

Preparation of a computerized database on Medicinal and Aromatic Plants of Tripura

INTRODUCTION

North East India being one of the richest reservoirs of plant diversity in India and one of the biodiversity hotspots of the world. North East India comprises all eight states namely Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland, Sikkim and Tripura. It is home to 8 million tribal populations with 225 tribal communities (Sharma et.al, 2014). Among these eight sister states, Tripura is a state located in biogeographic zone of 9B-North East Hills between 91⁰ 10' to 92⁰ 20' East longitude and 22⁰ 57' to 24⁰ 33' latitude (Sharma et.al, 2014). The state is situated in the south-western extremity of North-East India covering an area of 10497.69 sq km, it shares an international border with Bangladesh towards north, south and west as well as Indian states of Assam and Mizoram towards east. International border is extended upto 856 km with Bangladesh, which is almost completely open and porous. The state being one of the rich biodiversity hotspot with a variety of flora and fauna. Forest covers an area of about 6292.681 sq km, with the annual rainfall of about 247.9 cm and temperature ranging between 10⁰ C - 35⁰ C. The suitable tropical climate support luxuriant growth of various types of medicinal plants and other forest resources scattered all over the state from hilly tract to plain. There are around 19 ethnic groups predominantly living in and around the dense forest having their own language, culture, food habit and socio-religious traditions. The state is associated with diverse cultural traditions associated with medicinal plants.

The climate of Tripura exhibits a strong seasonal rhythm, displaying typical characteristics of hilly and mountainous region. The change in the topographical features of the region also causes a change in the climatic conditions in Tripura. The state records an average temperature of 10 degree Celsius in the winter season and it reaches the peak upto 35 degree Celsius in summer. The altitude of the state also influences the climatic conditions of Tripura state.

The forest of Tripura is mainly tropical evergreen, semi evergreen and moist deciduous forest. The state has diverse ecosystems ranging from forests and grasslands to freshwater wetlands. There are six types of 408 wetlands, of which, water logged (seasonal) are most numerous followed by oxbow lakes and lakes/ponds. The State is extremely rich in bio-diversity,

which is getting increasingly threatened. Situated in the Indian sub-region of Oriental Zoogeographic region, local flora and fauna bear a very close affinity and resemblance with floral and faunal components of Indo-Malayan and Indo-Chinese sub-regions.

The FRLHT with support from State Forest Department and State medicinal plant board organized Conservation Assessment and Management Prioritization (CAMP) process using IUCN Red listed categories and criteria for the State of Tripura for Developing an electronic database on medicinal plants of Tripura, which has brought out a list of species as threatened and assigned different threat categories as recognised by IUCN. Needless to mention they warrant for immediate conservation action.

PROJECT OBJECTIVE

To assist State forest department in Preparation of a computerized database on Medicinal and Aromatic Plants of Tripura

Conduct an inception workshop involving various stake holders from Tripura, state Medicinal Plants Board and FRLHT

Identification and collection of scientific publications, documenting flora of Tripura as well as the literature relating to recording of medicinal uses of these plant species in Indian's codified system of medicine and etho-botanical records of plant use of medicinal purposes in the folk tradition.

Using these available published sources, a computerized inventory of medicinal plants of Tripura will be prepared with each plant entity bearing medicinal system tag (Ayurveda, Siddha, Unani, Homeopathy and Folk)

Each of these plant species growing in Tripura, which has been recorded for medicinal applications, will be classified into wild or cultivated/planted categories.

The available data of regional/national/global trade will be linked to the specific prioritized species of the state, wherever available.

A user friendly interface will be developed for querying the database and to facilitate the viewing of results/outputs with the help of suitable programming inputs.

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Methodology

Database development and finding:

It is proposed to follow a methodology similar to the one used for development of medicinal plants database at FRLHT, for the database on medicinal plants of Tripura. FRLHT team has endeavored to catalogue the plant entities recorded in medicinal use in the codified systems of Indian medicine namely Ayurveda, Siddha, Unani, Swa-rigpa (Tibetan) and Homoeopathy as well as the ones documented in medicinal use in the folk practices, from the publications covering different regions of the country. Such an enlistment of Indian medicinal plants can constitute the central pillar of a computerized database on Indian medicinal plants. Multi-dimensional data relating to diverse aspects (nomenclature correlation, distribution, trade etc.) and features of each of the listed medicinal plant entity are then built around this central pillar. It will initially focus on drugs mentioned in the floras of Tripura which are correlated to botanical names in various reports and publications.

Ethnobotanical data

In the consultative meeting held on 23rd April 2016 at Aranya Bhavan, office of PCCF the feedback given after demonstrating the prototype version on Inventory of Medicinal Plants of Tripura, extensive literature review on Medicinal Plants of Tripura need to be carried out and for further enriching the medicinal plant database of Tripura following activities was carried by appointing one person from Tripura Mrs.Ruma Paul, a post-graduation student was involved in collecting publication, research papers from various institution and university in Tripura which were not there before in our List, further publication related to medicinal plants of Tripura was collected from university, departments, and different organization in Tripura, data on ethno medicinal usage part was collected from local publication in regional languages and then it was translated further incorporated into the database. Ethno medicinal information from North-Eastern Institute of Folk medicine (NEIFM) and the ones published by Tripura tribal Welfare department related to ethno medicinal use was incorporated into the database.

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Database development and findings

The first step involved collection of publications documenting the Flora of Tripura as well as literature relating to these plant species in India's codified systems of medicine (Ayurveda, Siddha, Unani, Tibetan and Homoeopathy) and other published data relating to ethno-botanical studies. Using these publications, a computerized inventory of medicinal plants of Tripura was prepared with each plant entity bearing a tag for medical system (codified as well as folk category). Each of these plant species growing in Tripura, which has been recorded in medicinal use, has been further classified into wild, as well as cultivated/planted categories.

A user-friendly interface has been developed for querying the database and to facilitate the viewing of results/outputs with the help of suitable programming inputs. In order to facilitate identification of plant entities, digital images of several medicinal plants have been incorporated in the database.

The process and authenticity

The process was initiated with enlistment of the available published literature documenting the floristic wealth, including the medicinal plants was collected from the relevant floras, research articles, reports and classical text etc. Some of the published literatures that are used for compilation include, The Bibliography utilized for the preparation of this inventorisation of Medicinal plants of Tripura, is provided below.

Based on a thorough review of such published floras, an inventory of plant species recorded in Tripura, along with appropriate tagging of species which have been recorded in medicinal use in one or more of the codified Indian systems of medicine namely Ayurveda, Siddha, Unani, Homoeopathy as well as in the Folk traditions has been prepared. Through detailed references of more than 200 published sources ranging from scholarly commentaries on classical texts relating to codified systems as well as published ethno-medico botanical studies. The database incorporates exhaustive correlation between the botanical names of medicinal plant entities and their vernacular names. These vernacular names belong to different Indian languages namely Hindi, Sanskrit and English etc have been included in the database.

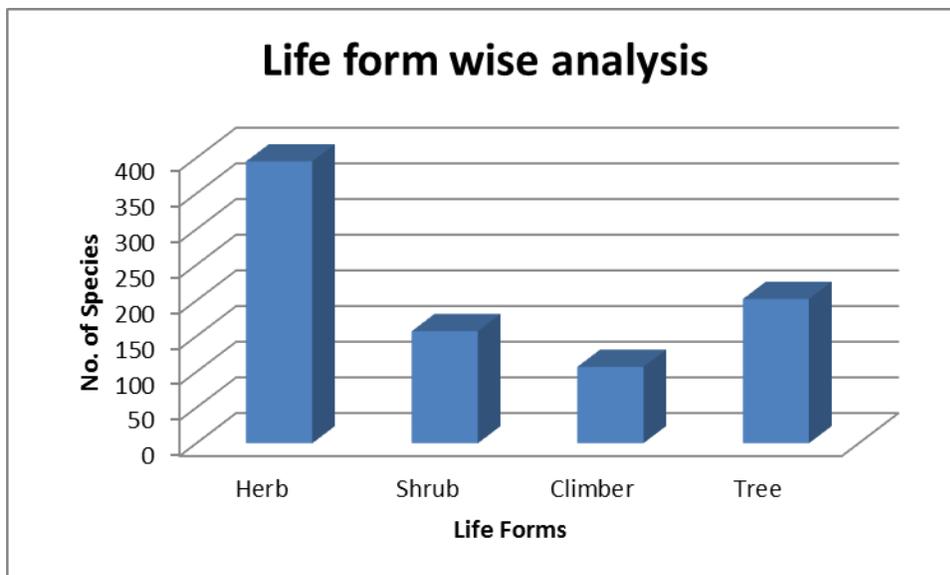
The total number of botanical names enlisted in this database for Tripura is 1103. This list of 1103 botanical names of medicinal plants of Tripura has been further processed to link the botanical synonyms and after such processing, the total number of plant species included in this exhaustive multi-dimensional database on medicinal plants of Tripura state stands at 892

RESULTS & DISCUSSION:

DATA ANALYSIS

Life form wise analysis of 892 medicinal plant taxa of Tripura

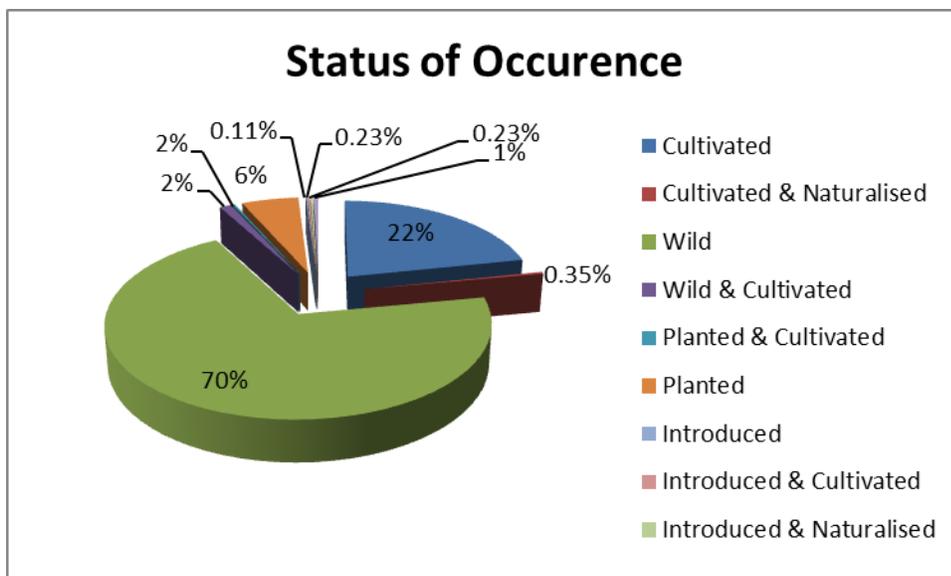
Life Forms	No. of Species
Herb	416
Shrub	167
Climber	99
Tree	210



Status wise analysis 892 botanical names (1103 taxa). Each of these 1103 taxa has been classified into one of the following categories:

Status wise analysis of 892 medicinal plant taxa of Tripura

Sl.No.	Status	No. of Species
1	Cultivated	191
2	Cultivated & Naturalised	2
3	Wild	629
4	Wild & Cultivated	13
5	Planted & Cultivated	2
6	Planted	46
7	Introduced	1
8	Introduced & Cultivated	2
9	Introduced & Naturalised	2
10	Naturalised	4



RED LISTED SPECIES

The Red Listed status is given based on Conservation Assessment and Management Prioritization (CAMP) assessment of Tripura held at Agartala during 2016. Since 1995 FRLHT has been coordinating rapid assessment of “threat status” of medicinal plants across different states. A total of 17 Indian States have been covered and overall 335 species were assessed and assigned Red list status ranging from Near Threat (NT) to Critically Endangered (CR) based on IUCN Red list criteria and categories. Except for endemics, these assessments pertain to the status in that specific state. The specific assessment exercise undertaken for the wild medicinal plants of Tripura during the CAMP workshop held in 2016, 36 species were assessed and assigned Red listed in the current study of Tripura. The breakup of taxa is as follows: Vulnerable (VU): 14, Near Threatened (NT): 3, Endangered (EN): 6, Critically Endangered (CR): 1, Least Concern (LC): 2, Data Deficient (DD): 10. Here data deficient need much more field work to assess the status of wild population. Obviously there is a need to undertake more such assessment in respect of several other medicinal species of conservation concern.

Trade Information Obtained from Mandis

The 'mandis' (raw drug markets) form the pivot around which the major quantum of trade in plant based raw drugs takes place in the country. These 'mandis' traditionally vary from the 'road-head depots' dealing with limited number of locally obtained botanicals to 'large mandis' forming major centres of trade in respect of a large number of botanicals. Trade in these mandis is generally considered to be highly intricate and secretive. To have a better understanding of the botanical entities and their quantities in trade in Tripura, data was collected from Kumarghat and Dharmanagar from 10 major traders and primary survey in Mandis during 2015-16 and data was collected by Dr.Saha.D (2015-16) and analysis was carried out in respect of the years, i.e, 2015 to 2016. The relevant tabulation is annexed. (Annexure I)

Total item listed are 19 botanicals.

1. The Highest quantity (for 2015-16) being Gondaki (*Homalomena aromatic*) at **150-180 MT** and Maidachal (*Litsea glutinosa*) at **80-100 MT**
2. Average wholesale price for 2015-16 was highest for Agar (*Aquilaria malaccensis*) and Topchini (*Smilax ovalifolia*) both at 400-450/kg followed by *Mucuna nigrans* at Rs 300-350 per kilogram that are sold outside the state.

The trade information has helped in unfolding many complexities in the trade of botanicals; it has also helped in arriving at a realistic list of botanicals entities in high trade (≥ 100 MT) for focused interventions for their sustainable management.