Musa markkui (Musaceae), a new species from Arunachal Pradesh, India

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ABSTRACT. *Musa markkui* R.Gogoi & S.Borah, a new species of *Musa* of the section *Rhodochlamys*, is described and illustrated from Lohit valley, Arunachal Pradesh, India based on observed morphological characters in the field. A key to *M. markkui* and related taxa is provided.

Keywords. Arunachal Pradesh, banana, India, *Musa*, Musaceae, new species

Introduction

North East India is considered a part of Southeast Asia and within the centre of diversity of *Musa* (Musaceae), a region not studied in detail and where new species and varieties continue to be reported (Häkkinen 2007, 2009). The genus *Musa* consists of about 73 species (Häkkinen & De Langhe 2001; Häkkinen & Sharrock 2002; Häkkinen 2003a, b, 2004a, b, 2005a, b, 2006a–c, 2007, 2009; Häkkinen & Meekiong 2004, 2005; Häkkinen et al. 2005; Häkkinen & Wang 2007; Häkkinen & Wallace 2007; Häkkinen et al. 2007; Häkkinen & Väre 2008a–c; Häkkinen et al. 2008; Swangpol & Somana 2011) and over 500 cultivars (Simmonds 1956, 1966; Champion 1967; Valmayor et al. 2001, 2002; Häkkinen 2009).

The present communication records the discovery of a new species of *Musa* from the Lohit valley of Arunachal Pradesh, India, here named *M. markkui*, which belongs to the section *Rhodochlamys*. The section *Rhodochlamys* is one of the four sections (the others being *Australimusa*, *Callimusa* and *Musa*) into which the genus *Musa* is divided, which is confined mainly to NE India, Bangladesh, Myanmar and NW Thailand (Häkkinen 2002, 2009). Species in *Rhodochlamys* are characterised by erect or drooping inflorescence with fruits pointing towards the bunch apex. Most of the species typically have relatively few fruits and are best known for their brightly coloured bracts (Cheesman 1947, 1949; Simmonds 1962; Shepherd, 1999; Häkkinen & Sharrock 2002; Häkkinen 2005b, 2007; Häkkinen et al. 2007).

Extensive field observations were made by the senior author during four expeditions in July 2011 and September 2012 in the border areas of Lohit and Anjaw districts of Arunachal Pradesh, under the Annual Action Plan Project "*Flora of*

Anjaw district" of the Botanical Survey of India. The new species is described in the field following the traditional banana taxonomy approach as used by Simmonds (Simmonds 1962, 1966). Relevant portions of the specimens are deposited as holotype at the Central National Herbarium (CAL) of the Botanical Survey of India, Howrah, and isotype at the ASSAM herbarium.

Musa markkui R.Gogoi & S.Borah, **sp. nov.**
Musa markkui is closely related to *M. ornata* Roxb, developing slender plants, erect inflorescences, green peduncles, and pink female and male buds, but differs in developing more pseudostems per plant, a much taller height, larger leaves, inflorescences that are at first erect and later becoming horizontal, longer peduncles with whitish pubescence, revolute bracts, more hands with more fruit in the fruit bunch, and bigger fruits.
TYPE: *Gogoi & Borah 21854*, India, Arunachal Pradesh, Lohit District, 7 km before Salangam towards Tidding, 27º56'25.33"N 96º22'38.76"E, 1302 m, 13 September 2012 (holo 3 sheets, CAL; iso ASSAM). (Fig.1 & 2).

Plant slender, suckers 12–22, produced freely and close to parent plant, vertical; mature ***pseudostem*** 300–325 cm tall, 9–12 cm in diameter at the base, generally light green with blood red blotches, shining, sap milky. ***Petiole*** 48–193 cm long, 3–3.5 cm in diameter, petiole bases winged and not clasping the pseudostem, margin reddish; ***blade*** 193–240 cm long, 45–65 cm wide, margin with brownish or pinkish lining, apex truncate, upper surface deep green, lower surface light green, mid-rib on lower surface pink, on upper surface green, leaf base asymmetric, both sides rounded. ***Inflorescence*** erect, or sometimes erect at first and then horizontal, peduncle to 40 cm long and 5.5 cm in diameter, clothed with white pubescence, sterile pink bracts two, persistent at the opening of the first female flowers. ***Female bud*** lanceolate, to 40 cm long and 8–9 cm wide; bracts pink, convolute, not waxy, white pubescent, 3–4 bracts parting at a time, revolute and deciduous. Basal flowers female, hermaphrodite, 4–7 per bract in a single row, flower 10.5 cm long (whole); ovary 5 cm long, 1.5 cm in diameter, slightly curved, triangular to quadrangular in cross section; style to 4.3 cm long, stigma capitate, 0.7 cm across; compound tepal 5.5 cm long, 2 cm wide, orange coloured, with 2 thickened keels, ribbed at the dorsal angles, with a 5-toothed orange apex, lobes subequal, rolled outwards; free tepal 5 cm long, 2 cm wide, translucent yellow, ovate, with a simple fold under the apex, acumen orange; stamens 5, filaments yellowish white, to 2.8 cm long, anther lobes to 3.2 cm long, rusty brown, anther and style at the same level. ***Male bud*** pink, lanceolate, to 21 cm long and 11 cm wide; bracts outside pink, internally light pink to whitish, one or two bracts parting at a time, revolute and deciduous, male bud inconspicous or without remains at infructescence maturity, only the rachis remaining, 13–16 cm long. ***Male flowers*** on average 6 per bract in a row, compound tepal 3.5–5.5 cm long, 0.8–1 cm wide, golden yellow, with a 5-toothed apex; free tepal 3–3.5 cm long, to 1.2 cm wide, translucent white, ovate, with a short orange acumen; style light yellow with creamy or light yellow stigma; stamens 5, filaments white, anther lobes creamy or light brown, anther and style at the same level; ovary straight,

Fig. 1. *Musa markkui* R. Gogoi & S. Borah. **A.** Plant in wild. **B.** Pseudostem base. **C.** Emerging inflorescence. **D.** Inflorescence with immature fruits and male bud. **E.** Infructescence. (Photos: R. Gogoi & S. Borah)

white, without pigmentation. ***Fruit brunch*** compact, with 4–7 fingers in a row, 7–10 hands, pedicel to 4 cm long; individual fruit up to 12 cm long (without pedicel), 2.5–3 cm in diameter, 3–4-angled, angles raised, fruit apex blunt-tipped at apex, without floral remains, fruit peel colour light greenish yellow when ripe, immature fruit pulp white, becoming creamy and soft at maturity. Seeds black, compressed, quadrangular, surface tuberculate, c. 4 mm long and 5mm wide at apex.

Distribution and habitat. Musa markkui is quite common in the hilly slopes of Tidding, Salangam, all the way from Hyuliang to Mataliang, at the higher elevations of 900–1400 m in the Lohit and Anjaw district of Arunachal Pradesh. It occurs sympatrically with *M. nagensium* var. *hongii* and *M. cheesmanii* Simmonds.

Notes. Chromosome numbers of *Rhodochlamys* species are 2n=22 (Cheesman & Larter 1935; Simmonds 1962; Shepherd 1999; Häkkinen & Sharrock 2002; Campion 1967; Häkkinen 2009; Li et al. 2010).

Etymology. The new species *M. markkui* is named in honour of Finnish botanist Markku Häkkinen for his outstanding contribution to a better understanding of *Musa* taxonomy.

There was some confusion in a horticultural context (Singh et al. 2001; Uma et al. 2005; Uma 2006: 9, Fig.7) with the name *M. rosacea* (non Jacquin, and used without any authority) from Arunachal Pradesh; indeed, that seems to refer to a distinct species, and shows similarity to *M. markkui*, but it is not published and type specimens were not deposited towards making a valid publication. On the other hand, the confusion between *M. ornata* Roxb. and *M. rosacea* Jacquin is also considered to be resolved as Jacquin's *Musa* is synonymous with *Musa balbisiana* Colla and distinct from the former (Väre & Häkkinen 2009).

NE India is very relevant to *Musa* taxonomy as it is the type locality of several species, viz., *M. velutina* H.Wendl. & Drude, *M. laterita* Cheesman, *M. sanguinea* Hook.f., *M. mannii* H.Wendl. ex Baker, *M. aurantiaca* Mann ex Baker, *M. cheesmanii* Simmonds, *M. nagensium* Prain, etc. The present discovery of a beautiful *Rhodochlamys* species with horticultural potential raises the possibility of further undescribed species in the wild. The new species *M. markkui* would be a desirable plant for introduction into horticultural circles worldwide.

Key to some closely related *Rhodochlamys* species

1a. Basal flowers female, 4–5 flowers per bract; male bracts orange externally, orange-yellow inside …… *Musa aurantiaca*

b. Basal flowers hermaphrodite, 3–7 flowers per bract; male bracts blood red, pink or rose on both sides …… 2

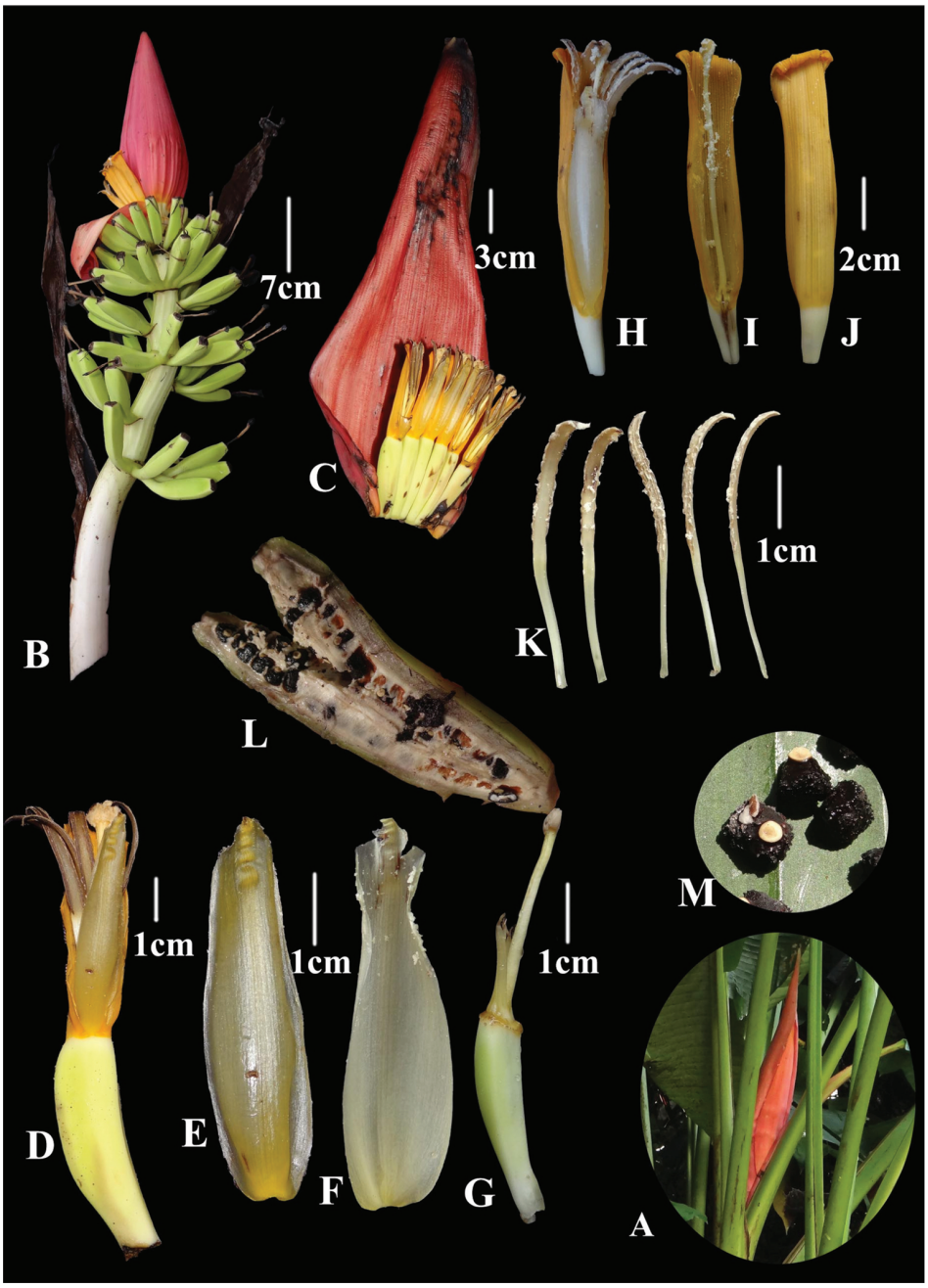

Fig. 2. *Musa markkui* R.Gogoi & S.Borah. **A.** Emerging female bud. **B.** Male bud with immature fruits. **C.** Bract with basal flowers of female bud. **D.** Basal hermaphrodite flower. **E.** Free tepal of basal flower (dorsal view). **F.** Free tepal of basal flower (ventral view). **G.** Ovary with style and stigma. **H.** Male flower. **I.** Compound tepal (ventral view) with style of male flower. **J.** Compound tepal (dorsal view). **K.** Stamens of male flower. **L.** Longitudinal section of fruit. **M.** Seeds. (Photos: R. Gogoi & S. Borah)

2a. Pseudostems 2–3 in the same plant; inflorescence erect or initially erect and then horizontal; free tepals a quarter the length of the compound tepal; bracts brick red or rose …… 3
b. Pseudostems 12–22 in the same plant, free tepals as long as compound tepals, bracts blood red or pink ……... 4

3a. Pseudostem emerging 2 meters from the parent plant; inflorescence erect; male flowers 6–10 per bract in two rows, orange in colour, bracts brick red ……..….. *Musa laterita*
b. Pseudostem emerging quite close to the parent plant; inflorescence horizontal; male flowers 2–3 per bract in one row, light yellow; bracts rose in colour ……..*Musamannii*

4a. Plant up to 150 cm tall; inflorescence horizontal, peduncle red, bracts blood red externally and internally; fruit bunch lax ……..……. *Musa sanguinea*
b. Plant up to 250–325 cm tall; inflorescence erect, peduncle light green, bracts pink; fruit bunch compact …… 5

5a. Plant up to 240 cm high; pseudostem up to 15 in the same plant, with black blotches; leaves up to 200 cm long, 35 cm wide; peduncle glabrous; bracts not revolute; fruit bunch up to 5 hands with 3–6 fingers; individual fruits up to 8 cm long and 2 cm diameter ……. *Musa ornata*
b. Plants up to 325 cm high; pseudostems up to 22 in the same plant, with red blotches; leaves up to 240 cm long and up to 65 cm wide; peduncle pubescent; bracts revolute; fruit bunch up to 10 hands with 4–7 fingers; individual fruit up to 12 cm long and 3 cm diameter ……. *Musa markkui*

ACKNOWLEDGEMENTS. The authors are grateful to Dr. P. Singh, Director, Botanical Survey of India, Kolkata and Dr. A. A. Mao, Scientist E and HOO, Arunachal Pradesh Regional Centre, Botanical Survey of India, Itanagar for much support and logistics. We are also thankful to Dr. K.N. Gandhi, Senior Nomenclatural Registrar, HUH, Harvard, U.S.A., for his helpful suggestions during preparation of the manuscript.

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