Journal of Systematics and Evolution 47 (1): 87–91 (2009) doi: 10.1111/j.1759-6831.2009.00005.x

Musa chunii Häkkinen, a new species (Musaceae) from Yunnan, China and taxonomic identity of *Musa rubra*

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Abstract The center of diversity of the genus *Musa* (Musaceae) is in Southeast Asia, a region not studied in detail and where new species and varieties continue to be reported. A new wild banana species, *M. chunii* Häkkinen from Yunnan, China is described and illustrated based on observed morphological characteristics in the field. This extremely rare new species was only found in Tongbiguan Nature Reserve, Dehong District, West Yunnan. A key to *M. chunii* and related taxa is provided. In addition, critical notes regarding *M. rubra* Kurz identity are given.

Key words *Musa, Musa chunii* Häkkinen, *Musa rubra* Kurz, Musaceae, *Rhodochlamys,* Southeast Asia, wild banana.

The family Musaceae include three genera, *Musa* L., *Ensete* Horan. (Horaninow, 1862) and *Musella* (Franch.) C. Y. Wu (Franchet, 1889; Wu, 1978). *Musa* includes both wild species and cultivated seed-sterile forms of enormous socio-economic importance, such as bananas and plantains. It has been estimated that *Musa* comprises about 70 species (Häkkinen & De Langhe, 2001; Häkkinen & Sharrock, 2002; Häkkinen, 2003a, b, 2004a, b, 2005a, b, 2006a–c, 2007; Häkkinen & Meekiong, 2004, 2005; Häkkinen et al., 2005; Häkkinen & Wang, 2007; Häkkinen & Wallace, 2007; Häkkinen et al., 2007; Häkkinen et al., 2008; Häkkinen & Väre, 2008a–c) and over 500 cultivars (Simmonds, 1962, 1966; Champion, 1967; Valmayor et al., 2000, 2002). Many regions within its centre of diversity in Southeast Asia have not been explored systematically and new species continue to be discovered (Häkkinen, 2007). Various botanists have divided the wild bananas into various sections or subgenera. Sagot (1887) and Baker (1893) distinguished three subgenera for the genus *Musa,* which were: *Physocaulis, Eumusa* and *Rhodochlamys.* Cheesman (1947) made the next classification in which the genus was divided into four sections: *Australimusa* with 2*n*=20, *Callimusa* with 2*n*=20, *Musa* (*Eumusa*) with 2*n*=22 and *Rhodochlamys* with 2*n*=22. Cheesman's classification is based on chromosome numbers and morphological characters and it has been widely accepted by botanists (Häkkinen & Sharrock, 2002; Häkkinen, 2003a, 2005b, 2006b, 2007; Häkkinen & Wallace, 2007; Häkkinen et al., 2007; Häkkinen & Väre, 2008 a, b). In this paper the author focuses on a new *Musa* species, viz., *M. chunii,* which belongs to the section *Rhodochlamys* originated on the Asian continent from northeast India to northern Thailand including western Yunnan. Species in *Rhodochlamys* are characterized by having inflorescences that are erect or drooping with fruit pointing towards the bunch apex. Most of the species also typically have relatively few fruits and are best known for their brightly coloured bracts, a feature that makes them popular as ornamental plants (Cheesman, 1947, 1949; Simmonds, 1962; Shepherd, 1999; Häkkinen & Sharrock, 2002; Häkkinen, 2005b, 2007; Häkkinen et al., 2007). *Musa chunii* was discovered in Yunnan, China in 2006.

Extensive field observations were made by the author during an expedition in 2006 to Dehong Prefecture, Yunnan, China. The new species is described based on living plants in the field by completing the entire INIBAP *Musa* Descriptor List (IPGRI-INIBAP/CIRAD, 1996). The descriptive terms here follow the traditional banana taxonomy as used by Simmonds (Simmonds, 1962, 1966). Relevant portions of the specimens were deposited as holotype at the herbarium of the Xishuangbanna Tropical Botanical Garden (HITBC) and isotypes at the herbaria of H, IBSC and PE.

Musa chunii Häkkinen, sp. nov. Fig. 1

Planta surculos usque ad 4–5 libere producens, quae prope parentem emergunt. Folii habitus intermedius, lamina usque ad 115 cm longa, 42 cm lata. Inflorescentia dependens; flores basales hermaphroditi. Alabastrum masculinum lanceolatum. Bracteae utrinque lilacinae. Flores masculini 6 in quaque bractea, in serie una dispositi. Fasciculus fructuum

Received: 19 February 2008 Accepted: 12 April 2008

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Holotype
One of Eight
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Flora of China
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compactus, fructibus arrectis. Semina nigra, tuberculata, irregulariter angulato-depressa.

China. Yunnan: Dehong Prefecture, Yingjiang County, Tongbiguan Nature Reserve, alt. 1185 m, latitude 24°37.034′ N, longitude 97°34.913′ E, 2006-04-06, *M. Häkkinen 517* (holotype (3 sheets), HITBC; isotypes, H, ISBC, PE).

Plant slender, suckering close to parent plant 10–30 cm, to 4–5 suckers, position vertical. Mature pseudostem to 1.7 m high, 8 cm in diameter at base, underlying colour cream-white, devoid of wax and with large red-purple pigmentations (Fig. 2), sap milky. Petiole to 35 cm, petiole canal margins overlapping, petiole bases winged and not clasping the pseudostem (Fig. 3). Leaf habit intermediate, with corrugated lamina, lamina to 115 cm long and 42 cm wide, truncate at the apex, upper surface green, and lower surface light green, appearance dull, slightly waxy, midrib dorsally light green and ventrally pink-purple, leaf bases asymmetric, both sides rounded. Inflorescence hanging, peduncle to 10 cm long and 3 cm in diameter, heavily clothed with white pubescence, sterile lilac bract one, persistent at the opening of the first female flowers. Female bud lanceolate, to 19 cm long and 8.5 cm wide, bracts lilac in external and internal faces, imbricate, moderately waxy, lifting several bracts at a time, revolute and persistent (Fig. 4). Basal flowers female, hermaphrodite, 6–7 per bract in a single row, ovary to 4.5 cm long, light green, arrangements of ovules in two rows per locule, compound tepal to 4.8 cm long, orange-yellow, lobes orange, free tepal to 3.5 cm, translucent white, oval, with a short orange acumen, stamens 5, dark brown, light green style with orange stigma. Male bud lanceolate, to 14 cm long and 7 cm wide, bracts lilac in external and internal faces, lifting several bracts at a time, revolute and persistent, male bud commonly aborting after producing few bracts of male flowers (Figs. 5, 6). Male flowers on average 6 per bract in one row, compound tepal to 4.4 cm long, orange-yellow, with 5-toothed apex, free tepal to 3.2 cm long, translucent white, oblong, with a short orange acumen, light green style with orange stigma, stamens 5, dark brown, anthers yellow, anthers and style at the same level, ovary straight, white, without pigmentation. Fruit bunch compact, with 8 hands and 7 fruits per hand on average, in 1 row, fingers curved toward to stalk, individual fruit to 7.5 cm long, 3–4 cm in diameter, slightly ridged, pedicel to 6 mm, fruit apex blunt-tipped at apex, with floral relicts, immature peel color light green becoming yellow brown at maturity. Seeds black, tuberculate, irregularly angulate-depressed, to 4–6 mm across, 2–3 mm high, ca. 6 mm in diameter, 60–80 seeds per fruit (Fig. 6).

Chromosome numbers of *Rhodochlamy*s species are 2*n*=22 (Cheesman & Larter, 1935; Simmonds, 1962; Shepherd, 1999; Häkkinen & Sharrock, 2002).

Distribution and habitat *Musa chunii* is very rare in Yingjiang County, Dehong Prefecture, Yunnan, in the area bordering Myanmar. We could only find one population of it with some ten individual plants with suckers. However, there have been several observations of *M. chunii* from Myitkyina District, Myanmar where it occurs in isolated populations but these areas need further study (Häkkinen, pers. comm.).

Etymology The new species of *Musa chunii* is named in honour of Chinese academician and botanist Chun Woon-Young for his contributions to the botany of China.

Key to some closely related *Rhodochlamys* species

1a. Pseudostem up to 1.7 m high, 8 cm in diameter at base, underlying colour cream-white with large red-purple pigmentations; sap milky; inflorescence hanging……**Musa chunii**

1b. Pseudostem up to 1.1 m high, 5 cm in diameter at base, underlying colour light green with large brown blotches; sap watery; inflorescence erect……2

2a. Basal flowers female, 4–5 per bract, peduncle light green to red, fruits becoming yellow at maturity……...**M. aurantiaca**

2b. Basal flowers hermaphrodite, 3 per bract, peduncle bright red, fruits becoming pale yellow-green and variegated with red at maturity……3

3a. Bracts blood-red in external and internal side, deciduous; free tepal as long as compound tepal; fruit bunch lax……... ……**M. sanguinea**

3b. Bracts bright red in both sides, persistent; free tepal one half in length as compound tepal; fruit bunch compact…… ……**M. rubra**

←

Figs. 1–9. **1.** Holotype specimen of *Musa chunii* Häkkinen (HITBC125197). Courtesy of XTBG. **2.** Pseudostem's underlying colour of *Musa chunii*. Photo: M. Häkkinen, XTBG. **3.** Petiole base of *Musa chunii*. Photo: M. Häkkinen, XTBG. **4.** Female bud of *Musa chunii*. Photo: M. Häkkinen, XTBG. **5.** Inflorescence of *Musa chunii*. Photo: M. Häkkinen, XTBG. **6.** Inflorescence and aborted male bud of *Musa chunii*. Photo: M. Häkkinen, XTBG. **7.** Drawing of *Musa rubra* (CBM7451). Photo: M. Häkkinen, XTBG. **8.** Lectotype of *Musa rubra* (K, 1867). Photo: M. Häkkinen, XTBG. **9.** Living specimen of *Musa rubra* at K. Photo: M. Häkkinen, XTBG.

Musa rubra Wall. ex Kurz in J. Agric. Hort. Soc. Ind. 14: 301. 1867; J. G. Baker in Ann. Bot. 7: 221. 1893; J. D. Hook. in Bot. Mag.: 121, t. 7451 (Fig. 7). 1895; E. E. Cheesman in Kew Bull. 3: 265. 1949; M. Häkkinen & S. Sharrock in INIBAP Annual Report 2001 (2002); M. Häkkinen in Philipp. Agric. Sci. 86 (1): 92. 2003; M. Häkkinen in Folia Malaysiana 6 (1–2): 56. 2005; M. Häkkinen in Chronica Horticulturae 47 (2): 10. 2007; M. Häkkinen et al. in Folia Malaysiana 8 (2): 71. 2008. Type: [Myanmar], Burma. Rangoon, 1867-01-13, *Mc. Clelland s.n.* (lectotype (3 sheets) K!, designated by Häkkinen & Väre (2008c)) (Fig. 8).

The lectotype, consists of three sheets at Kew, which were collected by John McClelland from Burma (Myanmar) (Baker, 1893; Hooker, 1895; Cheesman, 1949; Häkkinen, 2003a). McClelland served in the Bengal Medical Service, India in 1830–1865. The specimen was incorporated to Kew herbarium in 1867 by Dr. King from Calcutta, in the same year Sulpiz Kurz made diagnosis from the specimens collected in Pegu, Burma by McClelland. *Musa rubra,* however, had been discovered many years earlier, because Nathaniel Wallich had previously assigned the name *Musa rubra.* Voigt (1845) introduces Wallich's *Musa rubra* by name only. Kurz (1867) gave the credit Wallich to the name of *M. rubra*. Although Kurz gave Wallich as the author, Kurz made the diagnosis himself (Cheesman, 1949), therefore it should be authorized to Kurz alone (Häkkinen & Väre, 2008c).

Musa rubra has been misidentified in Chinese literature—*Musa rubra* auct. non. Wall. Kurz (1867); C. Y. Wu in Icon. Cormophyt. Sin. 5: 581, t. 7991. 1976; H. W. Li in Acta Phytotaxon. Sin. 16: 63, fig. 3 (3–5). 1978; C. Y. Wu in Fl. Yunnan 2: 731. 1979; T. L. Wu in Fl. Reip. Pop. Sin. 16 (2): 11, fig. 3 (3–5). 1981; T. L. Wu & W. J. Kress in C. Y. Wu & P. H. Raven in Fl. China 24: 316, fig. 367 (3–5). 2000; A. Z. Liu et al. in Bot. Bull. Acad. Sin. 43: 79. 2002.

The descriptions published in the Chinese literature are from either imperfectly known undescribed *Callimusa* or *Rhodochlamys* species. The unknown *Callimusa* species could not be located anymore but according to herbarium specimen no: 159711, Guangdong (Kwangtung), 1952-07-28, *S. Wang 160127* (IBSC!), it is a relative to *Musa paracoccinea* A. Z. Liu & D. Z. Li (Liu et al., 2002), from south Yunnan, China. This *Callimusa* species (Wu, 1981, fig. 3: 3–5) differs in many aspects from *M. rubra.* This species can be easily distinguished from *M. rubra* by the fact that its fruits point downwards while in *M. rubra* the fruits point upwards (Fig. 9). The imperfectly known *Rhodochlamys* species (Li, 1978, figs. 1, 2, 4) called *M. rubra* cannot be confused with either *M. rubra* or *M. sanguinea* Hook. f. (1872) like Liu et al. (2002) proposed in his description. The author has studied Liu's specimen No. 0787032 (KUN!) and additional specimens of *M. sanguinea* at the following herbaria: India. 1884-12-03. *Hort. Kew., 170B/4/36* (K!); *Hort. Kew., Hook. f. Bot. Mag. t. 5975* (K!); Lohit District (N. E. F. A.), 1969-09-21. *A. S. Rao 47996* (CAL!); (N. E. F. A.), 1969-11-30. *A. S. Rao 48404* (CAL!). The author has seen Ai-Zhong Liu's photo from his specimen and his species cannot be confused with *M. sanguinea* in any circumstances. Liu's species is a so far undescribed *Rhodochlamys* species from west Yunnan. The author has carried out several field studies in west Yunnan in 2005, 2006 and 2007 and has observed several still undescribed species in the *Rhodochlamys* section.

Conclusion *Musa* taxonomy, including the *Rhodochlamys* section, is still very obscure today just as it has been throughout its history despite several attempts at its clarification. Much of the diversity in the section is located in areas in continental Asia that have been and continue to be difficult, and sometimes even dangerous to travel and work in. For this reason, the present-day distribution, extent and status of many of the undescribed species are not clear despite some 200 years of study and still new species await description. Investigations of Musaceae in Yunnan, China, have shown that there are wild banana populations in both hills and plains below an elevation of 2100 m (Häkkinen, pers. obs.).

Acknowledgements This study was done in cooperation with the herbarium of the Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences and Tropical, Subtropical Fruit Research Laboratory, South China Agricultural University, Guangzhou. The author greatly appreciates the help and support from the staff of the mentioned institution. The author would also like to thank Prof. Richard H. Wallace, Department of Chemistry and Physics, Armstrong Atlantic State University, Savannah, Georgia, USA, for proof reading this article and Principal Botanist, Peter Bostock, Queensland Herbarium, Brisbane, Australia for the Latin translations and diagnoses.

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