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Notes on *Musa rubra* Kurz (Musaceae) and reduction of *M. laterita* Cheesman as conspecific

Alfred Joe, Puravannoor Edakkattillam Sreejith and Mamiyil Sabu*

Department of Botany, University of Calicut, Calicut University PO, Malappuram, Kerala, 673 635 India
**Corresponding authors. Email:msabu9@gmail.com*

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ABSTRACT: Notes on taxonomic identity and history of *M. rubra* are provided and lectotype is designated here. Detailed description, photographs and illustration are provided for easy identification. *M. laterita* is treated as conspecific to *M. rubra*.

KEY WORDS: Manipur, Mizoram, *Musa*, *M. laterita*, *M. rubra*, typification.

INTRODUCTION

M. rubra was first described by Kurz (1867) in brief, from specimens collected by himself in Pegu, Burma [Myanmar]. It must however, have been discovered many years earlier by Wallich and cultivated under the same name at Calcutta Botanical Gardens (Hooker, 1895, Fig. 1). Therefore Kurz given Wallich as author of the species, but, according to Cheesman (1949), Kurz made the diagnosis by himself and not by Wallich. Its cultivation in Calcutta Botanical Garden is also proved by the inclusion of the name *M. rubra* in Voigt (1845), who catalogued the plants cultivated in Hon. East India Company's Botanical Garden, Calcutta as well as in the Serampore Botanical Garden. Baker (1893) in his work gave a description with a begining "Habit of *M. coccinea*". He cited the specimens of M'Clelland and Kurz and concluded with "differs from *M. coccinea* by its short petal". According to Hooker (1895), "suckers of *M. rubra* were received at Kew from Dr. King in 1889, under the name of *M. rosea*, which is a different species, more like *M. coccinea* with shorter, much broader leaves, and the petal nearly as long as the sepals". This might be the origin of uncertainty in Baker's description of *M. rubra* which is entirely different from the habit of *M. coccinea*.

M. laterita was described by Cheesman (1949) from a plant grown from the seeds sent by Kermode, a silviculturist, collected from Burma [Myanmar] almost near to the type locality of *M. rubra*. During characterization and identification of the species, Cheesman found that his plant fitted with the very brief description given by Kurz (1867) about *M. rubra* and also referred to the detailed description of *M. rubra* by Baker (1893). But Baker's quote about the habit of *M. rubra*, *ie*., 'habit of *M. coccinea*' apparently confused Cheesman, who otherwise would not have described *M. laterita* as a new species. Indeed, before entering his description on *M. laterita* he wrote: "I conclude that further enquiry is desirable to establish the identity of *M. rubra* beyond question, and until that is possible our species must be described as new and Baker's description be accepted with reserve as applying to *M. rubra*". Actually, Baker's description agrees with Kurz's, except for the indication of habit, and this confused Cheesman who then described *M. laterita*. Subsequent botanists also treated *M. laterita* as a distinct species (Simmonds, 1954; Hakkinen, 2001, 2005a, b, 2007; Singh *et al*., 2001; Uma *et al*. 2005, 2006 *etc*.).



Fig. 1. Icon of *Musa rubra*: Hook.f., Bot. Mag. 121. T. 7451.

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Simmonds (1962) opined that "(the mysterious) *M. rubra* is allied to (and may even be identical with) *M. laterita*". However, neither of the above descriptions mention that *M. rubra* develops long, running rhizomes, the striking characteristic noticed for *M. laterita*. Yet, the illustration of *M. rubra* in Curtis's Botanical Magazine (Hooker, 1895) shows it to be remarkably similar to *M. laterita* and shows in fact the running rhizomes. Hakkinen and Vare (2008) suggested that *M. laterita* might be a variety of *M. rubra* but that definitive settling of the question requires further studies. Our detailed studies on both the taxa revealed that most of the characters of *M. rubra* and *M. laterita* were found to be similar.

Actually, *M. rubra* suckers freely but, unlike most *Musa*, the suckers are borne at the end of long rhizomes for which the development needs quite some space on the soil around the plant. In pot culture however, *M. rubra* displays a rather clump forming habit and this could be the main reason why the running nature of the rhizome was left unnoticed during the description by Baker (1893) and Hooker (1895). Likewise the bract persistency, considered a typical for *M. rubra* and as distinct from the dehiscent bracts of *M. laterita*, is highly influenced by climatic growth conditions. The bracts tend to strongly persist only in outspoken cold or dry conditions. During our collection of specimens from Manipur, the bracts seem to be persist because of pronounced cold in December and drought in summer. But under cultivation in normal conditions, the plant produces an inflorescence with dehiscent bracts. Indeed, the illustration of *M. rubra* in Curtis's Botanical Magazine was made from a plant flowered at Kew Gardens, in a climate quite different from that in the native habitat of the species. Moreover, the icon by Hooker shows a mixture of infloresences with or without persistent bracts, which means that the bract persistence of *M. rubra* is not a stable character. Even though the description by Hooker (1895) mentioned the bracts as persistent, any of the sheets for *M. rubra* at Kew and Calcutta herbarium lacks it.

Hakkinen and Sharrock (2002) and Hakkinen (2005a, b, 2009) reported the occurrence of *M. rubra* from Mizoram, India. For this they admitted that "there are several specimens of *M. rubra* in cultivation at IIHR, Bangalore, which were collected from India close to the border with Myanmar" and also provided a photograph with persistent bracts. During this work we studied the specimen cultivated at IIHR in the name of *M. rubra* and observed inflorescences variably with or without persistent bracts, thus strongly indicating that bract persistency is not a constant character of *M. rubra*. The other striking characters shared by both *M. rubra* and *M. laterita* such as running habit of plant, smooth seed surface, - also visible from Hooker's icon,-further weakens the concept that they would be different species. Finally, the SSR analysis of wild bananas by Čížková *et al.* (2015) shows *M. rubra* and *M. laterita* as genotypically strongly connected, if not conspecific taxa. Hence from the above circumstances and based on the field experience we concluded that both the taxa are the same. Hakkinen and Vare (2008) lectotypified *M. rubra* by a specimen collected by M'Clelland and mentioned that "the lectotype has probably been collected by M'Clelland in Myanmar. This specimen was incorporated to Kew herbarium in 1867, in the same year Kurz made the diagnosis". But during his description Kurz (1867) didn't mention about M'Clelland specimens and according to Hooker (1895) Kurz himself made the collection from Pegu and described *M. rubra* from Calcutta. And the specimen of *M. rubra* deposited at Calcutta herbarium by Kurz is existing in a good condition. Therefore the lectotypification by Hakkinen and Vare (2008) is superseded by Kurz specimen at CAL and here designated as lectotype.

TAXONOMIC TREATMENT

Musa rubra Wall.ex Kurz., J. Agric. Soc. Ind. 14: 301. 1867; Baker, Ann. Bot. 7(26): 221. 1893; Kew Bull., 1894: 258. 1894; Hook.f., Bot. Mag. 121: t. 7451. 1898; Anon., Bull. Misc. Inform. Kew.4: 268.1900; K. Schum. in Engl., Pflanzenr. 4(45): 23. 1900; Cheesman, Kew Bull. 4(3): 265. 1949; Simmonds, Kew Bull. 14(2): 204. 1960; Hakkinen & Sharrock, INIBAP annual report 21. 2002; Kress, W.J. *et al*., Checklist Pl. Myanmar 45: 63. 2003; Hakkinen, Folia Malysiana 6(1–2): 56. 2005 & Bull. Heliconia Soc. Int. 12(2): 4. 2005 & Chronica Horticulturae 47(2): 10. 2007 & J. Syst. Evol.47(1): 90. 2009; Hakkinen & Vare, Adansonia 30(1): 89. 2008; Hakkinen, Taxon 62(4): 810. 2013.

Laterite banana (English)
Thamaravazha (Malayalam), Figs. 1–5
Type:**INDIA**: Herb. Hort. Bot. Calcuttensis, C.B.G. [Calcutta Botanical Garden (Cultivated)], 14 January 1987, *SK [SulpizKurz] s.n.* (CAL, lectotype designated here).

Musa laterita Cheesman, Kew Bull.4(3): 265. 1949; N.W.Simmonds, Kew Bull. 14(2): 204. 1960; Hakkinen & Sharrock, INIBAP annual report 19. 2002; Kress, W.J. *et al*., Checklist Pl. Myanmar 45: 63. 2003; Uma *et al*., Pl. Genet. Resources Newlett.146: 20.2006; Hakkinen, Chron. Horti. 47(2): 8. 2007; *et* Adansonia 30(1): 81. 2008; Joe *et al*., Folia malaysiana 14(1): 37. 2013; Hakkinen, Taxon 62(4): 810. 2013. ***syn. nov.***

Type: Kew Bulletin 4(3): Fig. 2. 1949. (Lectotype, designated by Hakkinen &Vare, 2008)

Perennial stoloniferous rhizomatous herbs, plants suckering, not clump forming, spreading by running rhizomes, suckers 3–5, 0.5–1.2 m away from the parent, vertically arranged. Pseudostems cylindrical, not or indistinctly swollen at base, mature pseudostem 30–220 cm high, 15–20 cm circumference at the base, slender, light green with black blotches or with dark reddish

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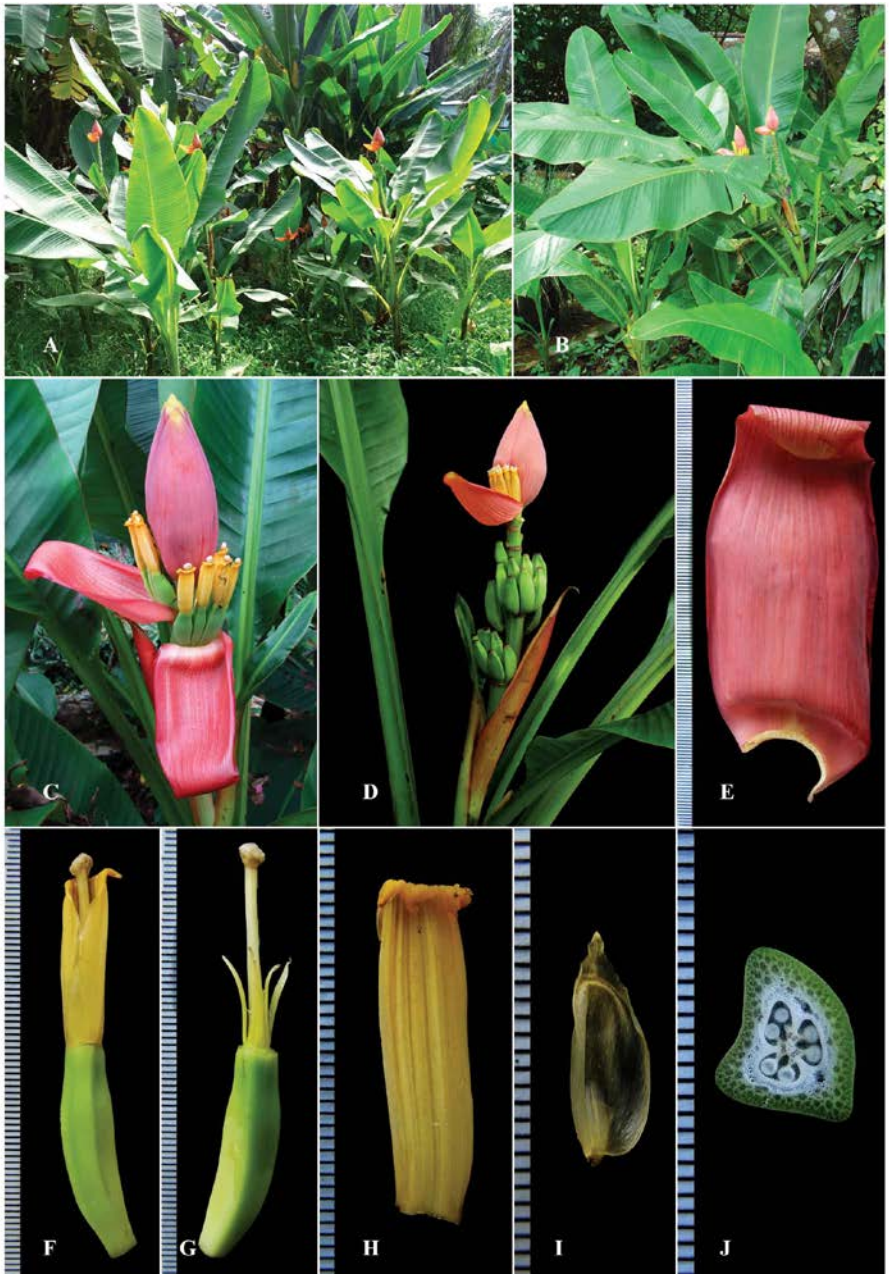


Fig. 2. ***Musa rubra***. **A-B**: Habit showing spreading behavior. **C**: Inflorescence at early stage. **D**: Inflorescence just after female flowers. **E**: Female bract-adaxial surface. **F-J**: Female flower parts. **F**: Entire flower. **G**: Flower without tepals. **H**: Compound tepal. **I**: Free tepal. **J**: c.s. of ovary. Photos by Alfred Joe.

brown patches, underlying colour light green without any pigmentation or with dark reddish brown patches, shiny, sap watery. Leaf habit erect, leaves arranged as terminal tuft at apex, lamina 90–108 × 25–37 cm, oblanceolate, adaxially dark green with brown scarious margin, dull, abaxially medium green, glabrous, leaf bases symmetric, both sides narrowing towards the base and extended to the petiole as petiole margin, narrowing towards apex, acute or obtuse at apex, with a tendril-like appendage at young stage, midrib adaxiallyand abaxially light green to yellow green. Petiole 22–40 cm long, glabrous, petiole margins open with spreading and without any blotches at the base, petiole bases winged, with blackish brown scarious margins, smooth and clasping the pseudostem. Inflorescence erect, peduncle 15–30 cm long, green, densely puberulent with short white hairs, grooves not prominent. Sterile bracts 1–2, persistent, first one leaf-like with a broadened petiole with brick red colour and leafy apex, next one like true bract, linear–lanceolate, brick red with cream base, 15–19 × 4.5–5.5 cm. Female bud lanceolate, imbricate at tip.

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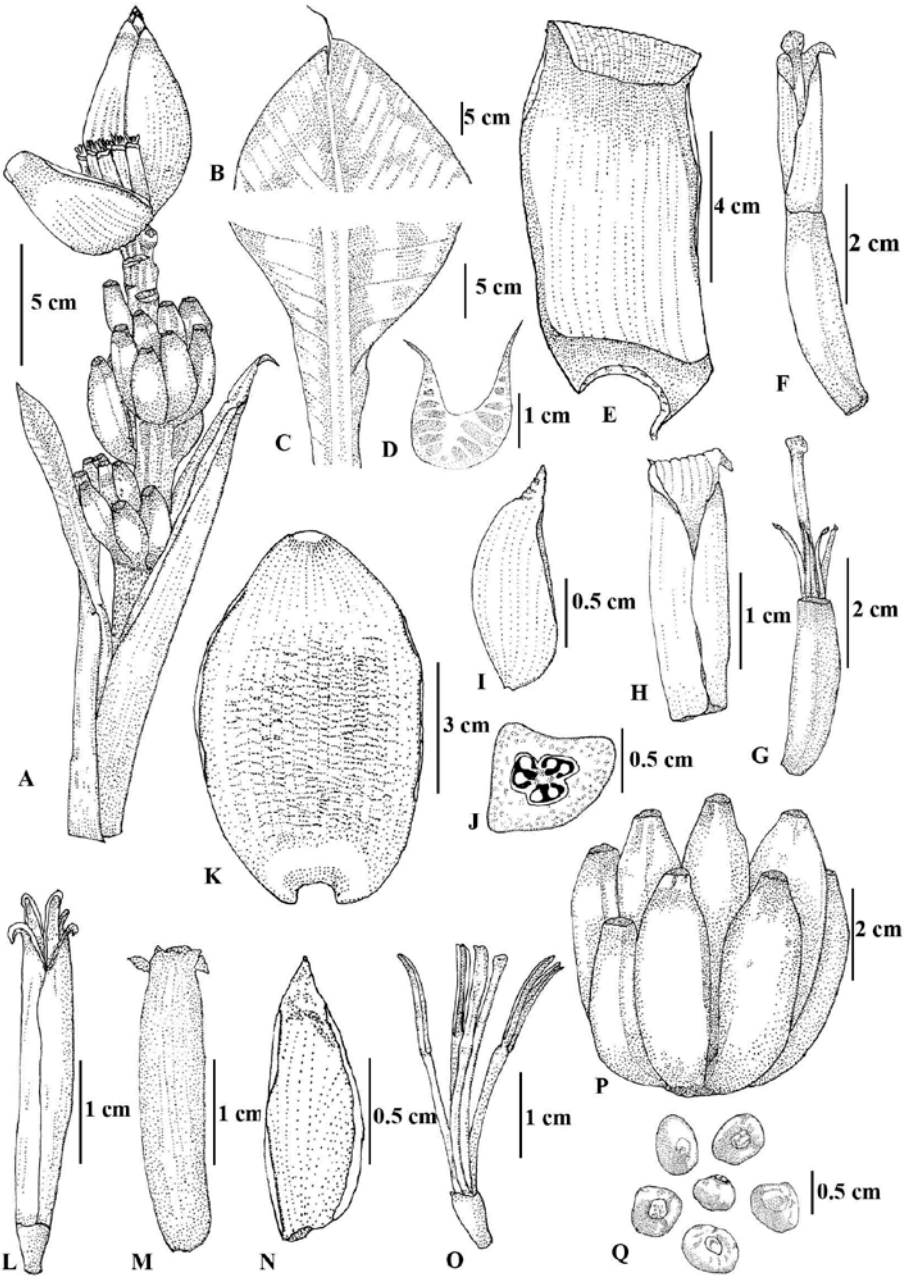


Fig. 4. ***Musa rubra*****. A**: Inflorescence. **B**. Leaf apex. **C**: Leaf base. **D**: c. s. of petiole. **E**. Female bract- adaxial surface. **F-J**: Female flower parts. **F**: Entire flower. **G**: Flower without tepals. **H**: Compound tepal. **I**: Free tepal. **J**. c.s. of ovary.**K**: Male bract-adaxial surface. **L-O**: Male flower parts. **L**: Entire flower. **M**: Compound tepal. **N**: Free tepal. **O**: Flower without tepals. **P**: Mature unripen fruit bunch. **Q**: Seeds. Illustration by Alfred Joe.

Female bracts lanceolate, 12–17 × 6–8 cm, adaxially, red to brick red with yellowapex, base oblique, moderately grooved, slightly glaucous, abaxially little paler, highly grooved with transverse lines, shiny, apex acute, lifting 1–2 bracts at a time, reflexed and revolute before falling. Basal 4–6 hands female. Bracts and flowers inserted independently on the axis. Female flowers 4–8 per bract in two rows, 6.7–8 cm long. Compound tepal 2.8–3.3 × 1.8–2.1 cm, orange-yellow, ribbed at dorsal angles, divided only to the apex, lobes 5, dark orange-yellow. Free tepal somewhat half of compound tepal, 1.6–1.9 × 1.2–1.6 cm, boat-shaped, fused, cream tinged with yellow, yellow towards base and apex, apex slightly corrugated with a short acumen, acumen yellow, 0.2–0.4 cm long. Staminodes 5, 1.2–1.6 cm long, yellow with cream apex. Ovary 3.8–4.3 cm long, straight, green, with ovules in 2 rows per locule; style straight, 3–3.8 cm long, cream with yellow tinge towards base and apex, inserted; stigma globose, exserted, cream-grey, sticky, *c*. 4 mm diam. Male bud lanceolate, in advanced blooming top-shaped,

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imbricate at apex, rachis erect. Male bracts 12–15 × 6.5 cm, highly grooved, adaxially red to brick-red with yellow apex, slightly glaucous, abaxially much darker, shiny, prominent ridges with transverse lines, apex obtuse or round, lifting 1–2 bracts at a time, deciduous or persistent, reflexed before falling, not revolute, the whole bud degenerating before maturity of fruits. Bracts and flowers inserted independently on the axis. Male flowers 6–8 per bract in two rows, 3–4.8 cm long, falling with the bracts or sometimes persistent with bracts, bract scar prominent. Compound tepal 2.5–4 × 1.9–2.5 cm, orange-yellow, divided only to the apex, ribbed at dorsal angles, and with 5-toothed orange lobes. Free tepal 1.3–1.6 × 1–1.1 cm, translucent creamy orange, boat-shaped, fused, corrugated at apex with a short acumen. Stamens 5, 3–3.5 cm long, exserted; filament 1.7–1.9 cm long, greenish-white, orange towards the anther; anther 1.3–1.9 cm long, creamy yellow. Ovary straight, rudiment, 0.7–1.2 cm long, cream tinged with yellow-green; style straight, 2.3–3.5 cm long, cream, orange towards stigma, inserted; stigma globose, orange, sticky, *c*. 1 mm diam. Fruitbunch compact, with 4–6 hands and 4–8 fruits per hand, in two rows, middle hand much developed, fingers pointed upwards, ie. negatively geotropic, appressed to the rachis, individual fruit 3.5–7 cm long, on a very short pedicel, 0.2–0.3 cm long, glabrous, fruits straight, pronouncedly ridged, apex slightly pointed, 0.3–0.6 cm long, without any floral relicts, immature fruit peel colour green, becoming yellow at maturity, immature fruit pulp white, becoming white and soft at maturity, fruits not self-peeling at maturity. Seeds 50–60 per fruit, 0.6–0.9 × 0.3–0.4 cm, globose, surface smooth, brown to black except for the circum-hilar area.

Flowering & Fruiting: Throughout the year.

Distribution: Simmonds (1954) commented its distribution 'Known only from Southwestern Burma'. Shepherd (1999), De Langhe *et al*. (1999) and Swangpol and Somana (2011) reported the occurrence of '*M. laterita*' and some hybrids of it from Northern Thailand and Western Thailand. Sundararaj (1955) recorded its presence from South India, probably from the gardens. However, Karthikeyan *et al*. (1989) and Hore *et al*. (1992) did not record its occurrence in India. Subsequently there have been reports about it being found in India (Anonymous, 2003; Banerjee, *et al*. 2011; Hakkinen, 2001, 2005a,b, 2007; Singh, *et al*. 2001; Uma *et al*., 2005, 2006) without any evidences of its occurrence in the wild, probably referring to its occurrence in gardens. Some reported this species even from wild of South India, but no one produced any proof. However, it is widely cultivated in home gardens and nurseries as ornamental plant throughout India. Joe *et al*. (2013a) reported *M. rubra* '*M. laterita*' for the first time about its occurrence from wild in India from Manipur. From wild, in India it is only known from Manipur and Mizoram, North-Eastern India.

Ecology: This species grows as undergrowth and also on the slopes of forest margins.

Etymology: The specific epithet '*rubra*' stands for its red coloured bracts.

Cytology: n = 11 (Cheesman, 1949).

Uses: Grown as ornamental plant.

Affinities: In its running nature of rhizome, *M. rubra* is allied to *M. itinerans*, but differ from it in having bright red bracts, leaf apex acute or obtuse, erect inflorescence *etc*. Cheesman (1949) noted that the plant has a strong general resemblance to *M. ornata*, and it hybridises with it, but it does not show a strong genetic affinity with that species and in other respects mainly like its flowers being in two rows and by its short free tepal.

Notes: *M. rubra* suckers freely but, unlike most *Musa except M. itinerans*, the suckers are borne at the end of long rhizomes. Consequently, instead of the typical clumped appearance of most bananas, *M. rubra* has a rather open habit. In a greenhouse bed or in a garden, *M. rubra* is a rather unruly plant that soon "travels" from its planting place. Fortunately the plant is quite amenable to pot culture where the long rhizomes will not be apparent until the plant is re-potted. The fruits are closely appressed to the rachis, another characteristic feature of *M. rubra*.



Fig. 3. Lectotype of ***Musa rubra***: *SK [Sulpiz Kurz] s.n.* (CAL)

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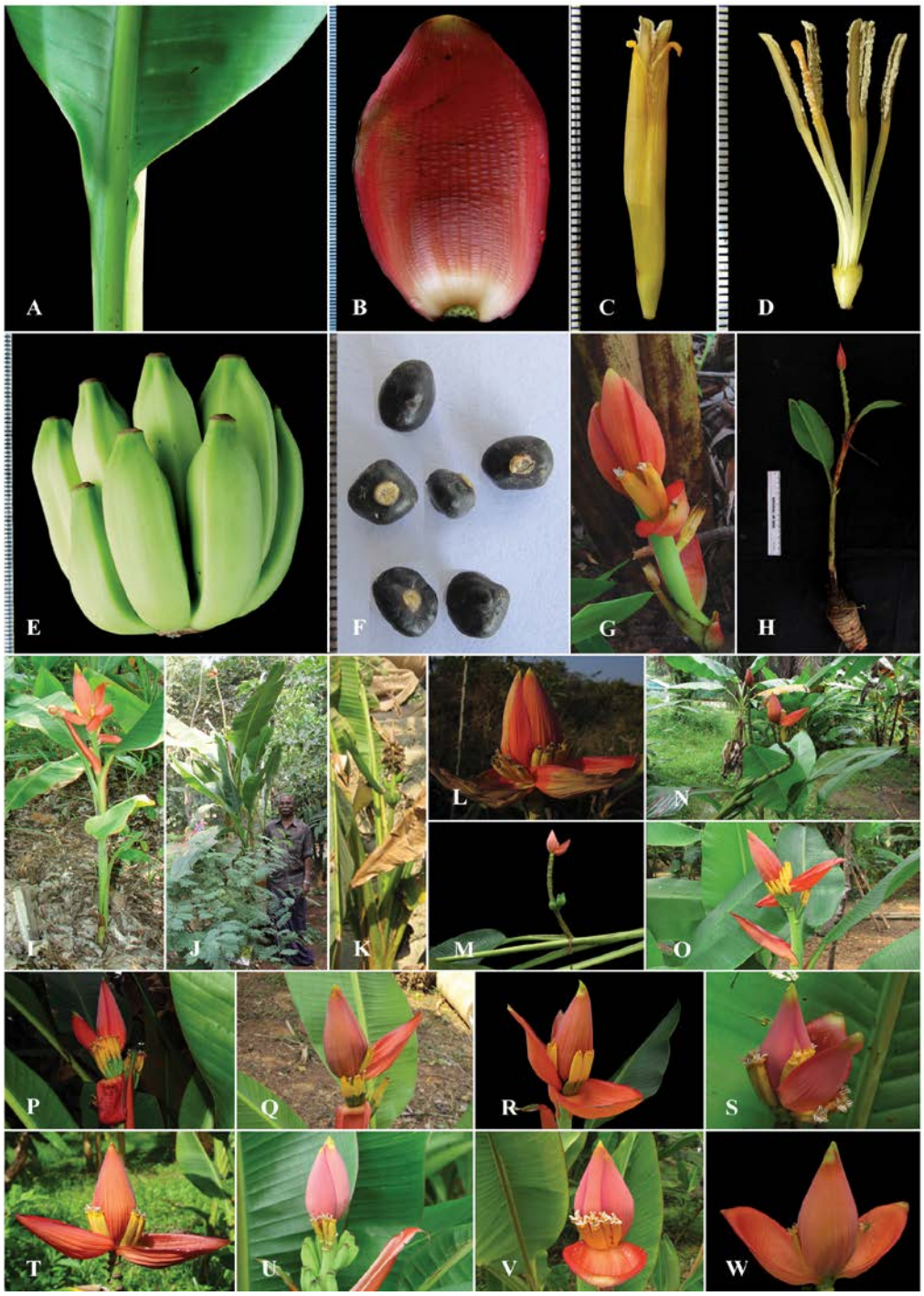


Fig. 5. ***Musa rubra***. **A**: Leaf base. **B**: Male bract- adaxial surface. **C-D**: Male flowers parts. **C**: Entire flower. **D**: Flowers without tepals. **E**: Mature unripen fruit bunch. **F**: Seeds. **G**: Inflorescence arised directly from rhizome. **H-J**: variation in pseudostem size. **K-L**: Dry persistent bracts due to extreme winter. **M-O**: Bended inflorescences. **P-W**: Variation in male bud shape and color of barcts. Photos by Alfred Joe.

IUCN Status: *M. rubra* is presently kept under Least Concern (LC) (IUCN., 2011) because of its vast distribution from North-East India, Myanmar to Western Thailand and because of its easy multiplication of the plant by running rhizome. It can also be easily propagate by seeds.

Specimens Examined: **BURMA [MYANMAR]:** Rangoon, 13 January, *M'Clelland s.n.* (K image). Bago region, Taungoo Dist., 150 ft, 4 August 1910, *J.H. Lacn. 5408* (K image). **INDIA:** Manipur**:** Churchandpur Dist., Chongpi, way to Samti, 608 m, 10 December 2012, *A. Joe & Ashfak 121655* (CALI); Tamenglong Dist., Noney, way to Silchar from Imphal, 230 m, 12 December 2012, *A. Joe & Ashfak 121658* (CALI). Karnataka**:** Bengaluru, IIHR (introduced from Mizoram, near Myanmar border)**,** 10 January 2014, *A. Joe & M.*

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Sabu 130786 (CALI). Kerala**:** Malappuram Dist., Calicut University Botanical Garden (CUBG)(Cultivated), 50 m, 04 February 2013, *A. Joe & M. Sabu 121679* (CALI); Musa garden, Calicut university Botanical Garden (CUBG)(Cultivated), 50 m, 25 May 2013, *A. Joe & M. Sabu 121679* (CALI); Malappuram Dist., Calicut university Botanical Garden (CUBG)(Cultivated), 50 m, 24 May 2012, *A. Joe & M. Sabu 130753* (CALI); Thrissur Dist., Amala Cancer Hospital (Cultivated), 03 February 2012, *A. Joe 130847* (CALI). Uttarakhand**:** Dehra Dun (Cultivated), March 1925, *J.S. Gamble 27572* (K image). **THAILAND:** Siam, Khwae Noi River Basin, Kin Sayok, about 120 km, n.w. of Kanburi, 100–150 m, 14 July 1946, *A. Kostermans 1125* (P image); Northern Thailand, S of Mae Sariang, 18°10′N, 97°55′E, 300 m, 8 July 1968, *Kai Larsen, T. Santisuk & E. Warnoke 2258* (P image); Tak, 45 km E of Mae Sot,400 m, 13 July 1999, *Newman, M. 903* (E image).

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