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Diversity and field status of lianas in Tripura, India

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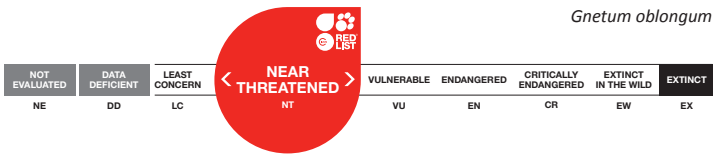
Abstract: A checklist of lianas in Tripura, India was prepared which enumerates about 60 species of lianas in the state. In this present paper, diversity of lianas in Tripura was analyzed by field exploration from October 2010 to February 2013. Out of the total 60 species enumerated, 34 species are provided with their phenology and places of occurrence . Field photographs are also given to facilitate their easy identification. Other 26 species could not be traced in the field and are represented only by herbarium specimens.

Keywords: Checklist, diversity, lianas, Tripura.

The lianas, commonly called woody climbers, are abundantly distributed in the tropical regions of the globe. The morphological diversity, twinning pattern and various mechanisms of seed dispersal have contributed towards their curious growth form in the plant world. In spite of the fact, in most of the floristic studies, lianas have always been overlooked and ignored. They germinate and produce roots in the ground and use co-existing tree species or other supports for their growth (Image 1). In general, their basal main stems are leafless and gigantic but they form a thick and dense cover on the supporting tree canopy to get the maximum sunlight for their metabolism. The lianas play a very important role in the composition of the plant community in tropical and subtropical forests, and the presence of lianas is one of the important physiognomic features for identifying tropical lowland and lower montane forests (Grubb 1977).

While working on the morpho-taxonomy of lianas in Tripura, India, a checklist was prepared from literature (Hooker 1875, 1879, 1882, 1885, 1890, 1894; Deb 1981, 1983) which reveals that there are about 60 species of lianas in the state. During field visits to different places in Tripura from October 2010 to February 2013 the authors could collect only 34 species of lianas belonging to 18 families (Images 2 & 3). From the field observations, it has been found that the maximum numbers of species are distributed at different altitudes and habitats of Jampui Hill ranges, Kanchhanpur, Longtarai Valley, Gandacherra and Shipahijala Wildlife Sanctuary. It was noticed that the status and distribution of lianas are



Gnetum oblongum

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Image 1. Twinning pattern of some giant lianas in their natural habitat. A - *Butea parviflora* Roxb.; B - *Parabarium micranthum* (A. DC.) Pierre; C - *Entada phaseoloides* (L.) Merr.; D - *Cissus repanda* Vahl. (LN = Liana; SP = Supporting Plant).

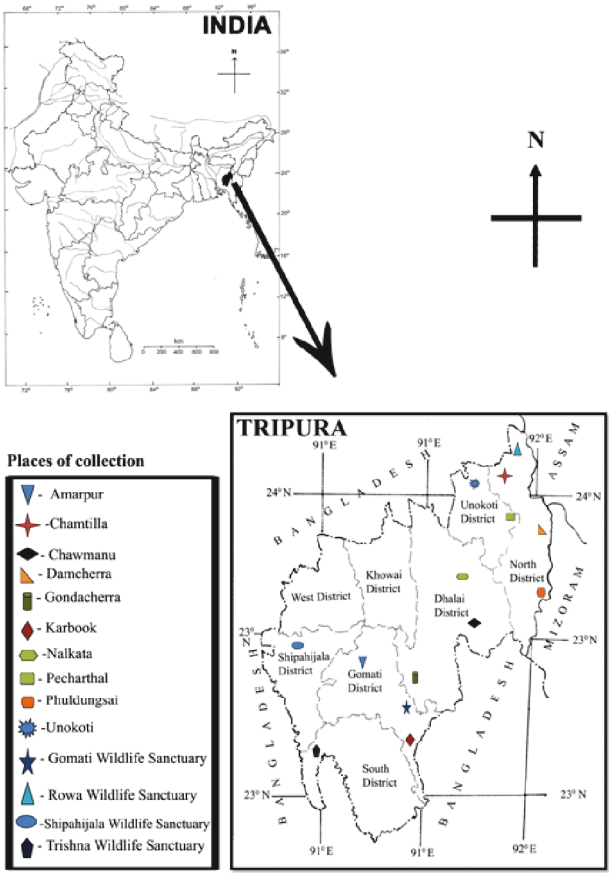

Figure 1. Collection sites in the study area Tripura

directly dependant both on the environmental factors and the host species.

Study area: Tripura, the second smallest state in northeastern India, is mainly a forest dominated state lying between the coordinates 23°30'–23°44'N & 91°15'–91°28'E. The state is surrounded on three sides by a deltaic basin of Bangladesh. Except for a portion of the eastern boundary with Mizoram and northeastern boundary with Assam, all are bounded by the international line with Bangladesh (Fig. 1). The forests in the state are mainly tropical evergreen, semi evergreen and moist deciduous in nature. The geographical area of the state is ca. 10,486km^2 and approximately 77% of the state's geographical area is under forest cover. In terms of forest canopy density classes, the State has around 66.33% reserved forests, 0.03% protected areas and 33.64% unclassified forests (Anonymous 2009). As per the classification by Champion & Seth (1968) and Anonymous (2011), the state has two broad groups of forests, viz., tropical semi evergreen forests and tropical moist deciduous forests. The climate of the state is characterized by moderate temperature (21–38 °C in summer and 4–33 °C in winter) and high humidity with an average annual rainfall of 2109mm, which is mostly received during the south-west monsoon season. The principal hill ranges in this state are Jampui, Sakhantlang, Langtarai, Atharomura and Baramura-Debtamura. Around 603.64km^2 of area is under reserved forests in Tripura which includes two national parks and four wildlife sanctuaries (Anonymous 2011).

Materials and Methods

The present study is primarily based on extensive and intensive field visits to different areas of the study area. Collections were made during different seasons (summer, pre-monsoon, post-monsoon, winter of 2010 to 2013) and each survey was of 10–20 days duration. Field visits were made to different forest dominated areas of the state, viz., Gandachera and Longtarai valley (Dhalai District), Dharmanagar, Kanchanpur, Jampui hill range and Panisagar (North District), Kumarghat and Kailashahar (Unokoti District), Amarpur and Karbook (Gomati District) and Bishalghar and Sonamura (Shipahijala District). Four different wildlife sanctuaries

viz. Shipahijala, Trishna, Gomati and Rowa were also surveyed.

The collected plant materials were made into herbarium specimens following standard technique (Jain & Rao 1977; Singh & Subramaniam 2008). After collection the flowers were dissected under Olympus SZ61 Stereo Zoom Dissecting Microscope and the plants were critically studied; identification of taxa was done following standard floras. Identifications were confirmed by matching our collected specimens with identified specimens housed in CAL & ASSAM, and sometimes with available type and other authentic specimens, as well as by consultations of relevant taxonomic literature. Specimens collected from the study area during the present study are housed in the herbarium of Department of Life Science & Bioinformatics, Assam University, Silchar. Field photographs have been taken with Nikon Coolpix camera.

Results and Discussion

A checklist prepared from the literature (Hooker 1875–1890; Deb 1981–83) reveals the occurrence of 60 species of lianas in Tripura. Of the 60, only 34 species could be located and collected in the present study (Table 1). Among the 34 species, two species are gymnosperms; the remaining 32 species are distributed under 18 angiospermic families. The most dominant family recorded was Papilionaceae (6), followed by Apocynaceae (4) and Combretaceae (4). Table 2 represents a list of the other 26 species which could not be traced during the study period but have their representative specimens in CAL and ASSAM. The largest genus was *Combretum* Loefl. with three species, followed by *Cissus* L. and *Byttneria* Loefl. with two species each. *Combretum punctatum* Blume subsp. *squamosus* (Roxb. ex G. Don) Exell, *Millettia pachycarpa* Benth., *Thunbergia grandiflora* (Roxb. ex Rottl.) Roxb. and *Cissus adnata* Roxb. were very common throughout their habitat. *Combretum punctatum* Blume subsp. *squamosus* (Roxb. ex G. Don) Exell and *Millettia pachycarpa* Benth. were also very common in the state; the former generally grows along the roadside of the forest areas and the latter in 'Sal' forests. In contrast, *Pueraria tuberose* (Roxb. ex Willd.) DC., *Uncaria sessilifructus* Roxb. and *Byttneria aspera* Collb. could only be seen in Chawmanu, Serhmun and Betlingship areas.

Two gymnospermic species *Gnetum montanum*

Table 1. Enumeration of species of lianas in Tripura with their phenology, collection sites and collection/field numbers

	Family	Scientific name	Phenology	Locality/Place of occurrence	Collection number/ Field No.
1.	Acanthaceae	*Thunbergia grandiflora* (Roxb. ex Rottl.) Roxb.	Fl.: Jun-Sep Fr.: Aug-Mar	Nalkata & Chawmanu, Dhalai District; Pecharthal, Unokoti District; Shipahijala Wildlife Sanctuary, Shipahijala Distict; Amarpur & Karbook, Gomati Distict	*L. Darlong* 10302
2.	Annonaceae	*Desmos dumosus* (Roxb.) Safford	Fl.: Apr-Aug Fr.: Jul-Apr	Nalkata, Dhalai District	*L. Darlong* 10312
3.	Apocynaceae	*Beaumontia grandiflora* (Roxb.) Wall.	Fl.: Jan-Mar Fr.: Mar-Apr	S. K. Para & Moracherra, Dhalai District; Jolai, North Tripura District	*L. Darlong* 10306
4.		*Ichnocarpus frutescens* (L.) R. Br.	Fl.: May-Aug Fr.: Aug-Dec	Serhmun, Unokoti District; Joyshree & Damcherra, North Tripura District; Nalkata, Dhalai District	*L. Darlong* 10331, 10337
5.		*Parabarium micranthum* (A. DC.) Pierre	Fl.: May-Jul Fr.: Aug-Sep	Phuldungsai, North Tripura District	*L. Darlong* 10319
6.		*Willughbeia edulis* Roxb.	Fl.: Jan-Apr Fr.: May-Jul	Chawmanu & Manikpur, Dhalai District; Shipahijala Wildlife Sanctuary, Shipahijala District	*L. Darlong* 10340
7.	Caesalpiniaceae	*Bauhinia scandens* Roxb.	Fl.: Oct-Nov Fr.: Oct-Dec	Ambassa & Nalkata, Dhalai District; Shermun & Sabual, North Tripura District; Hmuntha, Unokoti District	*L. Darlong* 10310, 10338
8.		*Mezoneuron cuculatum* (Roxb.) Wight & Arn.	Fl.: Oct-Nov Fr.: Nov-Dec	Damcherra, North Tripura District	*L. Darlong* 10329, 10333
9.	Capparaceae	*Stixis suaveolens* (Roxb.) Pierre	Fl.: Apr-May Fr.: Aug-Oct	Nalkata, Dhalai District	*L. Darlong* 10324
10.	Combretaceae	*Combretum dasystachyum* Kurz	Fl.: Jan-Apr Fr.: Dec-Feb	Chawmanu, Dhalai District	*L. Darlong* 10315
11.		*Combretum punctatum* Blume subsp. *squamosus* (Roxb. ex G. Don) Exell	Fl.: Mar-Apr Fr.: Apr-Jul	Koramcherra & Nalkata, Dhalai District; Kanchanpur, North Tripura District; Trishna Wildlife Sanctuary, Gomati District	*L. Darlong* 10322, 10344
12.		*C. roxburghii* Spreng.	Fl.: Aug-Oct Fr.: Oct-Jan	Ambassa, Devipur & Nalkata, Dhalai District;	*L. Darlong* 10301
13.		*Quisqualis indica* L.	Fl.: Mar-Nov Fr.: Jun-Nov	Nalkata, Dhalai District; Udaipur, Amarpur & Karbook, Gomati District; Hmuntha & Jolai, North Tripura District	*L. Darlong* 10317
14.	Connaraceae	*Connarus paniculatus* Roxb.	Fl.: Aug-Oct Fr.: Oct-Dec	Nalkata, Dhalai District; Joyshree, North Tripura district	*L. Darlong* 10328
15.	Cucurbitaceae	*Hodgsonia macrocarpa* (Blume) Cogn.	Fl.: Jan-Mar Fr.: Aug-Feb	Kanchancherra & Moracherra, Dhalai District; Hmunpuii & Jolai, North Tripura District	*L. Darlong* 10305
16.	Dilleniaceae	*Tetracera sarmentosa* (L.) Vahl.	Fl.: Apr-Jun Fr.: Jul-Aug	Gondacherra & Chawmanu, Dhalai District; Chamtilla, North Tripura District	*L. Darlong* 10367

17.	Gnetaceae	*Gnetum oblongum* Markgraf	Fl.: Jan-Mar Fr.: Apr-Jul	Chamtilla, North Tripura District	*L. Darlong* 10365
18.		*Gnetum montanum* Markgraf	Fl.: Feb-Mar Fr.: Apr-Jun	Chamtilla & Sabual, North Tripura District; Nalkata, Koramcherra & Gondacherra, Dhalai District; Trishna Wildlife Sanctuary, Gomati District	*L. Darlong* 10309, 10339
19.	Mimosaceae	*Entada phaseoloides* (L.) Merr.	Fl.: Jun-Jul Fr.: Aug-Apr	Devipur & Chawmanu, Dhalai District; Phuldungsai, Vanghmun & Damcherra, North Tripura District	*L. Darlong* 10307, 10342
20.	Moraceae	*Poikilospermum suaveolens* (Blume) Merr.	Fl.: Mar-Apr Fr.: Apr-May	Pecharthal, Unokoti District; Damcherra, North Tripura District	*L. Darlong* 10325, 10336
21.	Papilionaceae	*Butea parviflora* Roxb.	Fl.: Aug-Sep Fr.: Oct-Nov	Chawmanu, Moracherra & Kunkicherra, Dhalai District; Joyshree, North Tripura District; Unokoti, Unokoti District; Shipahijala Wildlife Sanctuary, Shipahijala District; Karbook, Udaipur & Amarpur, Gomati District	*L. Darlong* 10303, 10343, 10347
22.		*Dalhousiea bracteata* (Roxb.) R. Grah. ex Wight	Fl.: May-Jun Fr.: Jun-Oct	Nalkata & Koramcherra, Dhalai District; Boithang & Joyshree, North Tripura District	*L. Darlong* 10345,10346
23.		*Derris trifoliata* Lour.	Fl.: Jun-Jul Fr.: Aug-Oct	Gomati Wildlife Sanctuary, Gomati District; Nalkata, Dhalai District	*L. Darlong* 10363
24.		*Millettia pachycarpa* Benth.	Fl.: Mar-May Fr.: Aug-Oct	Chawmanu, Dhalai District; Joyshree, Pipla & Hmunpuii, North Tripura District	*L. Darlong* 10313, 10330, 10332
25.		*Pueraria montana* var. *chinensis* (Ohwi) Sanjappa & Pradeep	Fl.: Aug-Oct Fr.: Oct-Nov	Dumacherra & Kunkicherra, Dhalai District; Serhmun, North Tripura District; Kailashahar, Unokoti District	*L. Darlong* 10321
26.		*Pueraria tuberosa* (Roxb. ex Willd.) DC.	Fl.: Apr-May Fr.: May-Jun	Chawmanu, Dhalai District	*L. Darlong* 10314
27.	Rhamnaceae	*Ventilago madraspatana* Gaertn. var. *calyculata* (Tulasne.) King	Fl.: Feb-Mar Fr.: Mar-May	Nalkata (Debbarma basti), Dhalai District	*L. Darlong* 10387
28.	Rubiaceae	*Paederia foetida* L.	Fl.: Aug-Oct Fr.: Oct-Dec	Nalkata, Dhalai District; Serhmun, North Tripura District	*L. Darlong* 10388, 10389
29.		*Uncaria sessilifructus* Roxb.	Fl.: Jun-Oct Fr.: Jun-Oct	Kathalcherra, Dhalai District; Serhmun, North Tripura District	*L. Darlong* 10326
30.	Smilacaceae	*Smilax zeylanica* L.	Fl.: Aug-Sep Fr.: Oct-Dec	Devipur, Dhalai District; Shipahijala Wildlife Sanctuary, Shipahijala District	*L. Darlong* 10327
31.	Sterculiaceae	*Byttneria aspera* Collb.	Fl.: May-Jul Fr.: July-Aug	Sabual, Phuldungsai & Vanghmun, North Tripura District	*L. Darlong* 10318
32.		*Byttneria pilosa* Roxb.	Fl.: Sep-Oct Fr.: Nov-Feb	Jolai, North Tripura District; Laljuri, Nalkata & Koramcherra, Dhalai District	*L. Darlong* 10323, 10334
33.	Vitaceae	*Cissus adnata* Roxb.	Fl.: Jun-Jul Fr.: Aug-Oct	Jolai & Rowa Wildlife Sanctuary, North Tripura district; Nalkata, Dhalai District	*L. Darlong* 10335
34.		*Cissus repanda* Vahl.	Fl.: Apr-May Fr.: May-Jun	Birasi miles (*Sal* forest), Dhalai District; Amarpur, Trishna Wildlife Sanctuary, Gomati District; Shipahijala Wildlife Sanctuary, Shipahijala District	*L. Darlong* 10311, 10320

Table 2. The species of lianas which could not be traced in the field during recent explorations in Tripura

	Family	Scientific name	Voucher specimens
1.	Annonaceae	*Fissistigma bicolor* (Roxb.) Merr.	Deb 1745; Debbarma 1118
2.		*F. verrucosum* (Hook.f. & Thomson) Merr.	Deb 27035
3.	Apocynaceae	*Vallaris solanacea* (Roth) Kuntze	Deb 2780; Debbarma 1080
4.	Convolvulaceae	*Erycibe peguensis* Prain	Deb 2070; Debbarma 914
5.	Cucurbitaceae	*Trichosanthes bracteata* Voigt	Deb 1075, 1381
6.	Malpighiaceae	*Aspidopterys elliptica* A. Juss.	Deb 27268
7.		*Hiptage benghalensis* (L.) Kurz	Deb 2761; Debbarma 1033
8.	Menispermaceae	*Cocculus hirsutus* (L.) Diels	Deb 26864
9.		*Pycnarrhena pleniflora* Miers ex Hook.f. & Thomson	Deb 2794
10.	Mimosaceae	*Acacia pruinescens* Kurz	Biswas 5065; Deb 1004
11.	Oleaceae	*Jasminum caudatum* Wall. ex Lindl.	Deb 27293
12.		*J. coarctatum* Roxb.	Biswas 4911
13.		*J. subtriplinerve* Blume	Deb 26857
14.	Papilionaceae	*Abrus precatorius* L.	Debbarma 1043
15.		*Dalbergia thomsonii* Benth.	Deb 1043, 1760
16.		*D. volubilis* Roxb.	Deb 2866, 1079
17.		*Millettia extensa* Benth. ex Baker	Deb 1714, 2604
18.		*Mucuna bracteata* DC.	Deb 26947; Kashari 1211
19.		*M. nigricans* Steud.	Deb 351
20.		*Mucuna pruriens* (L.) DC.	Deb 2444
21.		*Rhynchosia sericea* Gillies ex Hook. & Arn.	Deb 27472
22.	Sabiaceae	*Sabia limoniacea* Wall. ex Hook. f. & Thomson	Deb 27298
23.	Vitaceae	Ampelocissus barbata (Wall.) Planch.	Deb 113
24.		*Tetrastigma lanceolarium* (Roxb.) Planch.	Deb 27200
25.		*T. obovatum* Gagnep.	Deb 2720
26		*T. serrulatum* (Roxb.) Planch.	Deb 2287, 27255

Image 2A. *Combretum punctatum* Blume ssp. *squamosus*

Image 2B. *Uncaria sessilifructus* Roxb

Image 2C. *Stixis suaveolens*

Image 2E. *Pueraria montana* var. *chinensis*

Image 2F. *Beaumontia grandiflora*

Image 2D. *Byttneria pilosa*

Image 2I. *Connarus paniculatus*

Image 2G. *Dalhousiea bracteata*

Image 2H. *Pueraria tuberosa*

Image 2J. *Combretum roxburghii*

Image 2K. *Hodgsonia macrocarpa*

Image 2L. *Entada phaseoloides*

Image 2M. *Millettia pachycarpa*

Image 2O. *Bauhinia scandens*

Image 2N. *Butea parviflora*

Image 2P. *Tetracera sarmentosa*

Markgraf and *G. oblongum* Markgraf have already been categorized as threatened in the state (Deb 1999).

Felling of supporting/host trees for *Jhum* cultivation and wood commerce viz., *Artocarpus chama* Buch.-Ham. (Moraceae), *Shorea robusta* C.F.Gaertn. (Dipterocarpaceae), *Tectona grandis* L.f. (Lamiaceae), utilization of some lianas for ethnic uses, clearing of forests for agriculture, are identified as some of the major threats to this highly important growth form in the state. Moreover, rubber and 'supari' (areca nut) plantations, tea and pineapple cultivation are the main sources of livelihood of the rural and tribal people of Tripura. These practices are also alarming threats for different species of lianas growing in the state (Darlong & Bhattacharyya 2012). So, proper in situ conservation is prescribed for their sustenance. Seeds can also be collected for seed banks. Moreover, ex situ conservation in botanic gardens is recommended.

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Image 3A. *Thunbergia grandiflora*

Image 3B. *Quisqualis indica*

Image 3C. *Paederia foetida*

Image 3D. *Combretum dasystachyum*

Image 3E. *Smilax zeylanica*

Image 3F. *Ichnocarpus frutescens*

Image 3G. *Mezoneuron cuculatum*

Image 3H. *Poikilospermum suaveolens*

Image 3I. *Ventilago madraspatana* Gaertn. var. *calyculata*

Image 3J. *Byttneria aspera*

Image 3K. *Desmos dumosus*

Image 3L. *Parabarium micranthum*

Image 3M. *Derris trifoliata*

Image 3N. *Willughbeia edulis*

Image 3Q. *Gnetum oblongum*

Image 3R. *Gnetum montanum*

Image 3O. *Cissus repanda*

Image 3P. *Cissus adnata*

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