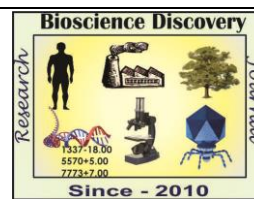


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Research Article



Notes on an Accidental Epiphytic Banana: *Musa acuminata* Colla (Musaceae) from Tripura, Northeast India

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Abstract

In the present communication we report a new accidental epiphytic banana, *Musa acuminata* Colla which grows above the height of 8 m in the trunk cavity of the host plant *Azadirachta indica* A. Juss (local name: *Gheto neem*). The size of collar diameter of this specimen is about 22 cm, smaller shoot growing up with 4 spreading leaves. It is an unconditional and accidental shows the possibility of plant growth by vegetative reproduction or by seed germination process on host plant cavity.

INTRODUCTION

Epiphytes are specialist plant that grows on another plant commonly referred to as air plants. They grow on the surface of barks, cavity, dead decompose part of tree but remain physiologically independent (Benzing, 2004) and do not extract nutrients from the host's vascular system. Thus, they are generally defined as non-parasitic because they grow upon another plant for support only. The life forms of the vascular epiphytes were included true epiphytes, species that normally spend their entire life span as epiphytes; hemi-epiphytes species that germinate on trees and later establish root contact with the ground and accidental epiphytes predominantly terrestrial plants that accidentally germinate in the tree trunk crevices.

Epiphytes plays an useful role in nutrient cycling, provide shelter and nesting materials for some insects, bird species and are important sources of food for some foraging animals (Stuntz *et al.*, 2002). They also provide unique microclimates for other species; thus, their decline may negatively affect many animals and plants those depends upon them. These plants play a key role in biodiversity

and functionality of some important ecosystems and they may even act as keystone species (Gabriela *et al.*, 2015). Many biotic and abiotic factors determine the miscellany of epiphytes, such as climate, water availability, edaphic factors, host tree size, species identity, bark features and architecture (Boelter *et al.*, 2014). The stem characteristic of angiosperm hosts suggested that bark characteristics might favor the germination and establishment of certain species (Mehltreter, 2005). Since tree species differ in many traits (e.g. bark properties and foliage density), the growing conditions for these structurally dependent plants may strongly depend on the particular host species. Epiphytes are a well-known feature in tropical rain forests. They contribute to the local and regional floristic diversity (Benzing, 2004). Most studies addressing epiphyte diversity focused on relationships with host trees (Boelter *et al.*, 2014) or the distribution in a single vegetation type. However, Madison (1977) reported list of 65 vascular plant families contain 850 genera and 28,200 species of epiphytes accounted about 10% from all vascular plants.

In a recent study collated a global list of 27,614 species of vascular epiphytes, which is about 9% of all vascular plant species (Zotz, 2013).

The present communication reports the discovery of new adaptive feature of *Musa acuminata* from Tripura, NE India. This region of Northeast India is important as the type locality of a large number of wild *Musa* species (Gogoi and Borah 2013). The area is considered as a micro centre of evolution of *Musa* species extended from the mega centre in Southeast Asia. In the beginning of 21st century, the taxonomic study of *Musa* gained momentum with the appearance of a good number of publications, including reports of many new taxa from northeast India (Uma *et al.* 2011; Gogoi 2013; Gogoi and Häkkinen 2013a; 2013b; Gogoi and Rabha 2013; Joe *et al.* 2013a; 2013b; Sabu *et al.* 2013a; 2013b; Sreejith *et al.* 2013). Wild *Musa* species were largely distributed in some tropical rain forests, wet evergreen forests to deciduous forests. The hilly tracts of these areas harbor a mosaic of tropical forests where *Musa* species occur very abundantly. In India eight species of *Musa* were found *viz.* *Musa acuminata* Colla, *Musa balbisiana* Colla, *Musa itinerans* Cheesman, *Musa nagensium* Prain, *Musa aurantiaca* G.Mann ex Baker, *Musa sikkimensis* Kurz and *Musa cheesmani* N.W. Simmonds and *Musa flaviflora* N.W. Simmonds (Simmonds 1962). Various workers reported these species from different parts of India as well as from northeast India. Taxonomically *Musa* is a perennial plant that arising from underground rhizomes. The pseudo-stem formed by upright concentric layers of leaf sheaths constitutes the functional trunk. The *Musa* species is characterized by vegetative means from stolon as well as seed germination by sexual reproduction. However, in a large extent *Musa* undergoes vegetative means of multiplication. Because limited and variable seed germination exhibited by *Musa* may be due to seed mortality caused by endosperm failure. Physical barriers that include embryo impermeability, seed coat and chemical barriers like inhibitors imposing seed dormancy hinder germination of seeds.

MATERIALS AND METHODS

During explorative field work we found an accidental and unconditional growth of epiphytic *Musa* sp in a plant trunk at the Baramura Reserve Forest. The plant was identified using the help of local flora and revealed that the species is *Musa*

acuminata Colla and the host plant is *Azadirachta indica* A. Juss. The adjacent dominated plants were also identified. The location was marked with Global Positioning System.

RESULTS AND DISCUSSION

We found a small banana species on a tree cavity. It has obviously been developed on a tree and hard crooked tuber root is indicating that the specimen is quite old. The tuber like root of the epiphytic banana plant indicates that the species can grow on trees under conditions of drought stress. The size of collar diameter of this specimen is about 22 cm, smaller shoot growing up with 4 spreading leaves. (Fig: A-D). In reality the species *Musa acuminata* is not an epiphytic or parasitic plant but the present report develops on an unsuitable habitat where minimum resources were present as a microenvironment. The uncertain growth of its species over the trunk of *Azadirachta indica* A. Juss (local name: *Gheto neem*) plant cavity act as a host that offers the place of microenvironment including water availability as well as light, humidity and temperature, substrate stability, mineral nutrition to grow. The location was marked with GPS (23°50'36.04" North Latitude and 91°33'14.29" East Longitude) with an altitude of 158m asl., situated at the Baramura Reserve Forest area near Khamtingbari. The adjacent forest was mainly deciduous, dominated by *Tectona grandis* L.f., *Albizia procera* (Roxb.)Benth, *Annogissus acuminata* (Roxb. ex DC.) Guill, *Atrocarpus chaplasha* Roxb. and *Microcos paniculata* L. etc. mixed with sparse distribution of other small tree species. The *Musa acuminata* Colla grows above the height of 8 meter on the host plant cavity. However, the unconditional and accidental habitat of *Musa acuminata* develops by the seed germination. In this case it is not possible to conclude whether the plant grows by vegetative reproduction or by seed germination process on host plant cavity. It might be a possible cause that any frugivores were responsible for the seed dispersal into the unconditional habitat. This result is perhaps not surprising because trees are essentially only providing structural support for the growth of epiphytes, and the epiphytic habitat in mature forest is highly homogenous at regional scales (Zhao *et al.* 2015). But the host tree surface has specific devices that reduce the likelihood that epiphytes can colonize, such as alleopathic chemicals in the bark, peeling bark or very smooth bark that may

physically shed epiphytes that may remove epiphyte seedlings, then host tree characteristics, other than size, may not be so important (Sillett and Antoine 2004). Conclusion: The short time observation does not allow concluding the nutritional consumption, survival mechanism and epiphytic adaptive features without critical scrutiny on physical and chemical property of microclimates, growth parameters, and interaction with the host plant to grow within the plant cavity. The valid scientific reasonable hypothesis is necessary to conclude for the accidental cases. Thus, a long time research may bring an idea for this unconditional and accidental growth of *Musa* species in a tree cavity.

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REFERENCES

Benzing DH, 2004. Vascular epiphytes. Forest Canopise. Margaret D. Lowman & H. Bruce Rinker (eds). Elsevier Academic Press, San Diego. Pp 175–211

Boelter CR, Dambros CS, Nascimento HEM and Zartman CE, 2014. A tangled web in tropical tree-tops: effects of edaphic variation, neighborhood phorophyte composition and bark characteristics on epiphytes in a central Amazonian forest. *Journal of Vegetation Science*, **25**: 1090–1099.

Gabriela CM, Jose Manuel, Garcia RH, Victor MC, 2015. Oscillatory Patterns of leaf growth in Epiphytic Plants: The role of Arthropods and Litter. *Research Journal of Biotechnology*, **10**: 57–59.

Gogoi R and Borah S, 2013. *Musa markkui* R Gogoi and S Borah, a new species from Arunachal Pradesh, India. *Gardens Bulletin Singapore*, **58**: 19 – 26.

Gogoi R and Häkkinen M, 2013a. *Musa puspanjaliae* (Musaceae) sp. nov. from Arunachal Pradesh, India. *Nordic Journal of Botany*, **31**: 473 – 477.

Gogoi R and Häkkinen M, 2013b. *Musa kamengensis* (Musaceae), a new species from Arunachal Pradesh, India. *Acta Phytotax. Geobot.*, **64**: 127 -131.

Gogoi R and Rabha NN, 2013. Notes on *Musa aurantiaca* Hook.f. and its ex-situ conservation in BSI, ERC, Shillong. *ENVIS Newsletters*, **18**: 6-7.

Gogoi R, 2013. *Musa nagensium* var. *hongii* Häkkinen – a new addition to the flora of India. *Taiwania*, **58**: 49 – 52.

Joe A, Sabu M and Sreejith PE, 2013a. A new variety of *Musa velutina* H. Wendl. & Drude (Musaceae) from Assam, northeast India. *Plant Systematics and Evolution*, **300** (1), 13–17

Joe A, Sabu M, Ashfak A and Sreejith PE, 2013b. *Musa laterita* Cheesman (Musaceae): a new record for India from the wild, with a key to the *Musa* (section *Rhodochlamys*) in India. *Folia Malaysiana*, **14** (1), 37-44

Madison M, 1977. Vascular epiphytes: their systematic occurrence and salient features. *Selbyana*, **2**:1–13

Mehltreter K, Flores Palacios A and García-Franco JG, 2005. Host preferences of low-trunk vascular epiphytes in a cloud forest of Veracruz, Mexico. *Journal of Tropical Ecology*, **21**: 651-660.

Mingxu Zhao, Nalaka Geekiyanage, Jianchu Xu, Myo Myo Khin, Dian Ridwan Nurdiana, Ekananda Paudel, Rhett Daniel Harrison. Structure of the Epiphyte Community in a Tropical Montane Forest in SW China. *PLoS ONE* **10**(4): 1-19

Sabu M, Joe A and Sreejith PE, 2013a. *Musa velutina* subsp. *markkuana* (Musaceae): a new subspecies from northeastern India. *Phytotaxa*, **92**: 49-54.

Sabu M, Joe A and Sreejith PE, 2013b. *Musa chunii* Häkkinen (Musaceae): an addition to the wild banana flora of India and notes on conservation of a critically endangered species. *Annals of Plant Sciences*, **2**: 160 – 162.

Sillett SC, Antoine ME. Lichens and bryophytes in forest canopies. In: Lowman M, Rinker HB, editors. Forest canopies, 2nd ed. London: Elsevier; 2004. pp. 151–174.

Simmonds NW, 1962. The Evolution of the Bananas. London U.K. Long man, Pp. 170.

Sreejith PE, Joe A, Sabu M. 2013. *Musa arunachalensis* : a new species of *Musa* section *Rhodochlamys* (Musaceae) from Arunachal Pradesh, northeast India. *Phytotaxa*, **134**: 49-54.

Stuntz S, Ziegler C, Simon U, and Zotz G, 2002. Diversity and structure of the arthropod fauna within three canopy epiphyte species in central Panama. *Journal of Tropical Ecology*, **18**: 161–176.

Uma S, Saraswati MS and Durai P, 2011. Evidence of a new *Musa* species – *M. swarnaphalya* in India and its confirmation through morpho-molecular characterization. *Indian Journal of Horticulture*, **68**: 145-151.

Zotz G, 2013. The systematic distribution of vascular epiphytes—a critical update. *Botanical Journal of the Linnean Society*, **171**: 453–481.



Figure: (A) Habitat of *Musa acuminata* (B-D) Unconditional growth in the tree cavity

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