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HSI Headquarters
c/o Fairchild Tropical Gardens
10901 Old Cutler Road
Miami, FL 33156-4296 USA

HSI Editor:
Gilbert S. Daniels
700 West 56th Street
Indianapolis, IN 46228

Asssociate Editor
Victor Lee
17 Warwick Road
Singapore, 139007

Ornamental bananas - Focus on the section *Rhodochlamys*

Markku Häkkinen, Helsinki University Botanical Garden. P.O. Box 44, Fin-00014 University of Helsinki Finland. Corresponding address: Tornatorintie 11 A 26, 48100 Kotka, Finland. E-mail: *markku.hakkinen@kymp.net*

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Abstract

The original review of the section *Rhodochlamys* (Häkkinen and Sharrock 2001) has been prepared largely from the original descriptions and illustrations made in the 19th and early 20th centuries, when most of the species were described for the first time by 'modern' botanist.

However, the present updated review draws heavily on information from the author's several field expeditions to Southeast Asia, his studies of herbarium specimens at the Royal Botanic Gardens Kew (K), Royal Botanic Gardens Edinburgh (E), Natural History Museum Paris (P), Calcutta Botanic Gardens (CAL) and Singapore Botanical Gardens (SIN). It is also based on author's observations made in several botanical gardens around the world and as well as author's *Rhodochlamys* species collection, which is maintained at the University of Helsinki Botanical Garden. This account also takes into consideration more recent information from morphological and cytogenetic studies. Although this review is based on the most up-to-date available knowledge, it is recognised that *Rhodochlamys* species remain poorly known in the wild, and as they are known to hybridise with each other, it is possible that hybrids have been, and will continue to be, mistaken for natural species. It is entirely possible that the conclusions drawn here will need to be changed substantially when further exploration and phylogenetic studies have been carried out.

Possible distribution of species of *Rhoidochlamys*

Introduction

The genus *Musa* is one of the three genera (*Musa, Musella* and *Ensete*) of the family *Musaceae*. 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 made the next classification in which the genus was divided into four sections: *Australimusa, Callimusa, Eumusa* and *Rhodochlamys* (Cheesman 1947). Cheesman's classification is based on chromosome numbers and morphological characters and it has been widely accepted by botanists. Members of the *Rhodochlamys* and *Eumusa* sections have a basic chromosome number of 2n=22 compared with 2n= 20 of the *Australimusa* and *Callimusa*. Argent added one more section *Ingentimusa*, comprised of a single species *M. ingens* in which 2n=14 (Argent 1976). Species in section *Rhodochlamys* are characterised by having inflorescences that are erect, at least at the base, with fruit pointing towards the bunch apex. Most of the species also typically have relatively few fruit and are best known for their brightly coloured bracts, a feature that makes them popular as ornamental plants.

This paper focuses on eight *Musa* species of the section *Rhodochlamys.* Five of these species are well recognised and

described: *Musa laterita* Cheesman*, Musa ornata* Roxb., *Musa rosea* Baker, *Musa rubra* Wall. ex Kurz and *Musa velutina* H. Wendl and Drude, while the remaining three: *Musa aurantiaca* Mann ex Baker*, Musa mannii* H.Wendl. ex Baker and *Musa sanguinea* Hook. *f*. are less well known and of somewhat less definite status.

Distribution of *Rhodochlamys*

Musa species of *Rhodochlamys* are the only species adapted to withstand seasonal droughts, which are common in the monsoon areas to which they are native. The natural habitat of *Rhodochlamys* species is Northeast India, Bangladesh, Myanmar and Northern Thailand except *M. rosea,* which is from Cambodia and southern Vietnam. *M. sanguinea* is also known to occur in Yunnan, China. Much of the diversity in the section is therefore located in areas that have been and continue to be difficult, sometimes even dangerous in which to travel and work. 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 await description.

Hybridisation

The section *Rhodochlamys* has long been recognized as being 'close' to the section *Eumusa*, which contains the cultivated bananas. Hybridisation tests in controlled situations between members of the two sections have been carried out by a number of researchers. Shepherd noted that hybrids between *M. flaviflora* (Noltie 1994) sect. *Eumusa,* and *M. ornata* gave highly vigorous and highly fertile F1s, not at all the usual behaviour of inter-specific hybrids (Shepherd 1999). He also noted the hybrid swarm of *M. flaviflora* and *M. velutina* that Simmonds reported growing alongside *M. flaviflora* in Assam (Simmonds 1956a, 1956b, 1962). There were indications that natural backcrossing and introgression were occurring and Simmonds therefore considered that *M. flaviflora* was a connecting link between *Eumusa* and *Rhodochlamys*. Although Shepherd agreed that this might be the case with *M. velutina,* his own studies indicated that other species in the *Rhodochlamys* section were far removed from *M. flaviflora.* Shepherd therefore suggested the section should divided in two groups, one of which would be "on the other side" of *M. acuminata,* away from M. *flaviflora, M. ornata* and *M. velutina.* Further analyses of *Musa* diversity using various molecular techniques support the theory that the sections *Rhodoclamys* and *Eumusa* are closely related as clear distinction between the two species being very close to *Eumusa* species provide a potential source of exploitable new genes, thus expanding the genepool available to banana breeders (Carreel 1994, Jarret and Gavel 1995, Wong *et. al.* 2001, 2002, 2003). One particular feature of the group that could be of interest to breeders is the special mechanism that some species have for surviving drought. In unfavourable, dry conditions, they die right back, but rapidly produce new growth as soon as the first rains appear.

Uses of *Rhodochlamys* species

The products of hybridisation and introgression involving the *Rhodochlamys* are likely to be attractive, and will therefore have ornamental potential. With the growing interest in exotic ornamental plants amongst gardeners in Europe, USA and recently in South East Asia, hybrids and partial hybrids of *Rhodochlamys* species may well find their way into commerce. Any increased interest in the *Musaceae* as ornamentals may however lead to further confusion of taxa and nomenclature.

With the exception of their use as ornamental plants in the horticultural and florist industries, there is a little recorded human use of species in this section. In some areas of Northeast India, the male buds are collected and eaten as a vegetable, but the fruit are seedy and unpalatable, and therefore are not used for food.

Species in the *Rhodochlamys*

Musa laterita Cheesman, *Kew Bull*. 3: 265-267, 1949, pl. 1.

M. laterita is native to Northeast India, Myanmar and Northern Thailand. It is however common in cultivation as an ornamental plant worldwide. It is frequently sold as an ornamental under the name of *Musa ornata* 'Bronze' or *Musa ornata* 'Red Salmon' and lately under the name *M. laterita* (Häkkinen 2001). The epithet "*laterita*" derives from the bright colour of its bracts, which resemble the brick-red tropical soil, known as lat-

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HSI Officers for 2005-2006

The HSI BULLETIN is the quarterly publication of the HELICONIA SOCIETY INTERNATIONAL. Editors: Gilbert S. Daniels, 700 W. 56th Street, Indianapolis, IN 46228 U.S A., gdaniels15@comcast.net, 317-251-7343, 317-251-9071 (FAX) and Victor Lee, BTF Horticultural Services, 17 Warwick Road, Singapore 139007, Singapore, leevic@starhub.net.sg, 65 6476 8028, 65 6472 0828 (FAX)

erite. Cheesman describes the species in the Kew Bulletin as a plant that spreads freely, sending up suckers at long distances from the mother plant, and forming only lax, open clumps (Cheesman 1949). The plant is slender, reaching a height of 1-2 m. The inflorescence is erect, and the peduncle velvety with dense, minute hairs. The bracts are brick red, the same colour inside as outside. The fruit bunch is very compact, with the fruit almost pressing against the rachis. The fruits reach about 8-10 cm in length and the peel becomes yellow on ripening. The male flowers are orange-yellow in colour. Cheesman notes that the plant has a strong general resemblance to *M. ornata* but, while it hybridises with it, it does not show a strong genetic affinity with that species and in other respects it approaches the section *Eumusa* species more closely than any other *Rhodochlamys*. The ability of the plant to hybridise with *M. ornata* suggests one possible origin of some of the plants commonly but sometimes erroneously known in tropical horticulture as cultivars of *M. ornata.*

Pseudostem Slender, 1-2 m in height, green, devoid of wax, profuse suckering, which can emerge up to 1m away from the mother plant.

Leaves Blades 1.50 m long and 40 cm wide, medium dark green in colour, truncate at the apex, narrowing down rather with a gradual acute base. Petiole 40-50 cm long, its base closely clasping the pseudostem, midrib is flushed red on the lower surface.

Inflorescence Erect, peduncle is slightly hairy in nature, first sterile bract is usually a foliage leaf with a broadened petiole, developing red colour, and this followed by one sterile true bract. Basal flowers are female.

Bunch Very compact, erect in position, 4-5 hands, 4-6 fingers in each hand.

Male bud Ovate, slightly imbricate at the tip, bracts are brick red, slightly grooved, 6-10 flowers per bract, biseriate.

Male flowers Compound tepal4 cm long, orange yellow in colour, lobes slightly darker, the lateral lobes 5 mm long with a minute dorsal appendages,.free tepal more than 1 cm long, opaque white and boat in shape.

Fruit Bunch very compact, the fruits almost appressed to the rachis. Individual fruit about 8-10 cm long, very short pedicel, yellow upon ripening.

Seeds Dull black, irregularly depressed, 5 mm in diameter and 3 mm high.

Musa ornata Roxb., *Hort. Beng*. 19, 1814 (by name only), Roxburgh *Fl. Ind.* 2: 488, 1924 (Carey ed.).

This species has been recently recorded in wild populations along the slopes in certain moist regions of Araku Valley in Andhra Pradesh, and it also grown wild in the NE states of India. It has also been recorded in Howaikong Forest, Hari Khola, Bangladesh in Dipterocarp forest growing on slopes by streams. Roxburgh recorded *M. ornata* as "a native of Chittagong" (Roxburgh 1814). *M.ornata* is described by Roxburgh in Flora Indica (Roxburgh 1824 in Carey ed.). However, some confusion exists, particularly in horticultural texts, between *M. ornata* and *M. rosacea* (see section *Musa rosacea*). As a result, in some texts, the name *M. rosacea* has been reduced to a synonym for *M. ornata*. In this sense, when the name *M. rosacea* is used in horticultural circles, it has come to mean something quite different from the original *M. rosacea* Jacq. (Jacquin.1804). To further confuse matters, the species *M. rosacea* Jacq. is commonly also found for sale under the names of *Musa ornata* "standard lavender" or *Musa ornata* "dwarf blue".

Cheesman also noted that *Musa salaccensis* H. Zollinger is sometimes given as a synonym of *M. ornata* Roxb. (Cheesman 1947, Zollinger 1854). However this is incorrect as the two species are in different sections of *Musa*. The confusion arose, because Zollinger when naming his species added in brackets "(ornata Roxb.?)" which, given the superficial similarity of the two was a reasonable query at the time. Miquel in his *Flora van Nederlandisch Indie* put it the other way around and thereafter certain later authors added *M. ornata* Roxb. to the synonymy of *M.salaccensis* (Miguel 1855).

Shepherd (1999) had doubts about the status of *M. ornata*, considering that its distribution in the wild seemed to be limited and variation within the species not obvious. He therefore suggested that *M. ornata* could be "secondary species" resulting from a hybrid swarm between *M. flaviflora* and *M. velutina* (Shepherd 1999).

Pseudostem 1.0-1.8 m high, green, slender and heavily waxy. Suckers profuse and emerge slightly at an angle from the mother plant

Leaves Up to 2 m long, 35 cm wide, medium green in colour, truncate at the apex, midrib often flushed with red beneath. Petiole up to 60 cm long and clasping the pseudostem at the base

Inflorescence Erect, 30-35 cm, glabrous, sterile bracts usually 2, the first a shortened foliage leaf with broadened and coloured petiole, the second a fully coloured true bract. Basal flowers female.

Male bud Top-shaped, acute, the bracts convolute or slightly imbricate at the tip. Pink in colour, yellow at the extreme tip.

Male flowers Orange yellow in colour, 4-6 flowers per hand in one row. Compound tepal about 4 cm long, orange-yellow in colour, free tepal is more or less as long as compound tepal, bowl shaped, tip is more or less smooth.

Fruit 6-8 cm long, 2-2.5 cm in diameter, green at maturity and bright yellow at ripeness.

Seeds Dull black, irregular, smooth surfaced, 5 mm in diameter and 3 mm in height.

Musa rosea Baker, *Annals of Botany* 7: 221, 1893.

Musa rosea has long been a "lost species" whose identity has been obscure since Baker's time in the 1890's. It has been regarded as a distinct taxon, and incorrectly regarded as a synonym of *Musa ornata* (*Musa rosacea*) (Cheesman 1931 and 1949). A lot of speculation had taken place since that time as to whether *M. rosea* is a true species or not. The first published information regarding *M. rosea* emerged in the

late 19th century, when Kew botanist J.G. Baker described the species from two sketches drawn from dried specimens in the herbarium of the Botanic Garden Calcutta, in June 1882. This species originates in Cambodia. The species is described by Baker in the Annals of Botany, 1893 as having the habit of *M. coccinea,* but with leaves much shorter and broader in proportion to length (Baker 1893). The inflorescence is short and erect with red bracts. Cheesman in the Kew Bulletin 1949 quotes De Wildeman as saying that *M. rosea* was introduced into Europe around 1805, from Mauritius. Cheesman also mentions that there was a species known in Europe as *M. rosea* long before 1893, which is proved by the citation in *Index Londinensis* of three illustrations published with this name in 1841, 1842 and 1849, (De Wildeman 1912, Stapf 1929-31). Cheesman wrote in the same article "I have not been able to refer to these illustrations to satisfy myself whether they represent Baker's plant, *Musa ornata*, or a third entity, but it seems to me likely that they may on examination prove to be *M. ornata*". This author has studied both the publications and the plants in the field and has come also to the conclusion that the plant shown in the sketches are *M. ornata* and not *M. rosea.*

Pseudostem 1.5 m in height, green, slender and devoid of wax. Profuse suckering, which can emerge up to 0.5 m away from the mother plant.

Leaves Up to 1 m long, 30 cm wide, green in colour and shiny, Leaf bases symmetric and pointed. Petiole up to 30 cm.

Inflorescence Erect, 30-35 cm, glabrous, medium green, sterile bracts usually, red in colour soon shrivelling. Basal flowers female.

Male bud Narrowly ovoid acute, bracts red, slightly imbricate at the tip. Red in colour, yellow at the extreme tip.

Male flowers Orange in colour, 2-4 flowers per hand in one row. Compound tepal about 3 cm long, orange in colour, free tepal 8 mm long, oblanceolate, translucent white.

Fruit Bunch rather lax, individual fruit 7 cm long, 1.5 cm in diameter, green at maturity and bright yellow at ripeness.

Seeds Dull black, irregularly depressed, 5 mm in diameter and 3 mm high.

Musa rubra Wall. ex Kurz, *J. Agric. Hort. Soc. India* 14: 301, 1876.

M. rubra, a native of Myanmar, and also found in the Mizoram area of India, was first described in the work by S. Kurz (1865/66) from specimens collected by himself in Pegu. It must, however, have been discovered many years earlier, because Kurz adopted a name, which Wallich had assigned, probably to plants cultivated in the Calcutta Botanical Gardens. Suckers of *M. rubra* were received at Kew from Dr. King in 1889, under the name of *Musa rosea,* which is however, a different species (Sir George King: Director of the Botanical Survey of India in1878. Before that, he was the superintendent of the Calcutta Botanical Garden). Dr. King further states that *M. rubra* has been in cultivation in the Royal Gardens, Calcutta, since 1882, but its origin is unknown.

There are several specimens of *M. rubra* in cultivation at the IIHR research station Bangalore, which were collected in India close to the border with Myanmar. These plants correspond very closely with the illustration of *M. rubra* in *Curtis's Botanical Magazine* (Hooker 1895). The plant is described by Baker as having the habit of *M. coccinea*, (*Callimusa)*, with the stem being slender and reaching about 1.5 – 2.5 m. in height. The peduncle and inflorescence are erect; the bracts are bright rose-red with golden tips, and the male flowers golden yellow (Baker 1893). The author has revised the species (Häkkinen 2003).

Pseudostem Slender, 1.5-2 m in height, lower sheaths pale brown, upper green, devoid of wax. Profuse sucker and emerge slightly at an angle from the mother plant.

Leaves Blades 1.2-1.8 m long and 30-40 cm wide, oblong lanceolate, green in colour, truncate at the apex, narrowing down rather with cuneate asymmetric base. Petiole 40-60 cm long, its base closely clasping the pseudostem.

Inflorescence Erect, peduncle is slightly hairy in nature, first sterile bract is usually a foliage leaf with a broadened petiole, developing pale red colour, and this followed by one sterile true bract. Basal flowers are female.

Bunch Very compact, erect, 4-5 hands, on average 4 fingers on hand.

Male bud Ovate, slightly imbricate at the tip, bracts are pale red, slightly grooved, 6-10 flowers per bract, biseriate.

Male flowers Compound tepal 4 cm long, orange yellow in colour, lobes slightly darker, the lateral lobes 5 mm long with a minute dorsal appendages. Free tepal more than 1 cm long, opaque white and boat in shape.

Fruit Bunch very compact, the fruits almost appressed to the rachis. Individual fruit about 8-10 cm long, very short pedicel, yellow upon ripening.

Seeds Dull black, irregularly depressed, 5 mm in diameter and 3 mm high.

Musa velutina H. Wendl and Drude. Wendland, H. &. Drude, C. *Gartenflora*, 65, t. 823, 1875.

This species is found growing wild in the sub-tropical evergreen forests of Arunchal Pradesh and Assam in India. This species was collected in Upper Assam by Gustav Mann and described by H. Wendland and O. Drude from a plant that flowered in the garden at Herrenhousen Botanical Gardens, Hanover, Germany. A probable synonym of this species is *Musa dasycarpa* described by Kurz (1865/66) as "*Musa dasycarpa* Kurz. Fruits hairy. (Assam)". Later Kurz noted, "Wendland and Drude published in *Regel's Gartenzeitung* for 1875, a supposed new species which they call *M. velutina*" (Regel 1875, Kurz 1978). It is possible that Kurz recognised that this *M. velutina* was the same as his *M. dasycarpa,* but he had no time to comment further upon this matter; "I cannot embark here upon a sifting of the literature and synonym, for such would be of too technical a character, and will be published in my revision of the *Musaceae* under preparation". Unfortunately Kurz died in Penang shortly after writing those words, leaving it to Cheesman some 60 years later to revise the *Musaceae*. The type specimen of *M. dasycarpa*

is in Calcutta, but there is supposedly a drawing of it at the Royal Botanic Gardens, Kew. According to Cheesman "the drawing strongly suggests identity with *M. velutina*", but Cheesman was not prepared to confirm the synonymy and *M. velutina* is still regarded as the accepted name. The epithet "*velutina*" was derived from the hairy, velvety nature of the fruit. On maturity the fruit peel splits and separates into irregular strips from apex to base, revealing a central mass of white flesh, filled with black seeds. *M. velutina* is one of only four known *Musa* species in which the fruit splits (or dehisces or is schizocarpic) on maturity, the other three are, *Musa johnsii,* a new species recently described from Papua (formally Irian Jaya) (Argent, 2003)*, Musa lolodensis* and *Musa schizocarpa* from Papua New Guinea (Argent 1976).

Habitat Grown wild in sub-tropical ever green forests of Arunachal Pradesh and Assam in India.

Pseudostem Up to 1.5 m high, yellowish-green, devoid of wax. Profuse suckering and spreading to a distance of 0.5 to 1.0m.

Leaves Blades up to 1 m long, 35 cm wide, truncate at apex, lamina shining dark green above, paler beneath but scarcely glaucous. **Petiole** 50 cm long, with spreading pink coloured surface along the midrib.

Peduncle Short 15-20 cm, erect, velvety with or without empty nodes. and uniquely crimson red in colour.

Inflorescence Erect, the peduncle red, heavily clothed with white pubescence, basal flowers hermaphrodite, the fertile "hands" 2-4, upper flowers male.

Bunch Erect, 3-6 hands, hands are closely spaced and fingers are compact.

Male bud Lanceolate, convolute and pink in colour, moderately wax coated, more or less smooth. Bracts open 2-3 at a time, both reflex and revolute.

Male flowers Pink flowers with pinkish red streaks. Compound tepal cream in colour pink tinged. Lobes are yellow.

Fruit Crimson red at all stages of maturity. Fruits exhibit unique character of dehiscent. Mature fruits short 10-12 cm, 4 cm diameter, 3-4 ridged, stout, hairy, sessile, with numerous seeds 30-35 embedded in ivory coloured mucilaginous pulp.

Seeds Seeds black, tuberculate, irregularly angulate-depressed, 4 - 6 mm. across, 2 - 3 mm. high".

Musa aurantiaca Mann ex Baker, *Annals of Botany* 7: 222, 1893.

This is one of the most elegant members of *Rhodochlamys* with bright orange buds and a wide distribution from West Arunachal Pradesh to East Arunachal Pradesh and seen mostly in higher altitudes. Unlike the other member of *Rhodochlamys*, *M. aurantiaca* suckers prolificly and each clump consists of 25-30 plants. Under undisturbed conditions, the clump is in flower at any given time of the year. 4-5 buds at one place give a false appearance of forest flame. *M. aurantiaca* is found in damp areas in the Changlang District between Deban and Haldi Barie, Assam, India. Baker in the *Annals of Botany*, 1893, describes the species and there is also a more recent description from (1994) from the herbarium of the Royal Botanic Gardens Edinburgh (E).

Habitat Grown as wild in the wet temperate forest of upper Assam, Arunachal Pradesh.

Pseudostem Slender, stoloniferous, 1-1.4 m height, yellow green in colour with black blotches. Few suckers emerge very close to the mother plant.

Leaves Almost erect, 90-95 cm long, light green, glabrous on upper and dull on lower surface, laminar bases are pointed. Petiole 20-25 cm long, wide open petiole canal, winged margins.

Bunch 4-6 hands, 10-12 fingers per hand, uniseriate in arrangements. Peduncle erect, very short with only 10-15 cm length, glabrous in nature. Rachis short, barren, scars are less predominant.

Male bud Lanceolate, orange in colour, convolute.

Male bract Orange on both inner and outer faces, open two at a time, takes two to three days for shedding, neither reflex nor revolute, lacks wax coating.

Male flower Orange in colour, 6-8 flowers per hand, arranged in uniseriate manner. Compound tepal and lobes are also orange in colour. Free tepal opaque white in colour and rectangular in shape.

Fruit Do not reflex, sub sessile, not edible, skin watery green in colour and glabrous in nature.

Seeds Warty, dull black in colour.

Musa mannii H. Wendl. ex Baker in J. D. Hooker, *The Flora of British India* 6: 293,1892.

This species is a native of the Assam valleys in India. It is described by J.D. Hooker in the *Flora of British India*, 1892 and in *Curtis' Botanical Magazine*, 1893. A description was also made by Baker of a specimen that flowered in the palm house at Kew, UK in March 1893 and was published in the *Annals of Botany*. This species differs from *M. sanguinea* in the shorter pseudostem and longer leaves and from *M. ornata* in the shorter-leaf petioles, large pale purplish bracts and shorter yellow male flowers

Cheesman 1949 in the *Kew Bulletin* cited the *Cat. Hort. Bull* 6. (Bull 1871). The entry runs: "This is a peculiarly dwarf-habited and elegant species, and has been imported from Upper Assam. The slender pseudostems are about a foot and half high, green, bearing a crowded tuft of several elliptic lanceolate leaves, which are stalked, about a foot in length, remarkably unequal-sided at the base, acute at the apex, and running out into a slender tendril-like point. The leaves are green, with a narrow purple border."

Pseudostem Slender, cylindrical, 60-80 cm in height, tinged with black, devoid of wax. Profuse sucker and emerge slightly at an angle from the mother plant.

Leaves Blades 60 cm long and 20 cm wide, oblong lanceolate, green in colour, rounded and asymmetric at the base.

Petiole 20 cm long and its base heavily corrugated.

Inflorescence The lax, smooth inflorescence, about 15 cm. long in the flowering portion, is somewhat inclined but neither horizontal or recurved. Basal female flowers are hermaphrodite.

Male bud Oblong, slightly imbricate at the tip, Bracts are rose coloured.

Male flowers Compound tepal 3 cm long, orange yellow in colour.Free tepal 2.5 cm long, opaque white and boat in shape.

Fruit Bunch very lax, horizontal, 3-5 hands, and 3 fingers on each hand. Individual fruit about 5 cm long, triangular, yellow at ripening.

Seeds Dull black, irregularly depressed, 5 mm in diameter and 3 mm high.

Musa sanguinea Hook. *f.* J. D. Hooker, *Bot. Mag*. t. 5975, 1872.

This species is a native of the Mahuni forests on the banks of the Booree Deling River in Upper Assam, India. The species was described by J.D. Hooker (1872), and again by Baker in *Annals of Botany*, 1893 and by Cheesman in the *Kew Bulletin*, 1949. It is a slender plant, with the pseudostem about as thick as a stout cane, reddish, and growing to about 1-1.5 m high. The leaf midribs are red on both sides on young leaves, later becoming green above, but remaining red on the lower surface. The fruit stalk is red and velvety and the inflorescence grows out horizontally. The bracts are dark pink or pale crimson and the whole bud usually aborts before the fruit are ripe. The male flowers are orange-yellow and the fruit become greenish yellow when ripe.

The species was first described from a plant growing at RBG Kew and it seems to be best known from cultivated material rather than from the wild. C.A. Backer described the plant in his *Flora van Java* as a native of British India, found occasionally in Java in ornamental gardens, (Backer 1924). He also mentioned *Musa assamica, Cat. Hort. Bull 6,* is an allied plant, but this species remains imperfectly known (Bull 1871). There are some doubts whether the living material described by Cheesman (from cultivated plants in Java) and Backer's plant are the same plant as that described by Hooker from India, and whether this is in fact *M. mannii*. It should also be noted that Cheesman himself gave his identification of the species as provisional.

Champion speculates that *Musa splendida* A. Chevalier may be identical with *M. sanguinea,* (Chevalier 1934, Champion 1967). *M. splendida* is recently described by Valmayor *et al.* and is totally distinct species, (Valmayor *et.al.* 2004).

Habitat Grown wild in the Mahuni forest of Assam and Arunachal Pradesh.

Suckers Many, emerging vertically upward and very close to the mother plant.

Pseudostem Very slender, 1.25-1.6 m high, reddish in colour.

Leaves Erect, 75- 85 cm long, 30-35 cm wide, green, leaf bases

are symmetrically rounded.

Petiole 20–25 cm long, wide-open canal, free margins.

Peduncle Erect, very short with 10-12 cm long, reddish and velvety in nature.

Bunch 3-5 hands of fingers, parallel to the axis, uniseriately arranged, horizontal or slightly erect in position.

Rachis Short and barren with medium bract scars.

Male bud Lanceolate, bright red in colour, convolute.

Male bract Lanceolate, bright red on outer face and orange red on inner face.

Male flowers Yellow in colour, 5-6 flowers per hand, compound tepal is yellow in colour, 3-3.5 cm long and free tepal is oblong in shape.

Fruits Do not reflex, sub sessile, not edible, pale yellowish green in colour and, variegated with pink pigmentation.

Seeds Small, black, irregularly depressed.

In addition there is one *Eumusa* species, which is constantly mixed with *M. ornata* namely *Musa balbisiana* Colla (Colla 1920).

Musa rosacea Jacq. Jacquin von, N.J.1804, *Hort. Schoenbr*. 4: Table 445.

There have been many serious questions about the identity of this plant. According to Cheesman in the *Kew Bulletin* (1949) the origin of the confusion between *M.rosacea* and *M.ornata* was a footnote appended by Nathaniel Wallich to the original description of *M. ornata* in *Flora Indica* "This is probably *M. rosacea* Jacq." It seems that Wallich, in editing *Flora Indica* after Roxburgh's death, made an honest mistake but the mistake was so commonly repeated that the synonymy of *M. ornata* and *M. rosacea* came to be accepted as fact. A further confusion dates back to 1805 when the names *M. rosacea* and *M.ornata* were mixed. Actually Jacquin's illustration was representing *Musa balbisiana* Colla.

M. ornata (misnamed *M.rosacea)* was known to have reached Mauritius by 1805 where Sir Joseph Banks introduced it. Cheesman quotes Bassler who described in the *Journal of the New York Botanical Garden* that he had found *M. ornata* / *M. rosacea* in Peru and Mexico, (Bassler 1926). Indeed he noted that the plant was "in so remote a locality that he at first wondered whether he had come upon an indigenous American *Musa*". Actually the species had been described 103 years earlier in *Edward's Botanical Register* in 1823. In this paper, Baron Humbolt suggested that several species of *Musa* may possibly be compounded under the names of Plantain and Banana, and that some of these species could be indigenous to America. Bassler however finally believed that evidence suggested that the species had in fact been introduced from Asia.

There is a new description of another *M. rosacea* (non. Jacquin), which is native of the higher altitude forests of Arunachal Pradesh, India, (Singh, *et al* 2001). The plant is described as being freely suckering, with new shoots emerging as far as 40-45 cm away from the mother plant. The plant grows to 2-2.4m height and the pseudostem is heavily waxy with

black blotches. The inflorescence is erect, and the peduncle short. The bracts are pink with a yellow tip and the male flowers are orange.

Musa violacea (only commercial name for hybrid).

In Brazil there has been in cultivation for decades or even centuries a species called *Musa violacea*, which is very similar to *Musa ornata* except that the bracts are somewhat paler, sometimes nearly white. This species could be a between hybrid *M. ornata* x *M. velutina.* Another intriguing possibility is that some of the *Musa violacea* encountered today derives from a man-made hybrid between *Musa flaviflora* and *Musa velutina*. This cross was made in Trinidad at the Imperial College of Tropical Agriculture as part of a study of *Musa* cytogenetics. According to Simmonds "selections [of *M. flaviflora* x *M. velutina*] were so vigorous and ornamental that they were distributed to various tropical botanical gardens as being of potential horticultural interest" (Simmonds 1962).

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