. tonkinensis* are, however, almost indistinguishable from each other in vegetative and floral characters. Tateishi et al. (2008) compared the morphological characters of these two species in detail and found continuous variation in habit, leaflets and pods. *Entada phaseoloides* is distinguished from *E. tonkinensis* only by seed characteristics: brown, convex with angular margins in the former, while blackish purple, flat with rounded margins in the latter (Tateishi et al., 2008). In distribution, *E. phaseoloides* occurs from southeast Asia, to southern Taiwan, the southern Ryukyus to the south Pacific and tropical Australia, while *E. tonkinensis* is found north of the area of *E. phaseoloides*: Vietnam, southern China, northern Taiwan, Amami-oshima in the northern Ryukyus and Yakushima in southern Kyushu. We therefore treat *E. tonkinensis* as a northern geographical form of *E. phaseoloides* to be regarded as a subspecies of *E. phaseoloides*.

TAXONOMIC TREATMENTS

***Entada* Adans.**

Lianas or scandent shrubs, unarmed. Leaves bipinnate, rachis terminating in a tendril. Leaflets opposite. Inflorescences spikes; flowers pentamerous, uniform, staminate or bisexual; calyx connate, valvate; petals valvate, free or connate at base; stamens 10, free, exserted, filaments adnate to petals at base; anthers with an apical gland; ovary with numerous ovules. Pods narrowly oblong, pendulous, compressed, straight or curved, often very long to 150 cm long, rarely twisted, septate, sutures thickened, straight or constricted; seeds orbicular or ellipsoid, compressed, without raphe.

Distribution: Tropics and subtropics, most numerous in Africa with 16 spp., 5 spp. endemic to Indochina and Malesia; 3 spp. widespread (Lucknow, 2005).

Key to the species of Taiwan

1. Leaflets conspicuously asymmetrical, 1-4 pairs per pinna, 3.5-6 cm wide; apex of midrib terminated at leaflet blade; endocarp parchment-like ……. *E. phaseoloides*
1. Leaflets more or less symmetrical, 3-6 pairs per pinna, 2.5-4 cm wide, apex of midrib slightly projected beyond leaflet blade; endocarp woody ……..…… *E. rheedei*

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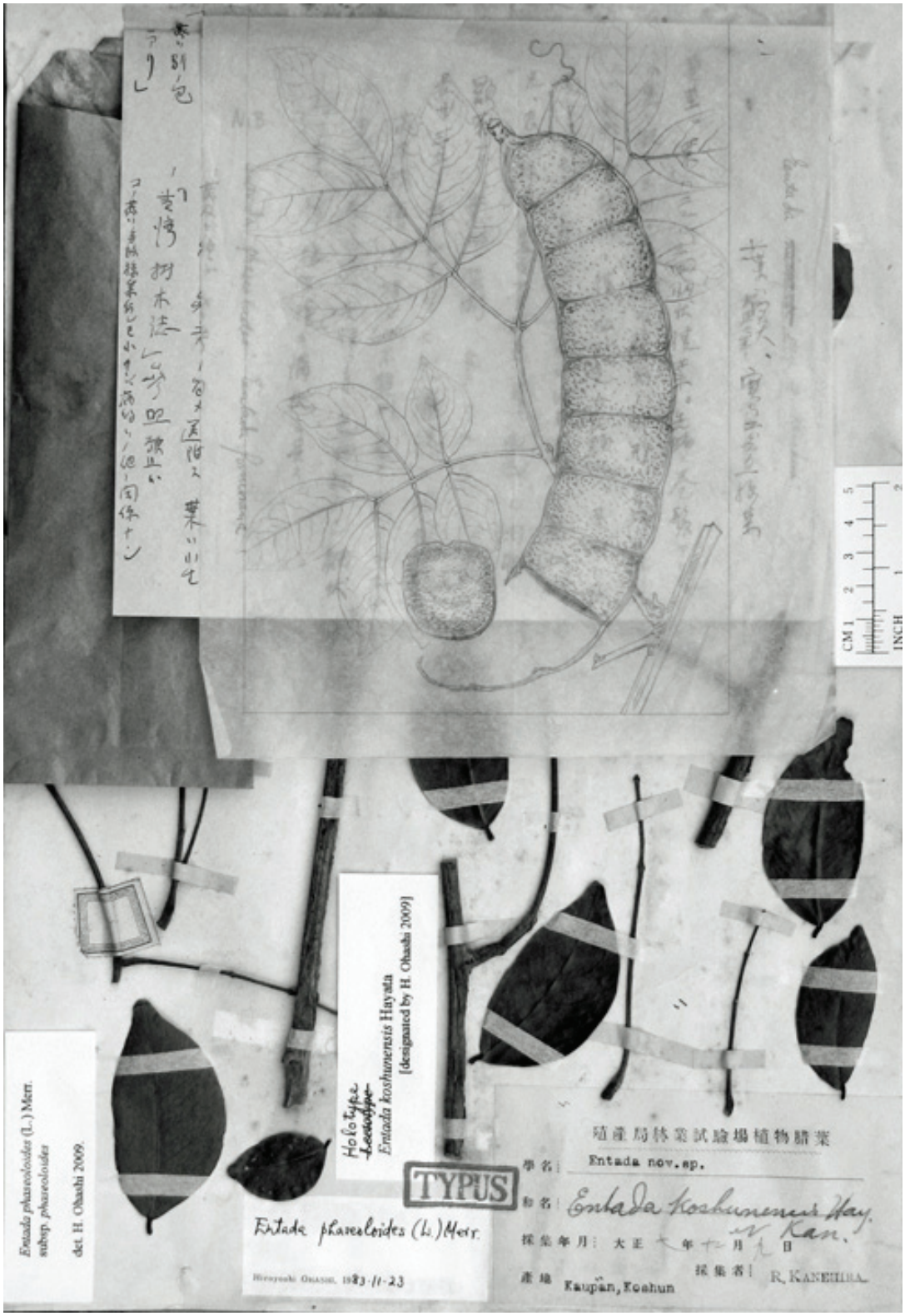


Fig. 6. *Entada koshunensis* Hayata & Kaneh. Holotype with Kanehira's note and illustration (TI).

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Fig. 7. ***Entada koshunensis***. Holotype (TI).



Fig. 8. ***Entada koshunensis***. Holotype (TI).



Fig. 9. ***Entada koshunensis***. Isotype (TAIF).

Entada phaseoloides (L.) Merr., Philipp. J. Sci., C 9: 86. 1914; Kaneh., Formos. Tree 193, fig. *s.n.* 1917; Hayata, Icon. Pl. Formosan. 10: 3. 1921; Kanehira, Formos. Tree ed. 2, 296, fig. 254. 1936; Liu, Ill. Lign. Pl. Taiwan 496, fig. 429. 1960; H. L. Li, Woody Fl. Taiwan 345, fig. 123. 1963, p.p., incl. syn. *E. koshunensis*, excl. syn. *E. formosana*, excl. specim. Playfair (K); Huang & Ohashi in Li et al., Fl. Taiwan 3: 279, pl. 584. 1977; Nielsen, Fl. Camb. Laos Vietnam 19: 21. 1981; Ohashi et al. in Sci. Rep. Tohoku Univ. ser. 4 (Biol.), 38: 292. 1984; T. L. Wu in Fl. Reipubl. Popul. Sin. 39: 13. 1988; Nielsen, Fl. Males. ser. I, 11: 179. 1992; Huang & Ohashi in Huang et al., Fl. Taiwan ed. 2, 3: 169, pl. 77. 1993; Liu et al., Manual Taiwan Vasc. Pl. 3: 76. 1998; S.-Z. Yang et al., Quart. J. Chinese Forestry 38: 260. 2005; Tateishi et al. in Acta Phytotax. Geobot. 59: 199. 2008.

Lens phaseoloides L. in Herb. Amboin.: 18. 1754 [Lectotype. "Faba marina" in Rumphius, Herb. Amboin. 5: 5, tab. 4. 1747. Lectotypified by Merrill (cf. Jarvis 2007)].
Mimosa scandens L., Sp. Pl. ed. 2, 2: 1501. 1763, nom. illeg. [Lectotype. "Faba marina" in Rumphius, Herb. Amboin. 5: 5. tab. 4. 1747. Lectotypified by Panigrahi (cf. Jarvis 2007)].
Entada scandens Benth., Hook. J. Bot. 4: 332. 1841; Matsum. & Hayata, J. Coll. Sci., Imp. Univ. Tokyo 22: 116. 1906.

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Climbers, woody. Leaves usually long petiolate; rachis often ending in a tendril; pinnae 1 or 2 pairs; leaflets 1-4 pairs, conspicuously asymmetrical, obliquely oblong, elliptic or obovate, 2.5-12 cm long, 3-6 cm wide, base rounded, apex acute to obtuse or rounded. Inflorescences spikes, pedunculate, 15-20 cm long, flowers sessile or subsessile; petals greenish white. Pods 40-130 cm long, 6-12 cm wide; articles 4-9.5 cm long; exocarp woody, separating from endocarp; endocarp parchment-like. Seeds ovoid-orbicular or slight rectangular, flattened, 3.5-7.4 x 3.3-5.5 cm, 1-2.3 cm thick; hilum 0.3-0.4 cm long, 0.05-0.1 cm wide; rim arillate, oblong 1 x 0.7 cm around the hilum.

Distribution: SE Asia, Taiwan, southern Ryukyus to the south Pacific and tropical Australia. Taiwan, in forests in Pingtung and up to 1,000 m in northern regions.

Key to the subspecies of E. phaseoloides

1. Seeds brown, convex, margins angular, 3.3-5.5 cm across, 1-1.5 cm thick; pods 6-10 cm wide ……..…….... subsp. *phaseoloides*
1. Seeds blackish purple or dark brown, flat, margins rounded, 4.7-7.4 cm across, 1.5-2.3 cm thick; pods 9-12 cm wide ... subsp. *tonkinensis*

1-1. **subsp. *phaseoloides***

Entada koshunensis Hayata & Kaneh. in Hayata, Icon. Pl. Formosan. 10: 3, fig. 1. 1921. [Type. Formosa. Kôshûn: Kaupan. 9 Dec. 1918. R.Kanehira *s.n.* (TI holotype, TAIF isotype)]; Kaneh., Formos. Tree ed. rev. 297, fig. 253. 1936; Liu, Ill. Lign. Pl. Taiwan 1: 495, fig. 428. 1960; S.-Z. Yang et al., Quart. J. Chinese Forestry 38: 259. 2005.

E. parvifolia auct. non Merr.: Hatusima in Sci. Bull. Agric. Home Econ. Div. Univ. Ryukyus 3: 20. 1965. & Fl. Ryukyus: 345. 1971; Ho in J. Taiwan Mus. 38: 76. 1985; Huang & Ohashi in Huang et al., Fl. Taiwan ed. 2, 3: 169. 1993.

Distribution (subsp. *phaseoloides*): Tropics and subtropics; Malesia, S. Taiwan, S. Ryukyus, Pacific islands and Australia. Taiwan, confined to Hengchun Peninsula.

Specimens examined (subsp. *phaseoloides*): Taiwan. Pingtung. Korin (Kolin). T. Hosokawa 3209 (TAI); Kaoshihfo, alt. 200 m. 28 Jul 1998. Y. P. Cheng (TAIF); loc. cit. Aug 1981. K. S. Hsu *s.n.* (TUS); Koshun. Kaupan. 9 Dec 1918. R. Kanehira *s.n.* (TI holotype of *E. koshunensis* Hayata & Kaneh., TAIF13205 isotype); loc. cit. 9 Dec 1918. R. Kanehira *s.n.* (TAIF119888); Nanjen-shan -Chiopeng, in evergreen forest, along rocky gully, alt. ca. 200 m. 2 Nov 1982. H. Ohashi et al. 14406 (TAI, TUS); loc. cit. Large woody climber, in evergreen forest, in ravine. 2 Nov 1982. H. Ohashi et al. 14410 (TAI, TUS); loc. cit. (Fruits) fallen on rocky ravine. 2 Nov 1982. H. Ohashi et al. 14449 (TAI, TUS); loc. cit. Large woody climber, in evergreen forest, in rocky ravine. 2 Nov 1982. H. Ohashi et al. 14557 (TAI, TUS); Chiopeng, alt. ca. 50 m. 1 Sep 1984. Y. Tateishi et al. 18446 (TAI, TUS).

Typification of *Entada koshunensis* Hayata & Kanehira: A plant later named *Entada koshunensis* was collected by Kanehira at Kaupan on 9 December 1918. He must have judged the plant to be new to the science, because he discovered another new species of *Entada*, *E. formosana* in 1916, just two years previous. *Kanehira* sent part of the original gathering of the plant to Hayata together with a description of the plant in Japanese with the provisional designation, "*Entada micropoda* Hay. et Kanehira," the date of its collection, additional notes, and an illustration of the leaf, pod and seed. The two portions of Kanehira's writings are mounted on one of the herbarium sheets as part of Kanehira's gathering at TI (Fig. 6).

Entada koshunensis Hayata & Kanehira was published by Hayata (1921), based on the type specimen "Kôshûn: Kaupan, leg. R. Kanehira, Dec. 1918.' There are two herbarium sheets of the species in TI named by Hayata: one, composed of many pinnae with many detached leaflets, leaf axes and small pieces of branches (Fig. 7), and another bearing a pod with seeds in an envelop (Fig. 8). The first sheet was labeled "*Entada* nov. sp." by Kanehira with "*Entada koshunensis* Hay. et Kan." added by Hayata (Fig. 7). This sheet is a duplicate of the original gathering sent by Kanehira. The second sheet was annotated by Hayata with only "*Entada koshunensis* Hay. et Kan." and has a small tag with the pod on which the provisional designation, "*Entada micropoda*" was written by Kanehira (Fig. 8). The pod with seeds was sent in a separate envelop with the original gathering as noted by Kanehira in his writings. This sheet is considered to be a duplicate of the original gathering sent by Kanehira, because the pod is labeled with Kanehira's provisional designation.

The two sheets in TI are considered to be two parts of the original gathering of the plant sent by Kanehira. They should therefore be considered to be a single specimen, although the second one lacks a label indicating it to be part of the original gathering, which is required for typification as indicated in Art. 8.3 of ICBN (McNeill et al., 2006). The two sheets were examined by Hayata, however, for the description of *Entada koshunensis* and having in common the name written by Hayata himself and Kanehira's provisional name.

The original gathering of *Entada koshunensis* is in TAIF, but that specimen consists of only a pod with seeds (Fig. 9). The pod and seeds are regarded to be a duplicate of the second sheet at TI. We hereby designate the two sheets in TI as the holotype of *Entada koshunensis* Hayata & Kanehira and the single sheet in TAIF as an isotype.

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1-2. **subsp. *tonkinensis*** (Gagnep.) H. Ohashi, comb. & stat. nov.

Entada tonkinensis Gagnep. in Notul. Syst. (Paris) 2: 60. 1911. & in Lecomte, Fl. Gen. Indo-Chine 2: 65. 1913; Tateishi et al. in Acta Phytotax. Geob. 59: 202. 2008.

Distribution (subsp. *tonkinensis*): Vietnam, S. China, N. & Central Taiwan (Ilan, Nantou, Taipei, Taichung, Taoyuan), N. Ryukyus (Amami-Oshima) and S. Kyushu (Yakushima). Taiwan, in forests up to 1,000 m in the north.

Specimens examined (subsp. *tonkinensis*): Taiwan. Ilan: Sanshin. T. C. Huang et al. 10815 (TAI); loc. cit. 2 Dec 1983. S. Y. Lu 13665 (TAIF); Shuanglienpei - Juntou, alt. 100-500 m. 15 Oct 1984. Y. Tateishi & T. Nemoto 20677 (TUS); Tatung-village, Dulishan - Nicoucon, on roadside, alt. 300-400 m. 15 Sep 1983. H. Ohashi & T. Nemoto 16849 (TAI, TUS). Nantou: Mokkwatan (=Mukuatan). B. Hayata s.n. 4 Apr 1916 (TI); Barbara. S. Suzuki *s.n.* 29 Dec 1926 (TAI); Horisha (Puli). Mar 1910. T. Kawakami *s.n.* (TAIF13212); loc. cit. Sep 1911. T. Kawakami *s.n.* (TAIF13211); Hori (Puli). Oct 1916. R. Kanehira *s.n.* (TAIF13210); loc. cit. Nov 1916. R. Kanehira *s.n.* (TAIF13209); loc. cit. 25 Nov 1982. S. Y. Lu 12214 (TAIF); loc. cit. 29 Dec 1982. S. Y. Lu 12329 (TAIF); Rengechi (=Lienhuachih). 21 Jul 1936. S. Hibino & S. Suzuki *s.n.* (TAI); loc. cit. anno 1926. Arakai (TUS). Taipei: Aoti, in secondary forest. alt. 50-100 m. 14 Oct 1985. S. F. Huang 3252 (TAI); Hsintien, on open roadside, 100-200 m. 8 May1985. S. F. Huang 2803 (TAI, TUS); Kankou. 30 Apr 1934. Lin & Shen *s.n.* (TAI); Kantzukenshan. C. M. Kuo 10073 (TAI); Maisha. R. Kanehira & S. Sasaki 7 (TAIF13208); Pishan park. 30 Dec 1982. S. Y. Lu 12381 (TAIF); Shihting, alt. 300 m. S. Y. Lu 25196 (TAIF); Wantan. 1 Jun 1936. Hideo Simizu 2290 (TAI). Taichung: Shihkang, alt. 100-500 m. 18 Apr 1999. S. Y. Lu 25720 (TAIF136920); no detail locality. Tadao Seki 62 (TAI). Taoyuan: Inter Goryo et Kappanzan. 11 Oct 1931. T. Hosokawa (TAI).

Previous illustrations of *Entada phaseoloides* in Taiwan (Kanehira, 1917 & 1936; Liu, 1960; Li, 1963; Huang and Ohashi, 1977 & 1973) are referable to subsp. *tonkinensis*. *Entada phaseoloides* or *E. scandens* of Hayata (1917, 1921) is referable to *E. phaseoloides* subsp. *tonkinensis* (Fig. 12).

2. ***Entada rheedei*** Spreng., Syst. Veg. (ed. 16) [Sprengel] 2: 325. 1825, ut "*rheedii*"; Nielsen in Fl. Males. ser. I, 11: 180. 1992; Liu et al., Manual Taiwan Vasc. Pl. 3: 76. 1998, p.p., excl. syn. *E. parvifolia*.

Mimosa entada L., Sp. Pl. 1: 518. 1753 [Lectotype. "*Entada*" in Rheede, Hort. Malab. 9: 151, t. 77. 1689. Lectotypified by Kostermans (cf. Jarvis, 2007).
Entada pursaetha DC., Prodr. 2: 425. 1825; Huang and Ohashi in Fl. Taiwan 3: 280. 1977; Nielsen, Fl. Camb. Laos Vietnam 19: 21. 1981; Ho in J. Taiwan Mus. 38: 75. 1985; Huang and Ohashi in Fl. Taiwan ed. 2, 3: 171. 1993.
Entada formosana Kaneh., Formos. Tree 195, fig. s. n. 1917 & Formos. Tree ed. rev. 296, fig. 252. 1936; Liu, Ill. Lign. Pl. Taiwan 494, fig. 427. 1960.
Entada scandens auct. non Benth. in Hook.: Henry in Trans. Asiat. Soc. Jap. 24. Suppl.: 38. 1896, p.p., incl. specim. "Playfair (K)".
Entada phaseoloides auct. non (L.) Merr.: H. L. Li, Woody Fl. Taiwan 345. 1963, p.p., incl. syn. *E. formosana*.
Entada pusaetha var. *formosana* F. C. Ho in Quart. J. Taiwan Mus. 38: 76. 1985, as var. *formesana* (Kaneh.) F. C. Ho, nom. illeg.; Huang and Ohashi in Fl. Taiwan ed. 2, 3: 171. 1993, as var. *formosana* (Kanehira) F. C. Ho.

Lianas, large, woody, twisted. Leaves bipinnate; leaflets 4-6 pairs, more or less symmetrical, obovate, elliptic or narrowly elliptic, 2-9 cm long, 1-4 cm wide, base rounded to broadly cuneate, apex obtuse or rounded. Inflorescences spikes, 12-25 cm long, flowers sessile or subsessile. Pod 40-140 cm long, 7-11 cm wide; articles 5-8.5 cm long; endocarp woody. Seeds brown, suborbicular, flat, 3.5-5.7 cm long, 3.5-5 cm wide, 2-2.5 cm thick, margins rounded; aril orbicular, 0.7 cm in diam.

Distribution: Africa, S. & SE. Asia, S. Taiwan to the south Pacific, tropical Australia. Taiwan: Kaohsiung, Pingtung and Tainan.

Specimens examined: Taiwan. Kaohsiung. Chia-hsien Tai-yang-ku, alt. 150 m. Roadside. T. C. Huang & W. Y. Huang 14500 (TUS). Pingtung. (as Ako: Kosenpo). Dec 1916, R. Kanehira (TAIF 13204. Holotype of *Entada formosana* Kanehira): Santeimon. 24 Aug 1932, Hosokawa 5462 (TAI). Tainan. Chiayi. Hotapu (as Kodaiho), foot of Sankyakunansan, Yoshizo Yanagida *s.n.* (TAIF 13203); Chiayi Farm, climbing on the broad leaved forest. ca. 250 m. 1 Jul 1989, T. C. Huang & S. F. Huang 14190 (TAI); Nanhua, alt. 0-100 m. Roadside along stream, 14 Nov 1985, S. F. Huang 3307 (TAI); Pinglin-Kuangshan, along the Houjuehsi river, alt. 180-200 m. 14 Nov 1985, Y. Tateishi & H. Hoshi 21620 (TAI, TUS); Pinglin-Kuangshan, alt. 200-250 m. Climbing over trees in evergreen forest. 15 Oct 1988, H. Ohashi et al. 24075 (TAI, TUS).

The epithet *Entada rheedei* is used in IPNI. Although the epithet has usually been written rheedii, we adopt rheedei. According to K. Gandhi one of the editors of IPNI, rheedei is derived from Hendrik Adriaan von Rheede tot Draakestein. Although the Dutch 'Rheede' is often spelled 'Rheed' in English, he did not spell his name Rheed. Sprengel's use of rheedii is therefore corrected to rheedei (vide Art. 60.7 Ex. 15) (Gandhi pers. comm.).

Seeds of *Entada rheedei* are more similar to those of *E. tonkinensis* than to *E. phaseoloides*. The former two species have compressed seeds with rounded margins (Fig. 5), while *E. phaseoloides* has convex seeds with angular margins (Figs. 10 & 11). Seeds of *Entada rheedei* tend to be smaller than those of *E. tonkinensis*, but are not distinct from each other. Tateishi et al. (2008) reported the size as: 3.5-5.7 x 3.5-5.0 cm and 2.0-2.5 cm thick in E. rheedei and 5.2-7.4 x 4.7-5.5 cm and 1.6-2.3 cm thick in *E. tonkinensis*.

Kanehira (1917) described and illustrated a leaf together with a pod and seed in the original description of *Entada formosana*, but he cited a single specimen comprising only of a pod with seeds (Fig. 3). There is, however, a specimen of *E. formosana* with leaves in TAIF (TAIF13203) which was collected by the collector of the holotype on the same date, but at a different locality

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Fig. 10. *Entada koshunensis*. Seed showing hilumfrom holotype (TI).



Fig. 11. *Entada koshunensis*. Seed showing convex lateral surface from holotype (TI).

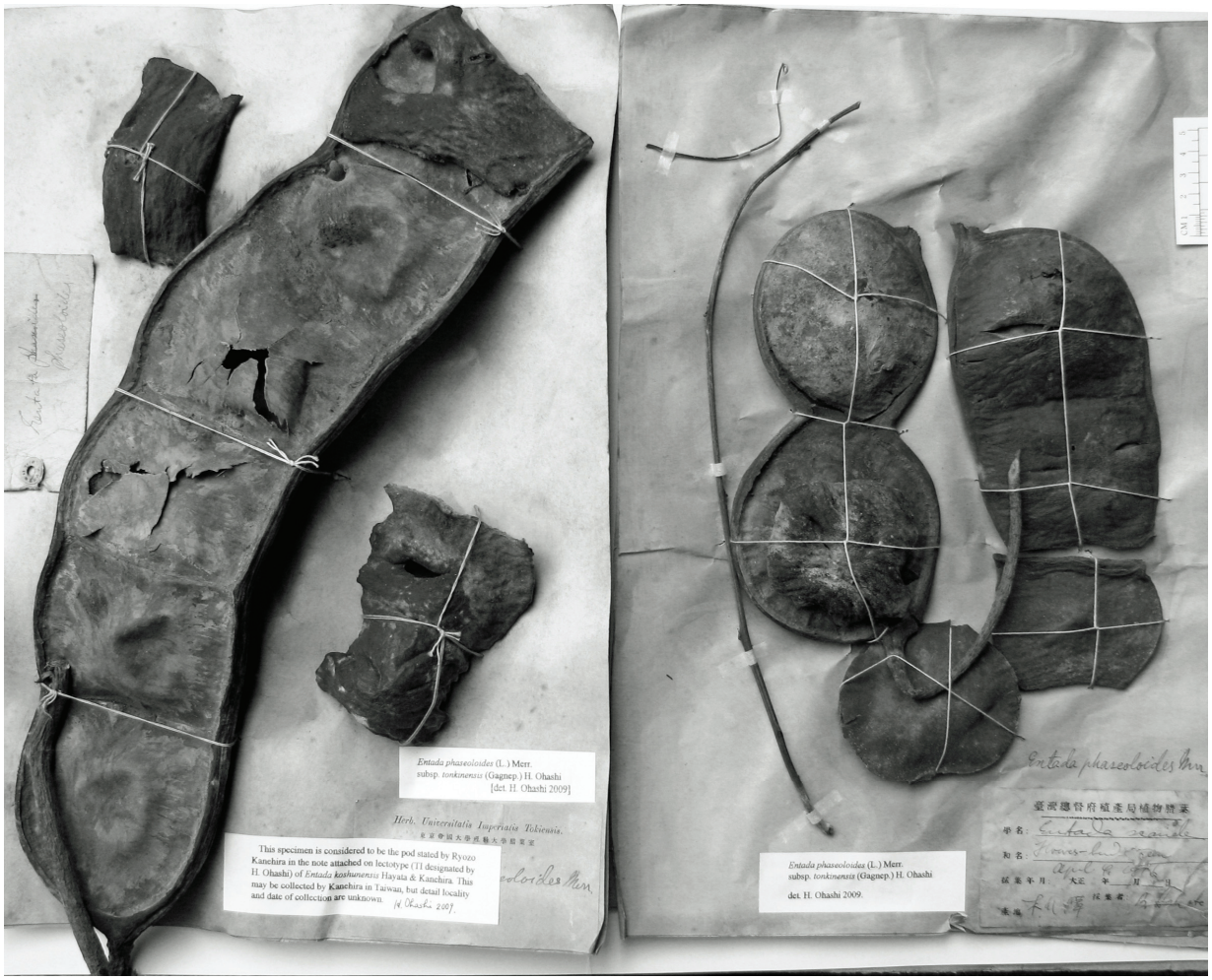


Fig. 12. *Entada phaseoloides* (L.) Merr. determined by Hayata (TI). Left: specimen probably sent from Kanehira for comparison with *E. koshunensis*. Right: Nantou: Mokkwatan (=Mukuatan). B. Hayata *s. n.* 4 Apr 1916 (TI).

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(Fig. 12). Kanehira's illustration of the leaf in the original publication of the species was apparently based on this specimen.

When Ho (1985) proposed the new combination, *Entada pusaetha* var. *formosana* (Kaneh.) F. C. Ho (as *formesana*), he cited the type specimen of var. *formosana* in synonymy under *Entada pusaetha* var. *pusaetha*, not under var. *formosana*. His var. *formosana* was based on a single specimen (Ho 3988), which he collected in Kenting National Park, Pingtung county. We therefore regard *Entada pusaetha* var. *formosana* F. C. Ho to be a new, but invalid name, since it lacks a Latin diagnosis (ICBN 36.1).

What, then, is the seed that Ho (1985) considered to be *E. formosana*? Ho (1985) cited a single specimen (F. C. Ho 3988), but it is not in TAIF where Ho worked. Judging from a picture (Photos 2, 3 and 7), illustration (Fig. 1D, the lowest) and the description given by Ho (1985), the specimen must be a pod with seeds. The seed in Ho's Photo 7 and Fig. 1D, however, appears to be an immature or an abnormal seed of *E. formosana*.

ACKNOWLEDGMENTS

Our sincere thanks to Dr. L. Rico Arce of the Royal Botanic Gardens, Kew, for sending us a scan of the Playfair specimen at Kew, to Prof. C. F. Hsieh, National Taiwan University, for supplying several references cited in this paper, to Dr. W. L. Chiou of the Taiwan Forestry Research Institute for allowing us to examine specimens in TAIF; to Dr. Kanchi Gandhi, Harvard University Herbaria, for his comments on the specific epithet, *E. rheedei*. We thank the curators of TAI and TAIF for allowing access to their material. We thank Dr. D. E. Boufford of Harvard University Herbaria for his reading and valuable comments on our draft.

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(收稿日期：2010 年 1 月 1 日；接受日期：2010 年 1 月 25 日)

摘要：重新檢驗模式標本、所有臺灣產鴨腱藤屬植物之文獻及藉分子演化資料，修訂臺灣產之鴨腱藤屬植物為三種分類群，即鴨腱藤，越南東京鴨腱藤，厚殼鴨腱藤。其中越南鴨腱藤係分離自鴨腱藤種而成為其一新組合亞種，即稱為越南鴨腱藤。

關鍵詞：鴨腱藤屬、鴨腱藤、越南鴨腱藤、厚殼鴨腱藤、新組合名、豆科、臺灣。

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