

Taxonomic notes on wild bananas (*Musa*) from China

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Abstract. *Musa paracoccinea* is published as a new species. Two imperfectly known species, *M. nagensium* and *M. sanguinea* are accepted. *Musa lushanensis*, *M. luteola* and *M. dechangensis* are reduced as synonyms of *M. basjoo*. It is pointed out here that *M. wilsonii* and *M. rubra* used in the Chinese literature such as Fl. Reipubl. Popularis Sin. and Fl. Yunnan. are in fact misidentifications of *M. itinerans* and *M. sanguinea*, respectively.

Keywords: China; *Musa paracoccinea*; Revision; Taxonomy; Wild bananas (*Musa*).

Introduction

The genus *Musa* (*Musaceae*) includes plants of great economic importance. It has, however, received little attention from taxonomists (Gawel et al., 1992) as it is a taxonomically difficult group because of the large fleshy nature of its plants and the ephemeral aspect of its flowers. Although Cheesman (1947, 1948, 1949, 1950), Simmonds (1953, 1957, 1960, 1962) and Argent (1976) made great contributions, inadequate herbarium specimens have been collected and representation in herbaria remains poor (Argent, 1976). According to Li (1978, 1979, 1981), six species (*Musa acuminata* Colla, *M. balbisiana* Colla, *M. itinerans* Cheesman, *M. wilsonii* Tutch., *M. rubra* Wall. ex Kurz, *M. coccinea* Andr.) are native to China; two are incompletely known (*M. nagensium* Prain and *M. sanguinea* Hook. f.), and two, *M. basjoo* Sieb. et Zucc. and *M. textilis* Nee, are introduced from Japan and the Philippines, respectively. Liu (1987, 1989, 1990) published three new species (*M. lushanensis*, *M. luteola* and *M. dechangensis*) from Sichuan Province. In this paper, we have checked the Chinese species of wild bananas and their distributions, based on extensive field observation as well as an intensive literature survey and herbarium research.

Materials and Methods

Herbarium material was checked from the following herbaria: K, PE, KUN, IBSC, HITBC, XIAS. The field survey covers all distribution areas of *Musa* in China except for Taiwan. Specimens have been deposited in KUN.

The chromosome numbers were checked to identify the new species *Musa paracoccinea*. The living plants of *M.*

paracoccinea and *M. coccinea* were transferred to the greenhouse for cytological investigation. Root tips were pretreated for 2 h with colchicine (0.05%), then fixed in ethanol/acetic acid (3:1), and stained and squashed in lacto-propionic orcein. To determine chromosome numbers, 5-10 cells at metaphase were counted for each individual.

Taxonomic Treatment and Notes

1. *Musa paracoccinea* A.Z. Liu & D.Z. Li, sp. nov. (Figure 1)—TYPE: China. Yunnan: Jinping Hsien, in valley or along stream, 5 Oct 1998, A. Z. Liu 98007 (holotype: KUN; isotype: PE).—*Musa coccinea* auct. non Andr. (1799): H.W. Li, Acta Phytotax. Sin. 16: 63. 1978, in C. Y. Wu, Fl. Yunnan. 2: 731. 1979, et in T. L. Wu, Fl. Reipubl. Popularis Sin. 16: 12. 1981; C.Y. Wu, Index Fl. Yunnan. 2: 1901. 1984.

M. coccinea Andr. affinis sed plantis 4-6 m altis, bracteais inflorescentiarum caducis, fructibus cylindricis, seminibus campaniformibus differt.

Plant suckering freely; pseudostems 4-6 m high, 15-20 cm in diameter at base, devoid of wax; blades 1.5-2.2 m long, 20-30 cm wide, deep green above, paler beneath, narrowed gradually toward the base, similar to the rounded apex, glabrous; petioles 30-50 cm, with narrow erect margins. Inflorescence erect; rachis glabrous; bracts bright red on both surfaces, caducous. Basal flowers pistillate, 4-8 per bract in a single row; ovary 6.5-7 cm long, cylindrical, glabrous; compound tepal 4-4.5 cm long, orange-yellow with green lobes, lateral lobes 4 mm long with a dorsal appendage 3 mm long, the 3 central lobes shorter and without appendage; free tepal as long as the compound, dorsally thickened, opaque and orange in color, staminodes short (about 1 cm); style as long as the perianth with a bright orange, clavate stigma. Staminate flowers terminal on inflorescence, 4-6 per bract, compound fused tepals 5-5.5 cm long, orange, with a white base, lobes similar to

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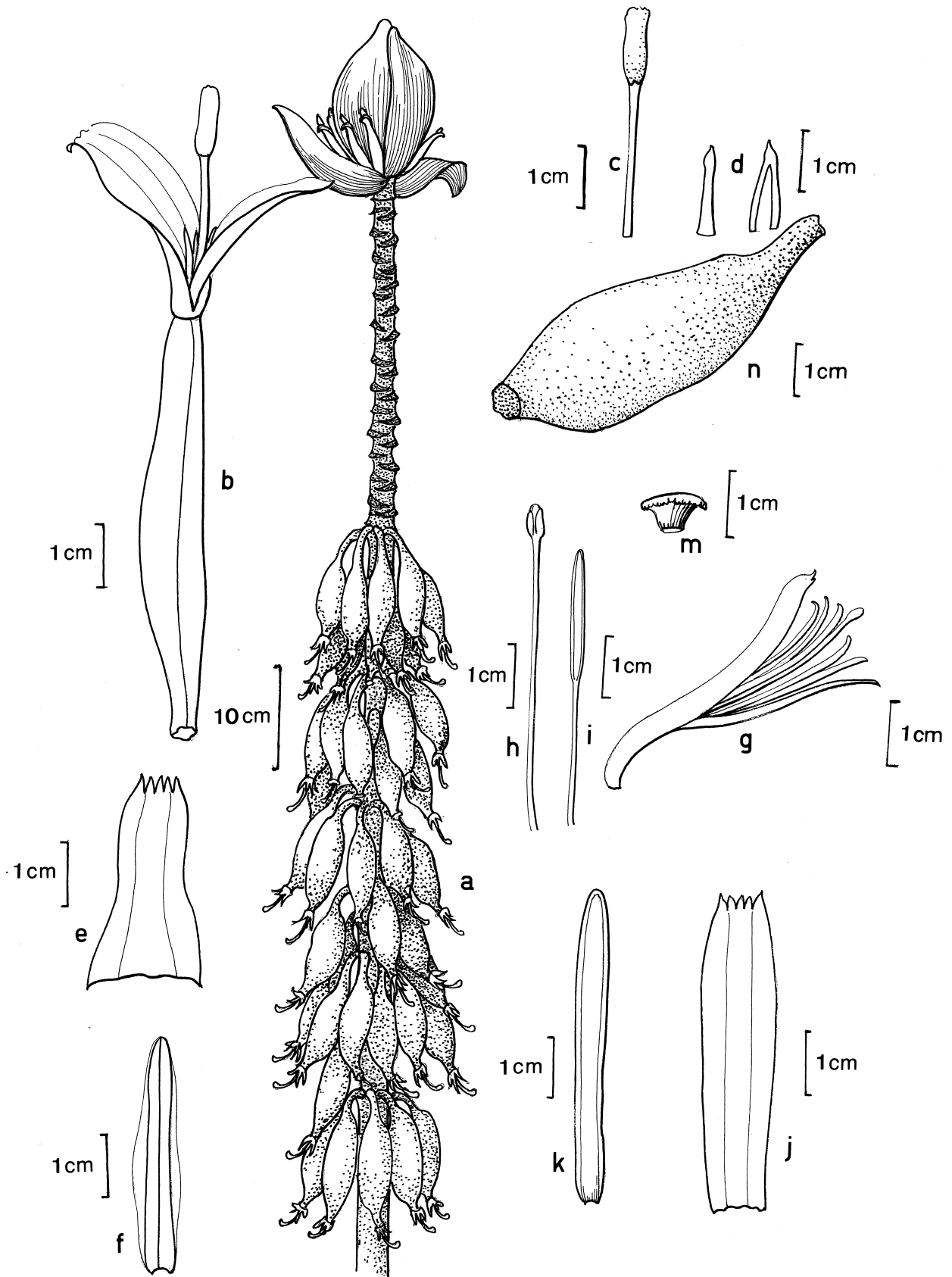


Figure 1. *Musa paracoccinea*: a, infructescence and inflorescence; b, female flower; c, stigma of female flower; d, style of female flower; e, compound fused tepal of female flower; f, free tepal of female flower; g, male flower; h, stigma of male flower; i, style of male flower; j, compound fused tepal of male flower; k, free tepal of male flower; m, seed; n, mature fruit.

that of pistillate; free tepal nearly as long as the compound, oblong, obtuse; the sterile style a little longer than the 5 staminodes. Fruit up to 12 cm long, 3–4 cm in diameter, cylindrical at maturity, glaucous, straight, narrowed gradually towards the pedicel (2–3 cm long) and similarly to a truncate apex, usually with the persisting perianth and style. Seed black, bell-shaped with crisped margin, 6–8 mm high and 8–10 mm across. This species occurs in evergreen forest or grows along streams in southeastern Yunnan (see Figure 2) and northern Vietnam. Chromosome number: $2n = 20$ (voucher specimen: A. Z. Liu 98007, KUN, PE).

Closely related to *Musa coccinea* Andr. in its erect inflorescence and same chromosome number ($2n = 20$), differs in its size, seed shape and bract habit. *Musa coccinea* has persistent bracts and lacks abscission layers between bracts and rachis, while the bracts of this new species are early caducous after blooming. The seed shape is unique (Figure 1: m) in the genus. It is distinctly larger in size than *M. coccinea*. Based on Cheesman (1947) and Simmonds (1960), *M. paracoccinea* belongs to Sect. *Callimusa*.

2. *Musa itinerans* Cheesman, Kew Bull. 4: 23. 1949; Simmonds, Kew Bull. 14: 204. 1960; H.W. Li, Acta Phytotax. Sin. 16: 62. 1978, in C.Y. Wu, Fl. Yunnan. 2: 731. 1979 et T. L. Wu, Fl. Reipubl. Popularis Sin. 16: 12. 1981.—*Musa wilsonii* auct. non. Tutch. (1902): H.W. Li, in T. L. Wu, Fl. Reipubl. Popularis Sin. 16: 12. 1981 et in C. Y. Wu, Fl. Yunnan. 2: 731. 1979; M. L. Sai, in Y. K. Li, Fl. Guizhouensis 6: 604. 1989; C.Y. Wu, Index Fl. Yunnan. 2: 1902. 1984; Y. H. Yi, List Pl. Xishuangbanna 5: 498. 1996; H. Li, Fl. Dulongjiang Reg. 313. 1993; T. L. Wu and W. J. Kress in C. Y. Wu and P. Raven, Fl. China 24: 317. 2000.—LECTOTYPE: *Parkinson 1761* (K!); lectotype here designated.

This species was misidentified as *M. wilsonii* Tutch. in previous Chinese literature (Li, 1978, 1979, 1981). The

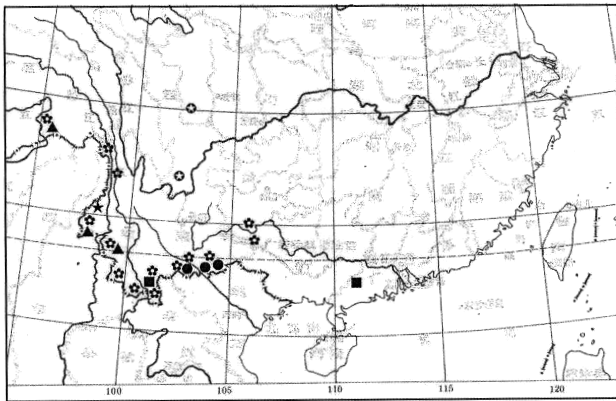


Figure 2. Distribution of *M. itinerans* (♣), *M. paracoccinea* (●), *M. coccinea* (■), *M. sanguinea* (▲), *M. basjoo* (⊕), and *M. nagensium* (★) in China.

confusion was clarified by Liu and Li (2001). The diagnostic character for this species is its long rhizomes, 2 meters or more from the parent stem. This species has a wide distribution in China (see Figure 2). It usually grows in secondary tropical rain forests. Chromosome number: $2n = 22$ (Simmonds, 1962).

3. *Musa coccinea* Andr. Bot. Rep. 1: t. 47. 1799; Baker, Bot. Mag. t. 1559. 1893; Schumann in Engler, Pflanzenreich 4: 23. 1900; Cheesman, Kew Bull. 5: 29. 1950; Simmonds, Kew Bull. 14: 204. 1960; H.W. Li, Acta Phytotax. Sin. 16: 64. 1978, in C.Y. Wu, Fl. Yunnan. 2: 73. 1979 et T. L. Wu, Fl. Reipubl. Popularis Sin. 16: 14. 1981; T. L. Wu, Fl. Guangdong 2: 392. 1991; T. L. Wu and Kress in C. Y. Wu and Raven, Fl. China 24: 316. 2000.—*M. uranoscopus* Lour., Fl. Cochinch. 645. 1793 non Rumph (1755).—TYPE: Bot. Rep. 1: t. 47. 1799.

This is a well-known species. Its small size and ornamental inflorescences make it suitable as an ornamental (Cheesman, 1950). It is distinctly different from other *Musa* species because of its persistent bracts. Although in the past *M. coccinea* was found in forests and had a wide distribution in Indo-China, it is difficult to find any wild populations in recent years due to human impact. Chromosome number: $2n = 20$ (voucher specimen: A. Z. Liu 98001, KUN).

According to Loureiro (1793), *Musa uranoscopus* Rumph (1755) is not different from *Musa paradisiaca* L. and *M. sapientum* L., triploid cultivated species of banana. He therefore published *Musa uranoscopus* Lour. (1793) as a new species. However, this was not in accordance with the IBCN (Art. 53.1) (Greuter and McNeill, 2000). *Musa coccinea* Andr. (1799) is the valid name for this species (Schumann, 1900; Cheesman, 1950; Simmonds, 1960; Li, 1979, 1981; Wu and Kress, 2000).

4. *Musa sanguinea* Hook. f., Bot. Mag. 98: t. 5975. 1872; Baker, Ann. Bot. 7: 221. 1893 et Fl. Brit. Ind. 6: 263. 1893; Schumann in Englar, Pflanzenreich 4: 23. 1900; Cheesman, Kew Bull. 2: 110. 1947 et Kew Bull. 4: 133. 1949; Simmonds, Kew Bull. 14: 204. 1960; C.Y. Wu, Fl. Xizangica 5: 626. 1987.—*Musa rubra* auct. non. Wall. ex Kurz (1867): H.W. Li, Acta Phytotax. Sin. 16: 57. 1978, in C.Y. Wu, Fl. Yunnan 2: 731. 1979, et T. L. Wu, Fl. Reipubl. Popularis Sin. 16: 13. 1981; C.Y. Wu, Index Fl. Yunnan. II: 1901, 1984; H. Li, Fl. Dulongjiang Reg. 313. 1993. T. L. Wu and Kress in C. Y. Wu and Raven, Fl. China 24: 316. 2000.—TYPE: Hort. Kew Dec. 3rd, 1884, collector unknown s. n. (K!).

An imperfectly known species misidentified as *M. rubra* Wall. ex Kurz. in China due to the similar inflorescence. Checking the types at Kew, we found this species should be *Musa sanguinea* Hook. f. It can be readily distinguished by *M. rubra* for its longer free tepal, nearly as long as the fused tepals, while in *M. rubra* the free tepal is only half of the fused tepals. This species occurs in evergreen forests in western Yunnan (see Figure 2). Chromosome number: $2n = 22$ (Simmonds, 1962).

5. *Musa nagensium* Prain, J. Asiat. Soc. Bengal 73: 21. 1904; Cheesman, Kew Bull. 3: 325. 1948; Simmonds, Kew Bull. 14: 204. 1960.—LECTOTYPE: India, Assam, Nagaland, Joboca, *Abdul Huq* s. n. (K!); lectotype here designated.

This is another incompletely known species of *Musa* in China due to its limited distribution. It is distinctive in its very slender and graceful pseudostem, long and narrow staminate buds, and especially, its thick wax layer on the blades abaxially, and the large seeds. The wild populations in China only occur in the evergreen broad-leaved forests at Tongbiguan Nature Reserve of Yingjiang County, western Yunnan (see Figure 2). Chromosome number: $2n = 22$ (Simmonds, 1960).

6. *Musa basjoo* Siebold, Verh. Batav. Gen. 12: 18. 1830; Baker, Bot. Mag. t. 7128. 1891 et Ann. Bot. 7: 210. 1893; De Wildeman, Ann. Mus. Colon. Marseilles. Ser. 2: 322. 1912; Cheesman, Kew Bull. 3: 323. 1949; Simmonds, Kew Bull. 14: 204. 1960; H.W. Li, Acta Phytotax. Sin. 16: 62. 1978, in C.Y. Wu, Fl. Yunnan. 2: 731. 1979 et T.L. Wu, Fl. Reipubl. Popularis Sin. 16: 12. 1981; T.L. Wu and Kress in C.Y. Wu and Raven, Fl. China 24: 317. 2000.—*Musa dechangnesis* J.L. Liu et M.G. Liu, Acta Bot. Yunnan. 9: 163. 1987, syn. nov.—TYPE: Sichuan, Dechang, Xiaogao, alt. 1,380 m, 2 Dec 1984, *J. L. Liu et J. Q. Xiao 179* (holotype, XIAS!).—*Musa luteola* J. L. Liu, Invetigatio et Studium Naturae 10: 41. 1990, syn. nov.—TYPE: Sichuan, Lushan, Shuangshi, alt. 700 m, 3 Oct 1987, *J.L. Liu et Z. H. Tang 180* (holotype, XIAS!).—*Musa lushanensis* J. L. Liu, Acta Bot. Yunnan. 11: 171. 1989, syn. nov.—TYPE: Sichuan, Lushan, Shuangshi, alt. 700 m, 3 Oct 1987, *J. L. Liu et Z. H. Tang 181* (holotype, XIAS!).—LECTOTYPE: Bot. Mag. t. 7182. 1891; lectotype here designated.

Musa basjoo is one of the best known species in the genus because of its ability to grow outdoors in cool climates. It was considered to be a native of the Ryukyu Islands (Baker, 1891; Cheesman, 1948; Li, 1981; Wu and Kress, 2000) since the original description was based on cultivated plants from a garden in the Ryukyus. However, this species is not native in Japan and was introduced from China (Makino, 1979; Amano et al., 1991-1992a, 1991-1992b). According to our study, the three species (*M. dechangensis*, *M. luteola*, and *M. lushanensis*) reported to occur in Sichuan Province seem to be identical with the original description of *M. basjoo*. The illustrations of fruits for the three species were actually described at different developing stages. Comparing all the type specimens of the three species with that of *M. basjoo*, there is no distinctive difference among their diagnostic characters, including color of bracts, the compact fruit bunch, and the free tepal nearly or quite as long as the fused tepals. Wu (1997) treated the above three species as synonyms of *M. balbisiana* Colla, but his treatment lacks convincing evidence. *Musa basjoo* is now widely cultivated in China, and the wild populations appear to occur only in some limited zones in Sichuan Province. We are sure that this species previously had a wider distribution in China.

According to Cheesman's notes (1948), we here designate the illustration Bot. Mag. t. 7182. (1891) as its lectotype.

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中國野生芭蕉 (*Musa*) 的分類訂正

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本文報導了芭蕉屬一新種 *Musa paracoccinea*，澄清產於中國的二種未詳知種，即 *M. nagensium* Prain 和 *M. sanguinea* Hook. f.，將 *M. lushanensis*、*M. luteola*、*M. dechangensis* 三個種名作為 *M. basjoo* 的異名處理；糾正了中國植物學文獻（如中國植物志和雲南植物志等）中將 *M. wilsonii* 和 *M. rubra* 分別鑒定為 *M. itinerans* 和 *M. sanguinea* 的錯誤。

關鍵詞：野生芭蕉；芭蕉屬；*Musa paracoccinea*；分類訂正；中國。