

Musa yamiensis C. L. Yeh & J. H. Chen (Musaceae),
a New Species from Lanyu, Taiwan

CHING-LONG YEH¹, JE-HUNG CHEN², CHUAN-RONG YEH³,
SHU-YING LEE², CHIO-WEI HONG⁴, TSAN-HSIU CHIU²
AND YING-YU SU²

¹ Department of Forestry, National Pingtung University of Science & Technology, 1, Hsuehfu Rd., Neipu, Pingtung 91201, Taiwan, Republic of China.

² Taiwan Banana Research Institute, 1, Rongchiuan St., Jiouru, Pingtung 90442, Taiwan, Republic of China

³ Department of Education, National Kaohsiung Normal University, 116, Heping 1st Rd., Kaohsiung City 80283, Taiwan, Republic of China

⁴ Puchian Primary School, 54, Chengong Rd., Banchiao, Taipei County 22070, Taiwan, Republic of China

Abstract

A new species of *Musa* L. (Musaceae), *M. yamiensis* C-L. Yeh & J-H. Chen, from Lanyu, Taiwan, is described and illustrated. *Musa yamiensis* is closely related to *M. insularimontana* Hayata, but differs from the latter in subhorizontal inflorescence, yellow-green with pink at apex bracts, 4 flowers in a bract in 1 row, and the size and structure of flowers.

Introduction

The Musaceae contain three genus, namely *Musa* L., *Ensete* Bruce and *Musella* (Franchet) C.Y.Wu ex H.W.Li (Wu and Kress, 2000). No one knows for sure the precise number of species in the Musaceae. For the record, most authorities now give the number of *Musa* species as 35 to 42 in 4 sections and the number of species of *Ensete* as 7 to 9. *Musella* is monotypic (Constantine, 2006). There is only one genus, *Musa*, recorded in Taiwan (Ying, 2000). Recently, *Ensete glaucum* (Roxburg) Cheesman was found in the mountain areas of Tainan and Pingtung.

Wild *Musa* species are generally grouped into four sections. They are *Australimusa*, *Callimusa*, *Musa* and *Rhodochlamys* (Hakkinen, 2006). Two species of *Musa* are recorded in Taiwan, *M. formosana* (Warb.) Hayata and *M. insularimontana* Hayata (Yang *et al.*, 2001).

Recently a new species of *Musa* was found at Lanyu Island, Taitung (Fig. 1). To honour the traditional name of the Lanyu people (the Yami),

we named this plant *Musa yamiensis*. This paper provides the description, information on the habitat and photos of *M. yamiensis*, and a new key to the species of *Musa* in Taiwan.

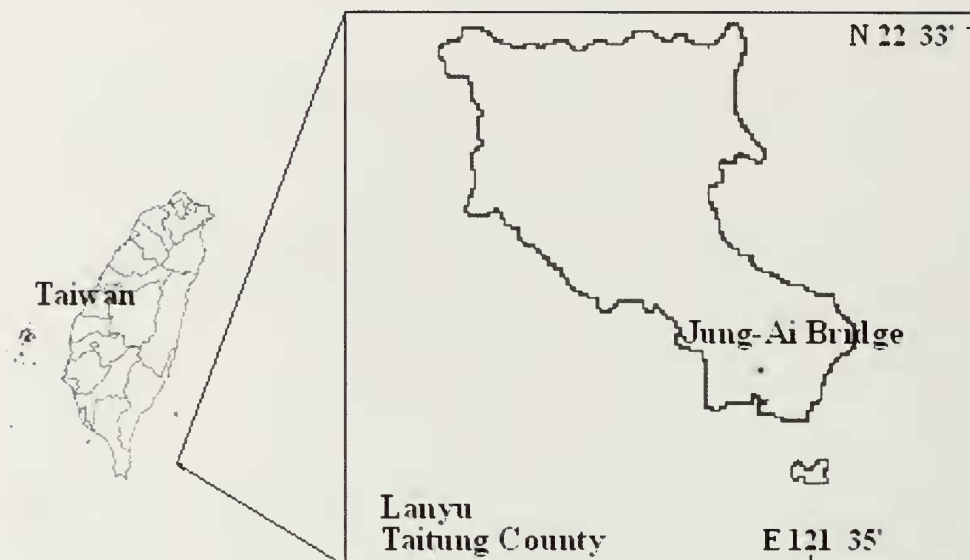


Figure 1. Distribution of *Musa yamiensis* in Taiwan.

Materials and Methods

The fresh materials were collected first by the 3rd and 4th authors on Isl. Lanyu on 20 Jul, 2006. Its habitat and floral characteristics were recorded with reference to the INIBAP *Musa* Description List (IPGRI-INIBAP/CIRAD, 1996) by the 1st author. In order to get more information about this new species, the authors took the second collection trip on 1 Aug, 2006. Since it is difficult to obtain and prepare adequate herbarium materials of species of *Musa*, especially the massive inflorescences (Constantine, 2006), and due to the insufficient references on *Musa* taxonomy in our possession, we gathered taxonomic papers of *Musa* mainly through the internet and discussed the new species status of our newly collected specimens from Taiwan with Dr. Hakkinen, a world-famous Musaceae taxonomic specialist from Helsinki University Botanic Garden.

Key to species of *Musa* in Taiwan

Because of the rare field observed data of *M. insularimontana* Hayata, our key to the species below follows the character treatment of *M. insularimontana* in Ying's (2000).

1. Male bract yellow-green with lightly pink at apex; male flowers 4 per bract in 1 row; male flowers' compound tepal 2.5 cm long; fruits cylindrical, slightly curved, 5.5-7 cm long; rachis glabrous *M. yamiensis*
1. Male bract yellowish red or dark purplish red; male flowers 8 or more per bract in 2 rows. 2
2. Male compound tepals about 3.5-4.3 cm long; fruits fusiform, 6-7 cm long; fruiting pedicel pubescent *M. formosana*
2. Male compound tepals 3-3.5 cm long; fruits obliquely tetragonal, 8-11 cm long; fruiting pedicel densely pubescent *M. insularimontana*

Taxonomic treatment

Musa yamiensis C.-L.Yeh & J.-H.Chen, *sp. nov.*

Caulis 2.5 m *altus*. *Folia anguste oblongus*, 138 cm *longa*, 40 cm *latus*. *Inflorescentia glabra prope horizontalis*. *Spatha viridis*, 27 cm *longa*, 5 cm *latus*, *lanceolatus*, *apex caudatus*, *glabra*; *bractea flavovirens*, *apex rutilus*, *lanceolatus*. *Flores masculini in quoque bractea 4, seriatus*. *Polypetalus pentalobus*; *longia polypetalus ad dimidium gamopetalus attingens*.

– **Typus:** Taiwan: Lanyu Island, 20 July 2006, C.R. Yeh & C.W. Hong 4096 (holo, PPI). **Figs. 2 & 3.**

Pseudostems green, about 2.5 m high, base not swollen. **Leaf blades** narrow-oblong, 138-150 cm long, 40 cm wide, rounded and asymmetric at base; petioles 60 cm long, margins erect and basally with wings. **Inflorescence** subhorizontal, about 46 cm or longer, 1 cm in diameter, densely angled, glabrous, green; spathe green, 27 cm long, 5 cm wide, lanceolate, apex caudate, glabrous; male bracts revolute, persistent, ovate-lanceolate, 6-7 cm long, 3 cm wide, adaxially yellowish-green, lightly pink at their rounded tip, abaxially green. **Male flowers** 4 per bract in a row, cylindrical, peduncle white, 0.6 cm long, glabrous; compound tepal 2.5 cm long, 1 cm wide, white, 5-lobed, apex of outer 2 lobes with a short hook-like appendage, inner 3 lobes almost as long as outer lobes or shorter;

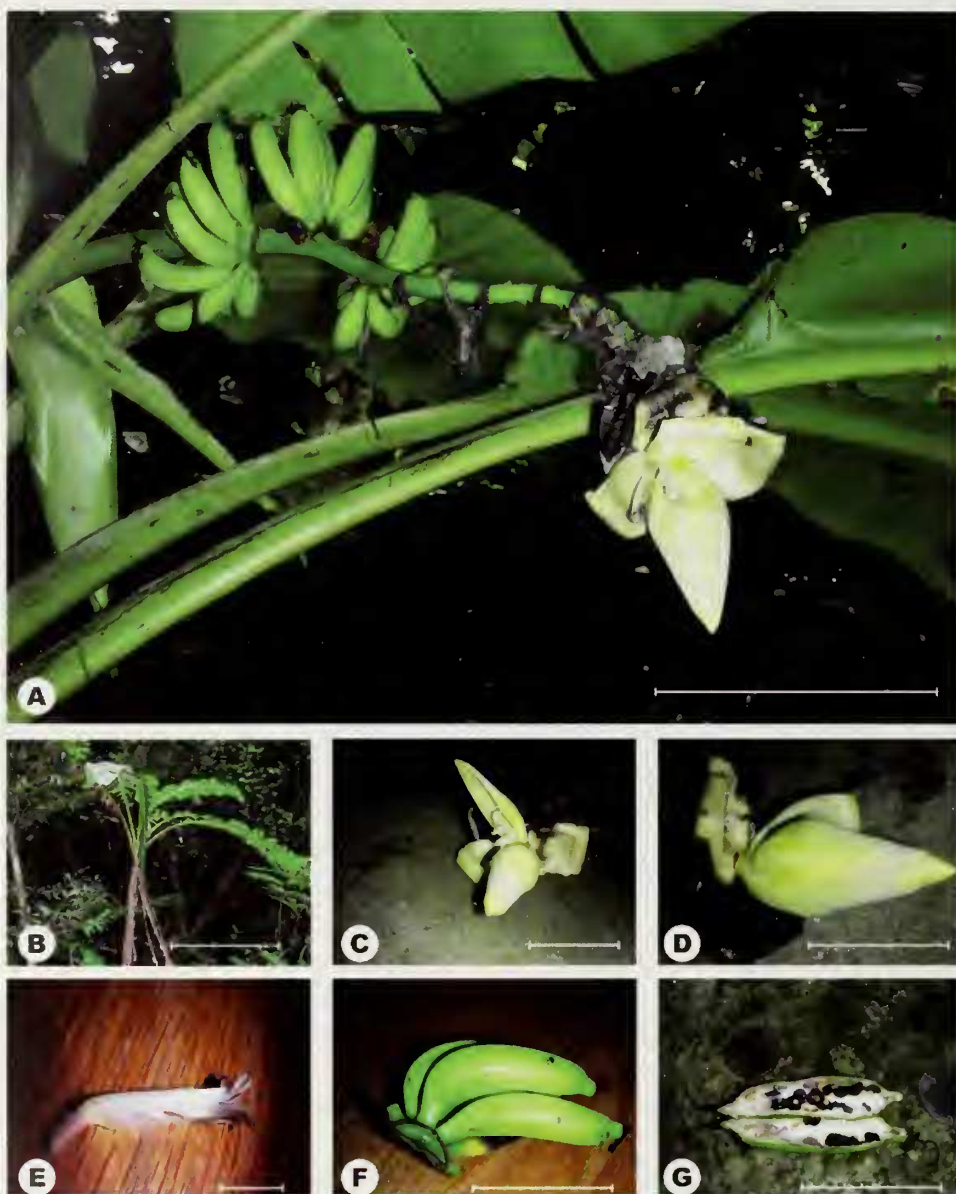


Figure 2. *Musa yamiensis* C. L. Yeh & J. H. Chen. A. Inflorescence; B. Habitat; C. Male bud and flowers; D. Bract, showing the color; E. Male flower; F. Fruits; G. Fruits and seeds. Bar A = 10 cm; bar B = 2 cm; bar C, D, F, G = 5 cm; bar E = 1 cm.

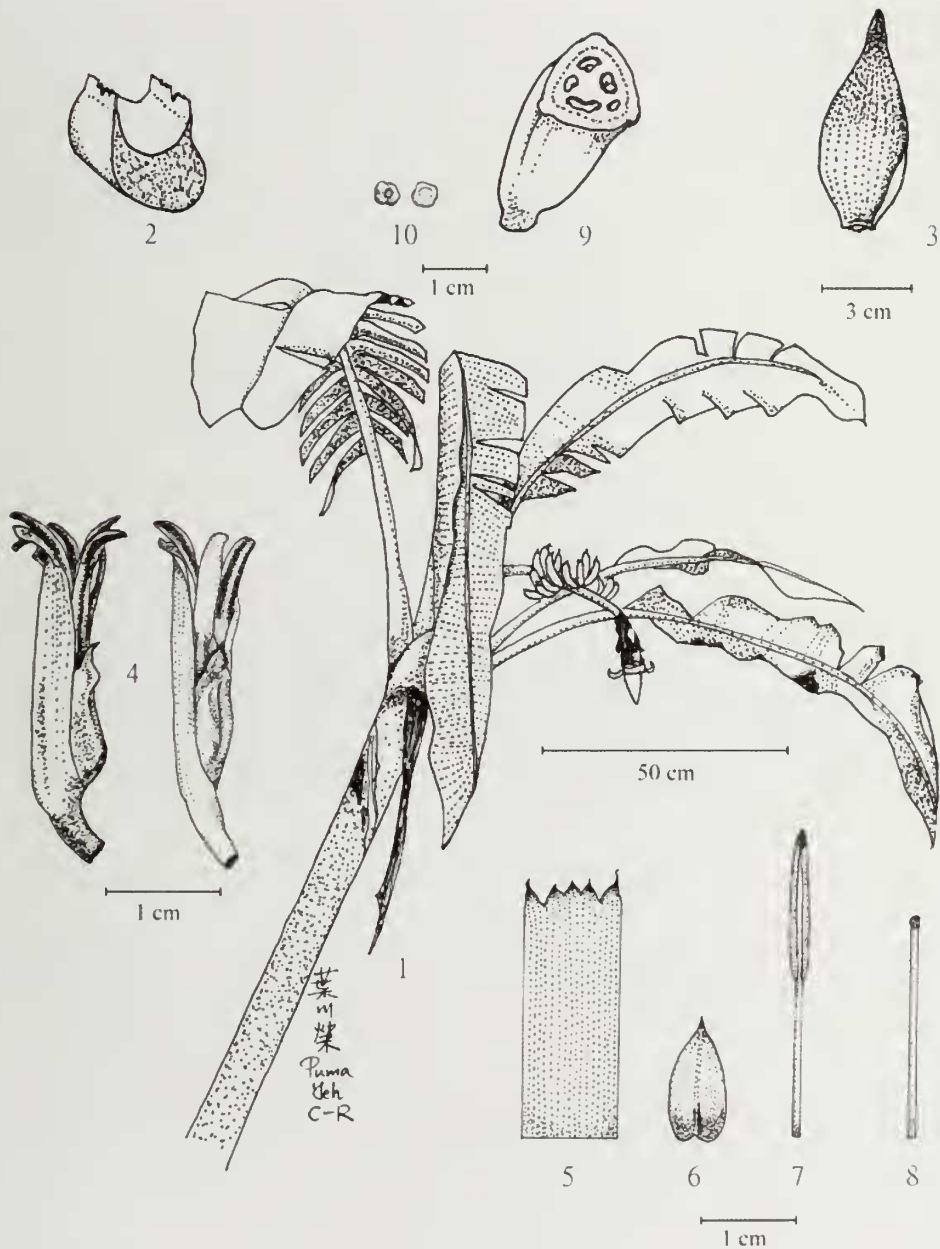


Figure 3. *Musa yamiensis* C. L. Yeh et J. H. Chen. 1. Habit; 2. Petiole, cross-section; 3. Bract; 4. Male flowers; 5. Compound tepal of male flower; 6. Free tepal of male flower; 7. Stamen of male flower; 8. Reduced gynoecium; 9. Fruit, cross-section; 10. Seeds. (drawn from fresh materials).

free tepal membranous, 1.3 cm long, 0.7 cm wide, about 1/2 as long as compound petal, boat-shaped, sulcate at outer side, (ovate and cordate at base when pressed), keeled in the central inner side, apex apiculate; stamens 5, anthers white, linear, flat, 1 cm long; filaments white, 1.2 cm long; reduced gynoecium white, 2.2 cm long, not clavate. **Fruits** 8 per cluster, green, 5.5-7 cm long, 1.5 cm wide, cylindrical, apex bottle-necked, slightly curved, 3-4 angled, glabrous. **Seeds** numerous, black, irregularly angled, smooth, 0.5 cm in diameter, 0.3 cm thick.

Other specimen examined: Taitung Co.: Jung-Ai Bridge, Lanyu, C. R. Yeh & C.W. Hong 4100, Jul 20, 2006.

Distribution: In shaded ravine, 150-250 m, southern part of Lanyu Island (Orchid Island or Botel Tabago).

Flowering and fruiting season: June to July.

Note: We found this *musa* in southern Lanyu's rainforest where there are two canopy strata. The upper canopy is dominated by *Pometia pinnata*, *Bischofia javanica*, *Pisonia umbellifera*, and *Ficus septica*. The understory is dominated by *Angiopteris palmiformis*, *Elatostema edule*, *Donax canniformis*, *Schismatoglottis kotoensis* and *Alocasia macrorrhiza*.

Discussion

Despite its importance as a source of valuable food plants, the Musaceae family is still incompletely known (Constantine, 2006). In the family, taxonomic literature is insufficient and inconsistent. Take *M. basjoo* var. *formosana* for example, the male bud is described as purplish red by Ying (2000), but it is described as bronze yellow by Wu and Kress (2000). According to our field observation, there actually exist these two kinds of wild bananas in Taiwan main island. The wild populations can be separated by taxonomic treatment into two or more species.

In Lanyu, so far, we could not find *M. insularimontana*. Due to its rarity, some researchers even doubted its existence in Taiwan even though that it has been described in publications. More and extensive wild banana explorations in Taiwan would be needed.

The distinguishing characteristics of Taiwanese *Musa* species are shown in Table 1. The specimens of *Musa formosana* examined are as follows – Taipei, Wulai Co., C.R. Yeh, *s.n.* (1 Sep 2006); Pingtung, Laiyi

Co., C.R. Yeh, s.n., (17 Aug 2006) and Pingtung, Shoka, C.R. Yeh, s.n. (6 Sep 2006). The characters for *Musa insularimontana* are obtained from Ying (2000).

Table 1. Differences among three species of *Musa* in Taiwan.

Character	<i>Musa formosana</i>	<i>Musa insularimontana</i>	<i>Musa yamiensis</i>
Rachis	pubescent	pubescent	glabrous
Color of male bud	yellowish red	dark purplish red	yellow-green, more or less tinged with pink
Number of male flowers in a bract	10-13 in 2 rows	8 in 2 rows	4 in 1 row
Color of male flowers	pale yellow	unknown	white
Compound tepals	3.5-4.3 cm	3-3.5 cm long	2.5 cm long
Free tepals	1.8-2.2 cm long	1.5-2 cm long	1.3 cm long
Fruits	fusiform, 6-7 cm long	obliquely tetragonal, stipitate, 8-11 cm long	cylindrical, slightly curved, 5.5-7 cm long
Fruiting pedicel	pubescent	densely pubescent	glabrous

Acknowledgements

We are grateful to Dr. Hakinnen for providing excellent research papers and precious comments. We also appreciate H.-L. Chiu, National Plant Genetic Resources Center, and Y.-C. Chen, Miaoli District Agricultural Research and Extension Station, for assisting in our field study in Lanyu.

References

- Constantine, D. 2006. The Musaceae: An Annotated List of the Species of *Ensete*, *Musa* and *Musella*. See www.users.globalnet.co.uk/~drc/Introduction.htm
- Hakkinen, M. 2006 *Musa lawitiensis* Nausution & Supard. (Musaceae) and its intraspecific taxa in Borneo. *Adansonia* **28**: 56.
- IPGRI-INIBAP/CIRAD. 1996 Description for Bananas (*Musa* spp.). International Plant Genetic Resources Institute, Italy/International Network for the Improvement of Banana and Plantain, Montpellier, France/Centre de Cooperation Internationale en Recherche Agronomique pour le Developpement, Montpellier, France.
- Wu, D-L.and W.J. Kress. 2000. Musaceae. Flora of China **24**: 297-313.
- Yang, Y.-P, H.-Y. Liu and T.-P. Lin. 2001. Musaceae. In: Manual of Taiwan Vascular Plants, vol. 5: 201. The Council of Agriculture, Taipei, Taiwan.
- Ying, S.-S. 2000. Musaceae. In: Huang, T.-C. (ed.), Flora of Taiwan. 2nd ed. **5**: 704.