ANNUAL 2015 REPORT 2016

Botanical Survey of India

Ministry of Environment, Forest & Climate Change

ANNUAL REPORT
2015 - 16

भारतीय वनस्पति सर्वेक्षण
BOTANICAL SURVEY OF INDIA

BOTANICAL SURVEY OF INDIA
Ministry of Environment, Forest & Climate Change

ANNUAL REPORT 2015-2016

Editorial Committee
Dr. B.K. Sinha
Dr. S.S. Dash
Dr. Debasmita Dutta Pramanick
Shri Sanjay Kumar

Data Collection
Shri Sabyasachi Saha
Shri Dhyanesh Sardar

ISBN: 81-8177-096-X

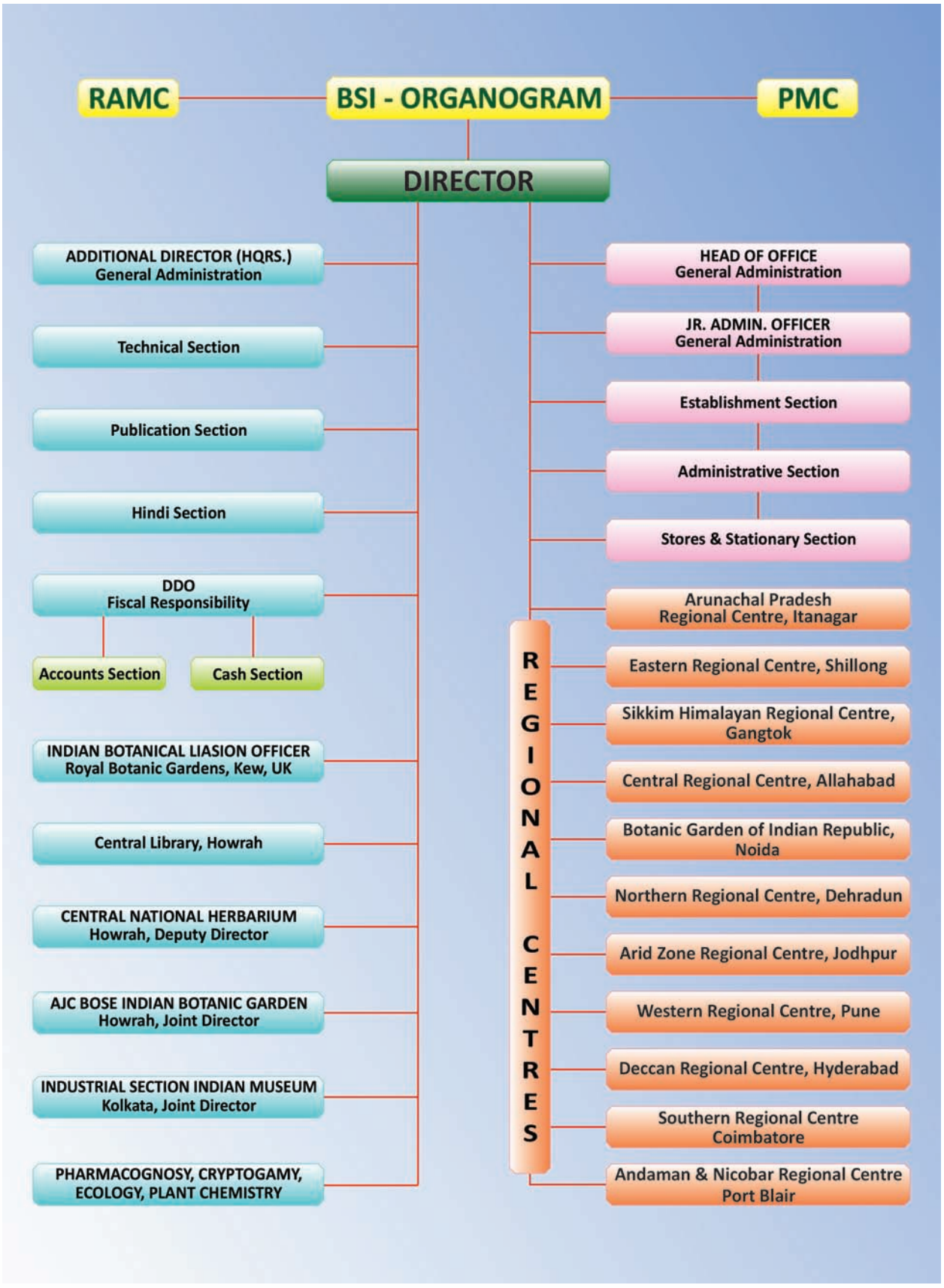
Acknowledgements

All Regional Centers of Botanical Survey of India

Published by
The Director
Botanical Survey of India
CGO Complex, 3rd MSO Building
F-Wing, 5th & 6th Floor
DF - Block, Sector-1, Salt Lake City
Kolkata - 700 064 (West Bengal)
Website:http//bsi.gov.in
email:nelumbo.bsi@gmail.com

Printed at
Print-Tech Offset, F-66/1 & 66/2, Chandaka Industrial Estate,
Bhubaneswar-751 024, Odisha, India

CONTENTS


RAMC
BSI - ORGANOGRAM
PMC
DIRECTOR
ADDITIONAL DIRECTOR (HQRS.)
General Administration
Technical Section
Publication Section
Hindi Section
DDO
Fiscal Responsibility
Accounts Section
Cash Section
INDIAN BOTANICAL LIASION OFFICER
Royal Botanic Gardens, Kew, UK
Central Library, Howrah
CENTRAL NATIONAL HERBARIUM
Howrah, Deputy Director
AJC BOSE INDIAN BOTANIC GARDEN
Howrah, Joint Director
INDUSTRIAL SECTION INDIAN MUSEUM
Kolkata, Joint Director
PHARMACOGNOSY, CRYPTOGAMY,
ECOLOGY, PLANT CHEMISTRY
HEAD OF OFFICE
General Administration
JR. ADMIN. OFFICER
General Administration
Establishment Section
Administrative Section
Stores & Stationary Section
REGIONAL CENTRES
Arunachal Pradesh
Regional Centre, Itanagar
Eastern Regional Centre, Shillong
Sikkim Himalayan Regional Centre,
Gangtok
Central Regional Centre, Allahabad
Botanic Garden of Indian Republic,
Noida
Northern Regional Centre, Dehradun
Arid Zone Regional Centre, Jodhpur
Western Regional Centre, Pune
Deccan Regional Centre, Hyderabad
Southern Regional Centre
Coimbatore
Andaman & Nicobar Regional Centre
Port Blair

DR. PARAMJIT SINGH
Director

Botanical Survey of India
CGO Complex, 3rd MSO Building
Block - F, 5th & 6th Floor
DF - Block, Sector - 1, Salt Lake City
Kolkata - 700 064

From the Director's Desk.....

I am happy to present the Annual Report of Botanical Survey of India for the year 2015-2016. The report highlights the brief accounts of all-round activities and achievements of this organization in the field of exploration, survey, research and outreach programmes.

During 2015-16, scientists of Botanical Survey of India carried out 97 field tours under 114 projects. Extensive floristic explorations were conducted in a wide range of phyto-geographical regions including Western Himalaya, Eastern Himalaya, North-East India, Arid and Semi- Arid regions, Gangetic Plains, Deccan peninsula, Western Ghats and Andaman & Nicobar Islands. During this period tours were also carried out in 24 Protected areas and 12 Sacred groves. During these field tours, 17,008 specimens were collected which were identified into 5367 taxa of flowering and non-flowering plant. Besides the field tours, revisionary studies of the family Bignoniaceae and genera *Lepisorus*, *Adiantum*, *Fimbristylis*, subtribe *Sporobolinae* (Poaceae), under National Flora, and *Impatiens* (Balsaminaceae), family Gesneriaceae and Polypodiaceae under Regional Flora were carried out. Collection of ethno-botanically important plants and their ethnobotanical significance were documented from Nuapada, Malkangiri, Balasore, Nayagarh districts of Odisha and Dang district of Gujarat. Study of Pollinia of South Indian Orchids using SEM and pollen and Seed morphology of *Andrographis* and *Ficus* is being continued by our scientists.

During 2015-2016, the scientists of BSI published 03 new genera, 42 new species and 02 new subspecies/ varieties of plants as new to science and discovered 1 genus, 101 species, 01 subspecies and 03 varieties as new records for India.

Besides, the regular maintenance of various herbaria, gardens and museum in BSI towards the dissemination of information relating to plant diversity is being continued. The reinterpretation of the Roxburgh Icones belonging to families Leguminosae, Moraceae, Myrtaceae, Convolvulaceae and Cucurbitaceae has been initiated.

For outstanding contribution in the field of Plant taxonomy, Scientists of Botanical Survey of India were also honored with National Awards and recognitions by different professional societies and organizations. This year Survey hosted several important events such as World Biodiversity Day (22nd May), World Environment Day (5th June), Himalayan day (9th September). Scientists of BSI also attended different conferences, symposia and training pragrammes.

I congratulate all scientific and administrative colleagues for their valuable cooperation and sincere efforts, team spirit, creativity and commitment, for fulfilling goals and targets of this Institution and maintaining the glory of Botanical Survey of India for carrying out taxonomic and floristic studies, survey, documentation and conservation of wild plant resources.

(PARAMJIT SINGH)

Introduction

The Botanical Survey of India (BSI) was established in 1890 serves the national by providing scientific basis for conservation and sustainable utilization of wild plants through survey, inventory and documentation of taxonomic information and creating environmental education. Since reorganization in 1954, Botanical Survey of India has diversified to 11 regional circles at Dehra Dun, Pune, Coimbatore, Shillong, Itanagar, Sikkim, Allahabad, Port Blair, Noida, Jodhpur and Hyderabad with its headquarter at Kokata. The Survey has come a long way in establishing rich traditions in fulfilling its targets by actively engaging in inventorization of flora of India and its conservation. Continuous survey and exploration in diverse ecosystems ranging from high altitude cold deserts to hot and humid coastlands, scientists of the Organization have assembled enormous information on occurrence and distribution of plant species, BSI holds more than 3 million plant specimens in the Central National Herbarium and its regional centres herbaria; Scientists of BSI have been discovered more than 1 family, 41 genera and 1465 taxa new to science. Wide varieties of non-flowering plants, such as fungi, pteridophytes, bryophytes, and algae have also been discovered which are not only acted as a fundamental resources for bio-prospecting but also played a crucial role for providing unique opportunities for multiple research goal.

Following are the main objectives of Botanical Survey of India

Primary

- Exploration, inventorying and documentation of phytodiversity (including non-flowering plants) in general and protected areas, hotspots, fragile ecosystems and sacred groves in particular; publication of National, State and District Floras.

The King lake in AJCB Indian Botanic Garden

- Identification of Red list species and species rich areas needing conservation; *ex situ* conservation of critically threatened taxa in botanical gardens.
- Survey and documentation of traditional knowledge (ethno-botany) associated with plants.
- Develop a National database of Indian plants, including herbarium specimens, live specimens, botanical paintings, illustrations etc.

Secondary

- Revisionary/Monographic studies on selected plant groups.
- Qualitative analysis of nutritive value of ethno-food plants and other economically useful species.
- Capacity building in plant taxonomy through refresher courses and post M.Sc. certificate course.
- Environment Impact Assessment of areas assigned to BSI for study.
- Develop and maintain Botanical Gardens, Museum and Herbaria.
- Preparation of Seed, Pollen and Spore Atlas of Indian Plants.

Headquarters and Brief insight to its Regional Centres

Headquarters: Apart from the Directorate, the Headquarters consist of Flora Cell, Cryptogamic Section, Publication Section, Central library, Technical Section, Pharmacognosy Section, Ecology and Plant Chemistry Section. The Central library is with more than 54,000 accessioned books and subscribes more than 62 National and International journals. The Pharmacognosy Section possess about 700 crude drug samples, while Cryptogamic section has more than 70,000 specimens of Pteridophytes, 5,000 of mosses, 2,000 of liverworts, 4,500 fungi, 3,000 lichens and 1,500 algal specimens.

AJC Bose Indian Botanic Garden, Howrah: AJC Bose Indian Botanic Garden, erstwhile known as the Royal Botanical Garden, established in 1790 by Robert Kyd is one of the largest and oldest garden in South East Asia. The AJCBIBG spreads over an area of 273 acres and grows 14,122 live plant collections of trees, shrubs and climbers belonging to 1377 species. Since the colonial era, the garden has been designated to 25 divisions for different groups of plants. Twenty-four interconnected lakes and one canal along the inner side of the boundary form a vast water body within the garden which is ultimately connected with river Hooghly for the regular flow of fresh water. The garden has been a unique place for learning which showcase a wide array of curious and botanically interesting plants including age-old the 'Great Banyan tree', more than 250 years old and occupying 4.5 hectares of land; the Double Coconut palm (*Lodoicea maldivica*); the Branching palm (*Hyphane thebaica*); the Century Palm (*Corypha macropoda*); the Giant Water Lily (*Victoria amazonica*); the queen of flowering trees (*Amherstia nobilis*); the Mountain rose or Venezuela rose (*Brownea coccinea*); the Baobao tree or Kalpavriksh (*Adansonia digitata*); the Star apple or Rosogolla tree (*Chrysophyllum cainito*); the Cannon ball tree (*Couroupita guianensis*); the African Sausage tree (*Kigelia pinnata*) and the Mad tree (*Pterigota alata var. irregularis*). The bambusetum of the garden has more than 35 species of bamboos.

The Central National Herbarium: The Central National Herbarium (CAL) is one of the internationally recognized plant repository, about 2.6 million herbarium specimens belonging to nearly 350 families of angiosperms. Apart from these collections, good collection of drawings of Indian plants painted by natural dyes and archival collections of the correspondences among the eminent botanists are in possession of CAL. The CAL also has appreciable cryptogamic collections that include fungi, lichens, algae, bryophytes and pteridophytes. This herbarium serves a national reference for taxonomic literature and specimens to plant taxonomists.

Central Botanical Laboratory: The Central Botanical Laboratory, established on 13th April 1954, is a Centre of research in the field of Ethnobotany and Economic Botany. The laboratory maintains Economic Botany Section with about 6,500 ethnobotanical specimens and its museum with 4233 exhibits.

The Industrial Section Indian Museum, Kolkata: Established on 1st April 1887, showcase the first-hand information on both wild and cultivated economic plants and plant products of India in eight Bays in the Botanical Gallery of Indian Museum. The Industrial Section has been a part of Botanical Survey of India since 1911. More than 20,000 diverse collections of economic and useful plant materials are exhibited in 8 Botanical Galleries catering to visitors of all age group. Some rare holdings of Botanical Gallery include *Textile Fabrics of India*; *Textile manufacturers and embroideries'* and *Fabrics dyed* with Indian dyes'. Sir George Watt's *Agricultural Ledgers* is another noteworthy material which has been great source of data for the publication of the eight volume, *A Dictionary of the Economic Products of India* (1889-1896).

Regional Centres

Andaman and Nicobar Regional Centre, Port Blair: Established at Port Blair on 30th March 1972 with an

objective to document the plant diversity of the Andaman and Nicobar Islands. The herbarium (PBL) of the regional Centre has about 32,000 herbarium specimens, including 109 type specimens. Some of the remote areas that were surveyed by the Centre are Saddle Peak National Park, Mount Thullier, Campbell Bay National Park and little Nicobar Tribal Reserve. The associated Experimental Garden-cum-Arboretum at Dhanikhari maintains about 200 plant species.

Arunachal Pradesh Regional Centre, Itanagar: The Centre is exclusively devoted to the plant-rich Arunachal Pradesh and its herbarium (ARUN) has more than 25,000 specimens of vascular plants, including 22 type specimens, about 1,100 specimens of bryophytes and more than 3,500 specimens of pteriodphytes. The botanic garden, Sankie View, has about 400 species.

Arid Zone Regional Centre, Jodhpur: This Centre was established on18th February 1972 to explore and to carry out floristic studies on plant resources of the arid and semi-arid regions of the North-western India, *viz.* Rajasthan and Gujarat. The herbarium (BSJO) attached to the Centre has more than 33,500 specimens, including 18 type specimens displaying plant diversity of Rajasthan and Gujarat states. The associated Desert Botanic Garden located in the premises of the regional Centre has more than 250 species of arid region.

Botanic Garden of Indian Republic, Noida: Established in 2002 with a mandate to bringing about 35 per cent of the country's wild plant diversity under *ex situ* conservation. The garden is actively engaged in replicating the different forest types of India and also in developing different economic plant sections.

Central Regional Centre, Allahabad : The Centre covers Chhattisgarh, Madhya Pradesh and Uttar Pradesh. The herbarium (BSA) of this regional Centre has about 79,000 herbarium specimens, including 4 type specimens. In addition, it houses about 1,700 pteridophytes and 5,000 lichens. The associated garden maintains about 450 species.

Wet evergreen habitat with *Oberonia* species in Dhanikhari Botanical Garden

Herminium monorchis (L.) R. Br.

Deccan Regional Centre, Hyderabad : Established in 2005 at Hyderabad, the Centre covers Andhra Pradesh and Odisha. The herbarium (BSID) of this Centre has about 16,400 herbarium specimens pertaining Andhra Pradesh and Odisha states, including about 900 mangrove specimens and about 6,500 Greater Hyderabad specimens. Presently, housed in ZSI premises, the Centre is engaged in exploring the flora of Greater Hyderabad

The Eastern Regional Centre, Shillong: Concerned with exploration and inventory of the flora of Northeast India, comprising the states of Assam, Manipur, Meghalaya Mizoram, Nagaland and Tripura. This Centre's herbarium (ASSAM) has a holding of about 2,60,000 specimens of flowering plants and about 11,000 specimens of non-flowering plants, including about 600 type specimens. The Centre also has a library, Museum, National Orchidarium and a Tissue Culture Laboratory, besides an Experimental Botanic Garden at Barapani, where a total of 756 species of angiosperms, 13 gymnosperms, 49 pteridophytes and 53 bryophytes of Northeast India are conserved. Some of the noteworthy endemic and

Dendrobium fimbriatum Hook.

View of Cold Desert in Western Himalaya

threatened plant species such as *Nepenthes khasiana*, *Citrus indica*, *Aquilaria malaccensis*, *Aesculus assamica*, and a large number of Zingibers, Musa and Bamboos are thriving well here.

Northern Regional Centre, Dehra Dun: The Centre covers Chandigarh, Haryana, Himachal Pradesh, Jammu and Kashmir, Punjab and Uttarakhand, including Trans-Himalayan Cold Deserts of Western Himalaya. The herbarium (BSD) of this Centre holding about 1,27,000 specimens of flowering plants, including 140 type specimens and 11,300 specimens of non-flowering plants showcasing the vast floristic diversity of the Northwest Himalaya, Indian Cold Desert, Shiwalik and part of Upper Gangetic Plains.The associated gardens at Pauri and Khirsoo maintain the National gymnosperm collections such as *Abies pindrow,Cedrus deodara*, *Cupressus torulosa, Pinus wallichiana,Taxus wallichiana* and species of *Juniperus* and *Taxodium.* A small garden at Dehra Dun facilitates *ex situ* conservation of about 750 endemic, threatened and economically important plant species, including about 70 species of orchids.

Sikkim Himalayan Regional Centre, Gangtok: The Centre is exclusively devoted to the state of Sikkim, and its

Rhododendron argipeplum B. Balfour & R. E. Cooper

herbarium (BSHC) has about 45,200 specimens, which include 22 type specimens, besides, there are about 3,700 pteridophytes,1,757 1ichens and 215 macrofungi. The associated garden in the campus has about 310 species mostly orchids from Sikkim.

Southern Regional Centre, Coimbatore: The Centre covers Kerala, Tamil Nadu and the Union Territories of Lakshadweep and Puducherry. The Centre's herbarium (MH) has more than 2,66,000 specimens, including 2,750 type specimens. The associated garden at Yercaud maintains about 1,100 species that include collections at National Orchidarium.

Western Regional Centre, Pune: The jurisdiction of this regional Centre includes states of Maharashtra, Goa, Karnataka and the Union Territories of Dadra, Nagar Haveli, and Daman Diu. The herbarium (BSI) of the Centre has about 1,33,000 specimens, including 687 type specimens. The collections of this Centre mainly showcase the biodiversity of Western Ghats, including the adjacent regions of Rajasthan, Andhra Pradesh and Kerala. The associated garden at Mundhwa has about 400 species.

Antidesma ghaesmbilla Gaertn.

RESEARCH PROGRAMMES

AJC BOSE INDIAN BOTANIC GARDEN, HOWRAH

1. Project : Development of Division No. 25 of AJC Bose Indian Botanic Garden, BSI, Howrah

Executing Scientists : Dr. A. Pramanik & Dr. S.P. Panda

Date of Initiation : April 2012

Date to be completion : March 2017

Objective : Collection of important historical plants of garden.

Area and locality of the Allotted Project:

Division No. 25 of AJC Bose Indian Botanic Garden, Howrah

Summary and achievements of the work done during 2015-16:

During 2015-16, 01 field tour *w.e.f.* 17.02.2016 to 23.02.2016 was undertaken to Tripura for collection of live plants. During this period, 65 plant saplings under 24 species were collected for introduction in the garden. Live plants collected are: *Alpinia calcarata, Aquilaria malaccensis, Bambusa cacharensis, Psidium guineense, Camellia sinensis, Clerodendrum splendens, Canarium strictum, Dipterocarpus retusus, Commiphora wightii, Phyllostachys aurea, Zeuxine longilabris, Ipomoea batatas, Cinnamomum verum, Malpighia glabra, Sapindus mukorossi, Melocanna baccifera,* etc.

2. Project : Enrichment of medicinal plant section (Charak Udyan) of AJC Bose Indian Botanic Garden through survey and introduction of medicinal plants

Executing Scientist : Dr. S.P. Panda

Date of Initiation : April 2015

Date to be completion : March 2018

Objective : To enrich Charak Udyan, AJCBIBG, Howrah with introduction of medicinal plants

Area and locality of the Allotted Project :

Charak Udyan, medicinal plant section, AJCBIBG

Summary and achievements of the work done during 2015-16:

During this period, 01 field tour *w.e.f.* 30.09.2015 to 05.10.2015 was conducted to North Bengal (Darjeeling, Pundibadi and Sukna) and collected 45 seedlings of medicinal plants under 38 species. Live plants collected are: *Acanthus carduaceus, Aloe jucanda , Alpinia malaccensis, Amoora walichii, Amorphophalus bulbifer, Aquilaria agallocha, Asparagus adscendens, Baccaurea sapida, Bixa orellana, Butea buteiformis, Canna edulis, Ceiba pentandra, Coffea arabica, Coffea benghalensis, Cordia macleodii, Costus erythrophyllus, Croton tiglium, Curculigo capitata, Eleocarpus floribundus, Eleocarpus ganitres, Kaempferia galanga, Kaempferia rotunda, Machilus edulis, Oroxylum indicum, Piper chaba, Plumbago zeylanica, Sapindus mukorossi, Sterculia villosa, Talinum patens.*

3. Project : Collection, introduction and multiplication of 20 endemic, threatened, medicinal, ornamental and economically important plants

Executing Scientists : Dr. A. Pramanik, Dr. S.S. Hameed & Dr. B.K. Singh

Date of Initiation : April 2012

Date to be completion : March 2017

Objective : To collect, introduce and multiply 20 endemic, threatened and economically important plants

Area and locality of the Allotted Project :

AJCB Indian Botanic garden

Summary and achievements of the work done during 2015-16:

A plant collection tour *w.e.f.* 16.11.2015 to 22.11.2015 was conducted to NBRI, Lucknow & Uttarakhand. The following endemic as well as other plants collected during the tour have been introduced in AJCBIBG : *Erythrina variegata, Ficus trigona, Bauhinia tomentosa, Butea superba, Elaeocarpus floribundus, Pittosporum eriocarpum, Gelonium multiflorum, Tabeubia palmeri, Cycas indica, Zamia pumila, Datura stramonium, Gardenia lucida, Bougainvillea spectabilis.*

4. Project : Collection, Introduction & *ex situ* Conservation of Rare and Endemic Orchids of NE India

Executing Scientists : Dr. M.U. Sharief & Dr. B.K. Singh

Date of Initiation : April 2014

Date to be completion : March 2017

Objective : *Ex-situ* conservation of rare and endemic Orchids in AJCBIBG

Summary and achievements of the work done during 2015-16:

One collection tour *w.e.f.* 09.03.2016-19.03.2016 was undertaken to Arunachal Pradesh in which 60 plant seeding under 45 species were collected; some of which are *Aerides odorata, Acampe rigida, Biermannia jainiana, Bulbophyllum parviflorum, Bulbophyllum*

gamblei, Bulbophyllum careyanum, Ceratostylis himalaica, Coelogyne fimbriata, Coelogyne rigida, Coelogyne nitida, Cymbidium aloifolium, Dendrobium densiflorum, Dendrobium jenkinsii, Dendrobium crepidatum, Eria discolour, Eria paniculata, Flickingeria fugax, Luisia trichorrhiza, Rhynchostylis retusa, Nervilia macroglossa, Oberonia verticillata, Podochilus khasianus, Goodyera procera, Vanda cristata, Paphiopedilum venustum, Zeuxine pumila etc. Some other rare plant species collected for *ex-situ* conservation are *Elaeocarpus floribundus, Terminalia myriocarpa* and *Syzygium kurzii*.

5. Project : Collection & Introduction of Indigenous Palms of India

Executing Scientist : Dr. S.S. Hameed

Date of Initiation : April 2012

Date to be completion : March 2016 (extended up to 2017)

Objective : Collection and introduction of 10 Indigenous Palms of India

Summary and achievements of the work done during 2015-16:

During 2015-16, one field tour *w.e.f* 27.12.2015 to 06.01.2016 was conducted to Southern Westen Ghats covering Kerala and Tamil Nadu in which 15 species were collected. The collected species are *Arenga wightii, Bentinckia condapanna, Calamus gamblei, Calamus huegelianus, Calamus metzianus, Calamus thwaitesii, Calamus pseudotenuis, Calamus travancoricus, Calamus shendurunii, Calamus nagbettai, Calamus vattayila, Calamus hookerianus, Corypha umbraculifera, Pinanga dicksonii* and *Phoenix pusilla*.

6. Project : GIS Phyto-mapping & Digitization of Shrubs & Trees in AJC Bose Indian Botanic Garden

Executing Scientists : Dr. C.M. Sabapathy, Dr. B.K. Singh & Dr. A. Pramanik

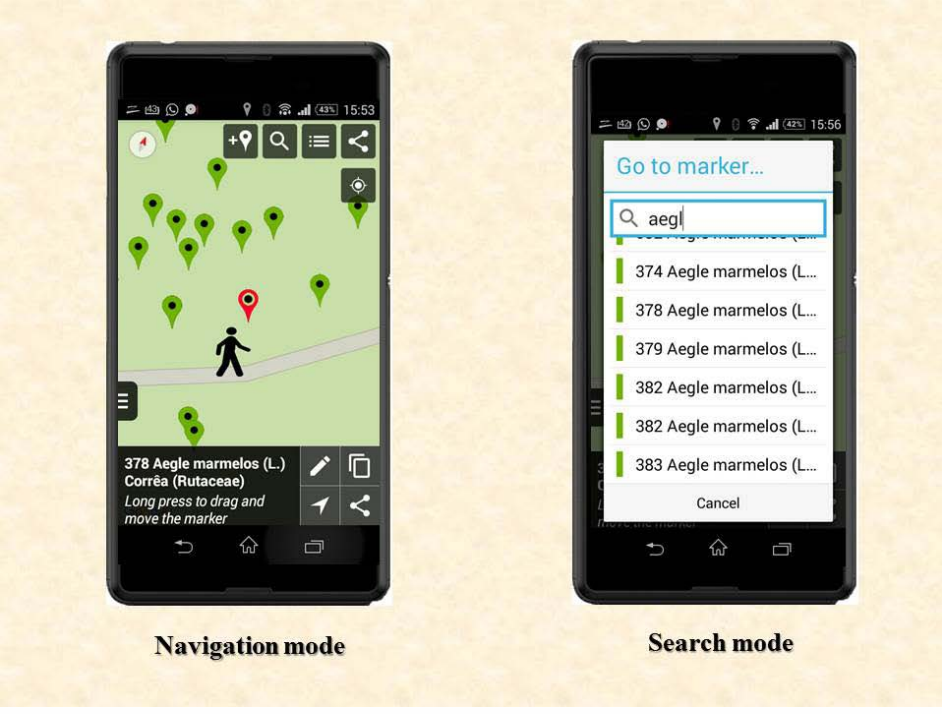
Date of Initiation : April 2014

Date to be completion : March 2016

Objective : To gather information about the introduction of the tree and shrubs in the past and present from the researchers of BSI and from the available literatures and catalogues, locating the trees and shrubs in the garden, collection of fresh flowering and fruiting specimens for identification. Making digital plates of all the significant and identifying characters as per requirement.

Background of the Project

Use of Geographical Information System (GIS) & Remote Sensing in the field of biodiversity study is gaining momentum and becoming an important tool for habitat conservation strategies. Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah is one of the biggest and



GIS Application in AJCB AJCB Indian Botanic Garden

oldest botanic garden of south-east Asia. Spread over an area of 273 acre, this garden is a living repository of approximately 14000 trees and shrubs under 1377 species. Development of printing technology and digital photography has given modernization to the old technique of cataloguing garden plants in register manually. To overcome the problem of locating the tree species on this large garden, GIS mapping of all the tree and shrubs in botanic garden was introduced on experimental basis. In the said proposal, all the plants occur in the garden will be plotted as per their co-ordinates in a digital map of AJC Bose Indian Botanic Garden

Summary of the work done during 2015-16:

During this period, out of 25 divisions, around 2100 trees and shrubs were serially labelled in 7 divisions and around 90% were identified. As sample the Total Station survey work was done for 90 labelled trees in only two hours and the rest has to be done by outsourcing.

Achievements/ Outcomes in 2015-16: A proto-type of GPS based navigation App for locating the trees and shrubs of AJCBIBG has been developed.

7. Project : Herbaceous Flora (Dicots) of AJC Bose Indian Botanic Garden, BSI, Howrah

Executing Scientist : Dr. B.K. Singh

Date of Initiation : April 2014

Date to be completion : March 2016

Objective : Documentation of Herbaceous Flora (Dicots) of AJCBIBG

Background of the Project

Acharya Jagadish Chandra Bose Indian Botanic Garden is a living repository of rare, endangered, endemic and economically important plant species introduced from across the globe. Actively involved in *ex-situ* conservation for centuries, this garden acted as introductory platform for many commercially and taxonomically important species from different parts of the world. Many unwanted weeds were also got introduced along with the rare plants those have established themselves and adapted successfully in this climate resulting into a unique floral composition which is quite distinct from the reported flora of this region. Some of these species are restricted only in the botanic garden or adjacent areas indicating their recent and localized introduction in the garden. Though these herbaceous plants are considered as weeds, but many of them are been used traditionally. Some with beautiful flowers and potential ornamental value and can be used for horticultural purposes. Occurrence of these herbs has also attracted many insects, butterflies and birds.

Summary of the work done during 2015-16:

During this period, c. 400 herbaceous plants (dicot) were documented along with enumeration of about 200 species and good field photographs.

Achievements/ Outcomes in 2015-16:

New distribution of about 12 herbs were recored in different seasons after de-siltation activities, enriching the list of herbaceous plants growing in the botanic garden.

Costus pictus D.Don

ANDAMAN & NICOBAR ISLANDS REGIONAL CENTRE, PORTBLAIR

1. Project : a) Collection and introduction of seeds and seedlings of 20 tree species, Zingibers, Rattans in the Dhanikhari Experimental Garden-cum-Arboretum (DEGCA), Nayashahar to raise Nursery and work on seed germination.

b) Phenological survey of tree Species of Dhanikhari Experimental Garden-cum-Arboretum (DEGCA), Nayashahar.

Executing Scientist : Dr. Lal Ji Singh

Date of Initiation : April 2014

Date to be completion : March 2017

Background of the Project:

This project has been initiated in 2014. During previous period, 03 field tours were conducted and collected seedlings/rhizomes/culms of 03 Rattans & Bamboos, 07 plants of Zingiberaceae, 26 trees and 22 other valuable plants and introduced in Dhanikhari Experimental Garden cum Arboretum, Nayasahar.

Area and locality of the Allotted Project :

Andaman Islands, *c*. 6408 sq. km.

Summary of the work done during 2015-16:

During this period, 03 field tours were undertaken for collection and introduction of seeds and seedlings of tree species, Zingibers and Rattans. Seedlings/ rhizomes/ culms of 08 Rattans & Bamboos, 10 Zingibers, 29 trees; seeds of 01 Rattans, 22 trees and 34 other valuable taxa were collected from various forest areas of Andaman Islands and introduced in the Dhanikhari Experimental Garden-Cum-Arboretum, Nayashahar (DEGCA). Seed germination for 07 tree species of Andaman and Nicobar Islands were documented for the first time and 16 tree species are in progress. The selected tree species are *Artocarpus chapalasha*, *Cycas pschannae*, *Dipterocarpus turbinatus*, *Ganophyllum falcatum*, *Garcinia andamanica* var. *andamanica* , *Heritiera littoralis*, *Mangifera griffithii*, *Manilkara littoralis*, etc. A nursery was raised for multiplication of RET plants along with maintenance of previous collection.

Achievements/ Outcomes in 2015-16:

During this study, the effect of habitats on seed germination and seedling survival of tree species of Andaman and Nicobar Islands have been studied for the first time. This is also a pioneer work in demonstrating the effect of various habitats on seed germination as earlier

Phoenix andamanensis S Barrow

available information are concerning to taxonomy only. Phenological surveys of 73 tree species of Dhanikhari Experimental Garden-cum-Arboretum (DEGCA) have been documented for the first time. The present study reported 02 species (*Scurrula paramjitii* L. J. Singh, *Cycas pschannae* R. C. Srivast. & L.J.Singh) as new to science; 02 species (*Heterotis rotundifolia.* (Melastomataceae), *Diplazium proliferum* (Lam.) Thouars) as new to India and 01 species [*Adiantum latifolium* Lam. (Adiantaceae)] as new record for the state.

2. Project : Lichens of the Nicobar Islands

Executing Scientist : Dr. T.A.M. Jagadeesh Ram

Date of Initiation : April 2014

Date to be completion : March 2017

Background of the Project:

The project is being started in 2014. During previous year,

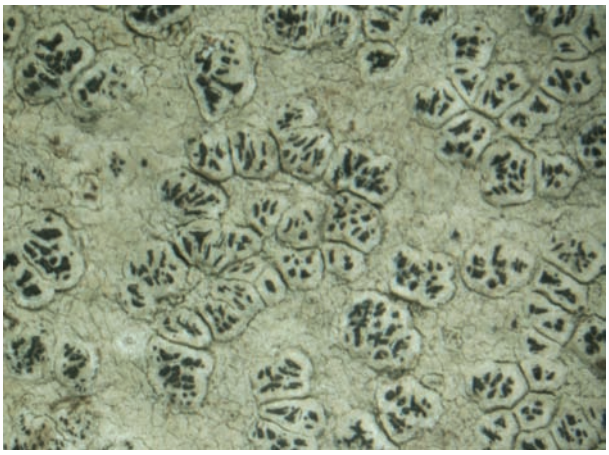
03 field tours were undertaken during which a total of 1541 field nos. of plant specimens were collected. Chemical nature of 1200 specimens was identified by TLC.

Area and locality of the Allotted Project :

c. 1841 sq. km.

Summary of the work done during 2015-16:

During the financial period, a total of 784 specimens were identified into 94 species. Chemistry of 760 specimens were identified by TLC. 1335 Field numbers were mounted. All the identified specimens were incorporated into the herbarium. A total of 54 specimens were consulted during the herbarium consultation tour to BSI, Allahabad.



Chiodecton nortsticticum Jagadeesh

Achievements/ Outcomes in 2015-16:

This study reported 02 species (*Chiodecton norsticticum* Jagadeesh, *Enterographa nicobarica* Jagadeesh: Rocellaceae) as new to science ; 01 species (*Relicina relicinula* (Müll. Arg.) Hale: Parmeliaceae) as new to India and 02 species (*Bulbothrix goebelii* (Zenker) Hale: parmeliaceae, *Stirtonia obvallata* (Stirt.) A.L. Sm.: Arthoniaceae) as new record for state.

3. Project : Flora of Kyd, Pitman & James Islands, South Andaman

Executing Scientists : Dr. Sanjay Mishra, Dr. Vivek C. P. & Shri. Gautam Anuj Ekka

Date of Initiation : April 2015

Date to be completion : March 2018

Background of the Project:

Kyd Island (*c.* 8.0 sq.km.), Pitman Island (*c.*1.27 sq.km.) &

Relicina relicinula (Mull. Arg.) Hale

Lumnitzera littorea J. Voigt

James Island (*c*. 2.10 sq km.), are part of South Andaman and situated northward from Port Blair. These group of Islands are situated between 11° 56' 28" - 11° 59' 20" N Latitude to 92° 43' 34" - 92° 45' 01" E Longitude. These are enriched with diverse plant groups and have not been surveyed so far. Therefore, this project has been proposed to document the floristic wealth of these islands along with conservation of the flora.

Area and locality of the Allotted Project :

Kyd Island (*c*. 8.0 sq.km.), Pitman Island (*c*. 1.27 sq.km.), James Island (*c*. 2.10 sq. km.)

Summary/Progress of the work done during 2015-16:

During this period, 01 plant exploration tour *w.e.f.* 20.1.2016 to 24.1.2016 was undertaken to Kyd, Pitman and James Islands in which a total 155 field numbers were vouchered along with the GPS data. A total of 75 field numbers were identified to 75 species by comparing own descriptions with the descriptions available in literatures and authenticated with the help of type specimens available in Indian as well as foreign herbaria. Plants/seedlings of 20 species were introduced in the Dhanikhari Experimental Garden-cum-Arboretum. Photographs of *c*. 200 plants and habitat were captured.

Achievements/ Outcomes in 2015-16:

During this study, a total of 75 Plant specimens, collected from these Islands were identified along with enumeration of economic importance and conservation status of the taxa. Among the entire collection, 12 species are medicinally known, 05 species are economically important, 06 species are rare and 02 species are endangered.

4. Project : *Ex-situ* conservation of RET species of Andaman & Nicobar Islands at Dhanikhari Experimental Garden-Cum-Arboretum, and identification of unidentified angiosperm specimens in ANRC Herbarium

Executing Scientist : Dr. Sanjay Mishra

Date of Initiation : April 2015

Date to be completion : Ongoing

Background of the Project:

The presence of over 2000 indigenous and 500 non-indigenous species of flowering plants within a land area of 8290 sq. km is a significant feature of Andaman & Nicobar Islands. In recent history, biodiversity of these Islands has suffered due to natural as well as human disturbances. The Botanical Survey of India is maintaining an Experimental Garden-cum-Arboretum at

Dhanikhari, Naya Sahar, an area of *c.* 30 h. 16 km away from Port Blair. This garden is a natural abode of many important endemic plants including orchids, zingibers, canes, rattans, bananas, ferns, etc. Besides the regional centres has a herbarium (PBL), with more than 40000 herbarium specimens from different parts of A & N Islands and also of South-East Asian countries.

Summary/Progress of the work done during 2015-16:

During this period, 01 exploration tour was undertaken to North Andaman *w.e.f.* 14.3.2016 to 20.3.2016 during which seeds/seedlings of 51 RET species and plants of medicinal and economic importance were collected and introduced in the Dhanikhari Experimental Garden-cum-Arboretum. Live plants, collected and introduced in garden, were *Aerides emericii*, *Anoectochilus narasimhanii*, *Dendrobium anceps*, *Dendrobium aphyllum*, *Eria andamanica*, *Papilionanthe teres*, *Aglaia andamanica* , *Flickingeria fimbriata*, *Dendrobium plicatile*, *Oberonia iridifolia*, *Dinochloa scandens*, *Schizostachyum andamanicum*, *Mangifera sylvatica*, *Mesua manii*, *Costus pictus*, *Pinanga manii*, *Garcinia xanthochymus* etc. In addition, 34 unidentified specimens of PBL were identified into nineteen species, *viz. Cyperus diffusus*, *Fimbristylis miliacea* , *Hypolytrum nemorum* , *Cycas zeylanica* , *Eleocharis retroflexa* sub sp. *Chaetaria*, *Cyperus difformis*, *Mallotus peltatus*, *Cyperus tenuispica*, *Pycreus pumilus*, *Cyperus diffusus*, *Ficus nemoralis*, *Neolitsea andamanica*, *Cyperus stoloniferous* etc.

Achievements/ Outcomes in 2015-16:

During 2015-16, seeds/seedlings/of 51 RET species and plants of medicinal and economic importance were collected and introduced in the Dhanikhari Experimental Garden-cum-Arboretum. 34 unidentified specimens of PBL were identified into 19 species. Photographic documentation of the collected plants was done.

Ficus andamanica Corner

Scaevola taccada (Gaertn.) Roxb.

ARID ZONE REGIONAL CENTRE, JODHPUR

1. Project : Flora of Navsari District, Gujarat

Executing Scientists : Dr. Ramesh Kumar & Mr. Vinod Maina

Date of Initiation : June, 2015

Date to be completion : March, 2020

Objective

To document the flora of Navsari District, Gujarat and prepare a pictorial handbook on flora of the district.

Background of the Project:

Navsari district, bounded by Arabian sea in the West, Surat district in North, Tapi and Dang districts in East and Valsad district in South, comprises of 5 talukas and a National Park, *i.e.*, Bansda National Park. The area, due to littoral and swampy vegetation along the coast of Arabian sea and Purna creack of Purna River, is one of the richest region in reference to the plant diversity. The area has four forest types *viz.* tropical moist deciduous, littoral and swamp, tropical dry deciduous and tropical thorn forests. As no flora is available of this region, an attempt has been made to explore to study the flora of Navsari district.

Area and locality of the Allotted Project :

c. 2211 sq.km.

Summary of the work done during 2015-16 :

During this period, 01 field tour *w.e.f.* 15.10.15-03.11.15 to Navsari, Gujarat was conducted during which *c.* 1200 sq. km. area was surveyed and 671 field numbers of specimens were collected from three different habitats including the mixed dry deciduous forest(Bansda National Park); littoral & swamp coastal areas and scrubby waste lands. A total no. of 153 species were identified for the Flora of Navsari District, Gujarat and *c.* 400 photographs were taken.

Butea monosperma (Lam.) Taub.

2. Project : Ethnobotany of Dang District

Executing Scientists : Sri Vinod Maina & Sri Ravi Prasad

Date of Initiation : April, 2012

Date to be completion : March, 2015 (extended till September 2015)

Background of the Project:

This project was started in 2012. During the year 2014-15, 02 field tours were conducted during which 377 field nos. were collected of which 240 field nos. were identified. In addition, 09 RET plants, 35 live individuals of 15 species and seeds of 22 plant species were collected for *ex-situ* conservation in office garden.

Area and locality of the Allotted Project :

Total area 1,764 sq. kms.

Summary of the work done during 2015-16:

During the study, about 100 localities in different forest ranges of north and south Dang, mainly inhabited by Bhil, Kokani, Gamit, Varli and kotwalia tribes were selected. Ethnobotanical information of about 130 plants along with 27 Museum exhibits were collected by interacting with these tribes. Besides, seedlings and propagules of 26 species of ethnobotanical and economic importance, seeds of 22 plant species were also collected. The live plants collected during tours, were introduced in office garden for *ex-situ* conservation. During the study about 230 photographs of plants, plant parts, tribal activities were taken. The gathered information were classified as ethno medicinal, ethno-veterinary, fodder plants, food plants, fish poison, agricultural implements, plants used for hut making, socio-religious and magico-religious believes and documented.

Achievements/ Outcomes in 2015-16:

During this study, seedlings and propagules of 26 species of ethnobotanical and economic importance, seeds of 22 plant species were collected and introduced in our Botanic garden for *ex-situ* conservation.

3. Project : *Ex-situ* conservation of RET and economically important species of the Arid region in the experimental Garden of AZRC and documentation of phenological data.

Executing Scientists : Shri.Vinod Maina, Dr. Ramesh Kumar, Dr. C.S. Purohit, Mr. M.K. Singhadiya, Dr. Harikrishna Peddi & Mr. Ravi Prasad.

Date of Initiation : Ongoing

Objective : Collection of RET and economically important species germplasm, and introduction in the experimental garden for *ex-situ* conservation; Documentation of phenological data of plants growing in Desert Botanic Garden.

Background of the Project:

The experimental Botanic Garden (Desert Botanical Garden) of this centre has been established during 1994 with an area of c. 8 acres. The main objective of the garden for maintenance of arid germplasm collection, growing and multiplication of rare / endangered / threatened plant species of North-western arid regions of India. About 300 species of vascular plants and 4 gymnosperms including of them are rare, endemic and economically plants are conserved in the garden.

Area and locality of the Allotted Project (with Map):

Rajasthan & Gujarat

Summary of the work done during 2015-16 :

During various field tours conducted to Navsari District, Gujarat, Kailana, Arna Jharna and surrounding area, Kailana, Machiya Biological Park, Nandra Kallan, surrounding area and Swami Keshwan and Rajasthan University, Bikaner respectively 109 live plants belonging to 27 RET and Medicinal plants species were collected and introduced in the Desert Botanical Garden. Besides, about 500 photographs were also taken.

Achievements/ Outcomes in 2015-16:

The plants that are introduced in the garden are *Acacia jacqmontii, Ceropegia bulbosa, Commiphora wightii, Corchorus depressus, Depterygium glaucum, Ealeocarpus sphericus, Eclipta prostrata, Jasminum grandiflorum, Jasminum humile, Bambusa vulgaris, Ceiba pentandra, Dendrocalamus strictus, Litchi chinensis, Almanda cathartica, Euphorbia pulcherrima, Adansonia digitata, Alpinia galanga, Alpinia malaccensis, Amomum sericeum, Boesenbergia longiflora*.

4. Project : Flora of Sariksa Tiger Reserve, Alwar District, Rajasthan (*c.* 1281sq. km.)

Executing Scientists : Mr. M.K. Singhadiya & Sri Ravi Prasad

Date of Initiation : April, 2015

Date to be completion : March, 2019

Background of the Project:

Sariska Tiger Reserve, situated (74°14´ to 76° 34´ N and 25° 5´ to 27° 3´ E) in the Aravalli hill range and lies in the semi-arid part of Alwar District, Rajasthan. It was declared as a wild life sanctuary in 1955 and became a Tiger Reserve in 1982. Total area of the Sariska Tiger Reserve is 866 sq. km, of which 302.2 sq. km. is buffer zone and 497.8 sq. km is core zone. Core zone is comprised of three isolated pockets i.e., Core-I (273.8 sq.km), II (126.5 sq.km.) and III (97.5 sq.km). Sariska is undulating to hilly and has numerous narrow valleys, Kiraska and Kankwari plateau and two large lakes Mansarovar and Somsagar. Silisad lake is situated just along the north eastern boundary of the Reserve. The altitude of Sariska varies from 540 to 777 meters. Earlier Sariska was the private hunting grounds of Alwar's Royal family; today only 20% of this vast expanse of jungle is "Tiger Habitat". The Sariska tiger reserve has its own importance and specific characteristics endowed with unique biodiversity. There are a good number of endemic and endangered plants, and also a good number of carnivores and herbivores .

Area and locality of the Allotted Project (with Map):

Sariska Tiger Reserve, Alwar Dt., Rajasthan, *c.* 1281 sq. km

Summary of the work done during 2015-16:

During the period under report, 01 botanical exploration tour *w.e.f.* 05.03.2016 to 20.03.2016 was conducted to Sariska Tiger Reserve and 249 field numbers (814 specimens) of plant were collected. Besides the GPS data and digital photographs of each plant and the field data were also documented during the study. Mounting and processing of the collected specimens are under progress. During this survey, 03 live plants of *Boswellia serrata*, 02 plants of *Ficus elastica* and 5-6 cuttings of *Commiphora wightii* were collected and introduced in the garden.

Achievements/ Outcomes of the Project (2015-16):

During this study, 03 live plants of *Boswellia serrata*, 02 plants of *Ficus elastica* and 5-6 cuttings of *Commiphora wightii* were collected and all the live plants collected during field tour were successfully introduced into Botanic garden of BSI, AZRC.

5. Project : Floral Diversity of Shoolpaneshwer Wildlife Sanctuary, Narmada District, Gujarat (India)

Executing Scientists : Dr. S.L. Meena & Dr. P. Hari Krishna

Date of Initiation : April, 2012

Date to be completion : March, 2017

Gloriosa superba L.

Background of the Project:

This project has been started in 2012. During the year 2014-15, 02 botanical exploration tours were conducted

and collected a total of 209 field nos. of 1254 plant specimens of which 313 field nos. were identified.

Area and locality of the Allotted Project :

Narmada district, Gujarat; *c*. 607.70 sq.km.

Summary of the work done during 2015 -16 :

During the period, 01 botanical exploration tour *w.e.f.* 10.09.2015 to 26.09.2015 was conducted to Shoolpaneshwer Wildlife Sanctuary, Narmada District, Gujarat during which 187 field nos. comprising to 1122 specimens were collected of which 387 Field nos. were identified. Besides, this GPS data and digital photographs of each plant and vegetation types carried out during the exploration and literature collected from Forest Department, Rajpipla and M.S. University, Vadodara (Gujarat). A total of 273 photographs were taken.

Achievements/Outcomes in 2015 -16:

This study reported a new generic record to the Flora of Gujarat State (India): *Heterostemma dalzellii* Hook.f. (Asclepiadaceae). Ethnobotanical information of 57 plant species were collected from the different ethnic groups of the Sanctuary area. 02 plant species, collected from the Shoolpaneshwer Wildlife Sanctuary, were introduced in desert botanic garden at AZRC for *ex-situ* conservation.

6. Project : Flora of Todgarh-Raoli Wildlife Sanctuary, Rajasthan

Executing Scientist : Dr. C. S. Purohit

Date of Initiation : April, 2015

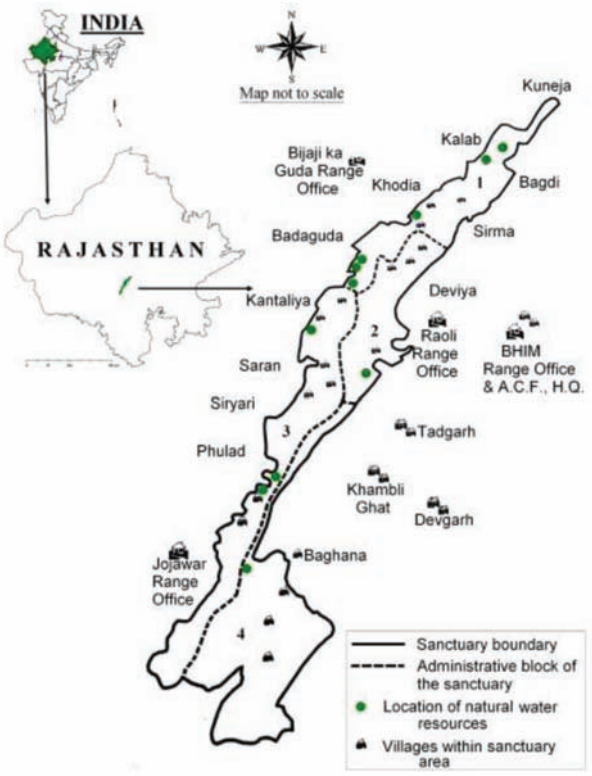
Date to be completion : March, 2020

Background of the Project:

Todgarh-Raoli Wildlife Sanctuary is located in one of the world's oldest mountain ranges, the Aravalli hills, Rajasthan. It is situated in between $73^0 40^I$-$74^0 10^I$ E and $25^0 20^I$-$26^0 00^I$ N encompassing an area of about 495 sq.km.

Opuntia elatior Mill.

The forest tract of the sanctuary is highly undulating with broken hills with elevations ranging from 300 ft to 4000 ft. Hills and hillocks form a network leading to the streams; these, in turn, enter the plains and drain into the bigger streams, which lead to many rivers, ultimately joining the Luni river (Koli, 2014). The floral constituents of the sanctuary are mostly edapho-climatic climax type forests. As per the Champion and Seth (1968) classification, the forests of the sanctuary is tropical dry deciduous type (5B/C2), dominated by *Anogeissus pendula, Anogeissus latifolia, Boswellia serrata, Butea monosperma, Acacia senegal, Acacia nilotica, Acacia catechu, Mitragyna parvifolia, Ziziphus nummularia,* and *Dendrocalamus strictus*. The vegetation cover varies from place to place owing to edaphic and biotic changes. About 50% of the area is Savana and the rest has become degraded, because of excessive biotic interferences. The climate of the study area is characterized by three seasons: summer (March to June), monsoon (July to October), and winter (November to February).



Area and locality of the Allotted Project :

It is situated in between $73^0 40^I$-$74^0 10^I$ E and $25^0 20^I$-$26^0 00^I$ N encompassing an area of about 495 sq.km.

Summary of the work done during 2015 -16 :

During this period, one herbarium consultation tour *w.e.f.* 13.03.16 - 23.03.16 was carried out to RUBL, Department of Botany, University of Rajasthan, Jaipur. Studied and documented 358 herbarium specimens of 107 plant species collected from Ajmer, Pali & Rajsamand. Listed 223 Herbarium sheets of 102 rare species, reported in literature. Identified of 89 plant species including 19 rare species at RUBL, Jaipur. Identified 16 species of plants that were submitted by Gujarat State to MoEF&CC for facilitating notification u/s 38 of the Biological Diversity Act 2002. Herbarium specimens of about 70 families deposited at BSJO were studied and prepared a check list (127 plants in list).

Achievements/Outcomes in 2015-2016 :

This study reported one species (*Diapensia purpurea* Diels) as new to India and three species (*Acrachne racemosa* (Heyne ex Roem. & Schult.) Ohwi; *Digitaria bicornis* (Lam.) Roem. & Schult. ex Loud.; *Poa supina* Schard.) as new to state.

Other works Done in the Regional Center :

Besides, the above allotted project works, the following works were also carried out by the scientists and scientific officials of this regional Centre.

New species described:

Zingiber murlenica Ram. Kumar, Sushil K. Singh & S. Sharma

Zingiber mizoramensis Ram. Kumar, Sushil K. Singh & S. Sharma

New report documented:

Eria merguensis Lindl. : New to India

Cheirostylis griffithii Lindl : New record for Mizoram state.

Aravalii range in Tadgarh-Raoli Wildlife Sanctuary, Rajasthan

ARUNACHAL PRADESH REGIONAL CENTRE, ITANAGAR

1. Project : a)Flora of Pakke Wild Life Sanctuary and Tiger Reserve, East Kameng District

b)Introduction, conservation of germplasm of Musa, Bamboos & Zingibers and documentation of phenology of flowering and fruiting

Executing Scientists : Dr. P. Satyanarayana & Shri B.B. Tham

Date of Initiation : April 2012

Date to be completion : March 2017

Background of the Project:

This project has been started in 2012. During previous year (2014-15), 01 field tour was undertaken during which 149 field nos. of plant specimens were collected. 09 live plants were collected and introduced in garden.

Area and locality of the Allotted Project :

c. 862 sq.km.

Summary of the work done during 2015-16:

During this period, 01 herbarium consultation tour *w.e.f.* 28.08.15 to 18.09.15 to ASSAM Herbarium, BSI, ERC, Shillong was undertaken to study previous collections and identified 229 specimens. Description of 235 species was completed towards the preparation of final manuscript. All the specimens were processed and mounted. In addition, 87 species of live plants collected and introduced in the Botanical Garden. Phenological data of 82 species in the Botanical Garden was recorded along with 60 photographs of plants and habit.

Achievements/ Outcomes of the Project 2015-16:

Identification of 229 species done, description of 235 species was completed and 87 species of live plants was introduced in the Botanical Garden.

2. Project : Taxonomic study of family Polypodiaceae of North East India

Executing Scientist : Dr. Vineet Kumar Rawat

Date of Initiation : April 2012

Date to be completion : March 2017

Background of the Project:

Northeast India, an important region in concern to Pteridophytic diversity, harbours 25 genera of fern and fern allies. No literature on the detailed account of family Polypodiaceae is available. Therefore this project was taken in 2012. During the year (2014-15), 02 field tours were conducted during which 365 field nos. of plant

Lepisorus scolopendrium (Ching) Mehra & Bir

Peranema aspidioides (Blume) Mett.

specimens were collected of which 209 field nos. were identified.

Summary of the work done during 2015-16:

During this period, one field tours to Kurungkumay, Siang and Lower Subansiri Districts *w.e.f.* 18.10.15-02.11.15 and to Meghalaya *w.e.f* 23/01/16 to 2/02/16 were undertaken. During both the tours, 255 field nos. were collected of

which 232 field no were identified. In addition, 01 Herbarium Consultation tour *w.e.f.* 22/12/15 to 22/01/16 to BSI, Allahabad, CNH-Kolkata and BSI- Shillong (ASSAM) was carried out. A total of 100 species was described along with keys *viz*. *Leptochilus decurrens*, *Lemmaphyllum carnosum*, *Lemmaphyllum microphyllum*, *Lemmaphyllum rostratum*, *Lepisorus sordidus*, *Drynaria quercifolia*, *Drynaria propinqua*, *Drynaria delavayi*, *Belvisia henryi*, *Lepisorus scolopendrium*, *Lepisorus macrosphaerus*, *Lepisorus clathratus*, *Lepisorus contortus* etc. Data filled in 260 sheets collected from field tours. Taken 500 digital photographs of ferns specimens housed in different herbaria for further study.

Achievements/ Outcomes of the Project 2015-16:

This study reported 01 new record.

3. Project : Grass flora of Arunachal Pradesh

Executing Scientist : Dr. Manish K. Kandwal

Date of Initiation : April 2012

Date to be completion : March 2017

Background of the Project:

This project was started in 2012. During the year (2014-15), 02 field tours were conducted and collected 307 field nos. of plant specimens. A total of 94 field nos. were identified.

Area and locality of the Allotted Project : Arunachal Pradesh

Summary of the work done during 2015-16:

During this period, 02 field tours *w.e.f.* 22.08.2015 - 13.09.2015 and 18.09. 2015–02.11.2015 in Lohit (Tezu, Namsai, Wakro), Changlang (Jairampur, Nampong), Tirap (Khonsa) & Zero and to Kurung kumay (Kolriang, Sartali, khili etc.) districts of Arunachal Pradesh respectively were conducted. A total of 270 field numbers were collected of which 130 field no. were identified and 35 species were described. About 80 photographs were taken. In addition, 01 herbarium consultation tour was undertaken to CAL and ASSAM and a total of 130 specimens were studied.

Achievements/Outcomes in 2015-16:

This study reported 03 genus (*Stipa* L., *Trisetum* Pers. & *Polytoca* R.Br.) as new record for the state and 02 species (*Hierochloe monticola* Mez & *Arundinaria faberi* Rendle) as new to India.

4. Project : Flora of East Kameng District, Arunachal Pradesh

Executing Scientist : Dr. Umesh Kumar L. Tiwari

Date of Initiation : April 2016

Date to be completion : March 2019

Luculia grandifolia Ghose

Background of the Project:

East Kameng district is situated in the Western flank of Arunachal Pradesh surrounded by West Kameng in the west, Papumpare in the East, part of Kurung Kumey and Macmohan (International Boundary) line in the North and Sonitpur District of Assam in the South, covering an area of 4134 sq. km. The entire district, barring a small area on the southernmost tip of Assam, is mountainous with deep gorges and narrow valleys. The district, an extension part of the North eastward Himalayan range, lies between 92° 36" E to 93° 24" E longitudes and 26° 56" to 27° 59" latitudes. The District Headquarter, Seppa lies on the bank of River Kameng. The flora of the district is diverse and interesting. The present poject was undertaken to study the floral diversity of the district.

Area and locality of the Allotted project :

c. 4134 sq.km.

Summary of progress of the work done in 2015-16:

During the period, 01 field tour to East kameng district was conducted in which 272 field no. of 900 plant

specimens were collected of which 47 species were identified and described. Preparation of a master checklist of 29 families, 100 genera and 338 taxa for East Kameng district is under process. During the period, plants collected by previous workers and lodged in ARUN were also studied; out of which 28 species under 71 accession numbers. were identified and incorporated. A total of 57 field numbers of plant specimens collected under NHPC project were identified into 19 species.

5. Project : Red Listing of Orchids of Arunachal Pradesh as per IUCN criteria

Executing Scientist : Dr. Krishna Chowlu

Date of Initiation : April 2015

Date to be completion : March 2019

Background of the Project :

The Orchidaceae is one of the largest families of flowering plants with about 1300 taxa, of which nearly 400 taxa are endemic to India which is very diverse and widespread, with blooms that are often colourful and fragrant. The entire Orchidaceae family has been regulated through different legislations for its conservation irrespective of the quantum of threat associated with individual species. The assigned threat level is not evaluated as per a widely accepted system and not based on the best scientific data available on their taxonomy, population size, threat factors and rate of population decline, range of distribution etc. The varied climatic conditions of Arunachal Pradesh harbours more than 600 orchids.

Area and locality of the Allotted Project :

c. 83,743 sq.km.

Summary of work done during 2015-2016:

Two field tours were conducted in Arunachal Pradesh and 90 field numbers were collected and processed. The species that were collected *Dendrobium aphyllum*, *Dendrobium transperns*, *Papilionanthe teres, Aerides rosea, Rhynchostylis retusa, Eria lasiopetala, Cymbidium aloifolium* etc. 48 specimens were incorporated in the herbarium. Germplasm of 90 field numbers has been introduced in the campus for further studies and *ex-situ* conservation. The species that are introduced in that garden are *Phaius walliichii, Coelogynne ovalis, Acampe papillisa, Pholidota imbricata, Bulbophyllum gamblei, Dendrobium nobile, Eria stricta, Eria acervata* etc. 09 taxa were documented through digital, macro-microscopic photo-plates Specimens (kept in Three herbaria at ARUN, SFRI, Itanagar and ORC, Tipi) were studied and confirmed identity of 57 specimens. Label data, assigning geo-coordinates of all these were incorporated in excel sheet for plotting of map. Seven species such as *Dendrobium aphyllum*, *Arundina graminifolia*, *Dienia ophrydis*, *Cymbidium bicolor*, *Dendrobium nobile* were fully worked out taxonomically.

Epigenium amplum (Lindley) Summerhayes

Oxyspora paniculata (D. Don) DC.

Achievements/ Outcomes of the Project 2015-16:

During the period, 90 species were collected during different field trips, 57 species were identified and introduced in campus of APRC, BSI.

6. Project : Flora of Lohit District and Flora of Kamlang Wildlife Sanctuary, Arunachal Pradesh

Executing Scientist : Dr. Souravjyoti Borah

Date of Initiation : March 2013

Date to be completion : April 2017

Background of the project :

This project was initiated in 2013. During previous year (2014-15), 02 field tours were conducted and 488 field nos. were collected of which 268 species were identified. 01 herbarium consultation tour was carried out and 163 field nos. were identified.

Area and locality of the Allotted Project :

c. 5,212 sq. km.

Summary/ Progress of the work done in 2015-2016:

During this period, 01 herbarium consultation tour *w.e.f* 19.01.2016 to 05.02.2016 to ASSAM, BSI-ERC, Shillong was undertaken in which 178 field no. were identified. A total of 208 herbarium sheets, collected from Lohit district, Assam were studied and 194 species were described along with nomenclature update of 275 species. Re-poisoning of 75 herbarium sheets were done.

Achievements/ Outcomes in 2015-16:

The present study reported 04 species (*Impatiens lohitensis* Gogoi & Borah, *Musa markkui* Gogoi & Borah, *Colocasia boyceana* Gogoi & Borah, *Musa argentii* Gogoi & Borah as new to science and 04 species (*Impatiens siculifer* Hook.f., *Tricarpelema chinensis* Hong, *Impatiens toppinii* Dunn, *Colocasia lihengiae* C.L.Long & K.M.Liu) as new to India. 03 taxa (*Impatiens laevigata var. grandifolia* Hook.f., *Musa cheesmanii* N. W. Simmonds, *Musa flaviflora* N. W. Simmonds) were rediscovered after 100 years and 01 taxon after 50 years.

View of Glow Lake

CENTRAL BOTANICAL LABORATORY, HOWRAH

1. Project : Pharmacognostic studies on Medicinal Aconites of India

Executing Scientist : Dr. A.B.D. Selvam

Date of Initiation : August, 2010

Date to be completion : March, 2016

Background of the Project:

This project was taken up to study Indian medicinal Aconites exhaustively on pharmacognostic aspects. The genus *Aconitum* has been included in the Negative list of Exports, which bans trade/export of Aconites from wild collections.

Area and locality of the Allotted Project (with Map):

Alpine and sub-alpine regions of Himalayas (Eastern and Western Himalayas)

Summary of the work done during 2015-16:

During this study, 02 field tours *w.e.f.* 03.07.15 to 21.07.15 to different parts of Jammu & Kashmir and Himachal Pradesh and 07.09.15 to 18.09.15 to different parts of Nagaland (Dzukou Valley) & Darjeeling district of West Bengal (Singalila National Park) were conducted in which a total of 10 field no. belonging to 08 species of *Aconitum* were collected. 45 photographs were taken during field survey. 01 Herbarium consultation tour *w.e.f.* 15.11.15 to 19.11.15 was also undertaken to National Botanical Research Institute (NBRI), Lucknow and herbarium of Crude Drug Museum & Library was consulted. Organoleptic, Anatomical, SEM and Powder microscopic studies on the roots of 05 species of *Aconitum* were completed along with preparation of 95 photographic plates. Pharmacognostic study and authentication of 22 crude drug samples, including CITES and Negative Listed Plants, received from Government departments, research institutions and individuals were completed and revenue earned of Rs. 11,000/- for the Department. Preliminary Pharmacognostic studies on 28 wood samples, received from Government institutions, was carried out. The final Manuscript of the AAP project titled, 'Pharmacognosy of Indian Aconites' was prepared and submitted to Director, BSI.

Achievements/ Outcomes in 2015-16:

During this study, 05 species were documented. The final Manuscript of the AAP project titled, 'Pharmacognosy of Indian Aconites' was prepared and submitted to Director, BSI.

2. Project : Ethnobotany of Nuapada District, Odisha

Executing Scientists : Dr. Harish Singh, Sri R. Saravanan & Dr. P. A. Dhole

Date of Initiation : April, 2015

Date to be completion : March, 2017

Background of the Project: New project

Area and locality of allotted Project (with Map):

1700 sq.km.

Summary/ Progress of the work done in 2015-2016:

During this period, a total of 178 field numbers of specimens were collected with a total of 215 ethnobotanical information (Medicine-122, edible-23, timber- 11, fodder- 13, gum & resin- 06, socio-religious-08; miscellaneous-32). More than 320 good quality digital photographs were taken and GPS data observed and noted for 22 localities in study area.07 ethnobotanical exhibits were procured to incorporate in CBL museum.

Achievements / Outcomes of the Project (2015-2016):

The project initiated in 2015 only.

3. Project : Ethnobotany of Malkangiri District, Odisha

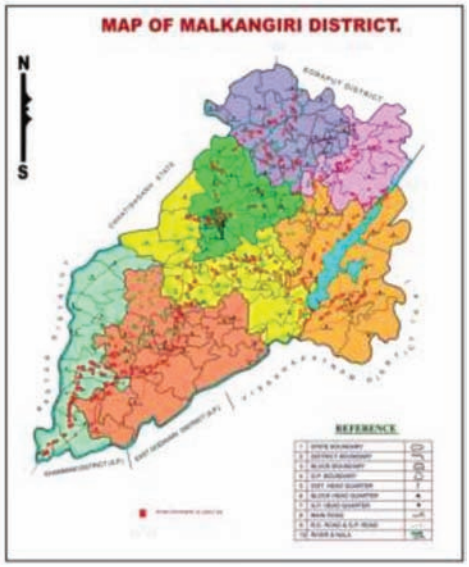
Executing Scientists : Dr. K. A. Sujana , Dr. Monika Mishra & Dr. P. A. Dhole

Date of Initiation : April 2015

Date to be completion : Mach 2017

Background of the Project:

New project



Area and locality of the Allotted Project (with Map):

Malkangiri District of Odisha, *c*. 4823 sq. km.

Summary/Progress of the work done in 2015-16:

During this period, an ethnobotanical field survey, *w.e.f.* 15-07-15 to 02-08-15 to Malkangiri District was conducted in which a total of 383 field nos. of ethnobotanically interested species was collected along with 515 ethnobotanical uses and 309 plant specimens were identified. All the collected materials were processed. GPS data, details of field numbers collected, field data and identity were documented in prescribed format (MS Excel).

4. Project : Flora and Ethnobotany of Balasore District, Odisha

Executing Scientists : Dr. K. A. Sujana, Sri R. Saravanan & Dr. Monika Mishra

Date of Initiation : April, 2013

Date to be completion : March, 2016

Background of the Project:

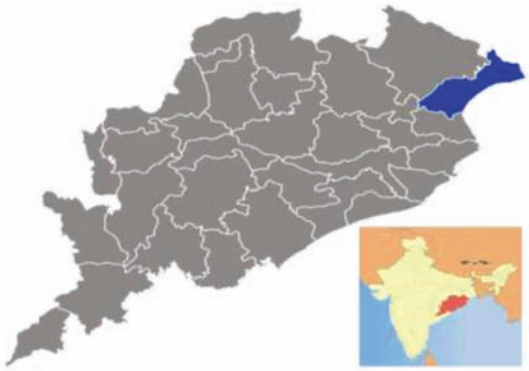
The project aims to survey the floristic wealth and to document the ethnobotanical uses of Balasore district, Odisha. Approximately 3706 sq. km. area of the district was surveyed for floristic analysis and documentation of ethnobotanical data, 1327 field numbers were collected, and 475 ethnobotanical uses were recorded.

Area and locality of the Allotted Project (with Map):

c. 3706 sq.km.

Summary/Progress of the work done in 2015-2016:

During this period, 01 field tour was conducted to the



Balasore district in which 55 specimens were collected along with 146 ethnobotanical information. A Herbarium consultation tour was conducted to RPRC, IMMT, Odisha in which 46 specimens were identified and total of 14 ethnobotanical information were noted from herbarium and library. A total of 126 plants were identified during the period of report. A draft of final report was prepared with description of 812 taxa with 540 ethnobotanical uses. 230 herbarium sheets were arranged according to family.

Achievements/Outcomes of the Project (2015-2016):

During this study, 449 field numbers were collected with 140 ethnobotanical uses; 415 plant specimens were identified. 02 species (*Gymnema montanum* and *Dysoxylum gotadhora*) were recorded first time from Odisha state. A sapling of an endangered and threatened liana, *Uvaria eucincta* was procured and planted in garden.

5. Project : Cytological investigation of some selected Angiosperms of AJC Bose Indian Botanic Garden, Howrah

Executing Scientists : Dr. Ashutosh Kumar Verma & Dr. Monika Mishra

Date of Initiation : April, 2015

Date to be completion : March, 2018

Background of the Project :

New project

Area and locality of the Allotted Project:

AJC Bose Indian Botanic Garden, Howrah, 273 acres.

Summary / progress of the work done in 2015-2016:

During this period, total 09 species were worked out and chromosomal count were done for all the species [*Solanum diphyllum* (Solonaceae) 2n=24; *Crotalaria spectabilis* (Fabaceae) 2n=16; *Abrus precatorious* (Fabaceae) 2n=22; *Gloriosa superba* (Colchicaceae) 2n=22; *Rungia*

pectinata (Acanthaceae) 2n=18; *Plantago ovata* Forsk. (2n=8); *Plantago lanceolata* (2n=12); *Plantago arenaria* (2n=12); *Plantago psyllium* (2n=12)]. 20 herbarium specimens were poisoned, mounted and labeled.

Achievements / Outcomes of the Project:

During this study, new chromosome count for *Rungia pectinata* was observed that justifies speciation and evolution of particular species.

6. Project : Ethnobotanical study of Nayagarh District

Executing Scientists : Sri A.C. Halder, Sri P.K. Baske, Dr. P.A. Dhole & Sri Somnath Gangully

Date of Initiation : April, 2015

Date to be completion : March, 2017

Background of the Project:

New project

Area and locality of the Allotted Project (with Map):

Nayagarh distric tof Odisha, 1900 sq. km.

Summary/ progress of the work done in 2015-2016:

During this period, 181 no. of ethnobotanically interested species were collected in duplicate, prepared a brief report mentioning 216 ethno botanical uses of which 126 are as medicinal, 54 as food, 04 as veterinary medicine, 03 as tooth brush, 02 as insect repellant, 03 as dye making, 03 as rope making, 03 as plate making, 02 as country liquor and 16 in other purposes and submitted. All the specimens were dried, poisoned, mounted, stitched, pasted label on herbarium sheets and documented information from field book to Herbarium label. GPS was used and recorded data of location of different places. About 200 photographs of different plant specimens and tribal habitation were taken by Digital camera. A total of 169 ethno botanically important specimens were identified.

7. Project : Ethnobotanical study of Boudh District

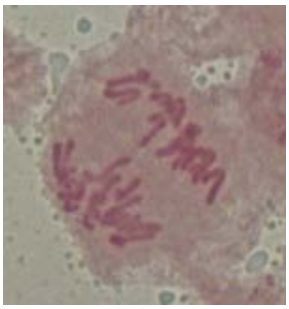
Executing Scientists : Sri A.C. Halder, Sri P.K. Baske, Dr. Monika Mishra & Sri Somnath Ganguly

Date of Initiation : April, 2015

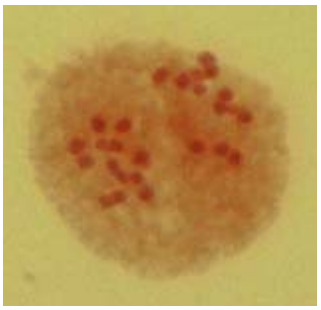
Date to be completion : March, 2017

Background of the Project:

New project



Mitotic cell showing anaphase stage of cell division in *Clitoria ternatea*



Pollen mother cell showing normal sagregation of chroosomes at anaphase I in *Tiliacora racemosa*

Area and locality of the Allotted Project (with Map):

Boudh District, *c*. 1600 sq. km.

Summary/Progress of the work done in 2015-2016:

During this period, 162 nos. of ethnobotanically interested species were collected in duplicate, all the specimens were dried, poisoned, mounted, stitched and pasted label on herbarium sheets. A total of 211 ethnobotanical uses was recorded of which 161 are as medicinal, 32 as food, 01 as veterinary medicine, 02 as tooth brush, 02 as Basket making, 02 as rope making, 01 as country liquor and 10 in other purposes. Some of these specimens were dried properly and poisoned. GPS data of location of different places was recorded along with 200 photographs of different plant specimens and tribal habitation.

Flacourtia montana J. Graham

CENTRAL NATIONAL HERBARIUM, HOWRAH

1. Project : Flora of Seshachalam Biosphere reserve, Andhra Pradesh

Executing Scientists : P. V. Prasanna, S. Nagaraju S. & M. Sankara Rao

Date of Initiation : April 2012

Date to be completion : March 2017

Background of the Project:

This project has been started in 2012. During the previous year (2015-16), 04 field tours were conducted during which 329 field nos. were collected along with 150 good photographs. A good no. of RET plant species were collected from study area.

Area and locality of the Allotted Project (with Map):

c. 4755.99 sq. km.

Summary of the work done during 2015-16 :

During this period, 03 field tours *w.e.f.* 25.07.2015 to 01.08.2015; 05.01.2016 to 12.01.2016 and 07.03.2016 to 15.03.2016 were undertaken to the study area in which 211 field numbers were collected of which 185 species were documented along with updation nomenclature. Identification of 73 species, collected in previous period, was completed.

Achievements/ Outcomes in 2015-16:

This study reported 02 species (*Euphorbia seshachalamensis*, *Brachystelma annamacharyae*) as new to science and 01 new distributional record (*Glochidion zeylanicum* var. *arborescens*) for South India.

Euphorbia seshachalamensis K. Prasad & Prasanna

Glochidion arborescens Blume

2. Project : Revision of the genus *Fimbristylis* of family Cyperaceae under Flora of India

Executing Scientist : Dr. V.P. Prasad

Date of Initiation : April, 2013

Date to be completion : March, 2017

Background of the Project :

This project has been started in 2013. During previous year (2014-15), 01 field tour was conducted during which 460 plant specimens under 151 field nos. were collected. In addition, 01 herbarium consultation tour was undertaken during which 270 plant specimens belongs to 56 species were examined.

Area and locality of the Allotted Project :

In Indian context.

Summary of the work done during 2015-16 :

During 2015-16, 01 field tour to Ponmudi, *c.* 1000 m high hilltop, Coal Paddy fields and certain coastal areas of Trichur district was conducted in which 25 field numbers of Cyperaceae specimens were collected along with 10 photographs of which 10 field numbers were identified. In addition 80 field no., collected by fellow scientists and staffs of CNH and students, were also identified. Taxonomic description of 17 species was completed along with incorporation of distribution data of 23 species. Identity of 71 herbarium specimens of *Fimbristylis*, housed in CAL, was completed. During this period, 01 herbarium consultation tour was also undertaken to MH, Coimbatore; CALI, Kozhikode and KFRI, Peechi in which identity of all the available specimens of *Fimbristylis* were checked and the label data of representative specimens for each district was recorded in excel-sheet and a database of about 674 specimens was prepared along with state-wise distribution of other members of Cyperaceae (155 species).

Achievements/ Outcomes in 2015-16:

This study reported 01 subspecies (*Cyperus conglomeratus* subsp. *curvulus* (Boeckeler) Kukkonen) as new to India; 01 new record for Eastern India and Central India and 01 new generic record for Kerala. This study also reported the most important collection *viz. Fimbristylis narayanii* C.E.C. Fisch. and *Cyperus cephalotes* – a floating species.

3. Project : Flora of Vikramshila Gangetic Dolphin Wildlife Sanctuary, Bihar

Executing Scientist : Dr. O.N. Maurya

Date of Initiation : April 2012

Date to be completion : March 2016

Background of the Project:

This project has been started in 2012. During previous year (2014-15), 02 field tours were conducted and 126 field nos. of plant specimens were collected of which 55 specimens were identified.

Area and locality of the Allotted Project (with Map):

c. 60 sq. km.

Summary of the work done during 2015-16 :

During this period, 01 field tour *w.e.f.* 16.09.2015 to 23.09.2015 was conducted in which 47 field nos. were collected along with G.P.S. data and 118 field photo. A total of 26 field nos. were identified and description of 49 taxa were completed. Out of the total 353 field numbers, 255 field numbers were identified.

Achievements/ Outcomes in 2015-16:

This study reported 07 taxa [*Bromelia penguin* L. (Bromeliaceae) ; Six algal taxa, e.g. *Aphanocapsa incerta* (Lemmerm.) Cornberg & Komárek, *Chroococcopsis epiphytica* Geitler, *Cosmarium ornatum* Ralfs ex Ralfs, *Euastrum verrucosum* Ehrenb. ex Ralfs var. *reductum* Nordst., *Navicula parietina* Kütz. and *Entomoneis alata* (Ehrenb.) Ehrenb] as new to India.

4. Project : Editing of Flora of West Bengal (Monocots.)

Executing Scientists : P. Lakshminarasimhan, V. P. Prasad & V. Sampath Kumar

Date of Initiation : 2014-15

Date of completion : 2016-17 (if manuscripts are available)

Summary of the work done during 2015-16:

During 2015-2016, species of the families Butomaceae, Najadaceae, Potamogetonaceae and Ruppiaceae was listed by referring various literatures. 15 species of the families mentioned above are studied and the manuscript prepared in the prescribed format. Besides, in connection with editing of the Flora of West Bengal (Monocots.), the manuscripts of the families Amaryllidaceae and Zingiberaceae were handed over to the family experts for updating as the manuscript was submitted more than a decade ago and the literature survey indicates that few species needs to be incorporated and many species have undergone a nomenclatural change. An exhausting listing of all the families of monocots of West Bengal along with the species were done with the available literature.

5. Project : Study of *Impatiens* L. of Arunachal Pradesh

Executing Scientist : Dr. Rajib Gogoi

Date of Initiation : April, 2013

Date to be completion : March, 2017

Background of the Project:

This project has been started in 2013. During the previous year (2014-15), 02 field tours were undertaken during which 12 species of *Impatiens* were collected.

Area and locality of the Allotted Project (with Map):

Arunachal Pradesh.

Summary of the work done during 2015-16:

During this period, 01 herbarium consultation tour *w.e.f.* 14.03.2016-21.03.2016 to BSI, Sikkim (BSHC) Herbarium was conducted in which 270 specimens of *Impatiens* was studied and identification confirmed to 24 species. A total of 03 species *Impatiens parkinsonii* C.E.C. Fisch, *I. arguta* Hook. f., *I. stenantha* Hook. f. were identified and 13 species were documented along with incorporation of 26 species in CAL, ASSAM and ARUN.

Achievements/ Outcomes in 2015-16:

This study reported 04 species *Impatiens adamowskiana* Gogoi & Borah, *Impatiens pathakiana* Gogoi & Borah, *Impatiens dalaiensis* Gogoi & Borah, *Impatiens ashihoi* Gogoi & Borah as new to Science; 01 species *Impatiens parkinsonii* C.E.C. Fisch. as new to India and 02 species *Impatiens parkinsonii* C.E.C. Fisch., *Impatiens khasiana* Hook.f. were rediscovered.

6. Project : Taxonomic Revision of Poaceae: Bambusoideae in India

Executing Scientist : Dr. Pushpa Kumari

Date of Initiation : April, 2014

Date to be completion : March, 2017

Background of the Project:

This project has been started in 2014. During previous year, 04 field tours were conducted during which 18 species of bamboos were collected for *ex-situ* conservation in AJCBIBG.

Summary of the work done during 2015-16:

During this period, 04 field exploration tours were conducted in different localities of Arunachal Pradesh, Assam, Sikkim, Kerala and Andaman & Nicobar Islands in which more than 50 samples of bamboo species were collected for study. A total no. of 60 specimens were identified from a total of 60 field no. collected. Flowering in bamboos, being a rare and taxonomically very important phenomenon, is being taken special attention and during the field surveys, 12 species of bamboos were collected in flowering/ and fruiting and dissected parts were illustrated. Types available in Indian and foreign herbaria were consulted along with initiation of typification of good number of species. Type localities of some very little known species were visited and also some of the newly described species (*Bambusa pseudopallida, Bambusa mastersii, Bambusa manipureana, Cephalostachyum fucshianum, Dendrocalamus sahnii, Dendrocalamus manipureanus*) were collected. A total of 40 bamboo species were identified and documented with the field details and GPS data. About 400 herbarium sheets were mounted and the field data were entered for incorporation in the general herbarium.

Achievements/ Outcomes in 2015-16:

During this study, samples of 12 species of bamboos were collected which were not collected previously. Leaf samples of *c.* 45 species were studied under Scanning Electron Microscope for search of additional identifying features. Various uses and the vernacular names of different species were noted with the help of local people. Rare, Endangered and Economically important plants (*Melocalamus gracilis* R.B. Majumdar, was collected partly in vegetative from the type locality from Assam; *Schizostachyum seshagirianum* R.B. Majumdar was collected from type locality as well other localities to map the distributional range).

7. Project : Bamboos of India: *Ex-situ* conservation

Executing Scientist : Dr. Pushpa Kumari

Date of Initiation : April, 2012

Date to be completion : March, 2017

Background of the Project:

This project has been started in 2012. During previous year (2014-15), 02 field tours were conducted and 10 Bamboo species were introduced in the garden.

Area and locality of the Allotted Project :

NE States, Western Ghats, Andaman & Nicobar Islands.

Summary of the work done during 2015-16 :

During 2015-2016, different bamboo species were introduced through offshoots and by cuttings or seeds and seedlings. Seeds and seedlings were raised on nursery beds or polyethylene bags , when grown up were transplanted into natural condition. Whenever, the offshoots were collected; three to four offshoots or established clumps were planted in groups. During this period, more than 10 species were collected for introduction in the garden from different tours to North eastern Parts of India particularly from Arunachal Pradesh, Assam, Sikkim (*Ampelocalamus patellaris, Dendrocalamus sahnii* etc]; from South India, Kerala (*Ochlandra scriptoria, Guadua angustifolia*) and Andaman & Nicobar Islands (*Dinochloa andamanica, Gigantochloa andamanica)*. A total of 05 species (*Bambusa polymorpha, Bambusa tulda* var. *gamblei*, and *Melocanna clarkei*) were planted in the Bambusetum.

Achievements/ Outcomes in 2015-16:

During this study, a rare bamboo species *Schizostachyum kurzii* was collected from Andaman Islands for macro-propagation and is being tried for multiplication. Fruits of *Melocalamus compactoflorus* were germinated and 10 seedlings were raised, which are kept in nursery for acclimatization. Similarly seeds of *Ampelocalamus patellaris* were sown and less than 40% mortality rate was observed.

8. Project : Survey and Assessment of Growing Stock of Economic Bamboos of West Bengal

Executing Scientist : Dr. Pushpa Kumari

Date of Initiation : April, 2014

Date to be completion : March, 2017

Background of the Project:

This project has been started in 2014. During previous year (2014-15), 02 field tours were conducted to 24 Parganas and Hooghly Districts.

Area and locality of the Allotted Project :

West Bengal.

Summary of the work done during 2015-16 :

During 2015-2016, 01 field trip to Pathar Pratima (South 24 Parganas) was conducted in which 09 field numbers were collected of which 06 species were identified and documented.

Achievements/ Outcomes in 2015-16:

This study reported rare event of flowering in *Bambusa balcooa*, the only species which is used commercially and the main use of the species is in scaffolding and constructions, and collected in sporadic flowering.

9. Project : Flora of Gautam Buddha Wildlife Sanctuary, Bihar & Jharkhand

Executing Scientists : Dr. P. Venu & Anand Kumar

Date of Initiation : April, 2012

Date to be completion : March, 2016

Background of the Project:

This project has been started in 2012. During previous year (2014-15), 02 field tours were conducted during which 404 field nos. of plant specimens were collected and 148 species were identified.

Area and locality of the Allotted Project (with Map):

c. 259.5 sq. km.

Summary of the work done during 2015-16 :

During 2015-2016, 01 field tour *w.e.f.* 19.07.15-30.07.15 was undertaken to Gautam Buddha Wildlife Sanctuary, Bihar & Jharkhand in which 100 field nos. were collected along with 400 photographs. A total of 130 species, collected from the Sanctuary, were enumerated.

Achievements/ Outcomes in 2015-16:

This study reported 01 (*Jatropha nana* Dalzell & A.Gibson) new record for the state. *Jatropha nana* Dalzell & A.Gibson, IUCN Red Listed plant, was collected and *ex-situ* conservation initiated.

10. Project : Flora of Bihar, Volume II (Rosaceae-Convolvulaceae, 51 families & c. 773 species) & of Jharkhand, Volume II (Rosaceae-Convolvulaceae, 51 families & c. 773 species)

Executing Scientists : Dr. Vinay Ranjan, Dr. R.Gogoi, Dr. A. Bhattacharjee, Dr. K.A. Bharti, Sri Prabal Baske, Shri P.P. Ghosal, Shri Anand Kumar, Sri Anant Kumar, Sri Gopal Krishna, Shri Shyam Biswa, Sri S. Sachan, Sri V.K.Masatkar

Date of Initiation : April 2014

Date to be completion : March 2017

Background of the Project:

Compilation of flora of Bihar

Area and locality of the Allotted Project : Bihar

Summary of the work done and Achievements/ Outcomes during 2015-16 :

During 2015-2016, 02 field tours *w.e.f.* 16.12.15-02.01.16 and 24.03.16-31.03.16 were undertaken to Kaimur, Rohtas, Nalanda district and Nawada , Aurangabad district respectively in which a total of 419 field no. were collected along with 650 field photographs. A total of 135 field no. were identified and 103 taxa were documented.

11. Project : Flora of Bihar, Volume III (Cuscutaceae-Ceratophyllaceae, 33 families & *c.* 674 sp.) & Flora of Jharkhand, Volume III (Cuscutaceae-Ceratophyllaceae, 33 families & *c.* 674 sp.)

Executing Scientists : Dr. V. Sampath Kumar, Dr. K. Karthigeyan, Dr. (Ms.)Pushpa Kumari, Dr. O.N.Maurya, Dr. S. Bandopadhyay, Dr. Mahua Pal

Date of Initiation : April 2015

Date to be completion : March 2018

Background of the Project:

Compilation of flora of Bihar & Jharkhand.

Area and locality of the Allotted Project: Bihar

Summary of the work done and Achievements/ Outcomesduring 2015-16 :

During 2015-2016, herbarium specimens, deposited in CAL, were consulted for study of the family Acanthaceae. Description of 20 species were completed along with submission of the final manuscript of the family Solanaceae (*c.* 39 sp.).

Other works done other than AAP Project:

During this year Scientists of this regional centre also reported the followings:

- 01 species (*Amitostigma pathakianum* Av. Bhattacharjee) as new to science;
- 03 species (*Eria merguensis* Lindl.(Orchidaceae); *Ixora longibracteata* Bremek. (Rubiaceae) and *Memecylon cerasiforme kurg* (Melastomataceae) reported new to India. The genus *Gynostemma* Blume

(based on *G. pentaphyllum* (Thunb.) Makino) and *Crotalaria paniculata* Willd. were reported first time from Kerala;

- 02 new names (*Teucrium heyneii* V.S. Kumar & Chakrab. and *Gentianella burkillii* Karthik. & V.S. Kumar) and 06 new combinations (*Campylospermum barberi* (Manickam & Murugan) Karthik. & V.S. Kumar, *Elatostema macroceras* (Gagnep.) Karthik. & V.S. Kumar, *Elatostema procridifolium* (Kurz) Karthik. & V.S. Kumar, *Limnophila limnophiloides* (Blatt. & Hallb.) Karthik. & V.S. Kumar and *Rubus irritans* var. *subinermis* (Hook.f.) Karthik. & V.S. Kumar) were proposed and published.
- A variety of *Crotalaria paniculata* Willd. was raised to the specific level and published new combination as *C. nagarjunagondensis* (Thoth.) V.S. Kumar.
- 05 names were lectotypified in *Carex* L. *and* 01 in *Teucrium* L.
- 01 new record (*Cheirostylis griffithii* Lindl. Orchidaceae for Mizoram) for state.
- 04 species (*Ficus concinna* (Miq.) Miq. (Moraceae), *Cyclea barbata* Miers. (Menispermaceae), *Lindenbergia philippensis* (Cham. & Schltdl.) Benth. (Scrophulariaceae) and *Glycosmis cymosa* (Kurz) V. Naray. (Rutaceae) as new record for the West Bengal.

Rivina humilis L.

CENTRAL REGIONAL CENTRE, ALLAHABAD

1. Project : Lichens of Rajasthan and Kutch, Gujarat

Executing Scientist : Dr. G. P. Sinha

Date of Initiation : April, 2012

Date to be completion : March, 2017

Background of the Project:

This project has been started in 2012. During the previous year (2014-15) 01 field tour was conducted during which 128 field nos. of lichen specimens were collected of which 53 species were identified.

Area and locality of the Allotted Project (with Map):

Summary/Progress of the work done in 2015-2016:

During this period, 01 field tour *w.e.f.* 28. 12. 2015 to 15. 01. 2016 to various localities of Jaipur, Sikar, Junjhunun, Jodhpur, Nagaur, Barmer, Jaisalmer and Bikaner districts was conducted in which 75 Field numbers of lichens (10137 to 10212) were collected of which 69 specimens were identified into 22 species. Taxonomic description of 15 species was completed along with 150 photographs taken. The specimens were dried, processed and mounted into suitable herbarium packets. 170 specimens were incorporated in the Herbarium.

Sarcographa heterocilta-Pushpi Singh

Sarcographa heterocilta-Pushpi Singh

Achievements / Outcomes in 2015-16:

This study reported 03 species as new records for India and 30 new records for the lichen flora of Rajasthan and Gujarat.

2. Project : Floristic Diversity of Upper Ganga Ramsar Site, Uttar Pradesh

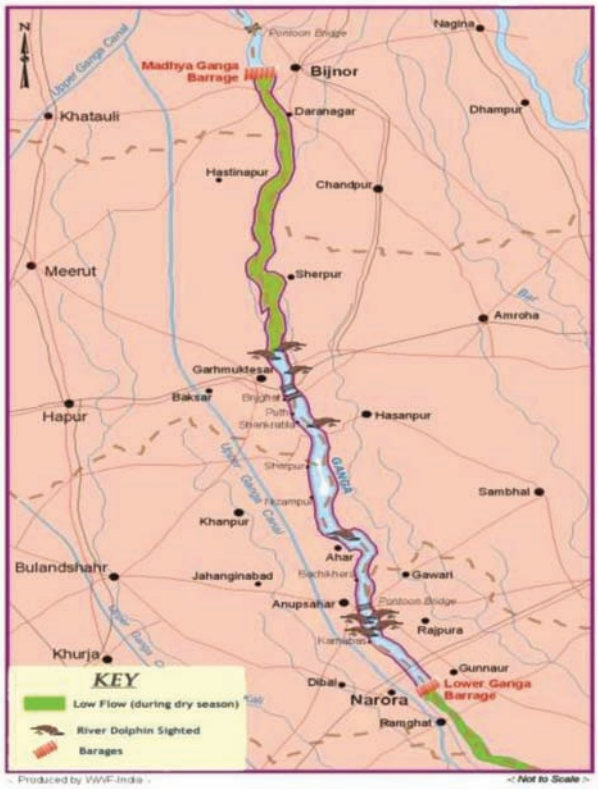
Executing Scientist : Dr. Arti Garg

Date of Initiation : April, 2012

Date to be completion : March, 2016

Background of the Project:

The Upper Ganga region, extending from Brij Ghat in



Map of Upper Ganga River

district Ghaziabad to Narora in Bulandshahr, was declared as a Ramsar Site on 8th November 2005. The site, spreads in an expanse of 85 km stretch of Upper Ganga river in Uttar Pradesh, with an area of 26,590 ha. area. The peripheral plains of the river cover 167 km and is beset with numerous wetlands. The river stretch of 85 km flows through four districts Ghaziabad, Moradabad, Bulandshahr and Badayun. The Upper Ganga Ramsar site is the only riverine Ramsar site of our country and hence holds added significance in terms of floristic diversity.

Area and locality of the Allotted Project (with Map):

c. 26,590 ha. area

Summary/Progress of the work done in 2015-2016:

During this period, 01 field tour *w.e.f.* 15.2.16 to 23.2.16 was conducted to the UGRS region during which 111 field numbers were collected of which 74 species were identified along with about 350 photographs were taken. 01 herbarium Consultation tour *w.e.f.* 17.04.15 to 01.05.15 was conducted to CNH, Howrah during which 11 specimens were identified into 09 species.

Achievements/ Outcomes of the project (2015-16):

This study reported 02 new records [*Emilia javanica* (Burm.f) C. B. Rob. and *Inula falconeri* Hook.f. (Asteraceae)] for Uttar Pradesh.

3. Project : Flora of Chhattisgarh, Vol.- I

Executing Scientists : Dr. A. N. Shukla & Dr. A.P. Tiwari

Date of Initiation : April, 2012

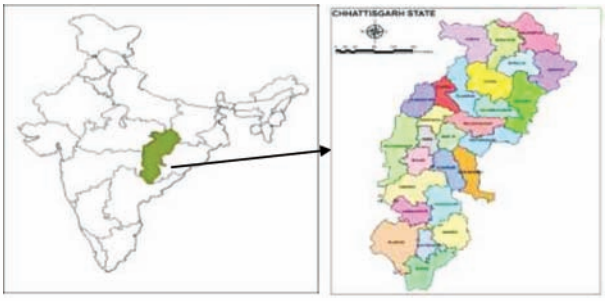
Date to be completion : March, 2017

Background of the Project :

The state Chhattisgarh, lies between 17Ú46' - 24Ú5' N latitude and 80Ú15' - 84Ú20' E longitude, covering an area of 1,46,361 sq. km, came into existence on 01.11.2000, is endowed with a very rich and diverse flora. Chhattisgarh, the second densely forested state of India after Assam, has 46 % of forest cover of its total area. Further, Bastar district of the state has the largest forest cover. The state known for its 'Sal' forests which occupy nearly 36 % of total forest cover, has forests ranging from subtropical to tropical, one Tiger Reserve, three National Parks and eleven Wildlife Sanctuaries that constitute an important source of germplasm. During 2014-15, 01 herbarium consultation tour was undertaken and studied 290 field nos. Total 200 species were identified along with description of 150 species.

Area and locality of the Allotted Project:

The state, comprising 27 districts, extends 700 km from north to south and 435 km from east to west, is bounded in the north by Uttar Pradesh and Jharkhand, in the east by Orissa, in the south by Andhra Pradesh and in the west by Madhya Pradesh and Maharashtra.



Summary of the work done during 2015-16:

During this period, 02 field tours *w.e.f.* 07. 09. 2015 to 18 .09. 2015 and 22. 01. 2016 to 03 .02. 2016 were undertaken to Bilaspur and adjoining districts of Chhattisgarh and Raigarh and adjoining districts of Chhattisgarh respectively during which 290 field nos. including 900 plant specimens and 132 field nos. including 400 plant specimens were collected. About 125 and 300 photographs of the habit of plant, flowers and fruits were exposed during these tours. The data on distribution of each species and ecological notes have also been recorded**.** In addition 01 Herbarium Consultation tour *w.e.f.* 30.03.2016 to 08.04.2016 was conducted to State Forest

Drosera burmanni Vahl

Research Institute, Jabalpur during which 600 field nos., 150 species under 70 families were examined and taxonomic description of 90 species was prepared. During this year, a total of 400 herbarium specimens housed in BSA were also identified to 190 species.

Achievements /Outcomes of the Project (2015-16):

This study recorded 18 angiospermic taxa (*Alysicarpus pubescens* J.S.Law., *Brachiaria ramosa* (L.) Stapf, *Crinum latifolium* L., *Crinum lorifolium* Roxb., *Digitaria ternata* (A.Rich.) Stapf. *Pedalium murex* L., *Fuirena pubescens* Kunth, *Indigofera colutea* (Burm.f.) Merr., *Neptunia triquetra* (Vahl) Benth., *Nervilia plicata* (Andr.) Schltr., *Persicaria strigosa* (R.Br.) H.Gross, *Physalis angulata* L., *Rhynchoglossum obliquum* Blume, *Schoenoplectiella roylei* (Nees) Lye, *Scilla hyacinthina* (Roth) McBride, *Senna hirsuta* (L.) H. S. Irwin & Barneby, *Senna uniflora* (Mill.) H.S. Irwin & Barneby, *Utricularia striatula* Sm.) as new record and 01 new generic record (*Papilionanthe* Schltr.) for the state.

4. Project : Flora of Chandra Prabha W.L.S., Chandauli, U.P.

Executing Scientists : Dr. A. N. Shukla & Dr. Nitisha Srivastava

Date of Initiation : April, 2015

Date to be completion : March, 2017

Calotropis procera (Aiton) Dryand.

Background of the Project:

Chandra Prabha Wildlife Sanctuary, (between latitudes $24^0 52' 0'' N$ to $25^0 3' 55''$ and $83^0 03' 24'' E$ to $83^0 22' 55''$ longitudes), situated in Chandauli district of south-eastern part of Uttar Pradesh, and is spreading between the area, Chakia and Naugarh, having rich vegetation. The Sanctuary, recognized in 1957, is the first declared Wildlife sanctuary of Uttar Pradesh which was famous for the Asiatic Lion during 1957 to 1970.

Area and locality of the Allotted Project :

c. 78 sq. km.

Summary of work done during 2015-16:

During this period, 01 field tour *w.e.f.* 18.08.2015 to 25.08.2015 to Chandra Prabha WLS was undertaken in which 185 field nos. including 400 plant specimens were collected along with 300 photographs of the landscapes and plants. The data on the distribution of each species and ecological notes have also been collected.

Achievements /Outcomes of the Project (2015-16):

During this study, 34 species have been identified and 20 species have been described along with updated nomenclature and ecological notes. 03 rare species collected from the WLS are *Hymenodictyon orixense*, *Oroxylum indicum* and *Litsea glutinosa* Robins. A total of 32 medicinal plants were collected and introduced in the Botanic garden of BSI, CRC, Allahabad.

5. Project : Floristic diversity of Parvati- Aranga Wildlife Sanctuary and adjoining Tikri forest area, Gonda, Uttar Pradesh

Executing Scientists : Mr. Vineet Kumar Singh & Dr. S.K. Srivastava

Date of Initiation : April, 2014

Date to be completion : March, 2017

Background of the Project:

The Parvati- Aranga Wildlife sanctuary is one of the significant wetlands in the eastern Uttar Pradesh, well known for migratory birds and its unique aquatic floral elements. This region is rich in Sal (*Shorea robusta*), Teak (*Tectona grandis*), Injar (*Barringtonia acutangula*), and Kath-jamun (*Syzygium heyneanum*). The objectives of the study are to document the flora of the area. This project has started in 2014. During 2014-15, 02 field tours were undertaken and 278 field numbers of specimens were collected of which a total of 101 plant species were identified.

Area and locality of the allotted Project (With Map):

c. 80 sq. km.

Summary of the work done during 2015-16:

During the period, 01 field tour *w.e.f.* 20.09.2015 to 27.09.2015 was undertaken. A total of 150 field numbers in triplicate were collected including some rare and economically important plant species *viz. Habenaria plantaginea, Oroxylum indicum, Hymenodictyon orixense* and *Curculigo orchioides*, etc. A total of 168 field numbers were identified. Taxonomic descriptions of 21 species were completed. Listing of the invasive alien species and identification of remaining field number are under progress.

6. Project : *Ex-situ* Conservation of EET and Economic plant species in the experimental garen of CRC

Executing Scientist : Dr. A. N. Shukla

Date of Initiation : 2015

Date to be completion : 2016

Background of the Project:

The experimental botanic Garden of Botanical Survey of India, Allahabad is situated in the office premises with an area of 2.50 hectares. The garden harbours 638 species belonging to 111families including many medicinal, economic, ornamental, rare and threatened plants. The garden has an Arboretum, Bambusetum, Rosery Green House; the other sections in the garden are Aquatic section, Gymnosperm, Medicinal Plants, Ornamental Plants. In addition to these, *Rauvolfia serpentina*, CITES (Appendix II) listed plant is also cultivated in the garden.

Summary of work done during 2015-2016:

Recorded phenological data of 100 species that are growing in the garden. 14 plant species those introduced in the garden were *Catamixis baccharoides, Phlomoides superba, Selaginella adunca, Pittosporum eriocarpum, Ephedra* sp., *Phlomoides superba, Gloriosa superba, Oroxylum indicum, Buchanania cochinchinensis, Indopiptadenia oudhensis, Curculigo orchioides, Selaginella bryopteris, Nelumbo nucifera, Drosera burmanii , Platanus orientalis*. Seven seedings of *Drosera burmanii* were sent to BSI/NRC/Dehradun. Live plants of *Rauvolfia serpentina, Andrographis paniculata, Strychnos nux-vomica, Clitoria ternatea, Withania somnifera* and *Terminalia arjuna* provided to Homeopathic College, Allahabad for their research.

Pyrostegia venusata (Ker-Gawl.) Miers

CRYPTOGAMIC UNIT, KOLKATA

1. Project : Studies on wild mushrooms of East and South Sikkim (except Agaricaceae, Hygrophoraceae, Boletaceae, Suillaceae and Cantharellaceae)

Executing Scientist : Dr. Kanad Das

Date of Initiation : April 2014

Date to be completion : March 2019

Background of the Project :

Fungi represent one of the largest groups of living organisms on the planet. Acting as symbionts, saprophytes or parasites, they play a prominent role in ecosystem functioning, and thus for the survival of many other species. Yet, fungi remain one of the least well-studied groups of organisms, and efforts to document their diversity, in order to conserve it, need to be prioritized. Although Sikkim belongs to one of the Global Biodiversity Hotspots, little is known about its fungal diversity, and even less about the main genera of wild mushrooms, i.e. *Cortinarius*, *Lactarius*, *Lactifluus*, *Hericium*, *Boletus*, *Suillus*, *Amanita*, *Russula*, etc. In continuation with the macrofungal exploration (initiated since 2008) of this state of Sikkim by Botanical Survey of India, survey, collection, characterization, identification and documentation of the diverse mycobiota of mushrooms of North district is being proposed. During previous year (2014-15), 01 field tour was undertaken during which 37 samples belonging to 35 species were collected. In total 09 field nos. belonging to 09 species were identified. SEM study of 04 basidiospores of wild mushroom was carried out.

Area and locality of the Allotted Project (with Map):

c. 1714 sq. km.; East and South districts of the State of Sikkim.

Summary of the work done during 2015-16:

During 2015-16, macromorphological characterization (in the field) followed by micromorphological characterization (in the laboratory) of different groups of wild mushrooms belonging to Ascomycota and Basidiomycota were executed in which 27 field nos. belonging to 18 species were identified along with preparation of description, photographic and drawing illustrations of specimens belonging to Russulaceae, Hericiaceae, Cortinariaceae, Entolomataceae etc. SEM-study of 03 basidiospores of wild mushrooms collected from East district of Sikkim was carried out. No tour was allowed to undertake due to financial crunch.

Russula peckii Sing

Besides this, the final report of the project, "Studies on Wild Mushrooms of North Sikkim" submitted during June 2015. The final project report includes 110 species of wild mushrooms belonging to 25 families, 50 genera in Basidiomycota and 12 genera in Ascomycota.

Achievements/ Outcomes in 2015-16:

This study reported 11 new species *Marasmius indopurpureostriatus* K. Das, A.K. Dutta & K.Acharya) for India; *Cantharellus sikkimensis* K. Das, Buyck, D. Chakr., A. Baghela, S.K. Singh & V. Hofstetter ; *Ramaria subalpina* K. Das & K. Acharya 3) *Lactarius olivaceoglutinus K. Das & Verbeken ; L. pyriodorus* K. Das & Verbeken*; L. yumthangensis* K. Das & Verbeken; *L. austrochrysorrheus* K. Das & Verbeken ; *Boletus lakhanpalii* K. Das, D. Chakr., A. Baghela, S.K. Singh & Dentinger; *B. recapitulatus* D. Chakr., K. Das, A. Baghela, S.K. Singh & Dentinger; *Suillus adhikarii* K. Das, D. Chakr. & Cotter; *S. lariciphillus* K. Das, D. Chakr., K.P.D. Latha & Cotter were discovered.

2. Project : Studies on the macrofungi of AJCBIBG

Executing Scientists : Dr. Kanad Das, Shri M. E. Hembrom & Shri Arvind Parihar

Date of Initiation : April 2015

Date to be completion : March 2019

Background of the Project :

Aacharya Jagdish Chandra Bose Indian Botanic Garden (AJCBIBG), Howrah is a 227 years old historic botanic garden located on the Southern bank of river Ganges in Shibpur (Howrah). The garden forms unique habitat for growth of fungi, the group which play important role by actively participation in recycling of complex organic materials by lignin decomposition, breakdown of cellulose and tannin. The present project was proposed to survey, collect, characterize, identify, document and preserve the macro fungi from this tropical garden.

Cortinarius traganus

Phallus atrovolvatus Kreisel & Calonge

Area and locality of the Allotted Project (with Map):

273 acres.

Summary of the work done during 2015-16:

During 2015-16, routine survey to garden area was undertaken during late monsoon for macromorphological characterization (in the field) followed by micromorphological characterization (in the laboratory) of different groups of wild mushrooms belonging to Ascomycota and Basidiomcota. A total 12 field nos. belonging to 10 species were identified and 01 species was documented.

Achievements/ Outcomes in 2015-16:

This study reported a new species of *Cyathus* (Agaricaceae) from India.

3. Project : **Algal flora of Jharkhand**

Executing Scientist : Dr. R. K Gupta

Date of Initiation : April, 2012

Date to be completion : March, 2017

Background of the Project:

This project has been started in 2012. Till now about 830 voucher specimens were collected, microscopically examined and preserved at Cryptogamic Unit, CNH, BSI.

Cellulariella acuta (Berk.) Zmitr. & Malysheva

Approximately 650 algal taxa were documented belonging to Cyanophyceae, Chlorophyceae, Euglenophyceae, Dinophyceae, Bacillariophyceae, Chrysophyceae, Xanthophyceae and Rhodophyceae.

Area and locality of the allotted Project (with Map):

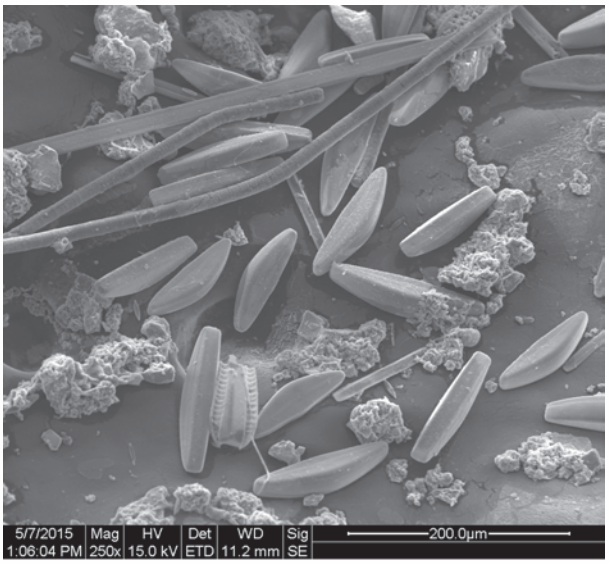
All freshwater lentic as well as lotic habitats of 24 districts of Jharkhand are targeted principally for algal sampling. Some terrestrial habitats like soil crusts and tree barks are also surveyed.

Summary/ Progress of the work done in 2015-2016:

During 2015-16, 02 field tour to Chatra, Latehar Gumla and Lohardaga districts of Jharkhand were conducted in which 90 algal samples from the various habitat were collected along with GPS data. Taxonomic description of about 107 species of algae mainly belong to the members of Euglenophyceae, Cyanophyceae, Chlorophyceae and Bacillariophyceae were completed. About 264 light microscopic photographs and 106 scanning electron microscopic photographs were taken for documentation and identification purpose.

Achievements/ Outcomes of the Project (2015-16):

This study reported a new variety of *genus Ecballocystopsis* (*E. dichotomous* var. *lateharii*) from Jharkhand. During the study, special emphasis was given to study the thermal algae of Balbal Duarii thermal spring at Chatra district, whose algal flora was documented for the first time.



A consortium of different species of Diatom (Bacillariophyceae)

4. Project : Revision of family Metzgeriaceae in India and data-basing liverworts and hornworts specimens in CAL

Executing Scientist : Dr. Devendra Singh

Date of Initiation : April 2015

Date to be completion : March 2018

Background of the Project:

The family Metzgeriaceae includes four genera *Metzgeri Raddi*, *Apometzgeria* Kuwah., *Austrometzgeria* Kuwah. and *Apertithallus* Kuwah. (Kuwahra, 1966, 1968), of which the former two genera are represented in India. The species are mostly epiphytic, but many are terrestrial and epiphyllous, found in different kind of forests ranging from tropical–subalpine. To date, 21 taxa of the genus are recognised from India.

Area and locality of the Allotted Project : To revise the species of family Metzgeriaceae of India.

Summary of the work done during 2014-15:

During this period, a total 22 field nos. specimens of Metzgeriaceae available in CAL herbarium belonging to nine species were identified viz. *Metzgeria conjugata* Lindb., *Metzgeria consanguinea* Schiffn., *Metzgeria pubescens* (Schrank) Kuwah., *Metzgeria leptoneura* Spruce, *Metzgeria lindbergii* Schiffn., *Metzgeria nilgiriensis* Udar & S.C.Srivast., *Metzgeria furcata* (L.) Dumort., *Metzgeria macrocellulosa* Kuwah., *Metzgeria macrospora* Kuwah. Of which, five species were illustrated, microphotographed and described viz. *Metzgeria conjugata* Lindb., *Metzgeria pubescens* (Schrank) Kuwah., *Metzgeria leptoneura* Spruce,

Metzgeria lindbergii Schiffn., *Metzgeria macrocellulosa* Kuwah., studied and microphotograped of sporoderm of *Metzgeria macrospora* Kuwah. under SEM and also requested type/authentic specimens of Metzgeriaceae from different national and foreign herbaria viz. Dehradun (BSD), Lucknow (LWU, LWG), Edinburgh (E), Japan (NICH), London, (BM), New York (NY). Prepared the data base of 553 species of liverwort and hornwort specimens of CAL.

Achievements/ Outcomes in 2015-16:

This study reported 05 species (*Riccardia tamariscina* (Steph.) Schiffn., *Solenostoma baueri* (Schiffn.) Steph., *Solenostoma fusiforme* (Steph.) R.M.Schust., *Solenostoma fusiforme* (Steph.) R.M.Schust., *Thysananthus fruticosus* (Lindenb. & Gottsche) Schiffn.) as new to science; 02 species as new to State (*Plagiochila dissecta* Steph. (Kerala), *Metzgeria macrocellulosa* Kuwah. (Sikkim).

Other Works Done Other than AAP Projects:

During 2015-16, participated in **XXXV Indian Scientific Expedition to Antarctica** under the project 'Studies of the diversity of Bryophytes of Larsemann Hills, East Antarctica' *w.e.f.* 13.12.2015-05.03.2016 during which collected 166 field numbers of bryophyte specimens. The major areas surveyed are Broknes Peninsula (Progress - 1), Maning Island, South Macleod, Soloman Island, Fisher Island, West Broknes, East Broknes, Cook Island, Stornes Penansula, Bretvenett Island, Easther Island, North Macleod, Osmar Islands, South and North Grovenes (Bharati Island). During this expedition, a total of 250 photographs were taken of which 26 photographs were identified upto species level.

5. Project : Wood rotting fungi of Rajmahal hills, Jharkhand

Executing Scientist : Mr. M.E. Hembrom

Date of Initiation : April 2013

Date to be completion : March 2017

Background of the Project:

This project was initiated in 2013. During the period 2014-15, 44 specimens were identified.

Area and locality of the Allotted Project (with Map):

c. 3000 sq. km.

Summary of the work done during 2015-16 :

During 2015-16, day to day routine wood rotting fungi survey to different parts of the projected area falling under Dumka district was undertaken during late monsoon in which 75 field nos. of various wood rotting macrofungi were collected and around 200 nos. of photographs related with habitat and habit of fungal specimens were captured as well as most of the GPS data were recorded in the field. Macromorphological characterization (in the field) followed by micromorphological characterization (in the laboratory) of different groups of wood rotting fungi were executed. In total 26 field nos. belonging to 24 species were identified and 05 species were documented.

Achievements/ Outcomes in 2015-16:

During this study, few interesting wood-rotting fungi were noted from Jharkhand, India.

Favolus grammocephalus (Berk) Imazeki

DECCAN REGIONAL CENTRE, HYDERABAD

1. Project : Flora of Nagarjunasagar Srisailam Wildlife Sanctuary (Tiger Reserve)

Executing Scientists : Dr. L. Rasingam & Mr. S. Nagaraju

Date of Initiation : April 2012

Date to be completion : March 2017

Background of the Project:

Nagarjunasagar-Srisailam Tiger Reserve, with an area of 3568 sq. km, is the largest tiger reserve of India spreads over five districts viz., Nalgonda, Mahaboobnagar, Kurnool, Prakasam and Guntur of Andhra Pradesh and Telangana states. This project has been started in 2012. During previous year (2014-15), 02 plant exploration tours were conducted during which 265 field nos. were collected and 106 species were documented from the earlier collection.

Area and locality of the Allotted Project:

c. 3568 sq. km.

Summary/ Progress of the work done in 2015-2016:

During this period, 03 field tours to the study area were undertaken in which a total of 186 field numbers were collected and 156 species (collected from the previous field tours) were documented.

Achievements/ Outcomes of the Project (2015-16):

This study reported 02 plants as new to Andhra Pradesh and 01 plant (*Heterostemma deccanense*) rediscovered from the Tiger Reserve.

2. Project : The Sacred Groves of Andhra Pradesh

Executing Scientists : Dr. M. Ahmedullah & Dr. J. Swamy

Date of Initiation : April 2012

Date to be completion : March 2017

Cansjera rheedei J.F.Gmel.

Caralluma umbellata Haw.

Background of the Project:

The project on sacred groves of Andhra Pradesh was initiated during 2012 with the aim of documentation of the flora of the sacred groves of the state. As per preliminary report (WWF, 1996) the state of Andhra Pradesh has about 650 "sacred and protected groves". During 2014-15, 04 field tours were conducted during which 214 field nos. were collected.

Area and locality of the project :

c. 275,069 sq. km.

Summary of the work done 2015-16:

During 2015-16, the sacred groves/sites from 04 districts of Krishna, Guntur, Prakasam and Chittoor were prioritised and targeted for study and a total of 13 prioritised sites in the above mentioned four districts were covered. The sacred groves covered are: Kondapalli, Gunadalamatha, Sri Kanakadurga, and Sri Peddinti Ammavaru in Krishna District; Kondaveedu, Kotappakonda, and Nagarjunakonda in Guntur District; Isukagundalu, Nemaligundla Ranga Swamy, and Palanka Veerabhadra Swamy in Prakasam District, and Thumburu Theertham, Papavinasanam and Talakona in Chittoor District. During this period, 03 field tours were conducted in four districts of Andhra Pradesh (Prakasam, Guntur, Krishna and Chittoor) and 428 field numbers were collected of which 257 were identified. A total of 557 species (including earlier collection) were documented from the sacred groves.

Achievements/ Outcomes in 2015-16:

This study reported a new distributional record [*Desmodium zonatum* Miq. (Leguminosae)] from Eastern Ghats. A total of 08 endemic plants (*Andrographis beddomei* C.B.Clarke, *Pterocarpus santalinus* L.f., *Syzygium alternifolium* (Wight) Walp., *Rhynchosia*

Phoenix loureiroi Kunth

beddomei Baker, *Shorea tumbuggaia* Roxb., *Terminalia pallida* Brandis, *Cleome viscosa* var. *nagarjunakondensis* Sundararagh. and *Cycas beddomei* Dyer.) were collected from the sacred groves of Andhra Pradesh.

3. Project : Inventory of Macrolichen diversity of Odisha State

Executing Scientist : Dr. Swarnalatha Ginnaram

Date of Initiation : April 2015

Date to be completion : March 2018

Area and locality of the Allotted Project :

Odisha State

Summary/ Progress of the work done in 2015-2016:

During this period, 01 survey cum collection tour *w.e.f.* 01.11.2015 to 11.11.2015 to Baripada Forest Division of Odisha was conducted in which 114 (12 macro and 92 micro) lichen specimens were collected. All the specimens were transferred in herbarium packets after drying. Further, field data of these specimens was entered in to the accession register and in excel work sheet. 01 herbarium consultation tour and library consultation tour *w.e.f.* 12.03.2016 to 18.03.2016 to Botanical Survey of India, Central Regional Centre, Allahabad was undertaken. 39 Macrolichen specimens of Odisha, preserved at BSA herbarium, was brought on loan for detailed study and collected literature pertaining to the macrolichens of Odisha from the library.

Dirinaria sp. groining on tree trunk at Betnoti, Mayurbhanj Dist.

EASTERN REGIONAL CENTRE, SHILLONG

1. Project : Flora of Amchang Wildlife Sanctuary

Executing Scientists : Dr. A. A. Mao & Mrs. Nandita Sarma

Date of Initiation : April 2014

Date to be completion : March 2017

Background of the Project:

Amchang Wildlife Sanctuary, located in the Kamrup district of Assam, comprises three Reserve Forests, *viz.* Amchang RF (53.18 sq.km.) , South Amchang RF (15.50 sq.km) and Khanapara RF (9.96 sq.km.). The Wildlife Sanctuary, is a continuation of the Khasi and Jaintia hills of Meghalaya and forms a part of Shillong Plateau. To study the flora of the sanctuary, the project was initiated during 2014. In previous years, 02 field tours were undertaken during which 400 field nos. were collected. A total of 45 species was identified from previous collection.

Area and locality of the Allotted Project:

c.78.64 sq. km.

Summary/progress of the work done in 2015-2016:

During this period, 02 field tours *w.e.f.* 15.06.2015 to 21.06.2015 and 03.09.2015 to 14.09.2015 were undertaken to Amchang WLS, Kamrup, Assam in which a total of 148 field no. were collected and 320 colour photographs were taken. A total of 45 species were identified and 16 species were documented. Consultation of relevant literature from Flora, Monograph, Fascicles, Journals etc. and available Herbarium Specimens in ASSAM were studied.

Achievements/ Outcomes of the project (2015-16): Nil

2. Project : Taxonomy, phylogeny and *ex-situ* conservation of Micro- fungal diversity from North-East India with special emphasis on fungi associated with endemic and threatened plants of Meghalaya

Executing Scientist : Dr. Ashish V. Prabhugaonkar

Date of Initiation : June 2015

Date to be completion : March 2018

Area and locality of Allotted Project :

Meghalaya state, North East India.

Summary/Progress of the work done in 2015-2016:

During this period, working facilities were established for micro-fungal biodiversity study. A total of 73 fungal

Artabotrys hexapetalus (L.F.) Bhandari

species belonging to 58 genera were isolated from six different localities using direct observation, three step sterilization and particle plating methods. 16 interesting fungal species were isolated. Six (06) fungi were isolated from *Nepenthes khasiana, viz. Aureobasidium* sp., *Cladosporium herbarum, Clonostachys cylindrospora, Harpophora* sp., *Pestalotiopsis* sp. and *Xylaria* sp. Ten (10) fungi were isolated associated with *Aquilaria sp., viz. Cladosporium* sp.1, *Cladosporium* sp.2, *Corynespora* sp., *Cryptophiale* sp., *Hansfordia pulvinata, Helminthosporium belgaumense, Pestalotiopsis* sp., *Phoma* sp., *Pseudohalonectria* sp. and *Vermiculariopsiella* sp. Six (06) fungi were isolated associated with *Zanthoxylum* sp., *viz. Diplodia* sp., *Paecilomyces divaricatus, Penicillium* sp., *Pestalotiopsis* sp., *Phoma* sp., *Phomopsis* sp. and *Vermiculariopsiella elegans* Three (03) litter degrading fungi were isolated from *Calamus khasianus*, namely *Virgaria nigra, Sporoschismopsis moravica* and *Gliocladiopsis sagariensis*. All the isolated fungal species were preserved as Herbarium specimens, living cultures and Permanent slide mounts. Microphotographs and descriptions of fungi were also prepared. Two pure single spore fungal cultures of taxonomically interesting micro-fungi were sequenced (3 fungal gene regions namely ITS, LSU and SSU) from 'Regional facility for DNA fingerprinting' RGCB, Trivandrum, Kerala. Sequences obtained were studied further; fungi were similar to *Fusarium solani* and *Albosynnema elegans*. A dataset of reference sequences from gene bank in group hypocreales for genus *Albosynnema* was prepared for further study.

Achievement/outcomes of the Project (2015-2016):

This study reports 16 interesting fungal species (*Acrogenospora sphaerocephala, Aplosporella* sp., Albosynnema sp., *Brachydesmiella biseptata, Craspedodidymum microsporum, Dendryphion* sp., *Gliocladiopsis sagariensis, Paradictyo arthrinium* sp., *Parodiella* sp., *Penzigomyces nodipes, Petrakia* sp., *Pithomyces flavus, Pseudospiropes* sp., *Sporoschisma mirabile, Sporoschismopsis moravica , Synnemellisia* sp.). Two (02) pure single spore fungal cultures of taxonomically interesting micro-fungi were sequenced.

Albosynnema sp.

3. Project : Checklist for Flora of Nagaland (1500 species to be listed with updated nomenclature and distribution)

Executing Scientists : Dr. A. A. Mao, Dr. N. Odyuo & Sri. D. Verma

Date of Initiation : April 2014

Date to be completion : March 2016

Background of the Project:

The project was undertaken to compile all the available published materials that are scattered on the floristic wealth of Nagaland. Except, Orchids of Nagaland, Fern and fern allies of Nagaland and Lichens of Nagaland no other publication is found for the state. During previous year, 1114 taxa so far enlisted along with updated nomenclature, distribution and local names.

Summary/ Progress of the work done in 2015-2016:

During this period, the project was completed, manuscript finalised and submitted to D/ BSI, Kolkata..

Achievements/ Outcomes of the Project (2015-16):

During this period, the manuscript comprising of 2197 species, 09 subsp., 31 var. under 193 families of Angiosperms with 1918 species, Pteridophytes 284 species and Gymnosperms 05 species was submitted.

Research Publication related to the allotted project: Nil

4. Project : Floristic Study of Laokhowa Wildlife Sanctuary, Nagaon, Assam

Executing Scientists : Dr. (Mrs.) Chaya Deori and Satya Ranjan Talukdar

Date of Initiation : April 2013

Date to be completion : March 2016

Background of the Project:

This project is being started in 2013. During previous year, 03 field tours were conducted during which 169 field nos. were collected along with GPS data. A total of 228 species were identified.

Area and locality of the Allotted Project :

70.13 sq. km.

Summary / Progress of the work done in 2015-2016:

During this period, the final manuscript of the project

Laokhowa wildlife sanctuary, Assam , comprising of 404 sp., 04 varieties and 01 subsp. was compiled and submitted. Keys to the genera and species were prepared for proper identity of every species and 27 colour photo plates were provided containing 300 colour photographs of general vegetation, and different floristic components, Pteridophytes. 635 voucher specimens along with detail field data were incorporated in ASSAM herbarium.

Achievements / Outcomes of the Project (2015-16):

The final manuscript of Laokhowa wildlife sanctuary, Assam, with containing the correct citation, basionym, a short description, phenology data, locality of collection and details of the voucher specimens of 404 species submitted. The report also supplemented by a keys to the genera and species. Some of the important plants collected from the region are Apocynaceae: *Rauvolfia serpentina;* Orchidaceae: *Papilionanthe teres*, *Dendrobium aphyllum*, *Rhynchostylis retusa*, *Zeuxine nervosa*; Menyanthaceae: *Nymphoides indica*, *Nymphoides cristata*; Potamogetonaceae: *Potamogeton crispus*, *Potamogeton octandrus*; Hydrocharitaceae: *Hydrilla verticillata;* Nelumbonaceaea: *Euryale ferox*, Aquifoliaceae: *Ilex khasiana* etc. were also collected along with good number of economic potential species.

5. Project : Flora of Yangoupokpi Lokchao Wildlife Sanctuary, Chandel District, Manipur

Executing Scientists : Dr. A.A.Mao & Shri L.R. Meitei

Date of Initiation : April 2014

Date to be completion : March 2017

Background of the Project:

Yangoupokpi Lokchao Wildlife Sanctuary covering an area of 184.80 sq. km. located in the Chandel District, Manipur. This project is being started in 2014. During previous year, 02 field tours were undertaken during which 316 field nos. collected and 63 species were identified.

Area and locality of the Allotted Project : 184.80 sq. km.

Summary/ Progress of the work done in 2015-2016:

During this period, 16 species [Annonaceae: *Artabotrys hexapetalus*, Aspleniaceae: *Asplenium phylliditis* Commelinaceae: *Amischotolype mollissima* Lecythidaceae: *Careya arborea* Leguminosae: *Mimosa pudica*, Lythraceae: *Lagerstroemia speciosa* Orchidaceae: *Bulbophyllum repens, Dendrobium delacourii Cleisomeria pilosulum Eria biflora*. (136099), *Pelatantheria insectifera, Thunia alba* Polypodiaceace: *Platycerium wallichii* Gentianaceae: *Canscora diffusa* Leguminosae: *Crotalaria sessiliflora* and Malvaceae: *Urena lobata*, collected from Yangoupokpi Lokchao Wildlife Sanctuary during earlier field trips, were identified and 14 species [Annonaceae: *Artabotrys hexapetalus*; Commelinaceae: *Amischotolype mollissima* ; Lecythidaceae: *Careya arborea* Leguminosae: *Mimosa pudica*; Lythraceae: *Lagerstroemia speciosa*; Orchidaceae: *Bulbophyllum repens Dendrobium delacourii*, *Cleisomeria pilosulum*, *Eria biflora*, *Pelatantheria insectifera, Thunia alba* Polypodiaceace: *Platycerium wallichii* Gentianaceae: *Canscora diffusa* Leguminosae: *Crotalaria sessiliflora* were described.

A view of Laokhowa Wildlife sanctuary

Barringtonia acutangula (L.) Gaertn.

Relevant literature were consulted from different Flora, Monographs, Fascicles, Journals etc. Herbarium specimens, collected earlier from Yangoupokpi Lokchao Wildlife Sanctuary and deposited in ASSAM herbarium were also consulted.

Achievements/ Outcomes of the Project (2015-16):

This study identified 16 species and described 14 species collected from the Sanctuary.

6. Project : *Ex-situ* conservation and multiplication of endemic, rare, threatened and economically important plants of North-East India at Experimental Botanic Garden, BSI, ERC, Barapani (Umiam)

Executing Scientists : Dr. M. Murugesan & Shri L. R. Meitei

Date of Initiation : 2015

Date to be completion : Ongoing

Background of the Project:

The present project was proposed for collection of endemic, rare, threatened and economically important plants of North East India for *ex-situ* conservation and multiplication in Experimental Botanic Garden, BSI, ERC, Umiam (Barapani).

Area and locality of the Allotted Project (with Map):

For the collection purposes the entire region of North east region will be covered.

Summary/ Progress of the work done in 2015-2016:

During this period, a field tour conducted *w.e.f.* 02.12.2015 to 11.12.2015 covering Lokchao, Laiching, Lai Lok and Khujai Lok forests of Yangoupokpi Lokchao Wildlife Sanctuary, 74 live plant species such as *Acampe ochracea, Acampe rigida, Arachnis labrosa, Artabotrys hexapetalus, Bulbophyllum careyanum, Bulbophyllum gamblei, Calanthe biloba, Cephalantheropsis obcordata, Cleisomeria pilosulum, Ceratostylis himalaica, Cleisostoma paniculatum, Coelogyne viscosa, Cycas pectinata,* were collected and introduced in the Experimental Botanic Garden, Barapani.

Achievements/ Outcomes of the Project (2015-16):

During the other field tours, the following species were also collected and introduced in the garden. Tree species: *Acacia auriculiformis, Acacia dealbata, Acacia farnesiana, Acer laevigatum, Aegle marmelos, Aesculus assamica, Agathis robusta, Aglaia edulis, Alangium chinense, Albizia lebbeck* etc; Shrubs: *Adhatoda*

Discladium squarrosum (L.) Tiegh

zeylanica, *Agapetes saligna*, *Agapetes setigera*, *Agapetes variegata*. Lianas: *Antigonon leptopus*, *Canavalis gladiata*, *Ceropegia longifolia*;. Medicinal Plants: *Acorus calamus*, *Aegle marmelos*, *Alstonia scholaris*, etc; Gingers: *Alpinia calcarata*, *Alpinia malaccensis*, *Alpinia alllughas* etc; Bamboos: *Bambusa vulgaris*, *Bambusa burmanica*, *Bambusa cacharensis*, *Bambusa hookerii* etc; Rare and Endangered Species(Orchids): *Acampe ochracea*, *Acanthephippium sylhetense*, *Bulbophyllum gymnopus*, *Bulbophyllum helenae*, *Bulbophyllum hirtum*, *Bulbophyllum odoratissimum*, *Bulbophyllum rothschildianum*, *Bulbophyllum scabratum*, *Calanthe herbacea*, *Calanthe sylvatica*, *Cephalantheropsis longipes* etc; Other species: *Areca nagensis*, *Arenga pinnata*, *Caulokaempferia secunda*, *Coptis teeta*, *Cyathea gigantea*, *Cycas circinalis*, *Cycas pectinata*, *Gingko biloba*, *Globba multiflora*, *Gnetum gnemon* etc.

7. Project : Flora of Eastern Nagaland (Mon, Tuensang, Kiphire Longleng Districts)

Executing Scientists : Dr. Nripemo Odyuo & Dr. Ranjit Daimary

Date of Initiation : April 2014

Date to be completion : March 2019

Background of the Project :

Eastern Nagaland bordering Myanmar is one of the rich in floristic diversity regions of NE India. Some of the pioneer workers on the flora of this area are Baker (1892), Rao and Verma (1972), A.R.K Sastry (1968) etc. This project was initiated in 2014 to explore the flora of the area. During previous year, 02 field tours were carried out during which 729 field nos. were collected along with 166 live specimens for *ex-situ* conservation.

Area and locality of the Allotted Project (with Map) :

The total geographical area of Eastern Nagaland is 8335 sq.km. The project comprises four districts of Eastern Nagaland, *viz.* Mon, Tuensang, Kiphire and Longleng.

Summary/progress of the work done in 2015-2016 :

During this study, one field tour *w.e.f.* 21-05-2015 to 07-06-2015 to Tuensang district, Eastern Nagaland was conducted in which 102 live plants were collected, 142 species were identified and description of 136 species were prepared. A total of 400 digital photos were taken.

Achievements/outcomes of the Project (2015-2016) :

This study identified 142 species out of 102 live plants collected.

8. Project : Flora of South Garo Hills District, Meghalaya with Reference to Siju Wildlife Sanctuary, Baghmara Pitcher Plant Wildlife Sanctuary and Balpakram National Park

Executing Scientist : Shri Dilip Kumar Roy

Date of Initiation : April 2012

Date to be completion : March 2016

Background of the Project :

The South Garo Hills district of Meghalaya with 1850 sq. km. area is one of the biologically significant regions and encompasses one National Park *viz.* Balpakram NP and two wildlife sanctuaries *viz.* Siju WLS and Baghmara Pitcher Plant WLS. This area is a part of Indo-Myanmar realm, has a great diversity of Flora. The project to study the plant diversity of the regions started in 2012. During previous year, 03 field tours were conducted during which 430 field nos. were collected of which 283 taxa have been identified, 117 species were described.

Dendrobium pendulum Roxb.

Area and locality of the Allotted Project (with Map):

The district –South Garo Hills lies between 25° 25' N to 25° 27' N Latitude and 90° 30' E to 90°66'E Longitude extending an area of 1850 sq. km with 1186 sq. km of forest coverage having Balpakram-Baghmara Landscape in its heart. The district has five protected/ reserve areas managed by the Meghalaya Forest Department *viz*. Balpakram National Park (352 km^2), Siju Wildlife Sanctuary (5.2 km^2), Baghmara Pitcher Plant Wildlife Sanctuary (2 km^2), Baghmara Reserve Forest (44.29 km^2) and Rewak Reserve Forest (~4 km^2) and rest falls under 36 tribal community lands (~330 km^2) come under Balpakram-Baghmara Landscape (Map).

Summary/ Progress of the work done in 2015-16:

Identification, Taxonomic description and compilation of collected Plant Samples from South Garo Hills District, Meghalaya: Completed identification and taxonomic description of the total plant taxa recorded for the flora of the district collected during field exploration in the years 2012-13, 2013-14, 2014-2015 and also based on the plant species collected earlier from the study site by different worker housed in ASSAM, CAL, NEHU and thus a total of 1279 taxa (1256 species, 5 subspecies and 18 varieties) of plants have been compiled for the Flora of the South Garo Hills District, Meghalaya.

Achievements during the last year:

During the study, 12 taxa are exclusively endemic to the state of Meghalaya are collected out of which 6 taxa namely *Aspidopterys jainii* R.C. Srivast., *Bulbophyllum manabendrae* D.K. Roy, Barbhuiya & A.D. Talukdar, *Amomum garoensis* Sunil & Ved Prakash, *Amomum jainii* S.Tripathi & V. Prakash, *Zingiber bipinianum* D.K. Roy, D. Verma, A.D. Talukdar & M. Dutta Choudhury and *Sauromatum meghalayense* D.K. Roy, A.D. Talukdar, B.K. Sinha & M. Dutta Choudhury, are point endemic and restricted in the district only.

Enlisting of Rare and Threatened Taxa recorded from South Garo Hills District, Meghalaya: A total of 112 taxa belonging to 98 genera and 56 families of different threat categories have been compiled from South Garo Hills District of Meghalaya, Discovery of New Taxa from South Garo Hills District, Meghalaya: During the study period, (2015-2016), one ginger species namely *Zingiber bipinianum* D.K. Roy, D. Verma, A.D. Talukdar & M. Dutta Choudhury new to Sciences has been discovered and published.

Recollections of Taxa from South Garo Hills District, Meghalaya: Of the total 1279 taxa recorded from the district during the present study, 11 taxa have been short out in this present year as the recollections, after a gap of up to 115 years. Of these, two recently described species, *viz. Toxicodendron bimannii* Barbhuiya (2013) and *Amomum jainii* S. Tripathi and V. Prakash (1999) have been recollected from other than Type localities. *Trigonostemon viridissimus* var. *chatterjii* (Deb & G.K. Deka) N.P. Balakr. & Chakrab. has rediscovered after the type as an extended distribution later than 70 years. *Adinandra griffithii* Dyer, *Diospyros pilosiuscula* G. Don, *Neanotis oxyphylla* (Wall. ex G. Don) W.H. Lewis and *Ormosia robusta* Baker have been recollected after a long gap of 70 years whereas *Mallotus khasianus* Hook. f., *Oberonia brachystachys* Lindl. and *Parsonsia alboflavescens* (Dennst.) Mabb. have been recollected after a lapse of 100-115 years in India. Whilst, *Leptomischus wallichii* (Hook. f.) H.S. Lo has been reported after a lapse of 40 years as 3rd recollection after the Type with an extended distribution.

Celogynae ovalis Lindl.

Galeola lindleyana (Hook. F. & J.W. Thomson) Rchb.f.

Nervilia plicata (Andrews) Schulr.

Passiflora foetida L.

New Records for Regional/ State Flora from South Garo Hills District, Meghalaya: A total sixty taxa (56 species, 2 subspecies and 2 varieties) have been recorded as new additions to the flora of Meghalaya from South Garo Hills district. Out of the 60 taxa, 8 taxa from Pteridophytes, 38 taxa from dicotyledons (35 species, 1 subsecies and 2 varieties) and 14 taxa from monocotyledons (13 species and 1 subspecies).

Besides A Checklist of Flora of Balpakram National Park and Baghmara Pitcher Plant Wildlife Sanctuary and Siju Wildlife Sanctuary prepared.

The Project Report for the Flora of South Garo Hills District, Meghalaya is finalized. The Report contains the documentation of 1279 taxa (1256 species, 5 subspecies and 18 varieties) of plants under 700 genera and 175 families from the South Garo Hills district of Meghalaya. Of these, 76 species belong to Pteridophytes under 44 genera and 22 families; 2 species belong to Gymnosperms under 2 genera and 2 families and 1201 taxa (1178 spp., 5 subspp. and 18 var.) belong to Angiosperms under 654 genera and 151 families. Of the total taxa of Angiosperms, dicotyledons comprise of 888 taxa (865 spp., 5 subsp. and 18 var.) belonging to 498 genera and 128 families and monocotyledons comprise of 313 species belonging to 156 genera and 23 families.

Calanthe brevicornu Lindl.

Ardisia solanacea Roxb.

9. Project : Micropropagation of RET plants of North East India

Executing Scientists : Dr. A. A. Mao & Smt. L. Ibemhal Chanu

Date of Initiation : April 2012

Date to be completion : March 2017

Background of the Project:

This project is being started in 2012. During 2014-15, micropropagation of *Armodorum senapatianum*, *Cymbidium trigrinum*, *Rhododendron coxianum* were completed.

Summary/ Progress of the work done in 2015-2016:

Experiments to standardize the protocols for *Ilex khasiana*, *Paphiopedilum hirsutissimum*, and *Cymbidium tigrinum* are in progress. A total of 100 plants of *Rhododendron coxianum* were transferred from lab to greenhouse and *c.* 1200 plants of *A. senapatianum* were transferred from Lab to land.

Achievements/ Outcomes of the Project (2015-16):

During this period, a protocol for *Rhododendron coxianum* and *Armodorum senapatianum* was standardized.

Rhododendron coxianum Davidian : Lab to Land plants

Cymbidium tigrinum E.C. Parish ex Hook.f. *:* Culture

10. Project : Bryoflora (Hepaticae & Anthocerotae) of Mizoram

Executing Scientist : Dr S.K. Singh

Date of Initiation : April 2008

Date to be completion : April 2014 (extended up to March 2017)

Background of the Project:

This project is being started in 2008. During previous year 2014-15 about 298 samples belonging to 105 species were identified along with SEM study of sporoderm pattern of 12 sporiferous materials.

Area and locality of the Allotted Project): 21,081 sq. km.

Summary/ progress of the work done in 2015-16 :

During this period, taxonomic description of 22 species (*Radula acuminata* Steph., *Radula acuta*, *Radula assamica*, *Radula complanata*, *Radula fulvifolia* , *Radula javanica* Gottsche, *Radula lindbergiana* , *Radula obscura*, *Radula protensa*, *Radula sumatrana*, *Radula tabularis*, *Radula tjibodensis*, *Lejeunea parva*, *Lejeunea pallide-virens*, *Acrolejeunea ermergens*, *Archilejeunea planiuscula*, *Plagiochila* completed: *Plagiochila arbuscula*, *Plagiochila bantamensis*, *Plagiochila beddomei*, *Plagiochila bicornuta*, *Plagiochila durelii*.) were completed along with rechecking of 490 samples of liverworts, collected from Manipur.

Achievements/ Outcomes of the Project in 2015-16:

This study reports 01 species (*Lejeunea mizoramensis* Sushil K.Singh) as new to science and 02 species (*Plagiochila ptychanthoidea* Steph., B*azzania hainanensis* L.-P. Zhou & L. Zhang) as new to India.

Other works Done :

Species New to Science: *Zingiber murlenica* Ram.Kumar, Sushil K.Singh & S.Sharma, *Zingiber mizoramensis*

Leptolejeunea elliptica (Lehm. & Lindenb.) Besch.

Ram.Kumar, Sushil K.Singh & S.Sharma; New to India *Eria merguensis* Lindl. New generic record: *Pendulorchis* Z.J. Liu, Ke Wei Liu & G.Q. Zhang ; New to Mizoram *Microlepia firma* Mett. ex Kuhn, *Lindsaea odorata* Roxb., *Aleuritopteris subdimorpha* (C.B. Clarke & Baker) Fraser-Jenk., *Coniogramme serrulata* Fee, *Pteris arisanensis* Tagawa, *Pteris subindivisa* C.B. Clarke, *Asplenium yoshinagae* Makino subsp. *yoshinagae*, *Asplenium yoshinagae* subsp. *indicum* (Sledge) Fras.-Jenk. *Thelypteris esquirolii* (Christ) Ching, *Thelypteris hispidula* (Decne.) C.F. Reed, *Athyrium setiferum* C.Chr., *Athyrium woodsioides* Christ, *Cheirostylis griffithii* Lindl.

11. Project : Taxonomic Revision of Genus *Riccia* (Mrachantiophyta) in India

Executing Scientist : Dr S.K. Singh

Date of Initiation : October 2014

Date to be completion : March 2019

Background of the Project:

The genus *Riccia* is the largest genus of thallose liverwort in India. A total of 36 species are known to occurr in India. This project has been started in 2014. During 2014-15, 01 field tour was conducted during which 301 sample of liverworts and hornworts were collected, In additions a herbarium consultation tour was also carried out to CAL.

Area and locality of the Allotted Project (with Map):

Entire India

Summary/ progress of the work done in 2015-16:

During this period, 04 species of *Riccia* (*viz. Riccia sorocarpa, Riccia hubenriana, Riccia discolor and Riccia stricta*), collected from Nongpoh, 09 samples belonging to 04 species (*viz., Riccia billarderi, Riccia sorocarpa, Riccia crispatula, Ricci stricta*) collected from West Bengal, 05 samples belonging to 04 species (*viz., Riccia billarderi, Riccia curtisii, Riccia stricta, Riccia frostii*), collected from Jharkhand and 06 samples belonging to 02 species (*viz. Riccia billarderi, Riccia sorocarpa*), collected from Gujarat were identified. Taxonomic description of 05 species of *Riccia* (*viz.* :*Riccia grollei, Riccia beyrichiana, Riccia billardieri, Riccia stricta, Riccia curtisii*) was completed along with SEM studies of 05 species.

Achievements/ Outcomes of the Project in 2015-16:

This study reports 01 very rare species (*Riccia curtisii*) as new to Jharkhand and 02 soecies (*Riccia huebenriana* and *Riccia stricta*) as new to Meghalaya.

Marchantia papillata ssp. *grossibarba* (Steph.) Bischl.

INDUSTRIAL SECTION INDIAN MUSEUM, KOLKATA

1. Project : Collection of Oil Crops, Pulses & Medicinal Plant materials for enrichment of Botanical Gallery from Bilaspur, Chattisgarh

Executing Scientists : Sri D.L. Shirodkar, Sri B.C. Dey & Sri S.K. Sharma

Date of Initiation : April 2015

Date to be completion : March 2016

Background of the Project:

For enrichment of Botanical Gallery, incorporation of new collections.

Area and locality of the Allotted Project :

Bilaspur and surrounding areas, Chhattisgarh.

Summary/Progress of the work done in 2015-2016:

01 field collection tour *w.e.f* 30.11.15 - 09.12.15 was undertaken to Bilaspur and 46 varieties of rice (*Oryza sativa* L.) and 1 variety of Guava (*Psidium guajava*), 15 samples of medicinal plant parts & 5 samples of Pulses were collected. Processing of materials for display is in progress.

Achievements/Outcomes of the Project (2015-16):

During this period, 66 plant materials were collected: 46 rice varieties and 05 pulse varieties were collected from local farmers; 15 different medicinal plant products were also collected from local market.

2. Project : Listing & Identification of Dicot herbarium specimens at BSIS

Executing Scientists : Mrs Geeta Chaudhury, Sri B.C. Dey & Sri S.K. Sharma

Date of Initiation : April 2013

Date to be completion : March 2016

Background of the Project:

Preparation of catalogue of dicot economic herbarium collections deposited at BSIS. This work aims at documentation of dicot herbarium collections from different parts of India and surrounding countries deposited at BSIS to prepare a database which helps to conserve all the important information written on the labels at the time of collection. These herbarium collections are now being preserved and digitized which will help future Botanists for further work on Economic Botany.

Area and locality of the Allotted Project :

ISIM economic herbarium, BSIS.

Summary/Progress of the work done in 2015-2016:

During this period, 2980 specimens of Dicot were studied at BSIS, relevant data of Herbarium were recorded along with correction of nomenclature.

3. Project : Listing & Identification of Monocot herbarium specimens at BSIS

Executing Scientists : Dr .Manas Bhaumik, Sri D.L. Shirodkar & Mrs. Kangkan Pagag

Date of Initiation : April 2013

Date to be completion : March 2016

Background of the Project:

Preparation of catalogue of monocot economic herbarium collections deposited at BSIS. This work aims at documentation of monocot diot herbarium collections from different parts of India and surrounding countries deposited at BSIS to prepare a database which helps to conserve all the important information written on the labels at the time of collection. These herbarium collections are now being preserved and digitized which will help future Botanists for further work on Economic Botany.

Area and locality of the Allotted Project :

ISIM economic herbarium, BSIS.

Summary/Progress of the work done in 2015-2016:

During this period, 1417 specimens of Monocot herbarium specimens were documented at BSIS along with relevant data which helps to conserve all the important information.

4. Project : Revision of the Family Gesneriaceae of North East India

Executing Scientists : Dr B.K. Sinha & Mrs. Sudeshna Dutta

Date of Initiation : April 2013

Date to be completion : March 2016

Background of the Project:

Detail Study of Gesneriaceae members of NE India.

Area and locality of the Allotted Project:

NE parts of India, including states of Sikkim, Assam, Meghalaya, Arunachal Pradesh, Nagaland, Manipur Mizoram and Tripura.

Summary/Progress of the work done in 2015-2016:

The present revision includes 2 subfamilies, 5 tribes, 21

genera and 81 species from North east India. Final Mss submitted.

5. Project : Collection of Economic plant materials for enrichment & replacement of exhibits of the Botanical Gallery

Executing Scientist : Dr A.K. Sahoo

Date of Initiation : April 2015

Date to be completion : March 2016

Background of the Project:

For enrichment of Botanical Gallery by incorporating new plant material in the collections.

Area and locality of the Allotted Project :

Koraput & Raygada district of Southern Odhisa.

Summary/Progress of the work done in 2015-2016:

During this period, 01 field tour undertaken in tribal localities of Koraput & Raygada districts of Southern Odisha *w.e.f.* 22.09.15 - 02.10.15 and 43 plant materials were procured.

6. Project : Interpretation of the Family : Moraceae & Myrtaceae in Icones Roxburghianae

Executing Scientists : Dr A.K. Sahoo, Sri D. L. Shirodkar & Kangkan Panag

Date of Initiation : April 2014

Date to be completion : March 2015

Background of the Project:

There are 89 entries of the families which will be interpreted.

Summary/Progress of the work done during 2015-2016:

In Myrtaceae: Listing of *Eugenia* (15 spp.) from relevant literature completed. Description of 15 species prepared. In Moraceae: Listing of 50 species completed; description of 27 species completed; interpretation of 3 spp. completed.

7. Project : Interpretation of the Family : Convolvulaceae & Cucurbitaceae in Icones Roxburghianae

Executing Scientists : Dr. B. K. Sinha & Mrs. Sudeshna Datta

Date of Initiation : April, 2015

Date to be completion : March, 2017

Background of the Project:

There are 71 entries of the families which will be interpreted.

Summary/Progress of the work done during 2015-2016:

Family Cucurbitaceae: Listing of 76 sp. Completed; Family: Convolvulaceae 60 species listed.

Impatiens toppinii Dunn

NORTHERN REGIONAL CENTRE, DEHRADUN

1. Project : Revision of Tree Ferns (*Cyathea, Cibotium* and *Brainea*) of India

Executing Scientist : Dr. B.S. Kholia

Date of Initiation : April 2014

Date to be completion : March 2017

Objective :

Taxonomic study of *Cyathea*, *Cibotium* and *Brainea* in India

Background of the Project :

This project has been started in 2014. During previous year, requests for types sheets/ pictures were sent to various herbaria; Protologue of *Cyathea nilgirensis* and *Cyathea andersoni* are procured; Completed checklist of Indian tree ferns with author citation, correct nomenclature and distribution; Digital images of six species of *Cyathea* were arranged from different herbaria; Descriptions of *Cyathea brunoniana, C. spinulosa, C. gigantean* and *C. chinensis* completed based on the specimens deposited at BSHC; Visited DD Herbarium and 60 sheets belonging to 20 species of ferns were examined/ identified.

Cyathea albocetacea Copel.

Area and locality of the Allotted Project :

Complete Indian Territory.

Summary/ Progress of the work done in 2015-2016:

During 2015-16, 02 field tour to Andaman and Nicobar Islands, Pithoragarh and Champawat were conducted during which 46 interesting ferns and fern allies, 38 live plants belonging to fern rhizomes, orchids, palm, Banana and 04 species of Orchid were collected. In addition 01 Herbarium consultation tour to PBL was also undertaken in which 31 herbarium sheets of unidentified ferns and fern-allies were identified. During this study, type image of 08 species (from different herbaria); lithographs of 04 species (from BM); about 250 images of different species of *Cyathea* (from K, BM, China, US), 20 specimens (from MH and BSI) and 62 herbarium sheets (PBL & DD) were examined/ studied/ identified. The request for remaining images of type sheets as well as herbarium sheets were sent to various herbaria like K, BM,PE, E, Z, GENT,TI etc. 03 species [*Cyathea spinulosa* (from Pithoragarh), *C. albosetacea* and *C. gigantea* (from Andaman and Nicobar) were worked out and described. Collection containing c. 2500 specimens (300 sheets from Japan) of Pteridophytes were also transferred from Dr. N. Punetha of Botany Department, Govt. P.G. College Pithoragarh to BSD.

Achievements/ Outcomes of the Project (2015-16):

This study reported *Cyathea gigantea* for the first time from Indian Islands as a new record; 01 new species (*Huperzia cavei* Fraser- Jenkins & Kholia new to science), 01 new record to India (*Diplazium proliferum*); 06 regional new records (*Botrychium simplex* and *Aleuritopteris chrysophylla* for W. Himalaya; 02 filmy ferns and 01 tree fern *Cyathea gigantea* for Andaman and Nicobars) and 01 rediscovery (of filmy fern) from Andaman and Nicobar.

2. Project : Revisionary studies of the genus *Lepisorus* (Sm.) Ching

Executing Scientist : Dr. Brijesh Kumar

Date of Initiation : April 2013

Date to be completion : March 2016

Objective :

Taxonomic study of the members of genus *Lepisorus* (Sm.) Ching

Background of the Project:

The project is being initiated in 2013. During previous

Lepisorus nudus (Hook.) Ching

year, two herbarium consultation tours were conducted during which 360 species were studied. Besides, a checklist of 18 taxa belonging to the genus prepared with author citation, synonymy, updated nomenclature and their distribution; type image and protologues of 12 species were procured; description of eleven species prepared.

Area and locality of the Allotted Project :

Complete Indian Territory

Summary/ Progress of the work done in 2015-2016:

During 2015-16, 01 Herbarium consultation tour undertaken to BSI, WRC, Pune, SRC, Coimbatore (MH) & National Botanical Research Institute, Lucknow (LWG) and studied 289 specimens. A total of 59 specimens were identified. During this period, 06 species were described, 05 species were illustrated, distribution map and notes on 09 species were prepared, taxonomic studies of 15 species were updated and nomenclature of 11 species were updated.

3. Project : Revision of family Bignoniaceae in India

Executing Scientists : Dr. S.K. Srivastava & V. K. Madhukar

Date of Initiation : April 2013

Date to be completion : March 2016

Objective :

Revisionary study of the family Bignoniaceae in India

Background of the Project:

45 taxa have been identified, dissected out with the help of Stereo zoom Microscope, illustrated, described and updated the nomenclature and distribution.

Area and locality of the Allotted Project : India.

Summary of the work done during 2015-16:

During 2015-16, 150 herbarium specimens of family Bignoniaceae housed in herbarium of Botany Division, Forest Research Institute Dehradun (DD) were consulted. 11 species under 07 genera were identified, flowers were dissected, illustrated, described and updated the nomenclature and distribution. 50 herbarium specimens (25 field no.'s) of family Bignoniaceae were processed, labelled, accessioned and incorporated into BSD herbarium. Description, nomenclatural citation, line drawings, digital photo plate and distributional pattern of 45 taxa were updated along with re-confirmation of Bignoniaceae members housed in BSD and herbarium specimens received on loan from various centres of Botanical Survey of India.

Achievements/ Outcomes in 2015-16:

During this study, comprehensive description, updated names, coloured photo plate, illustration, type details, phenology, ecology, nomenclatural and taxonomic notes, etymology, distribution map of all the members of Bignoniaceae were prepared after studying a total of 3750 herbarium specimens. Endemism and nativity of all the taxa were evaluated.

Oroxylum indicum (L.) Kurz

Tecomella undulata (Sm.) Seem

4. Project : Floristic Diversity and Phytosociological study of Flora of Col. Sher Jung (Simbalbara) National Park, Himachal Pradesh

Executing Scientists : Dr. M.R. Debta & Dr. S. K. Srivastava

Date of Initiation : April 2014

Date to be completion : March 2017

Objective :

To study floristic diversity of Col. Sher Jung (Simbalbara) National Park.

Background of the Project:

During 2014-15, 178 species were identified and 154 species were described; 03 tours were undertaken and 305 field numbers were collected.

Area and locality of the Allotted Project :

c. 27.8 sq. km. lies in subtropical shiwalik region of the Sirmaur District of Himachal Pradesh

Summary of the work done during 2015-16:

During this period, 02 field tours *w.e.f.* 28.09.2015 to 08.10.2015 and 11.03.16 to 13.03.16 in the study area were conducted during which 157 field numbers of plant specimens were collected of which 80 species were identified and 57 species were documented. A total of 350 photographs were captured and identified. In addition to these, 35 quadrates (taking into account GBH for trees; Collar base for herbs and shrubs) were laid down to study the phytosociological aspects of its vegetation. Soil samples from each quadrate were collected for quantitative analysis of edaphic factors influencing floristic components.

Achievements/ Outcomes in 2015-16:

During this period, several medicinal and RET species were collected from the field such as *Asparagus adscendens, Boswellia serrata, Catamixis baccharoides, Curculigo orchioides, Habenaria plantaginea, Rauvolfia serpentina, Sonerila erecta, Vanda tessellata*. The collection of *Catamixis baccharoides* from Simbalbara reports its occurrence from Himachal Pradesh for the first time.

5. Project : Flora of Sonanadi Wildlife Sanctuary Pauri District, Uttarakhand

Executing Scientist : Dr. R. Manikandan

Date of Initiation : April 2014

Date to be completion : March 2017

Objective :

To document floristic wealth of Sonanadi Wildlife Sanctuary

Background of the Project:

Identified 181 species and described 183 species and updated nomenclature for 84 species. Conducted three field tours: 1. 4.05.2015 to 20.05.2015 and collected 213

Phoenix humilis (L.) Cav.

field nos. (*c.* 600 specimens) of about 180 species, 2. 14.5.15-20.5.15 and collected 213 field nos. (*c.* 800 specimens) of about 180 species and collected 18 live plants; 3. 3.9.15 to 11.9.15 and collected 226 field nos. and *c.* 180 species (*c.* 910 specimens) along with 18 live plants incl. 18 RET spp. Area covered: 200, 120, 110 sq. km.

Area and locality of the Allotted Project (with Map):

c. 301 sq. km, Pauri Dt., Uttarakhand.

Summary of the work done during 2015-16:

During this period, 02 field tours *w.e.f.* 14.05.2015-20.05.2015 and 03.09.15-11.09.15 were undertaken to the study area during which a total of 439 field nos. (*c*.1710 specimens) belongs to 360 species were collected along with 107 photographs. A total of 36 live plants including 09 RET species were also collected. 128 species were identified and 53 species were described; nomenclatural citations for 84 species were updated and 100 specimens were incorporated in the BSD herbarium.

Achievements/Outcomes in 2015-16:

During this study, 128 species were identified and description of 53 species were prepared, nomenclatural citations updated for 84 species.

6. Project :Flora of Nandhour Wildlife Sanctuary, Uttarakhand

Executing Scientist : Dr. Kumar Ambrish

Date of Initiation : April 2014

Date to be completion : March 2017

Objective :

To document the floristic wealth of Nandhour Wildlife Sanctuary

Background of the Project:

Conducted three field tours to the area, collected 584 field numbers (1452 specimens), including 07 RET species of live plants and taken more than 700 photographs. Identified 382 species (897 specimens) and described 154 species in detail.

Area and locality of the Allotted Project and Area explored:

c. 269.95 sq. km.

Summary/ Progress of the work done in 2015-2016:

During 2015-16, 02 filed tours were conducted to the study area during which a sum of 382 field numbers of *c* 872 plant specimens including 07 RET species of live plants were collected, examined and field data recorded. RET species *viz. Pholidota articulata* , *Vanda tessellata, Eria pubescens* (Hook.) Lindl., *Aerides multiflorum* and *Luisia brachystachys* (Orchidaceae), one endangered and medicinal tree species *Pterocarpus marsupium* Roxb. (Fabaceae), *Clerodendrum indicum* (Verbenaceae) and *Eria spicata* (Orchidaceae) were introduced in the Experimental Garden of BSI, NRC, Dehradun. A total of 230 specimens (*c* 170 species) were identified and 70 species were described during the reporting period.

Achievements/Outcomes of the Project (2015-16):

This study reported 01 new record (*Senna alata* (L.) Roxb.)

Nandhour Wildlife Sanctuary

Inula cuspidata (DC.) C.B. Clarke

for Northern India from Uttarakhand and new Plant Records of Family Fabaceae for Uttarakhand.

7. Project : Flora of Himachal Pradesh (Gymnosperms-Estt. spp.: 29)

Executing Scientist : Dr. Puneet Kumar

Date of Initiation : April 2015

Date to be completion : March 2016

Area and locality of the Allotted Project :

Himachal Pradesh.

Summary/ Progress of the work done in 2015-2016:

During this period, a list of species from earlier literature was prepared and noted data from Herbarium BSD and DD for Gymnosperms of Himachal Pradesh. Number of families: 5, *viz.* Ginkgoaceae, Ephedraceae, Taxaceae, Pinaceae, Cupressaceae. Number of species described: Ginkgoaceae-1sp.; Ephedraceae-5 spp.; Taxaceae-1 sp.; Pinaceae-10 spp.; Cupressaceae-09 spp.); Studied *c* 184 herbarium specimens and described a total number of 26 species including cultivated species, also consulted the following herbarium BSD and DD for the above said families.

8. Project : *In vitro* propagation of RET species from North-West Himalaya

Executing Scientist : Dr. Giriraj Singh Panwar

Date of Initiation : April 2015

Date to be completion : March 2016

Background of the Project :

In 2015-16 action plan project entitled "In vitro

Female cones of Cedrus deodara (Roxb. ex D. Don) G. Don

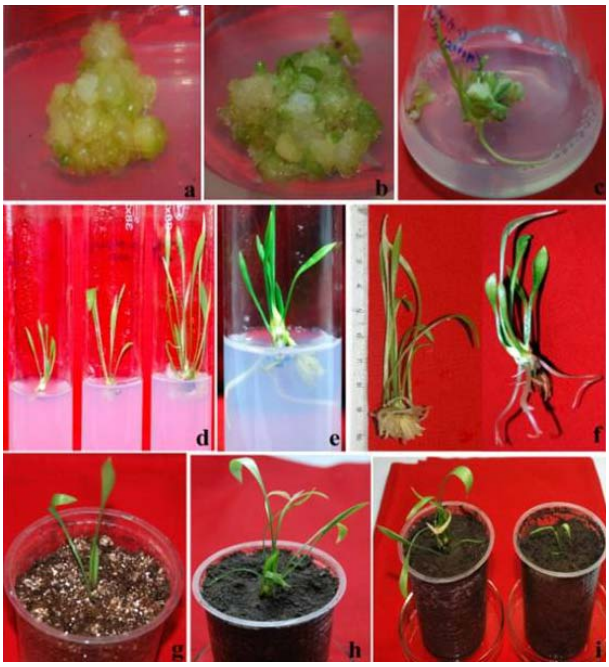
propagation of RET species of North-West Himalaya", tissue culture experiments were conducted on *Eremostachys superba* and *Pittosporum eriocarpum*. Effiecient micropropagation protocol was standardized for the endangered species *Pittosporum eriocarpum* and *Eremostachys superba*. Plantlets were successfully transferred to the open environment as well as field also for the conservation and maintaining the population in wild.

Summary/ Progress of the work done in 2015-2016:

During this period, an efficient protocol has been standardized for in vitro propagation of *Lillium polyphyllum*, a critically endangered and important Astavarga species, using scale explants and plantlets have been successfully transferred to the open environment. Bulb formation has been achieved in field transferred Plants of *Lillium polyphyllum* after 5-6 months. Incipient callusing has been induced in *Indopiptadenia oudhensis* but, further organogenesis could not be achieved due to recalcitrant nature of the species.

Achievements/ Outcomes of the Project (2015-16):

A simple and efficient micropropagation protocol was optimized for the mass multiplication and conservation of critically endangered *Lillium polyphyllum*, a high medicinal value herb.



Tissue culture

9. Project : Flora of Uttrakhand, Vol. 5. [Estt spp.: 1256] (Except Orchidaceae, Poaceae)

Executing Scientists : Dr. P. K. Pusalkar, Dr. Kumar Ambrish**,** Dr. R. Manikandan, Dr. Manas Ranjan Debta, Sh. Durgesh Verma, Sh. Sachin Sharma & Dr. S.K Srivastava

Date of Initiation : April 2015

Date to be completion : March 2017

Objective :

To document the flora of Uttrakhand

Background of the Project :

State Flora of Uttarakhand

Area and locality of the Allotted Project:

Uttarakhand State, N.W. Himalaya.

Summary/ Progress of the work done in 2015-2016:

Dr P.K. Pusalkar: Undertook one floristic survey and plant collection tour from 08/06/2015 to 17/06/2015 for 10 days to Naina Devi Himalayan Bird Conservation Reserve, Nainital and Pawalgarh Conservation Reserve, Ramnagar, Uttarakhand covering ± 140 sq. km area in Tarai [Tarai Sal (*Shorea robusta*), Shiwalik Sal, Mixed deciduous forests, Grasslands] and temperate-sub-alpine zone [temperate Mixed broad-leaved forests, sub-alpine Oak (Ban and Kharsu) forests, Oak-*Rhododendron* forests, Conifer (Pine) forests, Mixed broad-leaved forests, subalpine meadows] at 380–2600 m elevation. Collected 500 field numbers referring to + 430 species. Also he prepared description of 80 species:

Arisaema jacquemontii Blume

Apart from this following work has been done he has identified 475 specimens, studied over 800 specimens in BSD, DD and WII. The study on Flora of Uttarakhand, so far resulted in discovery of one new tribe, three new genera, 18 new species, 15 new records for India, 13 new records for western Himalayan phytogeographic zone and 50 new records for the state.

Dr. K. Ambrish described 34 species under 3 families; **Dr. R. Manikandan** described 29 species compiled the entire manuscript comprises of 898 species, 11 varieties and 10 subspecies under 341 genera belongs to 45 families [Solanacaeae-Ceratophyllaceae],

Dr. Manas Ranjan Debta & Dr. S.K Srivastava: Consulted herbarium for taxa belonging to the genus *Carex,* also consulted relevant literature related to the genus *Carex* L. Apart from that Described 49 species belonging to genus *Carex*.

Sh. Durgesh Verma & Dr. S.K Srivastava: Documented 65 species out of which 25 species are belonging to family Zingiberaceae, 14 species from Iridaceae, 9, 8, 4 and 3 species from Dioscoreaceae, Agavaceae, Musaceae and Hypoxidaceae respectively also one species each belonging to family Cannaceae and Marantaceae have been documented.

Sh. Sachin Sharma & Dr. S.K Srivastava: Documented 61 species from family Cyperaceae of which 32 belonging to Genera *Fimbristylis*, 17and 4 belonging to genus *Kobresia* and *Eleocharis* respectively whereas 2 species each belonging to genera *Fuirena* and *Kyllinga* also described one species each belonging to genera *Juncellus*, *Eriophorum*, *Indocourtesia* and *Isolepis.*

Achievements/ Outcomes of the project (2015-16):

A total of 475 species have been identified; 193 species have been described and all the Scientists and technical associates have achieved their AAP targets successfully.

10. Project : *Ex-situ* Conservation of Endemic, Threatened and Economic Plant Species in the experimental gardens of NRC and documentation of phenological data on flowering & fruiting

Executing Scientists : Dr. B.S. Kholia, Dr. R. Manikandan & Sri B.P. Kadam

Date of Initiation : Ongoing

Date to be completion : Ongoing

Summary/ Progress of the work done in 2015-2016:

During this period, 04 *ex-situ* conservation tours were conducted; one tour to Sonanadi WLS *w.e.f.* 14.5.2015-20.5.2105; one tour to Naina Devi Himalayan Bird Conservation Reserve, Nainital and Pawalgarh Conservation Reserve, Ramnagar, Uttarakhand *w.e.f.* [08.06.2015 to 17.06.2015]; one day field tour to Robber's cave on 16.9.2015 and one tour to Champawat and Pithoragarh districts of Kumaon *w.e.f.* 11-102015 to 17-10-2015. A total of 85 species were collected and maintained in Office garden some of which are *Bischofia javanica, Zingiber capitatum, Wrightia arborea, Luisia trichorhiza, Vanda tessellata, Hedychium spicatum, Trapa natans, Nymphaea alba , Neolitsea pallens , Thalictrum punduanum, Spirodella polyrhiza, Lemna minor* etc.

Achievements/ Outcomes of the Project (2015-16):

During this period, A total of 85 RET/ Endemic plant species were collected and maintained in Experimental Botanic Garden, Pauri.

Cirsium arvense var. *alpestre* Nageli - New Record for India

PLANT CHEMISTRY UNIT, HQRS, KOLKATA

1. Project : Chemical composition & nutritive value of wild edible plants of NE region, India

Executing Scientist : Dr. Tapan Seal

Date of Initiation : April 2008

Date to be completion : March 2017

Summary of the work done during 2015-16:

During this period, a tour was undertaken to different parts of Meghalaya and collected 18 wild plants *viz. Spinacea oleracea, Rhynchotechum ellipticum, Wendlandia wallichii, Malva parviflora, Leucaena leucocephala* etc. The proximate composition (ash, moisture, fat, fibre, proteins, carbohydrates, energy content) of 16 plants was carried out along with mineral content of 18 plants. In addition, antioxidant properties of sixteen plants with four different solvent extracts were carried out. Quantitative analysis of Rutin, quercetin, kaempferol, apigenin, myricetin, gallic acid, catechin, ferulic acid, coumarin, naringin, vanillic acid, caffeic acid, syringic acid content of four wild edible plants were carried out using HPLC. Estimation of water soluble Vitamin (Vit C, Vit B1, B2, B3, B5, B6, B9)in plant sample has been started.

PUBLICATION SECTION, HQRS, KOLKATA

1. Project : Interpretation of Roxburgh Icons in respect to current nomenclature: family Leguminosae

Executing Scientists : Dr. Debasmita Dutta Pramanick & Dr. S.S. Dash

Date of Initiation : April 2015

Date to be completion : March 2018

Objective :

To elucidate the current status of *c.* 230 entries in Icones Roxburghianae: Family Leguminosae

Background of the Project :

'Icones Roxburghianae' or 'Drawings of Indian Plants', a collection of plates prepared under the supervision of William Roxburgh, is accompanied by text from 'Flora Indica'. Out of 2533 plates illustrated in Roxburgh's icons, the family Leguminosae is represented by about 230 species. It is pertinent to stress here that many Indian legume species mentioned in 'Icones Roxburghianae' require further interpretation in view of the correct nomenclatural changes (as per current ICN), as a good no. of species have either been merged or splitted taxonomically. The present project on interpretation of Roxburgh's icons in respect of family Leguminosae was proposed towards the critical analysis of legume species illustrated in Roxburgh's Icones in conformity with present political boundary of India.

Summary of the work done during 2015-16:

During 2015-16, a complete list of entries of the family Leguminosae was prepared from 'Icones Roxburghianae' along with preparation of Leguminous taxa from authentic current literature. A total of 70 entries belongs to 70 taxa were interpretated in view of current ICN and updated nomenclature of the taxa along with vernacular name, description, phenology, distribution, ecology and uses.

Achievements/ Outcomes in 2015-16:

During this study, nomenclature of 70 taxa belonging to 07 genera of the family Leguminosae were updated.

SOUTHERN REGIONAL CENTRE, COIMBATORE

1. Project : Flora of Kerala - Arecaceae

Executing Scientist : Dr. C. Murugan

Date of Initiation : April 2015

Date to be completion : March 2016

Area and locality of the Allotted Project (with Map):

Kerala.

Background of the Project:

Palms, one of the most useful groups of flowering plants, are confined to the tropical regions. They form vital components of forest and agricultural ecosystems, providing a wide range of economic products necessary for daily life. Food and allied produced from palms are acclaimed for their nutritional value and have gained much popularity.

In India 21 genera and 100 species are recorded from three major geographical zones namely Peninsular India, North Eastern India and Andaman and Nicobar Islands.

Summary of the work done during 2015-16 : The family Arecaaceae in India is represented by 11 genera and *c.* 32 species. Based on the herbarium specimens available at the Madras Herbarium and Kerala Forest Research Institute, *c.* 30 spp. under 11 genera are consulted and documented during 2015-16. Of the total recorded species (30 spp.), some of the endemic species (*Arenga wightii*, *Bentinckia condapanna*, *Calamus brandisii*, *Calamus delessertianus*, *Calamus dransfieldii*, *Calamus gamblei*, *Calamus hookerianus* , *Calamus huegelianus*, *Calamus metzianus* , *Calamus nagbettai*, *Calamus neelagiricus*, *Calamus travancoricus*, *Calamus vattayilla*, *Phoenix pedunculata*, and *Pinanga dicksonii* are noteworthy.

Achievements/ Outcomes of the Project (2015-16):

Based on the specimens available at the Botanical Survey of India, Coimbatore, Tamil Nadu and Kerala Forest Research Institute, Kerala, 30 species under 11 genera are consulted. In general, documentation (Family description, key to genera, generic description, key to species, nomenclature, description, phenology, specimens studied) work completed. Among the 30 species, 15 are endemic to the Western Ghats. The updating of nomenclature on each species and typesetting of the manuscript are in progress.

2. Project : Flora of Malabar Wildlife Sanctuary, Kozhikode, Kerala

Executing Scientists : J.H.Franklin Benjamin & RG Vadhyar

Date of Initiation : April 2012

Date to be completion : March 2016

Area and locality of the Allotted Project :

The Malabar WLS is located in Kozhikode District of Kerala. The extent of the sanctuary is 74.215015 sq. km.

Suregada multiflora (A. Juss.) Baill.

Background of the Project:

This project has been initiated in 2012. During 2014-15, 02 field tours were conducted during which 350 field nos. of plant specimens were collected of which 249 species were identified.

Summary of the work done during 2015-16:

During this period, 02 field tours as per action plan were undertaken to Malabar WLS. The first tour was conducted between 22.05.15 - 02.06.15. The second tour was conducted between 05.10.15 - 16.10.15. During the tour, 325 field numbers were collected and about 400 digital

Garcinia morella (Gaertn.) Desv.

photographs of plants and habitats were taken. All 1485 field numbers collected from Malabar WLS have been entered in database format with field data and distribution status

Achievements/ Outcomes of the project :

The maximum number of field numbers was collected at an altitude between 700-800 m (452), where evergreen forests are dominant. Pannikottur R.F., showed highest field number collections(677). Among the 1485 field numbers collected, herbs (480) were dominant, followed by trees (458), shrubs (385) and climbers (152). The meticulous survey of the Malabar WLS, yielded 407 species in 310 genera and 107 families. The most dominant families were Euphorbiaceae (27), Rubiaceae (24), Acanthaceae (20). Rubiaceae with 20 genera, followed by Euphorbiaceae with 19 genera and Poaceae with 16 genera are dominating families in terms of Generic Diversity of the sanctuary. The Malabar Wildlife Sanctuary represents high degree of endemism characterized by the presence of high number of endemic taxa. Out of 407 taxa, 101 are endemic: of which 1 taxa is endemic to India, 9 to Peninsular India, 1 to Kerala, 42 to Western Ghats, 46 to Southern Western Ghats and 2 strict endemic to Malabar WLS constituting 24.8% of the taxa. 17 taxa are under IUCN threatened Categories constituting 4.17% of collected taxa. The top 3 families *viz.*, Euphorbiaceae, Rubiaceae and Acanthaceae have 7, 13 and 8 taxa as endemic respectively. The final manuscript with correct name, synonyms, if any, and with Nomenclature according to ICN and using '*Type Method*'; author citations confirmed with Brummitt and Powell's "*Authors of Plant Names*" and abbreviations of Periodicals confirmed with *BPH* and for Books with *TL-2* is followed by a brief description with phenology, habitat, distributional status and specimen examined is submitted.

3. Project : Flora of Kodaikanal Wildlife Sanctuary, Tamil Nadu

Executing Scientists : Dr. K. Althaf Ahamed Kabeer & Mr. A. Ravi Kiran

Date of Initiation : April 2015

Date to be completion : March 2020

Area and locality of the Allotted Project :

Background of the Project:

Kodaikanal wildlife sanctuary has been declared on 20.09.2013 by the Government of Tamil Nadu under section 26 A1 (b) of Wildlife (Protection) Act, 1972 (Central act 53 of 1972) for the purpose of protecting, propagating and developing wildlife and its environment. The Sanctuary covers 608.95 Sq.Km and falls in Dindigul district and part of Theni district of Tamil Nadu, which are part of

Ancistrocladus heyneanus Wall. ex Graham

Humboldtia brunonis Wall. var. *raktapushpa* Udayan, Tushar & S.George

Western Ghats and rich in biodiversity by possessing 2474 Sq.Km total forest cover excluding 136 Km2 Scrub (FSI 2013). There is a good number of endemic plants, orchids, conifers, endangered plants, Indian Gaur, Sambar, barking deer, mouse deer, wild dogs, giant squirrels and birds like Malabar grey hornbill, Nilgiri flycatcher, black and orange flycatchers and small number of predators in the area.

The vegetation of Kodaikanal Wildlife Sanctuary varies from foothills with 800 m consisting of thorn forest at the lower range and then dry deciduous forest, Sub-montane evergreen forest accompanied by shrub savannah to 1600 m, from 1600 m to 2100 m, the outer montane slopes characterized by grassland savannah and Shola. The pioneer study in this newly evolved wildlife sanctuary will bring out the enormous information on vegetation such as rare, endemic, threatened plants, economical importance, keystone species, species association, plant animal interaction, natural resources of the wildlife sanctuary and threat factors to the biodiversity

Summary of the work done during 2015-16:

During this year, three plant exploration trips (38 days) were conducted to Kodaikanal WLS during which a total of 692 field numbers were collected along with 1100 photographs of plants and habitat vegetation. Collected many endemic and rare species pertaining to this sanctuary. Nomenclature citations and writing of descriptions were initiated. Live specimens of Orchids, Carallumas and Zingibers were collected and sent to NOEG, Yercaud germplasm centre for conservation purpose and further studies. Field Tour Reports were submitted to HoO. Prepared interim field tour reports of Kodaikanal Wildlife Sanctuary, Tamil Nadu and submitted to Wildlife Warden for their local usage. In addition to this, literature on KWLS were consulted and primary data base was prepared, updating of the same is under progress. Poisoning and repoisoning work, segregation of duplicate specimens, mounting and stitching work of previous collection were done. A checklist of RET species that are found in and around KWLS has been made.

Achievements/ Outcomes of the Project (2015-16):

Following endemic species were collected during this year field tour *viz.*, (Red listed plants like *Cotoneaster buxifolius*, *Magnolia nilagirica* and *Symplocos cochinchinensis* endemic plants like *Anaphalis neelgerryana*, *Berberis tinctoria* , *Elaeocarpus recurvatus*, *Garnotia elata*, *Impatiens leschenaultii*, *Osbeckia brachystemon*, *Rhododendron arboreum* ssp. *nilagiricum*, *Rosa leschenaultiana*, *Streblochaete sanjappae*, *Syzygium densiflorum* and *Vernonia bourneana*) were collected. A total of 150 field numbers were identified. Label writing was completed for 150 field numbers consist of 300 specimens.

4. Project : Seaweed Flora of Karnataka Coast

Executing Scientist : Dr. M.Palanisamy

Date of Initiation : April, 2014

Date to be completion : March, 2017

Area and locality of the Allotted Project :

Coastal region of Karnataka

Background of the Project:

This project has been initiated in 2014. During previous year, 01 field tour was conducted during which 226 field nos. were collected from 81 localities of which 213 field nos. were identified.

Summary of the work done during 2015-16:

During this period, a total of 03 field (quarter I, II and IV; totally 38 days) tours were undertaken to Karnataka Coastal region for seaweeds survey and collection. During these exploration tours, a total of 684 field numbers of seaweeds were collected and total of 500 photographs of seaweeds habit , habitats and coastal area were taken. Totally 614 field numbers were identified, nomenclature citations and writing of descriptions were initiated. Two consultation tours were undertaken to CMFRI, Kochin and SNG college, Kollem, Kerala and CSMCRI and CMFRI, Mandapam, Ramnad ,Tamilnadu during second and fourth quarter respectively. Mounting, stitching and labeling works of collected seaweed specimens were completed and 1350 herbarium sheets were made.

Rocky coast with mixed seaweed vegetation at Gorte

Achievements/ Outcomes of the Project (2015-16):

Economically important and endemic seaweeds species were collected during this year field tours. A total of 614 field numbers were identified.

5. Project : Study of Caryopsis in *Eragrostis*, *Sporobolus* and *Tripogon* genera of Poaceae using SEM

Executing Scientist : Dr. K. Althaf Ahamed Kabeer

Date of Initiation : April 2012

Date to be completion : March 2017

Background of the Project:

In the present study the surface features of the caryopses of Indian species of *Eragrostis*, *Sporobolus* and *Tripogon* were taken up. A study on the caryopses morphology of Indian *Eragrostis* using Light Microscope and Scanning Electron Microscope has been worked out during 2012-2014. A total of 44 species have been studied. Eleven species of the genus *Sporobolus* (Poaceae) were taken up for SEM studies and images of caryopsis were taken during 2014-15 period.

Summary/ Progress of the work done in 2015-2016:

During this period, caryopses of a total number of sixteen (16) species of the genus *Sporobolus* (Poaceae) were studied by using of Scanning Electron Microscope including surface ornamentation, shape and size, length of embryo and thickness with cross section of caryopses, *viz*. 1. *S. africanus* 2. *S. capillaris*, 3. *S. coromandelianus*

Caulerpa taxifolia (vahl) Agardh

Padina tetrastromatica Hauck

4. *S. diandrus* ; 5. *S. festivus* ; 6. *S. fertilis*; 7. *S. fimbriatus* ; 8. *S. hajrae* ; 9. *S. humilis* ; 10. *S. ioclados* ; 11. *S. maderaspatanus*; 12. *S. piliferus*; 13. *S. spicatus*; 14. *S. tenuissimus* ; 15. *S. tetragonus* and 16. *S. wallichii* .

Achievements/ Outcomes of the Project:

Caryopsis of 16 species of the genus *Sporobolus* (Poaceae) were studied by using of Scanning Electron Microscope.

6. Project : Study of Pollinia of South Indian Orchids using SEM

Executing Scientist : Dr. G. V. S. Murthy

Date of Initiation : April 2012

Date to be completion : March 2017

Objectives :

To observe SEM images of Pollinia of all available South Indian species of Orchid to overcome taxonomical and phylogenetic Problems

Background of the project:

The family Orchidaceae comprising about 800 genera and *c.* 25,000 species (some estimates as high as 30,000 species). In India, the orchid diversity is represented by about 1,331 species belonging to 186 genera. Orchids are well known for the diversity in pollen morphology. The diversity can be observed at different levels; i.e. arrangement of pollen in pollinia, micromorphology of pollen wall, and pollen wall surface sculpturing or ornamentation. Hence, the structure and shape of pollinia have been used frequently for the classification of orchids.

Area and locality of the Allotted Project : South India.

Dendrobium aqueum Lindl.

Summary/ Progress of the work done in 2015-2016:

During this period, pollinia of 61 species were studied using SEM and 122 images of pollinia were taken.

Achievements/ Outcomes of the Project:

61 Rare and Endangered plants were collected and conservation initiation taken.

7. Project : Seed Morphology of *Ficus* L. using SEM

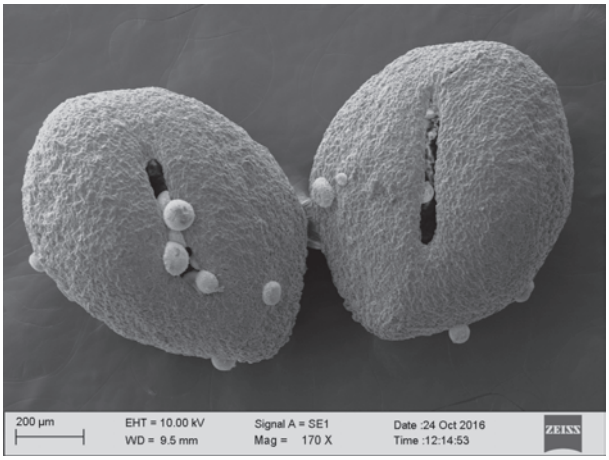
Executing Scientist : Dr. J.V. Sudhakar

Date of Initiation : April 2012

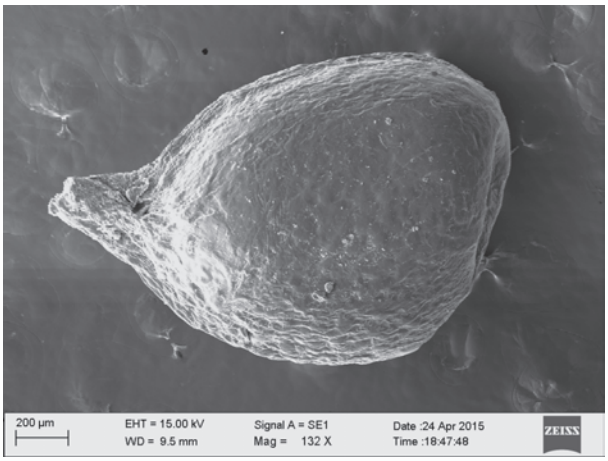
Date to be completion : March 2017

Objectives :

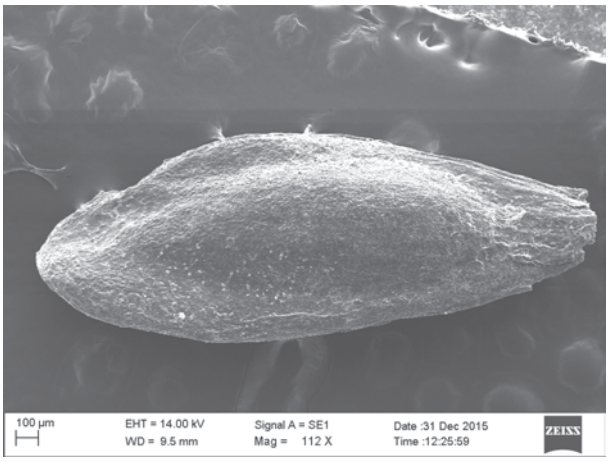
To collect achenes/seeds of *Ficus* species of India from field and duplicates of Herbarium specimens; study variations in shape, size and ornamentations using SEM; analyse the data and document Seed morphology of *Ficus* of India.



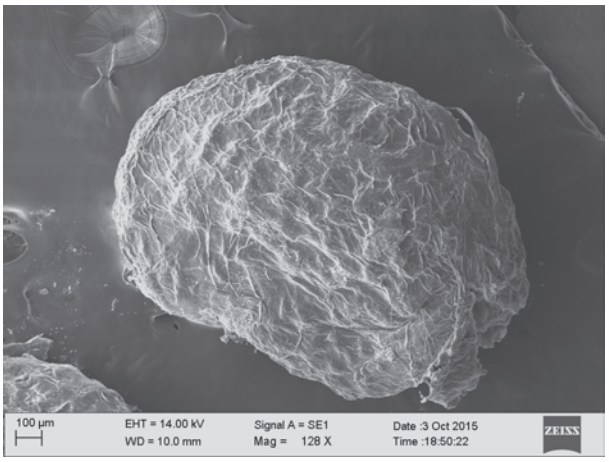
Luisia zeylanica Lindl.



Ficus laevis Blume



Ficus punctata Thunb.



Ficus andamanica Corner

Background of the Project:

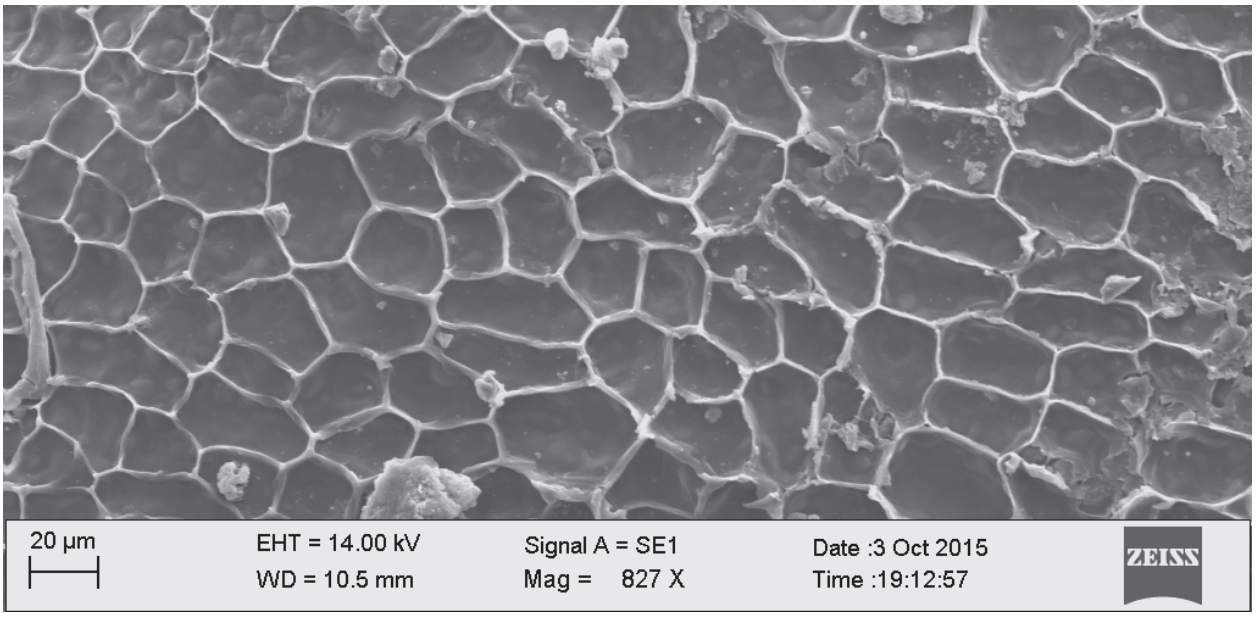
The genus *Ficus* L. (Moraceae) is one of the largest genera in the angiosperms with *c*. 735 species. In India it is distributed with *c*. 115 taxa. It is also considered as one of the most diversified genera with regard to its habit. As no comprehensive study on this genus in India was carried out after King (1888), Botanical Survey of India, Southern Regional Centre has initiated a revisionary study on this genus at country level in 2010. During the review of literature it was observed that there are no SEM studies on the seed morphology for any of the Indian taxa and also at the global level. Therefore, it is proposed here to study the micro morphological characters of seeds along with morphological characters to delimit the taxa. During 2012-2014, Seed morphology of 35 taxa has already been completed and results are analysed.

Summary/ Progress of the work done in 2015-2016:

During this period, 01 field cum herbarium consultation tour *w.e.f.* 11.3.2016 - 30.3.2016 was conducted to BSI, ANRC, Port Blair and Andaman Islands and collected 40 samples of achenes/seeds of *Ficus* sp. Along with photographs. 60 SEM Images were taken from the 20 taxa, *viz. Ficus andamanica, F. clavata, F. hookeriana, F. fistulosa, F. superba, F. hirta, F. prostrata, F. punctata, F. ischnopoda, F. foveolata, F. beddomei, F. recurva* etc.

Achievements/ Outcomes of the Project:

This study reports *Ficus talbotii* King as new record to Andaman & Nicobar Islands.



Leaf of *Ficus dalhousiae* Miq. under SEM

SIKKIM HIMALAYAN REGIONAL CENTRE, GANGTOK

1. Project : Red listing of Orchids of Eastern Himalaya (Entire Sikkim, Darjeeling district of West Bengal and Arunachal Pradesh excl. Changlang and Tirap) as per IUCN criteria

Executive Scientist : Dr. Dinesh Kumar Agrawala

Date of Initiation : April 2013

Date to be completion : March 2018

Objective :

Study of orchid specimens in respect of their identity and geo-coordinates

Background of the Project:

This project is being started in 2013 and during previous year, 03 field tours and 02 herbarium consultation tours were undertaken and studied a total of 5718 specimens.

Area and locality of the Allotted Project (with Map):

Eastern Himalaya (Entire Sikkim, Darjeeling district of West Bengal and Arunachal Pradesh excl. Changlang and Tirap)

Summary/ Progress of the work done in 2015-2016:

During the year 2015-2016, 03 field tours *w.e.f.* 20.08.2015 – 29.08.2015 to West Sikkim, 18.06.2015 to Kabi sacred groove and 16.06.2015 to South Sikkim were conducted in which a total of 82 field nos. were collected and identified 153 taxa from study of 417 specimens. Population of all 102 field numbers was analyzed during the tours. Germplasm of 100 field numbers was introduced in the campus for further studies and *ex-situ* conservation. 50 taxa were characterized through digital, macro-microscopic photo-plates. 550 specimens of BSHC were studied in respect of their identity, label data, assigning geo-coordinates and entry into excel sheet for plotting of map. In this way, several unidentified and wrongly identified specimens at BSHC could be determined with correct identity. Label data entered in 200 specimens collected by self during different field tours in the study area. Orchids from fallen tree logs in and around Gangtok were rescued and introduced in the campus garden. In addition, 01 Herbarium consultation tour *w.e.f.* 12.12.2015 to 25.12.2015 was conducted at BSI, ERC, Shillong (ASSAM) in which 6600 Orchidaceae specimens housed at ASSAM were photographed to note the label data, checked identity and assigned geo-coordinates. All the photographed specimens are being studied in respect of their identity, label data, and nomenclature. Geo-coordinates are to be determined for all specimens for plotting the map and calculating Extent of Occurrence (EOO) and Area of Occupancy (AOO). Taxonomy, nomenclature and typification of many taxa under genera like *Bulbophyllum*, *Calanthe*, *Dendrobium*, *Phreatia*, *Eria*, *Flickingeria* etc. could be solved. Technical expertise for IUCN red listing provided to Botany

Dendrobium hookerianum Lindi

Department, Sikkim University and other relevant institutes/ organizations. In addition, the live orchid specimens were studied at National Orchidarium and Experimental Garden at Barapani, shillong.

Achievements/ Outcomes of the Project (2015-16):

This study reported 01 new species; 01 new record for India and 01 species reduced to synonymy (*Herminium haridasanii* merged under *Herminium monorchis* ; regarding rescue of orchids from fallen tree logs in and around Gangtok, 20 field numbers were collected. 550 specimens of BSHC were studied in respect of their identity, label data and assigning geo-coordinates.

2. Project : Flora of Sikkim: Family Onagraceae

Executive Scientists : Dr. David Lalsama Biate & Dr. D.K. Agrawala

Date of Initiation : October 2015

Date to be completion : March 2017

Objective :

Taxonomic study of the family Onagraceae in Sikkim

Background of the Project:

Onagraceae Juss., commonly known as 'Evening primroses' is a well-defined monophyletic family within the order Myrtales. The family comprises of 22 genera, 657 species, and 806 taxa. While the family is cosmopolitan in its distribution, majority of the species are known to be concentrated in the New World (Raven, 1988; Mabberley, 1997). Onagraceae is one of the most well studied families and has been developed as one of the best known model system for studying plant evolution. Based on molecular evidences, Onagraceae is known to be closely related to Lythraceae within the Myrtalean families (Conti & al.1997). While earlier works of Raven & Axelrod (1974) and Raven (1988) suggested a South American centre of origin of Onagraceae, recent studies by different workers however, have hinted to a wider origin of the family encompassing both South and North America (Berry & al. 2004; Katinas & al. 2004; Levin & al. 2003, 2004). Certain species of the genus *Chamerion* within the tribe Epilobieae are however, exceptions to the predominantly North American distribution of Onagraceae as they are known to be endemic to Europe and Asia, suggesting a complex pattern of diversification of the tribe (Raven 1976; Baum & al. 1994; Levin & al. 2003, 2004). As the Family Onagraceae Juss. has not yet been completed for state Flora of Sikkim, the following project was proposed. This proposed work will provide the treatment of this family for State Flora of Sikkim and bridge the knowledge gap for this poorly understood yet scientifically important family.

Area and locality of the Allotted Project (with Map):

Entire Sikkim (North, South, East and West District).

Summary/ Progress of the work done in 2015-2016:

During the year 2015-2016, a comprehensive checklist of Onagraceae of Sikkim was prepared through literature survey, physical verification of all the specimens of Onagraceae housed at BSHC and by checking the specimens of Onagraceae collected from Sikkim and available in different National and International herbaria. 400 digital images of herbarium specimens of Onagraceae present at CAL, ARUN and ASSAM were obtained for studies. Specimens of Onagraceae present at BSHC were studied and 05 species were identified from the unidentified herbarium specimens studied. Flowers of *Epilobium wallichianum* Hausskn. & *E. cylindricum* D. Don. from dried herbarium sheets were worked out and photographs captured digitally. During the period, 01 local field tour on 17.11.2015 was undertaken to Kabi and surrounding areas of North Sikkim in which a total of 14 field numbers of specimens including 13 orchids were collected and vegetative plants were brought live to BSI, SHRC for further studies and *ex-situ* conservation. All the 13 orchids were introduced into the Campus Garden. Seeds of *Epilobium wallichianum* Hausskn. collected from Kabi was sown at Campus Garden for further study.

Achievements/ Outcomes of the project (2015-16):

During this study, 05 specimens were identified from herbarium sheets and 02 species were characterized through preparation of digital, macro-microscopic photographs.

3. Project : Updating the BSHC Herbarium and its Digitization

Executive Scientist : Dr. Sankararao Mudadla

Date of Initiation : June 2015

Date to be completion : Ongoing

Summary/ Progress of the work done in 2015-2016:

In connection with the ongoing herbarium digitization project, supervised the scanning of 1270 herbarium sheets for digitization (Ferns, Ranunculaceae, Magnoliaceae, Schisandraceae, Annonaceae, Menispermaceae, Papaveraceae and Fumariaceae families) and 3250 entries of field label data in excel format.

Achievements/ Outcomes of the Project (2015-16):

During this period, Supervised the scanning of 1270 herbarium sheets for digitization (Ferns, Ranunculaceae, Magnoliaceae, Schisandraceae, Annonaceae, Menispermaceae, Papaveraceae and Fumariaceae families) and 3250 entries of field label data in excel format.

WESTERN REGIONAL CENTRE, PUNE

1. Project : Floristic diversity of Biligirirangaswamy Temple (BRT) Wildlife Sanctuary, Karnataka

Executing Scientist : Dr. J. Jayanthi

Date of Initiation : April 2013

Date to be completion : March 2017

Background of the Project:

The project has been initiated in 2013. During previous year (2014-15), 03 field tours were conducted during which a total of 401 field no. of plant specimens were collected of which 235 field no. belonging to 233 species were identified. A total of 18 endemic and threatened plant species were identified and 28 economically important and threatened plants were collected and introduced in office garden for *ex-situ* conservation.

Area and locality of the Allotted Project : *c.* 540 sq. km.

Summary/ Progress of the work done in 2015-2016:

During this period, 01 field tour *w.e.f.* 01.09.15 – 15.09.15 was conducted in which a total of *c.* 50 sq.km area was surveyed comprising of different vegetation types. A total of 200 field numbers were collected and photographs were also taken. GPS locations of all the species collected were recorded in the field. Identified 222 field numbers belonging to 208 species. Updated the nomenclature of 200 plant species mentioned in earlier works. 1500 herbarium specimens were sorted out for mounting. 330 herbarium specimens were mounted. In addition, 01 herbarium consultation tour *w.e.f.* 13.02.16 – 21.02.16 was undertaken to French Institute of Pondicherry (HIFP). About 1500 specimens were consulted resulted in documentation of 500 herbarium specimens pertaining to collections from BRT hills. Determinavit slips were attached for about 10 unidentified/misidentified herbarium sheets. Relevant literature was consulted in Library.

Achievements/ Outcomes of the Project (2015-16):

The study reports 01 herbaceous climber of the family Cucurbitaceae (*Gynostemma pentaphyllum* (Thunb.) Makino, collected from study area, as new distributional record for the state of Karnataka; and identified 13 species of endemic and threatened plants protected in the sanctuary such as *Asystasia crispata, Bulbophyllum fischeri, Crotalaria mysorensis, Curcuma pseudomontana, Decaschistia crotonifolia, Diplocentrum recurvum, Disperis neilgherrensis, Indigofera wightii, Ligustrum gamblei, Litsea deccanensis, Memecylon lushingtonii, Myristica dactyloides, Schoenorchis smeeana.* About 28 species were collected and introduced under *ex-situ* conservation *viz. Bulbophyllum fuscopurpureum, Bulbophyllum fimbriatum, Papilionanthe subulata, Coelogyne odoratissima, Coelogyne breviscapa, Dendrobium heterocarpum, Ipomoea campanulata, Hypericum mysorense.*

View of BRT WLS

Elaeocarpus serratus L.

2. Project : An assessment of Orchid diversity of Central Western Ghats: Goa

Executing Scientist : Dr. Jeewan Singh Jalal

Date of Initiation : April 2015

Date to be completion : March 2017

Objective :

To assess the Orchid diversity of central Western Ghats: Goa

Background of the Project :

The study area, situated in the Western Ghats of Goa state, lies between the latitudes 14°532 543 N and 15°402 003 N and longitudes 73°402 333 E and 74°202 133 E , is covering a total area of 3702 sq km. Goa, one of the smallest states in India, is divided into two districts such as North Goa and South Goa. The project was initiated in April 2015 with the aim of evaluation of Orchid diversity of Central Western Ghats, Goa.

Area and locality of the Allotted Project : *c*. 3702 sq. km.

Summary/ Progress of the work done in 2015-2016:

During this period, prior to the field work, based on literature and herbarium consultation in BSI, WRC, a tentative checklist was prepared for orchids of Goa. 02 field tours covering an area of *c*. 210 sq km to Madei Wildlife Sanctuary, Bondala Wildlife Sanctuary, Malpan, Satpal, Mole, Anmod ghat, Surla plateau, Cotigaon Wildlife Sanctuary and its adjacent areas were undertaken in which a total 117 field numbers were collected and 130 photographs were taken. A total 225 GPS records were also taken for mapping of individual orchid species. In each location mature individual of each orchid species were counted for assessment. A total 55 field numbers were identified and 110 herbarium specimens were sorted out for mounting among which 83 herbarium specimens

Bulbophyllum fimbriatum (Lindl.) Reichbf.

were mounted along with detailed label for 10 herbarium specimens. Fresh flowers of different orchid species (*viz. Bulbophyllum sterile*, *Eulophia graminea*, *Peristylus aristatus*) were dissected under microscope. Colored illustrations were prepared for 04 species. A total of 36 species (*Acampe praemorsa*, *Aerides crispa*, *Bulbophyllum sterile*, *Cleisostoma tenuifolium*, *Conchidium exile*, *Conchidium filiforme*, *Conchidium microchilos*, *Conchidium reticosum*, *Cottonia peduncularis*, *Dendrobium aqueum*, *Dendrobium barbatulum*, *Dendrobium herbaceum*, *Dendrobium lawianum*, *Dendrobium nanum*, *Dendrobium nodosum*) were documented of which 15 species are endemic.

Achievements/ Outcomes of the Project (2015-16):

During this study, a total 107 live orchid individuals of 12 orchid species were introduced in the office garden viz., *Geodorum* spp. (01 individual), *Cleisostoma tenuifolium* (24 individuals), *Bulbophyllum* sterile (50 individuals), *Cymbidium* sp. (04 individual), *Smithsonia* sp. (03

Dendrobium ovatum (L.) Kraenzl.

individual), *Zeuxine* spp. (02 individual), *Dendrobium aqueum* (05 individual), *Dendrobium* spp. (02 individual), *Dendrobium lawianum* (06 individual), *Vanda testacea* (08 individual), *Pomatoculpa* sp. (01 individual) and *Vanda wightii* (01 individual). This study also reports 02 species of *Peristylus* Blume as new addition to the flora of Goa, Western Ghats, India and *Habenaria suaveolens* Dalzell as a new distributional record for Goa state.

3. Project : Floristic Survey of Someshwara Wildlife Sanctuary, Karnataka

Executing Scientist : Dr. C. R. Jadhav

Date of Initiation : April 2015

Date to be completion : March 2017

Objective :

To survey and document flora of Someshwara Wildlife Sanctuary, Karnataka

Backgroud of the Project:

The Someshwara Wildlife Sanctuary, located in Western Ghats in Udupi and Shimoga Districts of Karnataka State, lies between 13°29'N and 74°50'E, covers an area of 88.40 sq. km and was subsequently expanded to 314.25 sq. km vide gazette notification No: FEE302 FWL2011-(V) Bangalore-27-12-2011. With expansion, the sanctuary spans across Udupi, Kundanpur, Karkala, Tirthahalli taluka of Udupi and Shivamogga Districts covering Balehalli Reserved Forest, Agumbe State Forest, Someshwara Reserved Forest and Tombatlu Reserved Forest areas including the existing sanctuary. After expansion, the Sanctuary forms a contiguous stretch of protected area which includes Mokambika WLS, Sharavati WLS and Kudremukh National park traversed by the Sitanadi River. The Someshwara Wildlife Sanctuary has a tropical wet evergreen forests, west coast semi-evergreen forests and southern secondary moist mixed deciduous forests in its two forest ranges namely Someshwara range and Ameshbailu range.The project was initiated in April 2015 with the aim of assessment of floristic diversity of the Santuary.

Memecylon randerianum S.M.Almeida & M.R.Almeida

Area and Locality of Allotted Project : *c.* 314.25 sq. km.

Summary/ Progress of the work done in 2015-16:

During this study, 01 field tour *w.e.f.* 27.03.2016 to 14.04.2016 was conducted to the study area in which a total of about 50 sq. km area was surveyed and a total of 261 field numbers were collected for herbarium, garden and museum. It includes some endemic and medicinal species and about 20 epiphytic and 01 terrestrial orchids, some fruits, seeds and corms. Photographs of the vegetation as well as of the individual plant specimens were also taken. GPS locations of almost all the species collected were recorded in the field. About 50 field numbers were tentatively identified in the field.

Achievements/ Outcomes of the Project (2015-16):

Out of a total 261 collected field numbers, about 50 field numbers were tentatively identified in the field. Some important species collected are *Ancistrocladus henyanus, Antidesma sp., Arenga wightii , Bauhinia malabarica, Bulbophyllum sp., Pholidota imbricata, Calamus spp.,* etc.

4. Project : Foliicolous Fungi of Maharashtra

Executing Scientist : Dr. Rashmi Dubey

Date of Initiation : November 2010

Date to be completion : March 2016

Background of the Project:

The project has been initiated in 2010 and during previous year (2014-15), 02 fungal exploration tours were conducted during which 375 field no. were collected of which 338 host plant specimens and 285 fungal specimens were identified.

Area and locality of the Allotted Project (with Map):

c. 3, 07,731 sq.km., Maharashtra state.

Summary/Progress of the work done during 2015-16

During this period, one exploration tour *w.e.f.* 23.09.2015 to 27.09.2015 to various protected forest areas of Aurangabad Dist *viz.* Gautala Autramghat Wild life Sanctuary and its adjoining areas were conducted in which

Leaf spots of Tectona grandis L.

163 host plants were collected. A total of 366 plant specimens were identified of which 37 fungal specimens were cultured on PDA (Potato Dextrose Agar) medium**;** Microscopic measurements of 148 fungal species along with calibrations were scrutinized and completed. In this connection, 01 Herbarium Consultation tour *w.e.f.* 29th - 30th Dec., 2015 to National Fungal Culture Collection Institute (NFCCI), Agarkar Research Institute, Pune was conducted. 490 specimens were incorporated in the Herbarium during the study. All New Findings published (New Species/ New Genus/New records) were submitted to Mycobank – An online database owned by International Mycological Association.

Achievements/ Outcomes in 2015-16:

This study reported 07 species (*Stigmina koyanensis* Dubey & Sengupta, 2016 (MB-813869) on leaves of *Ficus* sp.; *Camposporium memcylii Dubey* sp.nov. (MB 816543)- On leaves of *Memecylon umbellatum* Burm.f.; *Conidiocarpus koyanensis* sp. nov. (MB- 816643) on leaves of *Syzygium cumini* (L.) Skeels; *Periconia chandolensis* sp.nov. (MB- 814190) - On leaves of *Saccahrum officinarum* L.; *Tripospermum melghatensis* sp. nov. (MB 815474)- on leaves of *Terminalia* sp.; *Thirumalacharia thanensis* sp.nov. (MB- 816648)- On leaves of *Coix lacryma-jobi* L.; *Temerariomyces indicum* Dubey sp. nov. (MB – 816648) on leaves of *Nelumbo* sp.) as new to science; 01 variety (*Asterina jasmini* Hansf. var. Koyani) as new to science; 01 genus [*Scolecoxyphium* sp. Ci (Pat. & Har.) G. Arnaud ex Deighton f. & Bat. 1956 (Capnodiaceae)] as new to India; 03 new species record (*Aithaloderma viride Fraser* (Trichomeriaceae), *Acremoniula uniseptata Huseyin* (Anamorphic Ascomycota), *Questieriella* state and Teleomorh state of *Schiffnerula*) to India; 14 new records (*Acrodictys balladynae* (Hansf.) M.B. Ellis, *Ampullifera foliicola* Deighton, *Balladyna vanderystii* (Hansf.) Arx , *Chloridium indicum* Subram., *Meliola tylophorae-indicae* Hosag. & Manojk. etc.) for the state Maharashtra; 01 species (*Helicomina costi* M.A. Salam & P.N. Rao : rediscovered after 65 years) and 03 new reports (*Questieriella state and Teleomorh state of Schiffnerula* sp, *Asterostomella* state of *Asterina jasminicola* W. Yamam.& *Domingoella asterinarum* Petr. & Cif.). During this year 53 New host records were reported for Fungi of India. This was also noticed that the diseases like Powdery mildews, Rust, smuts, leaf spots and sooty mold diseases were frequently reported from the area surveyed.

5. Project : Ferns of Karnataka

Executing Scientist : Dr. A. Benniamin

Date of Initiation : April 2014

Date to be completion : March 2018

Objective :

To bring out a comprehensive floristic account of plant wealth of Karnataka by way of exploring this rich, but under explored area, extensively and intensively.

Osmunda sp.

Background of the Project :

This project has already been initiated in 2014 and during the period (2014-15), 69 fern species were collected of which 65 species were identified.

Area and locality of the Allotted Project : Karnataka state

Summary/ Progress of the work done in 2015-2016:

During this period, 01 field exploration tour *w.e.f.* 14.03.16-23.03.16 to Biligirirangaswamy Temple Wildlife Sanctuary (BRT), Kudremukh National Park, Rajiv Gandhi National Park, Bandipur National Park and Anshi National Park, Karnataka were conducted in which 115 field numbers belonging to 95 species were collected. 14 live ferns belonging to 10 species were also collected to introduce in the botanical garden. A no. of 43 species , collected from earlier exploration, were identified. (*195503 –Pteris biaurita, 195504- Arachniodes aristata, 195506-Dryoathyrium boryanum* etc). In addition, 01 herbarium consultation tour *w.e.f.* 14.03.16 – 23.03.16 to BSI, Coimbatore (MH) and St. Xaviers College, Palayamkottai (XCH) was undertaken. Spores of 21 species (*Pteris longipes, Pteris biauita, Arachniodes aristata, Tectaria coadunata,, Asplenium decresens, Doryopteris concolar, Dryopteris cochleata,Pyrrosia porosa* etc) were studied under Scanning Electron Microscope. 12 fern species, namely *Cyathea gigantea, Angiopteris helferiana, Adiantum concinnum, Cyatheae spinulosa, Pteris argyrea, Pteris biaurita, Microsorium membranaceum, Pyrrosia porosa, Osmunda hugeliana and Asplenium indicum* were collected and introduced in Office Botanical Garden.

Achievements/ Outcomes in 2015-16:

This study reported 04 species namely *Diplazium cognatum, Diplazium muricatum, Diplazium brachylobum and Leptochillus bahupunctica* as new record for Karnataka.

Osmunda sp.

Amorphophallus bulbifer (Roxb.) Blume in East Kameng district of Arunachal Pradesh

Bulbophyllum chyrmangensis D. Verma & al.

India, with its varied geography, topography, climatic regimes, altitude and ecological habitats, ranks among the top ten species rich nations in the world and well known for its rich biological diversity. The diversity of flora, further compounded by the confluence of three biogeographic realms, *viz*. Indo-Malayan, Indo-Arctic and Afro-tropical, is concentrated in four biodiversity hotspots, namely Eastern Himalayas, Western Ghats (and Sri Lanka), NE India and Andaman Islands (Indo-Burma) and Nicobar Islands (Sundaland) which exihibit high degree of endemism and higher incidence of rare and threatened species. A great variety of edaphic, climatic and altitudinal variations have resulted in a wide range of ecosystems and habitats such as humid tropical western Ghats and North-east to the hot deserts of Rajasthan, from cold deserts of Ladakh and lofty mountains of the Himalayas to the long coastal stretches of Peninsular India and Andaman & Nicobar Islands. A significant feature of Indian flora is the amalgamation of floristic wealth of adjoining countries (China, Indonesia, Malaysia, Myanmar, Thailand) along with flora of widely separated continents (Africa, Australia, Europe and USA).

Current estimations revealed a total of 18259 species of angiosperms, 78 species of gymnosperms, 1288 species of pteridophytes, 15053 species of fungi, 7331 species of algae, 2550 species of bryophytes, 2479 species of lichens and 1120 species of microbes in India which is approximately 11.4% of total recorded plant species of the world. The group wise current status of number of species known from India is given below.

Group	No. of Species in India	Percentage of Indian Flora
Virus/Bacteria	1120	2.34
Algae	7331	15.23
Fungi	15053	31.29
Lichens	2479	5.15
Bryophytes	2550	5.20
Pteridophytes	1288	2.68
Gymnosperms	78	0.17
Angiosperms	18259	37.94
Total	48158	100.00

During 2015-16, scientists of BSI discovered 03 new genera, 42 new species and 02 new subspecies/varieties of plants as new to science while new distributional records of 01 genus, 101 species, 01 subspecies and 03 varieties are reported for the first time from India. It is also interesting that during 2015, fungi contributed the maximum with 32 per cent followed by seed plants by 28 per cent, microbes by 13 percent, lichens by 12 per cent and algae by 6 per cent of the total discoveries. Pteridophytes and bryophytes together contributed 9 per cent of the total discoveries.

The list of new discoveries are given below:

NEW TO SCIENCE

SEED PLANT

NEW GENUS

Himgiria Pusalkar & D.K. Singh, J. Jap. Bot. 90: 86. 2015. (CARYOPHYLLACEAE) : areas at 2400–4500 m elevation of Lahul-Spiti divisions of Himachal Pradesh and distributed from Afghanistan to Tibetan Plateau of China.

Plectoglossa (Hook.f.) K.Prasad & Venu, Rheedea 25(2):86.2015. (ORCHIDACEAE): distributed in Shola forest of Nilgiri hills of Western Ghats between 1600-2200m.

Shivparvatia Pusalkar & D.K. Singh, J. Jap. Bot. 90: 81. 2015. (CARYOPHYLLACEAE) : alpine meadows, sandy river banks, rocky grassy slopes at 3000-5500m altitude

Shivparvatia Pusalkar & D.K. Singh (Caryophyllaceae)

NEW SPECIES

Bulbophyllum chyrmangensis D.Verma, S. Lavania & Sushil K. Singh, Phytotaxa 195(1):094.2015. (ORCHIDACEAE) : described from Chyrmang sacred groove, West Jaintia Hills District of Meghalaya, India.

Carex kotagirica A. Maji & V.P. Prasad, Rheedea 25(2):81.2015. (CYPERACEAE): described from Nilgiri Hills, way to Kotagiri, Nilgiri District of Tamil Nadu, India.

Cycas pschannae R. C. Srivast. & Lalji Singh, Int. J. Curr. Res. Biosci. Plant Biol. 2(8):35. 2015. (CYCADACEAE): described based on the collections made from AJC Bose Indian Botanic Garden, Howrah, West Bengal, India

Ficus anamalayana J.V. Sudhakar & G.V.S. Murthy

Ficus anamalayana J.V. Sudhakar & G.V.S. Murthy, Rheedea 25(1):1.2015. (MORACEAE): described based on the collections made from Anamalai Tiger Reserve, in Coimbatore District of Tamil Nadu, India at 300m altitude.

Ficus jarawae G.K. Upadhyay & Chakrab., Phytodiversity 1(1 & 2):71. 2014. (MORACEAE): described based on the collections made from near Dhani Nala, Jarawa Reserve Forest, Middle Andaman Island of Andaman & Nicobar Islands, India.

Huberantha senjiana (R. Muralidharan, Naras. & N. Balach.), R. Muralidhaaran, Naras. & N. Balach., Phytotaxa 217(2):200.2015. (ANNONACEAE): described from Pakkamalai Reserve Forest, Devathanampettai, Gingee, Villupuram District of Tamil Nadu, India at 250m altitude.

Impatiens adamowskiana Gogoi & Borah, Nordic J. Bot. 33: 586. 2015. (BALSAMINACEAE): described

Impatiens ashihoi Gogoi & Borah

based on the collections made from 65 Point Mayodia, Lower Dibang Valley of Arunachal Pradesh, India at 2600m altitude.

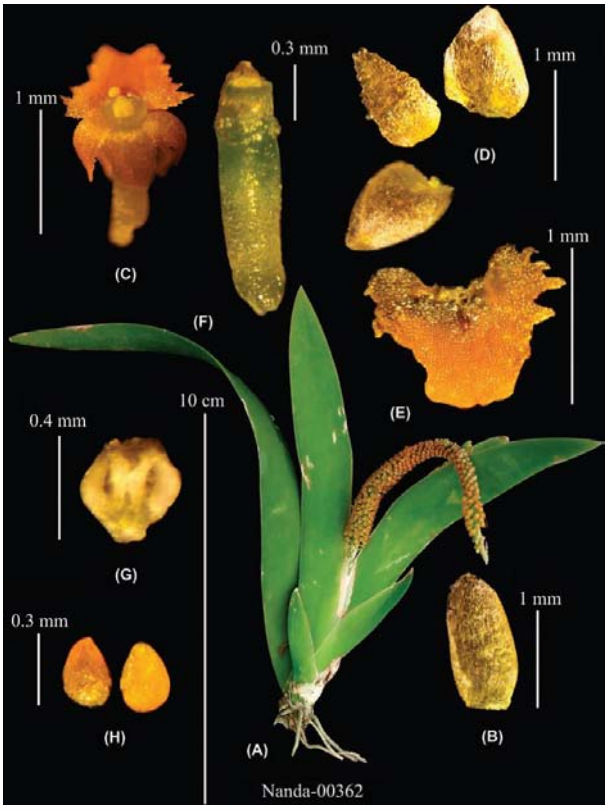
Impatiens ashihoi Gogoi & Borah, Phytotaxa 238 (3): 278.2015. (BALSAMINACEAE): described based on the collections made in between Tiwari Gaon to Mayodia, Lower Dibang Valley of Arunachal Pradesh, India.

Impatiens dalaiensis Gogoi & Borah, Phytotaxa 207(3):286.2015.(BALSAMINACEAE): described based on the collections made from the locality 10km before Chaglagam on the way from Hyuliang, Anjaw District of Arunachal Pradesh, India at 1517m altitude.

Impatiens pathakiana Gogoi & Borah, Telopea 18:121.2015. (BALSAMINACEAE): described based on the collections made from the area, 20 km before Chaglagam, way from Hyuliang, Anjaw District of Arunachal Pradesh, India.

Impatiens siangensis Gogoi, Phytotaxa 192(2): 117.2015. (BALSAMINACEAE): described based on the collections made from the locality between Pasighat and Along, East Siang District of Arunachal Pradesh, India.

Oberonia manipurensis Chowlu, Nanda, A.N. Rao, Angela, Bishwajit & Akimpou, Nordic J. Bot.33:42.2015. (ORCHIDACEAE): described based on the collections made from Tamenglong, Tamenglong District of Manipur, India.



Oberonia manipurensis Chowlu & al.

Pennilabium labanyaeanum C. Deori, N. Odyuo & A.A. Mao

Pennilabium labanyaeanum C. Deori, N.Odyuo & A.A. Mao, Gard. Bull. Singapore 67(1):143.2015. (ORCHIDACEAE): described based on the collections made from Laitkyrhong, 5km from Smith, East Khasi Hills District of Meghalaya, India at 1753m altitude.

Rhododendron mechukae A.A.Mao & A.Paul, Edinburgh J. Bot. 70(1): 57. 2013. (ERICACEAE): described based on the collections made from Mechuka to Yourlung, West Siang District of Arunachal Pradesh, India at an altitude of 2436m altitude.

Rhododendron titapurense A.A. Mao, K.N.E. Cox & D.F. Chamb.

Rhododendron pseudomaddenii A.A.Mao & M. Bhaumik, Edinburgh J. Bot. 72(2): 209.2015. (ERICACEAE): described based on the collections made from Yourlung to Lamang, West Siang District of Arunachal Pradesh, India at 3000m altitude.

Rhododendron titapuriense A.A. Mao, K.N.E. Cox & D.F. Chamb, Plantsman 26.2013.(ERICACEAE): described based on the collections made from the locality near Hanuman Camp, Yang Sang Valley, Anjaw District of Arunachal Pradesh, India at 2350m altitude.

Scrula paramjitii L.J. Singh, Taiwania 60(3):123.2015. (LORANTHACEAE): described from APWD Guest House, Ranghat, Middle Andaman District of Andaman & Nicobar Islands, India at 105m altitude.

Rhododendron pseudomaddenii A.A.Mao & M. Bhaumik

Scurrula paramjitii L. J. Singh

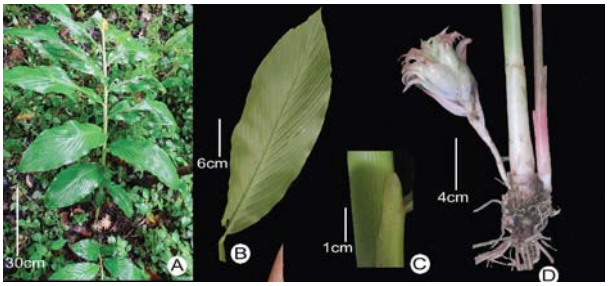
Tripogon mahendragiriensis Chorghe & al.

Stellaria devendrae Pusalkar & S.K. Srivast., Nordic J. Bot. 33(4): 385. 2015. (CARYOPHYLLACEAE): described based on the collections made from Phata-Trijuginarayan, Rudraprayag District, Garhwal Division of Uttarakhand, India at 2000m altitude.

Tripogon mahendragiriensis Chorghe, Sangita Dey, K.Prasad, Prasanna & Y.V.Rao, Nordic J. Bot. 33(6):655.2015.(POACEAE): described based on the collections made from Mahendragiri Hills, Gajapati District of Odisha, India at 1478m altitude.

Zingiber bipinianum D.K.Roy, D. Verma, A.D. Talukdar & M.Dutta Choudhury, J. Jpn. Bot. 90.298.2015. (ZINGIBERACEAE): described based on the collections made from Teptepa, Balpakram National Park, Hatisia Beat, South Garo Hills District of Meghalaya, India at 257m altitude.

Zingiber bipinianum D.K. Roy & al.



Zingiber murlenica Ram. Kumar, Sushil K. Singh & S. Sharma

Zingiber mizoramensis Ram. Kumar, Sushil K. Singh & S. Sharma, Phytotaxa 233(1): 080. 2015. (ZINGIBERACEAE): described based on the collections made from Murlen National Park, Champhai District of Mizoram, India.

Zingiber murlenica Ram. Kumar, Sushil K. Singh & S. Sharma, Phytotaxa 233(1): 080. 2015. (ZINGIBERACEAE) : described based on the collections made from Murlen National Park, Champhai District of Mizoram, India.

NEW VARIETY

Molineria prainiana Deb var. **josephii** D.K.Roy, D.Verma & A.D. Talukdar, J. Jap. Bot. 90(1):61.2015. (HYPOXIDACEAE): described based on the collections made from Namdapha, Changlang District of Arunachal Pradesh, India at 475m altitude.

NEW SUB-SPECIES

Adenophora capillaris Hemsley subsp. **dzukoensis** A.A. Mao, Nandita Sharma & D.K. Roy, Pleione 9(1):211.2015. (CAMPANULACEAE): described based on the collections made from Dzukou valley, Nagaland, India at 2400-2700m altitude.

PTERIDOPHYTES

Huperzia cavei Fraser-Jenk. & B.S.Kholia, Ferns and Fern-allies of Nepal 46.2015. (LYCOPODIACEAE): described from Eumtso La (Pass) Sikkim, India.

BRYOPHYTES

Plagiochila arunachalensis Shuvadeep Majumdar and D.K. Singh, NeBIO 6 (4): 8. 2015. (PLAGIOCHILACEAE): described from Anjaw district of Arunachal Pradesh, India at 3400m.

Acanthothecis subconsocians Pooja Gupta & G.P. Sinha

LICHENS

Acanthothecis subconsocians Pooja Gupta & G.P. Sinha, J. New Biological Reports 4(2): 103. 2015.: described from Pangthang–Rokshe, East Sikkim District, Sikkim, India.

Gyalidea corticola Pooja Gupta & G.P. Sinha, Current Research in Environmental & Applied Mycology 5(2): 145. 2015.: described based on the collections made from Penangla, Sikkim, India.

Melaspilea amarkantakensis S. Joseph & G. P. Sinha, Taiwania 60(1):18. 2015.: described from Ma Ki Bagiya, Amarkantak, Anuppur district, Madhya Pradesh, India.

Synarthonia psoromica S. Joseph & G. P. Sinha, Lichenologist 47(2):128.2015.: described based on the collections made from Armbi Forest, Nilgiris, Tamil Nadu, India.

Synarthonia sikkimensis S. Joseph & G. P. Sinha, Lichenologist 47(2): 128. 2015.: described based on the collections made from Yakche, Lachung-Dombang, Sikkim, India.

Gyalidea corticola Pooja Gupta & G.P. Sinha

Lemanea manipurensis E.K. Ganesan, J.A. West, Zuccarello & J. Rout

ALGAE

Gomphonema doonensis B. Karthick, R. Nautiyal & J.P. Kociolek, Nova Hedwigia 144: 169. 2015. (BACILLARIOPHYCEAE): described based on the collections made from Nalota stream, Dehradun, Uttarakhand.

Gomphonema juetnerrii B. Karthick, R. Nautiyal & J.P. Kociolek, Nova Hedwigia 144: 166. 2015. (BACILLARIOPHYCEAE): described based on the collections made from Nalota stream, Dehradun, Uttarakhand.

Lemanea manipurensis E.K. Ganesan, J.A. West, Zuccarello & J. Rout, Algae 30 (1):3. 2015. (RHODOPHYCEAE): described based on the collections made from Chakpi river, Manipur.

Nitzschia kociolekii B. Karthick, J. C. taylor & P.B. Hamilton, Phycological Research 63: 31. 2015. (BACILLARIOPHYCEAE): described based on the collections made from a Bird feeding pond in Buldana, Maharashtra.

Nitzschia tripudio Alakananda, B. Karthick, J. C. taylor & P.B. Hamilton, Phycological Research 63: 33. 2015. (BACILLARIOPHYCEAE): Bird feeding pond in Buldana, Maharashtra.

Rhoicosphenia gandhii E.W. Thomas, B. Karthick & Kociolek, Diatom Research 30 (1): 36. 2015. (RHOICOSPENIACEAE): described based on the collections made from Galteshwar, near Mahi river, Gujarat, India.

Rhoicosphenia indica E.W. Thomas, B. Karthick & Kociolek, Diatom Research 30 (1): 36. 2015. (RHOICOSPENIACEAE): described based on the collections made from Galteshwar, near Mahi river, Gujarat, India.

Thallassiosira sunderbana B. Samanta & P. Bhadury, Phycological Research 63(2): 104. 2015. (BACILLARIOPHYCEAE): described based on the collections made from Chemaguri Creek, sundarban, West Bengal.

Trentepohlia sundarbanensis G.G. satpati & R. Pal, Phykos 45(1): 2. 2015. (CHLOROPHYCEAE): described based on the collections made from cheramatla Island, Sundarban, west Bengal.

FUNGI

Austroboletus olivaceoglutinosus K. Das & Dentinger, Kew Bulletin 15.70.2015.

(BOLETACEAE): described from Lachen top, North district of Sikkim, India at 2846m.

Boletus lakhanpalii K. Das, D. Chakr., A. Baghela, S. K. Singh & Dentinger, Sydowia 67:15.2015. (BOLETACEAE): described from Dombang, North district of Sikkim, India at 2920m.

Boletus recapitulatus D. Chakr., K. Das, A. Baghela, S.K. Singh & Dentinger, Phytotaxa 234 (2):152.2015. (Boletaceae): described based on the collection made Churten, East district of Sikkim, India at 1454m.

Bondarzewia zonata K. Das, A. Parihar & Hembrom, Turk. J. Bot. 39:129.2015. (BONDARZEWIACEAE): described based on the collection made Dombang, North district of Sikkim, India at 2829m.

Cantharellus sikkimensis K. Das, Buyck, D. Chakr., A. Baghela, S.K. Singh & V. Hofstetter, Phytotaxa 222 (4):273.2015. *(CANTHARELLACEAE):* described from Shingba Rhododendron Wildlife Sanctuary, North district of Sikkim, India at 3208m.

Corneriella indica Raj & Manim. Phytotaxa 213 (2): 107.2015. (TRICHOLOMATACEAE): described based on the collection made from Peechi forest, Thrissur district of Kerala, India.

Boletus recapitulatus D. Chakr. & al.

Bondarzewia zonata K. Das, A. Parihar & Hembrom

Lactarius indochrysorrheus K. Das & Verbeken, Mycotaxon 130.110.2015.

(RUSSULACEAE): described based on the collection made from Dombang, North district of Sikkim, India at 2920.

Lactarius olivaceoglutinus K. Das & Verbeken, Mycotaxon 130.110.2015. (RUSSULACEAE): described based on the collection made from Shingba Rhododendron Sanctuary, North district of Sikkim, India at 3252m.

Lactarius pyriodorus K. Das & Verbeken, Mycotaxon 130.118.2015. (RUSSULACEAE): described based on the collection made from Dombang, North district of Sikkim, India at 2975m.

Lactarius yumthangensis K. Das & Verbeken, Mycotaxon 130.124.2015. (RUSSULACEAE): described from Yumthang valley of Shingba Rhododendron Sanctuary, North district of Sikkim, India at 3586m.

Marasmius indopurpureostriatus K. Das, A.K. Dutta & K. Acharya, Mycosphere 6 (5): 563.2015. (*MARASMIACEAE):* described based on the collection made from Churten, East district of Sikkim, India 1454m.

Sporidesmium biligiriense Dubey and Sengupta,, Curr. Res. Environ. Appl. Mycol. 5 (4): 391.2015.: described based on the collection made from Biligiri Rangaswamy Temple Wildlife Sanctuary of Karnataka, India.

Suillus adhikarii K. Das, D. Chakr. & Cotter, Phytotaxa 219 (3): 290.2015. (*SUILLACEAE*): described based on the collection made under *Larix griffithiana*, at Dombang, North district of Sikkim, India at 2890m.

Bromelia pinguin L.

Suillus lariciphilus K. Das, D. Chakr., K.P.D. Latha & Cotter**,** Cryptogamie Mycologie 36(2):155.2015. (*SUILLACEAE*): described based on the collection made under *Larix griffithiana*, at Dombang, North district of Sikkim, India at 2890m.

DISTRIBUTIONAL RECORDS

SEED PLANT

Aeschynanthus angustioblongus W.T. Wang (GESNERIACEAE): collected from Tirap, Changlang of Arunachal Pradesh and Kohima, Nagaland.

Artabotrys suaveolens (Blume) Blume (ANNONACEAE): collected from India based on the collection made from East-West Road, Great Nicobar Biosphere Reserve and Afra Bay, Andaman & Nicobar Islands at 20-131m.

Bromelia pinguin L . (BROMELIACEAE): collected from Vikramshila Gangetic Dolphin Wildlife Sanctuary, Kahalgaon, Bhagalpur, Bihar, India at 39-48m altitude.

Carpesium cordatum F.H. Chen & C.M. Hu (ASTERACEAE): collected from Kukinakhal, Gangi, Uttarkashi District of Garhwal Himalaya, Uttarakhand, India at 2800-3000m altitude.

Diapensia purpurea Diels

Eria merguensis Lindl.

Diapensia purpurea Diels (DIAPENSIACEAE): collected from Shingba Rhododendron Sanctuary, North Sikkim, India.

Eria merguensis Lindl. (ORCHIDACEAE): collected from Murlen National Park, Champhai District of Mizoram, India at 1550m altitude.

Heterotis rotundifolia (Sm.) Jacq.-Fel. (MELASTOMATACEAE) : collected from India based

Heterotis rotundifolia (Sm.) Jacq.-Fel.

Impatiens yui S.H. Huang

on the collection made from Rangat, Kalsi and Diglipur of Andaman & Nicobar Islands.

Hyoscyamus albus L. (SOLANACEAE): collected from YSR Horticultural University Herbal Garden, Rajendra Nagar, Telangana at 555m altitude.

Impatiens fugongensis K.M. Liu & Y.Y. Cong (BALSAMINACEAE): collected from Myodia, 2-3km ahead towards Hunli, Dibang Valley District, Arunachal Pradesh at 2100m altitude.

Impatiens yui S.H. Huang (BALSAMINACEAE): collected from Myodia, near Shiv Mandir, Arunachal Pradesh.

Impatiens xanthina H.F. Comber

Ixora longibracteata Bremek

Impatiens xanthiana H.F. Comber (BALSAMINACEAE): collected from Chaglagam, Anjaw District of Arunachal Pradesh.

Ixora longibracteata Bremek. (RUBIACEAE): collected from Kodalbasthi Range, Jaldapara National Park, Chilapata Range, Nalrajabadi and Baniya, Jalpaiguri District, West Bengal.

Kobresia loliacea F.T. Wang & Tang ex P.C. Li (CYPERACEAE): collected from Kanebang to Pao Camp, Upper Siang District, Arunachal Pradesh at 3000m altitude.

Memecylon capitellatum L. (MEMECYLACEAE): collected from Periaaruvi Valley, Alagar Hills, Dindigul District of Tamil Nadu at 460m altitude.

Rubus sengorensis Grierson & D.G. Long (ROSACEAE): collected from Dibang Valley, Arunachal Pradesh.

Saurauia sinohirsuta J.Q. Li & Soejarto (ACTINIDIACEAE): Gima gida river bank near Garu, West Siang District at 900m and Boleng to Along road, East Siang district of Arunachal Pradesh.

VARIETAL RECORDS

Cirsium arvense L. var. **alpestre** Nageli (ASTERACEAE): collected from Western Himalaya, Garhwal and Kumaun of Uttarakhand.

Galium boreale L. var. **ciliatum** Nakai (RUBIACEAE):

collected from Dhopardhar, Tehri, Uttarakhand, India at 1400m altitude.

Galium boreale L. var. **intermedium** DC. (RUBIACEAE): collected from Dras, Ladakh, Jammu & Kashmir, India at 2700m altitude.

SUB-SPECIES RECORDS

Cyperus conglomeratus subsp. **curvulus** (Boeckeler)Kukkonen (CYPERACEAE): collected from Balab garden farm, Bikaner District of Rajasthan.

PTERIDOPHYTES

Tectaria puberula (Desv.) C.Chr. (DRYOPTERIDACEAE) : collected from Moozhiyah forest of Pathanamthitta district of Kerala, India at 1010m.

BRYOPHYTES

Bazzania angustistipula N.Kitag. (LEPIDOZIACEAE): collected from Anjaw and West Siang districts of Arunachal Pradesh and West district of Sikkim at 2875 and 2982m altitude.

Bazzania hainanensis L.-P. Zhou & L. Zhang (LEPIDOZIACEAE): collected from Champhai-Khawzawl of Mizoram at 1320m altitude.

Neolepidozia wallichiana (Gottsche) Fulford & J.Taylor (LEPIDOZIACEAE): collected from from Anjaw and Lower Dibang Valley districts of Arunachal Pradesh at 1650 and 950m altitude.

Plagiochila biondiana C.Massal. (PLAGIOCHILACEAE): collected from North district of Sikkim at 3419 and 3590m altitude.

Plagiochila ptychanthoidea Steph. (PLAGIOCHILACEAE): collected from Dampa, Bambu and Ngengpui Wildlife Sanctuary of Mizoram at 291m and 138m altitude.

Riccardia tamariscina (Steph.) Schiffn.

Radula retroflexa Taylor (RADULACEAE): collected from Anjaw district of Arunachal Pradesh and North district of Sikkim at 820 and 923m altitude.

Riccardia tamariscina (Steph.) Schiffn. (ANEURACEAE) : collected from South Andaman and Little Nicobar of Andaman & Nicobar Islands at 19 and 33m altitude.

Solenostoma baueri (Schiffn.) Steph. (SOLENOSTOMATACEAE): collected from East and West districts of Sikkim at 2000 and 2150m altitude.

Solenostoma fusiforme (Steph.) R.M.Schust. (SOLENOSTOMATACEAE): collected from East district of Sikkim at 3109m altitude.

Solenostoma vulcanicola (Schiffn.) Vaòa, Hentschel & Heinrichs (SOLENOSTOMATACEAE): collected from East district of Sikkim at 1600m altitude.

Thysananthus fruticosus (Lindenb. & Gottsche) Schiffn. (LEJEUNEACEAE): collected from Great Nicobar Island of Andaman & Nicobar Islands at 47–73m altitude.

LICHENS

Arthopyrenia saxicola A. Massal. (ARTHOPYRENIACEAE): collected from Mehao Wildlife Sanctuary, Lower Debang Valley district, Arunachal Pradesh.

Arthothelium subbessale (Nyl.) Makhija & Patw. (ARTHONIACEAE): collected from Subansiri River bed, Taliha, Upper Subansiri district, Arunachal Pradesh.

Aulaxina dictyospora R. Sant. (GOMPHILLACEAE): collected from the Andaman Islands, Middle Andaman.

Aulaxina opegraphina Fée (GOMPHILLACEAE): collected from Little Andaman Island of Andaman Islands.

Bulbothrix ventricosa (Hale & Kurokawa) Hale (PARMELIACEAE): collected from the Andaman Islands.

Byssoloma vezdanum Sérus. (GOMPHILLACEAE): collected from Andaman Islands.

Calenia graphidea Vain. (GOMPHILLACEAE): collected from the Andaman Islands.

Chaenothecopsis savanica (Räsänen) Tibell (MYCOCALICIACEAE): collected made from decaying Van Vibhag parishad forest, Kachahari Road, Polibhit district, Uttar Pradesh.

Chiodecton malmei G. Thor (ROCCELLACEAE): collected from Andaman Islands.

Cryptothecia irregularis Lücking, Aptroot, Kalb & Elix (ARTHONIACEAE): collected from Andaman Islands.

Diorygma macgregorii (Vain.) Kalb, Staiger & Elix (GRAPHIDACEAE): from Bhaulkpong-Tenga, West Kameng district, district, Arunachal Pradesh.

Diorygma pachygraphum (Nyl.) Kalb, Staiger & Elix (GRAPHIDACEAE): collected from Mehao Wildlife Sanctuary, Lower Debang Valley district, Arunachal Pradesh.

Graphis crassilabra Müll. Arg. (GRAPHIDACEAE): collected from Balpakgram forest, West Garo hills district, Meghalaya.

Graphis nuda (Magn.) Staiger & Lücking (GRAPHIDACEAE): collected from Mehao Wildlife Sanctuary, Lower Debang Valley district, Arunachal Pradesh.

Graphis oligospora Zahlbr. *apud* Handel-Mazzetti (GRAPHIDACEAE): collected from Mehao Wildlife Sanctuary, Lower Debang Valley district, Arunachal Pradesh.

Graphis paraserpens Lizano & Lücking (GRAPHIDACEAE): collected from Sessa, West Kameng district, Arunachal Pradesh.

Graphis pavoniana Fée. (GRAPHIDACEAE): collected from Mokokchung-Mekong forest, Mokokchung district, Nagaland.

Graphis renschiana (Müll. Arg.) Stizenb. (GRAPHIDACEAE): collected from Tipi, West Kameng district, Arunachal Pradesh.

Herpothallon japonicum (Zahlbr.) G. Thor (ARTHONIACEAE): collected from Phakui Wildlife Sanctuary, East Kameng district, Arunachal Pradesh.

Malmidea psychotrioides (Kalb & Lücking) Kalb, Rivas Plata & Lumbsch (MALMIDEACEAE): collected from Mount Abu, Sirohi district, Rajasthan.

Megalospora atrorubricans (Nyl.) Zahlbr. (MEGALOSPORACEAE): collected from Shergoan, West Kameng district, Arunachal Pradesh. The

Mycoblastus affinis (Schaer) Schauer (MYCOBLASTACEAE): collected from Hotspring-Jachup, Anjaw district, Arunachal Pradesh.

Opegrapha subdimidiata Ertz (ROCCELLACEAE): collected from Bitta, 24-Parganas district, West Bengal.

Opegrapha xerica Torrente & Egea (ROCCELLACEAE): collected from Yakche, Lachung, Sikkim.

Porina tijucana Vain. (PORINACEAE): collected from Shergoan, West Kameng district, Arunachal Pradesh.

Porina sphaerocephala Vain. (PORINACEAE): collected from the Andaman Islands.

Protoparmelia hesperia (Kantivilas & Elix) Kantvilas, Papong & Lumbsch (PARMELIACEAE): collected from the barks of tree, Panbarie Tea–Garden, Panbarie, Dhubri district, Assam.

Relicina relicinula (Müll. Arg.) Hale (PARMELIACEAE): collected from Katchal Island of the Nicobar Islands.

Rhabdodiscus crassus (Müll. Arg.) Rivas (GRAPHIDACEAE): collected from Mehao Wildlife Sanctuary, Lower Debang Valley district, Arunachal Pradesh.

Staurothele rugulosa (A. Massal.) Arnold (VERRUCARIACEAE): from Sajjangarh Wildife Sanctury, Rajasthan.

Strigula microspora Lücking (STRIGULACEAE): collected from the Andaman Islands.

Stirtonia punctiformis Aptroot & Sipman (ARTHONIACEAE): collected from Kalain Tea–Garden, Kalain, Cachar district, Assam.

Trichothelium bipindense F. Schill. (PORINACEAE): collected from the Andaman Islands

Willeya diffractella (Nyl.) Müll. Arg. (VERRUCARIACEAE): collected from Kusalidra forest, Sawaimadhopur, Rajasthan.

ALGAE

Apatococcus lobatus (Chodat.) J.B. Petersen (CHLOROPHYCEAE): collected from Iron fences around AJC Bose Indian Botanic Garden, Howrah, West Bengal.

Aphanocapsa incerta (Lemmerm.) Cornberg & Komárek (CYANOPHYCEAE): collected from Ganga river in Bihar.

Chamaesiphon amethystinus (Rostaf.) Lemmerm. (CYANOPHYCEAE): collected from high mountain stream in West Kameng district of Arunachal Pradesh, India.

Chamaesiphon polonicus (Rostaf.) Hansg. (CYANOPHYCEAE): collected from Thongling stream in Tawang district of Arunachal Pradesh, India.

Chroococcopsis epiphytica Geitler (CYANOPHYCEAE): collected from Ganga river in Bihar.

Cosmarium ornatum Ralfs ex Ralfs (CHLOROPHYCEAE): collected from Ganga river in Bihar.

Entomoneis alata (Ehrenb.) Ehrenb. (BACCILARIOPHYCEAE): collected Ganga river in Bihar.

Euastrum verrucosum Ehrenb. ex Ralfs var. **reductum** Nordst. (CHLOROPHYCEAE): collected from Ganga River in Bihar.

Navicula parietina Kütz. (BACCILARIOPHYCEAE): collected from Ganga River in Bihar.

Prasiolopsis ramosa Vischer (CHLOROPHYCEAE): collected from Banjhakri waterfall, Gangtok, Sikkim.

FUNGI

GENERA RECORDS

Rugiboletus G. Wu & Zhu L. Yang (BOLETACEAE): collected from North and East district of Sikkim, India.

SPECIES RECORDS

Cortinarius salor Fr., (CORTINARIACEAE): collected from Shingba Rhododendron sanctuary, North district of Sikkim, India at 3252m.

Cortinarius variicolor (Pers.) Fr., (CORTINARIACEAE) collected from Dombang and Samthang, North district of Sikkim, India at 2890m.

Hymenochaete damicornis (Link.) Lev.

Hymenochaete murina Bers.

(HYMENOCHAETACEAE): collected from Manjari, Andaman & Nicobar Islands.

Hymenochaete depallens Berk. M. A. Curtis, (HYMENOCHAETACEAE): collected from M. G. National park, Andaman & Nicobar Islands.

Hymenochaete floridea Berk. & Broome (HYMENOCHAETACEAE): collected from Ross Island Andaman & Nicobar Islands.

Hymenochaete murina Bers. (HYMENOCHAETACEAE): collected from Ross Island Andaman & Nicobar Islands.

Hymenochaete muroiana Hino & Katumoto (HYMENOCHAETACEAE): collected from Rut Island Andaman & Nicobar Islands.

Hymenochaete ochromarginata P. H. B. Talbot (HYMENOCHAETACEAE): collected from Manjari Andaman & Nicobar Islands.

Hymenochaete pellicula Berk. & Broome (HYMENOCHAETACEAE): collected from Baratang, Andaman & Nicobar Islands.

Hymenochaete pinnatifida Burt., (HYMENOCHAETACEAE): collected from M. G. National park, Andaman & Nicobar Islands.

Hymenochaete separabilis (Dicks.) Lev., (HYMENOCHAETACEAE): collected from Baratang, Andaman & Nicobar Islands.

Hymenochaete unicolor Berk. & M. A. Curtis (HYMENOCHAETACEAE): collected from Ross Island, Andaman & Nicobar Islands.

Hymenochaete vallata G. Cunn. (HYMENOCHAETACEAE): collected from Mount Harriet, Andaman & Nicobar Islands.

Hymenochaete variegata Bresadola (HYMENOCHAETACEAE): Mount Harriet, Andaman & Nicobar Islands.

Hymenochaete villosa (Lev.) Bres. (HYMENOCHAETACEAE): collected from Baratang, Andaman & Nicobar Islands.

Inonotus lloydii (Clel.) P.K. Buchanan & Ryv. (HYMENOCHAETACEAE): collected from Ross Island, Andaman & Nicobar Islands.

Phellinus cesatii (Bres.) Ryv. (HYMENOCHAETACEAE): collected from M. G. National Park, Andaman & Nicobar Islands.

Phellinus crocatus (Fr.) Ryv. (HYMENOCHAETACEAE): collected from M. G. National Park, Andaman & Nicobar Islands.

Phellinus longisetulosus Bond et. Herr. (HYMENOCHAETACEAE): collected from Rut Island, Andaman & Nicobar Islands.

Phellinus membranaceus Wright et Blumenf (HYMENOCHAETACEAE): collected from M. G. National Park, Andaman & Nicobar Islands.

Phellinus minutiporus Bond. et Herr. (HYMENOCHAETACEAE): collected from M. G. National Park, Andaman & Nicobar Islands.

Phellinus orientalis Bond et Herr. (HYMENOCHAETACEAE): collected from Rut Island, Andaman & Nicobar Islands.

Phellinus pseudopunctatus A. David, Dequatre & Fiasson (HYMENOCHAETACEAE): collected from M. G. National Park, Andaman & Nicobar Islands.

Phellinus reichingeri (Bres.) Ryv. (HYMENOCHAETACEAE): collected from Rut Island, Andaman & Nicobar Islands.

Phellinus resinaceus Kotl. Et Pouz. (HYMENOCHAETACEAE): collected from M. G. National Park, Andaman & Nicobar Islands.

Phellinus rhytiphloeus (Mont.) Ryv. (HYMENOCHAETACEAE): collected from Ross Island, Andaman & Nicobar Islands.

Phellinus rufitinctus (Berk. & Curt. :Cke.) Pat. (HYMENOCHAETACEAE): collected from Ross Island, Andaman & Nicobar Islands.

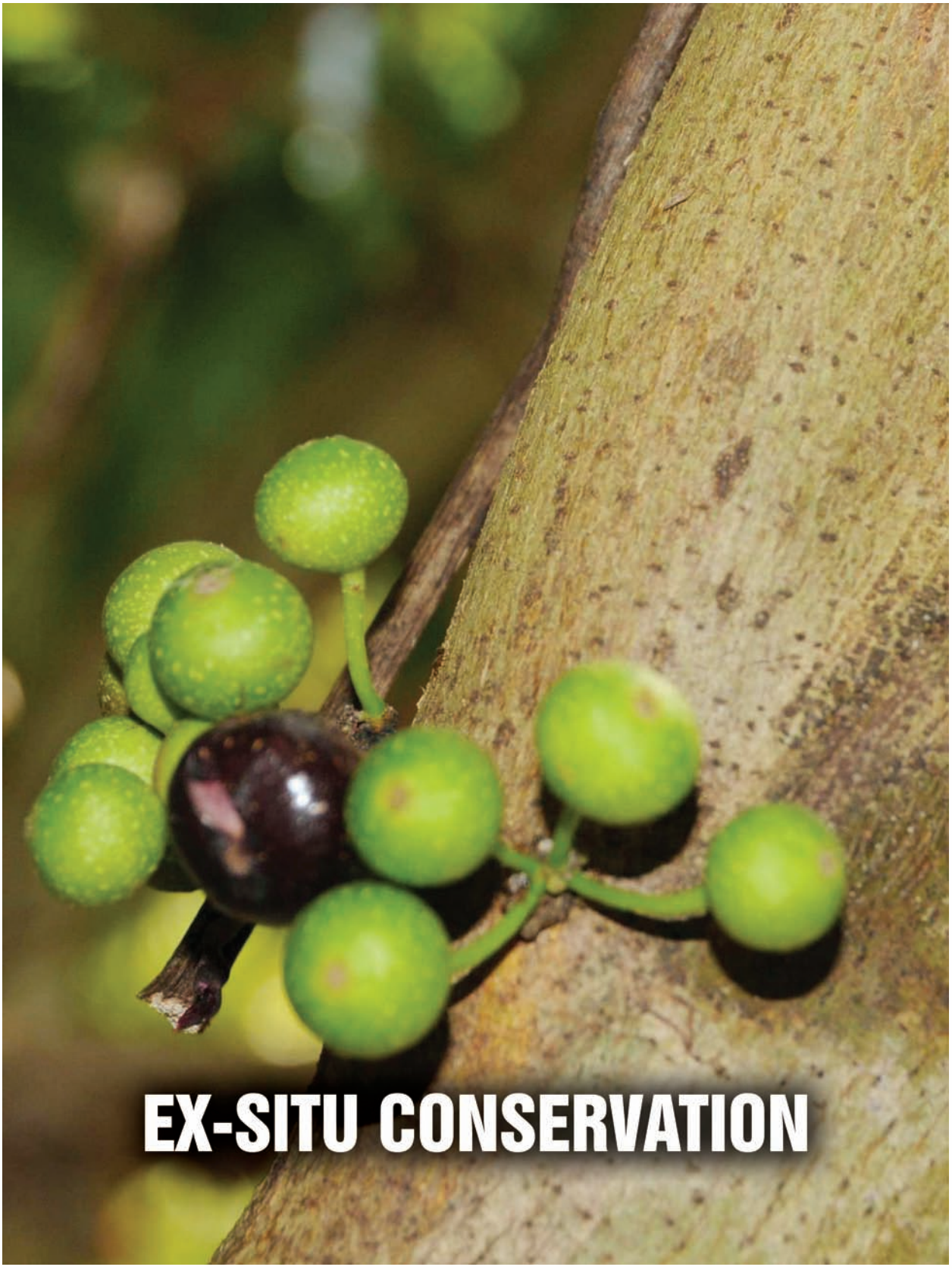
Phellinus sanctigeorgii (Pat.) Ryv. (HYMENOCHAETACEAE): collected from M. G. National Park, Andaman & Nicobar Islands.

Phellinus sonorae Gilbertson (HYMENOCHAETACEAE): collected from Ross Island, Andaman & Nicobar Islands.

Phellinus swieteniae (Murr.) Herr. et Bond. (HYMENOCHAETACEAE): collected from Manjari, Andaman & Nicobar Islands.

Rugiboletus brunneiporus G. Wu & Zhu L. Yang (BOLETACEAE): collected from North and east district of Sikkim, India.

Papilionanthe teres Roxb. Schltr.



Ficus andamanica Corner

Ex-situ CONSERVATION

Botanical Survey of India, the premier research organization under the Ministry of Environment, Forest and Climate Change in the field of taxonomy, has designated botanic gardens in different phytogeographic regions of India. There are total 11 botanical gardens under BSI and its regional centers which are doing excellent work in the field of *ex situ* conservation, biodiversity conservation and botanical garden education.

Sl. No.	Name of the Garden	Regional Centre Jurisdiction	Focal Area
1.	AJC Bose Indian Botanic Garden	Howrah	Tree species, Bamboos
2.	Experimental Garden, Barapani	Shillong	Zingiberaceae, Orchids
3.	Experimental Garden, Dhanikhari	Port Blair	Medicinal plants
4.	National Orchidarium and Experimental Garden, Yercaud	Coimbatore	Orchid
5.	National Gymnosperm collection cum Botanic Garden, Pauri	Dehradun	Gymnosperm
6.	Experimental Garden, Sankie View	Itanagar	Indigenous species of Arunachal Pradesh
7.	Botanic Garden of Indian Republic	Noida	Arboreta, Woodland and Botanic Garden Education
8.	Experimental Garden, Gangtok	Gangtok	Pteridophytes, Orchids
9.	Experimental Garden, Jodhpur	Jodhpur	Arid plants
10.	Experimental Garden, Mundhwa	Pune	Pteridophytes, Gymnosperms
11.	Experimental Garden	Allahabad	Wild Rose and its cultivars

Ex-situ Conservation of Rare/Threatened/Endemic Plants :

A. J. C. Bose, Indian Botanical Garden, Howrah

During 2015-16, 255 plant saplings of 139 species were collected from Tripura, Arunachal Pradesh, Uttarakhand, different districts of North Bengal, Southern Western Ghats and introduced in the garden under *ex-situ* conservation programme. Details of plants collected and introduced are listed below:

Acanthus carduaceus, Aloe jucanda, Alpinia malaccensis, Amoora walichii, Amorphophalus bulbifer, Aquilaria agallocha, Asparagus adscendens, Baccaurea sapida, Bixa orellana, Butea buteiformis, Canna edulis, Ceiba pentandra, Coffea arabica, Coffea benghalensis, Cordia macleodii, Costus erythrophyllus, Croton tiglium, Curculigo capitata, Eleocarpus floribundus, Eleocarpus ganitres, Kaempferia galangal, Kaempferia rotunda, Machilus edulis, Nephrolepis auriculata, Oroxylum indicum, Phlogacanthus thyrsiformis, Piper chaba, Piper longum, Plumbago zeylanica, Pogostemon patchouli, Sapindus mukorossi, Smilax zeylanica, Sterculia villosa, Talinum patens, Tephrosia candida, Vanilla planifolia, Zingiber zerumbet, Aquilaria malaccensis, Bambusa cacharensis, Psidium guineense, Camellia sinensis, Ipomoea batatas, Clerodendrum splendens, Calamus tenuis, Canarium strictum, Dipterocarpus turbinatus, Commiphora wightii, Phyllostachys aurea, Zeuxine longilabris, Cinnamomum verum, Malpighia glabra, Sapindus mukorossi, Melocanna baccifera, Erythrina variegata, Ficus trigona, Bauhinia tomentosa, Butea superba, Pittosporum eriocarpum, Gelonium multiflorum, Tabeubia palmeri, Cycas indica, Zamia pumila, Datura stramonium, Gardenia lucida, Bougainvillea spectabilis (var. Chitra, Pallavi, Mahara (Abnormal), Tulu Queen, Dr. H.B. Singh, Hawain white, Los Banos Beauty), (cuttings: Himani, Mary Palmer special, Begum Sikandar, Wajid Ali Shah, Splendens),

Canna indica, Aerides odorata, Acampe rigida, Biermannia jainiana, Bulbophyllum parviflorum, Bulbophyllum guttulatum, Ceratostylis himalaica, Cymbidium devonianum, Coelogyne fimbriata, Coelogyne rigida, Coelogyne stricta, Dendrobium densiflorum, Dendrobium devonianum, Dendrobium jenkinsii, Dendrobium palpebrae, Dendrobium transparens, Dendrobium crepidatum, Dendrobium chrysanthum, Dendrobium heterocarpum, Dendrobium nobile, Eria discolour, Eria pannea, Eria paniculata, Esmeralda cathcartii, Flickingeria fugax, Rhynchostylis retusa, Nervilia macroglossa, Oberonia verticillata, Goodyera procera, Otochilus fuscus, Vanda cristata, Paphiopedilum venustum, Elaeocarpus floribundus, Syzygium kurzii, Arenga wightii, Bentinckia condapanna, Calamus gamblei, Calamus huegelianus, Calamus metzianus, Calamus thwaitesii, Calamus pseudotenuis, Calamus travancoricus, Calamus shendurunii, Calamus nagbettai, Calamus vattayila, Pinanga dicksonii, Phoenix pusilla.

As part of AJCBIBG's active *ex-situ* conservation programmes, artificial pollination attempts/ breeding experiments on *Lodoicea maldivica* - The Double Coconut Palm (a single representative of its kind) and a female palm introduced in India and conserved in the Large Palm House of AJCBIBG, Howrah) were under trials since 2006 for fruit setting. The said pollination/ breeding experiment was of a cross-country nature by first arranging pollens from Peradeniya Botanic Garden, Sri Lanka and later from Nong Nooch Tropical Garden, Thailand. The pollens received from Sri Lanka from time to time were tested for pollination but not produced any effective result until 2012. Finally, pollination carried out with the fresh pollens procured from Nong Nooch Tropical Garden, Thailand (pollen received in a closed vial through high speed courier) in July 2013 has shown a land mark success by setting fruit for the first time in India. At present fruits are actively developing and showing healthy growth in different phases of development within 2 years period. Three attempts of artificial pollination have been made to fertilize the newly emerged inflorescence (containing 6 female flowers) in the month of July, 2015. Currently the pollinated flowers are under constant observation. The female flowers which were got successfully fertilized for the first time in August, 2013 have gone through various growth phases and attained enormous sizes of the fruits; measuring size of bigger fruit is 52 cm in length and 112 cm in diam. and the smaller fruit is 45 cm in length and 80 cm in diam.

The 'Giant Water Lilies' (*V. amazonica* & *V. cruziana*), the pride possession of AJCBIBG, are being cultivated, multiplied, and distributed to different Universities and Institutions of India. Both *V. amazonica* & *V. cruziana* are being multiplied from seeds (about 500 seedlings each) and well maintained at different lakes of AJCBIBG. At present, luxuriant growth of 'The Giant Water Lilies' can be seen in Kunstler, Dewan and Shadir Lakes of AJCBIBG - as the part of regular maintenance programme.

Andaman & Nicobar Regional Centre, BSI, Dhanikhari Experimental Garden-cum-Arboretum, Port Blair

During the *ex-situ* conservation programme, the following plant specimens were collected and introduced in Dhanikhari Experimental Garden cum Arboretum, ANRC:

Aerides emericii (18 nos.); *Aglaia andamanica* (06 nos.); *Angiopteris evecta* (08 nos.); *Anoectochilus arasimhanii* (04 nos); *Areca triandra* (15 nos.); *Arisaema saddlepeakense* (02 nos.); *Bentinckia nicobarica* (10 nos.); *Calamus andamanicus* (37 nos.); *Ceratopteris thalictroides* (06 nos.); *Christella dentata* (03 nos) ; *Cycas rumphii* (08 nos.); *Cycas zeylanica* (14 nos.); *Dinochloa scandens* var. *andamanica* (06 nos.); *Diospyros pyrrhocarpa* (06 nos.); *Diplazium esculentum* (04 nos.); *Elaeocarpus macrocerus* (15 nos.); *Eria andamanica* (16 nos.); *Euphorbia epiphylloides* (12 nos) *Fagrarea frarans* (14 nos) ; *Ficus andamanica* (02 nos); *Flickingeria fimbriata* (10 nos.); *Habenaria andamanica* (02 nos.); *Horsfieldia glabra* (08 nos.) ; *Korthalsia rogersii* (10 nos); *Korthalsia laciniosa* (34 nos.); *Mangifera andamanica* (30 nos.); *Mangifera sylvatica* (06 nos.); *Mesua manii* (06 nos.); *Mimusops andamanensis* (30 nos.); *Myristica andamanica* (10 nos.); *Oberonia iridifolia* (10 nos.); *Phoenix andamanensis* (08 nos.); *Phoenix paludosa* (15 nos.) *Planchonia andamanica* (04 nos.); *Podocarpus neriifolius* (04 nos.); *Pronephrium meniscicarpon* (06 nos.) ; *Pseudostachyum polymorphum* (05 nos.) ; *Pteris griffithii* (03 nos.) *Pteris mertensioides* (05 nos.); *Schizostachyum kalpongianum* (04 nos.); *Schizostachyum andamanicum* (09 nos.); *Sphaeropteris albo-setacea* (05 nos.); *Syzygium andamanicum* (05 nos.); *Terminalia manii* (20 nos.); *Trigonum viridissimus* var. *viridissimus* (12 nos.) ; *Bentinekia nicobarica* (02 nos); *Calamus andamanicus* (02 nos.); *Cycas zelanica* (10 nos.); *Dillenia andamanica* (05 nos.); *Diosphyros marmorata* (30 nos.); *Mangifera griffithii* (03 nos.); *Phoenix andamanensis* (10 nos.); *Syzgium andamanicum* (03 nos.); *Dracaena helferiana* (25 nos.); *Tectaria polymorpha* var. *polymorpha* (06 nos.); *Vanilla andamanica* (03 nos.)

Seeds: *Garcinia andamanica* var. *andamanica* (30 nos.); *Pinanga manii* (100 nos.)

Arid Zone Regional Centre, Jodhpur

During this period, RET plants (*Acacia jacqmontii,*

Ceropegia bulbosa, Commiphora wightii, Corchorus depressus, Dipterygium glaucum etc.), Medicinal plants (*Calotropis gigantea, Cestrum nocturnum, Ealeocarpus sphericus, Eclipta prostrata, Jasminum grandiflorum, Jasminum humile* etc.), Economically important plants (*Bambusa vulgaris, Ceiba pentandra, Dendrocalamus strictus, Litchi chinensis* etc.), Ornamental plants (*Almanda cathartica, Bignonia capreolata, Cliandra haematocephala, Euphorbia pulcherrima* etc.), Ethno-religious plants (*Adansonia digitata*), Gingers (*Alpinia galanga, Alpinia malaccensis, Amomum sericeum, Boesenbergia longiflora* etc.) were introduced in the garden.

Arunachal Pradesh Regional Centre, Itanagar

During 2015-16, 62 RET/Endemic plant species were introduced and conserved in the experimental garden, some of which are *Acampe papillosa, Aerides rosea, Agrostophyllum callosum, Arachnis labrosa, Bulbophyllum careyanum, Bulbophyllum gamblei, Bulbophyllum guttulatum, Bulbophyllum parviflorum, Calanthe bicolor, Ceratostylis himalaica, Coelogyne fimbriata, Coelogyne fuscescens, Coelogyne stricta, Cologyne ovalis, Cymbidium bicolor, Cymbidium munronianum, Dendrobium aduncum, Dendrobium aphyllum, Dendrobium chrysanthum, Dendrobium farmer, Dendrobium fimbriatum, Dendrobium jenkinsii, Dendrobium lituiflorum, Dendrobium moschatum, Dendrobium nobile, Dendrobium vexabile, Dendrobiun longicornu, Epigenium rotundatum, Eria carinata, Eria lasiopetala, Eria stricta, Esmeralda cathcartii, Fickingeria fugax, Gastrochilus calceolaris, Goodyera procera, Liparis bootanensis, Luisia trichorhiza, Nervillia macroflossa, Oberonia acaulis, Oberonia kamlangensis, Panisea tricallosa, Papilionanthe teres, Phaius flava, Phaius mishmensis, Phaius wallichii, Phalaenopsis lobbii, Phalaenopsis mannii, Pholidota chinensis, Rhynchostylis retusa, Schoenorchis gemmata, Smitinandia micrantha, Tylostylis discolour* etc.

Central Regional Centre, Allahabad

During 2015-16, phenological data of 100 species growing in the garden were recorded. 14 plant species were introduced in the garden, these are *Catamixis baccharoides, Phlomoides superba, Selaginella adunca, Pittosporum eriocarpum, Gloriosa superba, Oroxylum indicum, Buchanania cochinchinensis, Indopiptadenia oudhensis, Curculigo orchioides, Selaginella bryopteris, Nelumbo nucifera, Drosera burmanii , Platanus orientalis.* Seven seedings of *Drosera burmanii* were sent to BSI/NRC/Dehradun. Supplied germplam of *Rauvolfia serpentina, Andrographis paniculata, Strychnos nux-vomica, Clitoria ternatea, Withania somnifera* and *Terminalia arjuna* to Homeopathic College, Allahabad.

Deccan Regional Centre, Hyderabad

During this period, 100 samples of Orchids have been introduced in the campus and their growth/ survival rate was observed along with introduction of two (02) medicinal plants *viz. Vernonia amygdalina* (Asteraceae) and *Bacopa monnieri* (Plantaginaceae). Seedlings of *Digitalis purpurea* (Plantaginaceae) were raised and introduced in a plot at campus garden.

Eastern Regional Centre, Shillong

Ex-situ conservation of RET/ Endemic Plants: RET plants (67 nos.)

During this period, the following species were introduced and conserved in the garden, *viz. Acampe ochracea, Acampe rigida, Aerides multiflora, Arachnis labrosa, Artabotrys hexapetalus, Bulbophyllum careyanum, Bulbophyllum delitescens, Bulbophyllum gamblei, Bulbophyllum odoratissimum, Bulbophyllum reptans, Bulbophyllum sunipia, Calanthe biloba,Calanthe clavata, Cephalantheropsis obcordata, Ceratostylis himalaica, Cleisomeria pilosulum, Cleisostoma paniculatum, Coelogyne flaccida, Coelogyne ovalis, Coelogyne prolifera, Coelogyne schultesii, Coelogyne suaveolens, Coelogyne viscosa, Cycas pectinata, Dendrobium delacourii, Dendrobium acinaciforme, Dendrobium anceps, Dendrobium chrysotoxum, Dendrobium densiflorum, Dendrobium devonianum, Dendrobium falconeri, Dendrobium formosum, Dendrobium infundibulum, Dendrobium jenkensii, Dendrobium lituiflorum, Dendrobium moschatum, Dendrobium nobile, Dendrobium ochreatum, Dendrobium pulchellum, Dendrobium wardianum, Epipogium roseum, Eria acervata, Eria amica, Eria biflora, Eria lasiopetala, Eria pannea, Eria tomentosa, Esmeralda clarkei, Eulophia graminea, Gastrochilus calceolaris, Gastrochilus obliquus, Gnetum gnemon, Gymnocladus assamicus, Oberonia acaulis,Oberonia mucronata, Panisea tricallosa, Panisea uniflora, Pelantheria insectiferia, Phalaenopsis parishii, Pholidota articulata,Pholidota imbricata, Pholidota convallariae, Renanthera imschootiana, Rhyncostylis retusa, Saccolabiopsis pusilla, Schoenorchis gemmata* and *Vanda coerulea.* The following endemic plants (4 nos.) **:** *Amentotaxus assamica, Platycerium wallichii, Gymnocladus assamicus,* and *Pyrinaria khasiana* were also conserved in the garden of ERC, Shillong.

IN VITRO/Micro-propagation of RET Plants

Ilex khasiana, Paphiopedilum hirsutissimum, Rhododendron coxianum, Armodorum senapatianum, Cymbidium tigrinum, Cymbidium elegans.

Ilex khasiana Purkayastha, R.P.: Nodal explant

experiment in different concentration of hormone is in process. Inoculated *Ilex khashiana* after surface sterilization in 10% (tender ones shoots) and in 20% (mature explants) Sodium hypochloride.

Paphiopedilum hirsutissimum (Lindl. ex Hook. f.) Stein: Experiment on seed germination in different medium such as in control, Aloe, banana, charcoal, coconut, Hengduan Cypripedium medium are in progress. Cultured seeds of *P. hirsutissimum* in 10 % of coconut MS medium.

Rhododendron coxianum Davidian: In vitro experiment on nodal and leaves for multiple shoot induction experiment in different concentration of 2iP and in control are in progress. Multiple shoot induction in different concentration of 2iP in WPM is completed in control, 0.1, 0.2, 0.3, 0.4, 0.5 mg/L. Transferred 100 plants from lab to land in greenhouse. Cultured 400 nodes of *Rhododendron coxianum* in 1/2WPM. Inoculation of 350 nodes of *Rhododendron coxianum* done for multiple shoot induction experiment. Subcultured 300 nos. explants of *Rhododendron coxianum* to ½ strength WPM.Transferred 100 plants of *Rhododendron coxianum* to fresh substratum in green house.

Armodorum senapatianum Phukan & A.A. Mao: Set up a new experiment with coconut, banana, Aloe and control in WPM. *Armodorum senapatianum* and *Cymbidium tigrinum* in MS (5.6, 5.8 PH), 10% Coconut (5.6, 5.8 PH), and 10 % , Aloe (5.6, 5.8 PH) were subcultured. 500 plants of *Armodorum senapatianum* were subcultured and experiments set up with coconut, 2 % charcoal etc. About 1200 plants were transferred Lab to land.

Cymbidium tigrinum E.C. Parish & Hook.f.: Subculture of *Cymbidium tigrinum* and *Cymbidium elegans* in 10 % coconut, MS, in different pH were completed. 50 plants of *Cymbidium tigrinum* were transferred from greenhouse to garden.

Northern Regional Centre, Dehradun

Ex-situ conservation of RET/ Endemic Plants

During 2015-16, 04 tours were conducted in Sonanadi WLS, Naina Devi Himalayan Bird Conservation Reserve and Pawalgarh Conservation Reserve, Ramnagar, Robber's cave and Champawat and Pithoragarh District and collected the following species *viz. Bischofia javanica, Zingiber capitatum, Wrightia arborea, Luisia trichorhiza, Vanda tessellata, Eria pubescens, Remusatia vivipara, Rhaphidophora pertusa, Murdannia scapiflora, Firmiana pallens, Ardisia solanacea, Diospyros exsculpta, Terminalia alata, Lagerstromia parviflora, Stereospermum chelonoides, Hedychium spicatum , Trapa natans, Nymphaea alba , Neolitsea pallens , Thalictrum punduanum, Spirodella polyrhiza, Lemna minor , Hydrilla verticillata, Typhonium diversifolium, Wulfenia amherstiana , Hemiphragma heterophylla, Epipactes helleborine, Ophiopogon intermedius, Nephrolepis biserrata, Polystichum discretum, Selaginella subdiaphana, Equisetum diffusum, Asplenium dalhousiae, Pyrrosia floculosa, Lepisorus contortus, Adiantum incisum, A. phillipense, A. capillus-veneris, Christella dentata, Tectaria coadunata, Pteris stenophylla, Pteris vittata, Hypodematium crenatum, Rhynchostylis retusa, Selaginella bryopteris, Diplazium maximum, D. subsinuatum, D. esculentum, D. spectabile , Arachniodes aristata, Cyrtomium falcatum, Wallichia densiflora, Huperzia cernua, Pyrrosia mannii, P. costata, P. lanceolata, Cyathea spinulosa, Thelypteris ornata, T. dentata, Thelypteris papillio, T. tylodes, Athyrium cuspidatum, Plagiogyria euphlebia, Ampelopteris prolifera, Pteris viattata, P. wallichiana, P. subquinata, Dennestaedtia scabra, Polystichium squrrossum, P. lantum, Dryopteris cochleata, D. Sparsa.*

IN VITRO / Micro-propagation of RET Plants

Protocol has been standardized for the *in vitro* propagation and mass multiplication of *Lillium polyphyllum*, a critically endangered and important Ashtavarga species, and plantlets have been successfully transferred to thefield. Bulb formation has been achieved after 5-6 months.

Western Regional Centre, Pune

During this period, the following Orchids such as *Aerides cylindrica, Bulbophyllum fimbriatum, Bulbophyllum fuscopurpureum, Bulbophyllum sterile , Cleisostoma tenuifolium, Coelogyne breviscapa, Coelogyne odoratissima, Dendrobium aqueum, Dendrobium heterocarpum, Dendrobium lawianum, Eria pseudocalvis, Geodorum densiflorum, Oberonia brunoniana, Oberonia ensiformis, Vanda testacea, Zeuxine longilabris*; Ferns such as *Adiantum concinnum, Vittaria elongata, Osmunda hugeliana, Pteris biaurita, Microsorium membranaceum, Pyrrosia porosa, Angiopteris helferiana, Cyathea gigantea, Cyathea spinulosa, Asplenium indicum;*

Other angiosperms such as *Ipomoea campanulata, Hypericum mysorense, Dioscorea tomentosa, Lilium wallichianum* subsp. *neilgherense , Crotalaria lunulata, Argyreia cuneata, Antiaris toxicaria, Polyalthia corintii, Salacia chinensis, Careya arborea, Morinda citrifolia, Areca triandra, Cordia cerasoides, Solanum macranthum, Barleria sepalosa, Barleria cristata, Barleria grandiflora* were also introduced and maintained in the garden.

Rhododendron campanulatum D. Don

Pteris biaurita L.

RESEARCH PUBLICATIONS

(April, 2015 - March, 2016)

ADAMÈÍK, S., L. CAI, D. CHAKRABORTY, X.H. CHEN, H.V.T. COTTER, D.Q. DAI, Y.C. DAI, K. DAS, C.Y. DENG, M. GHOBAD-NEJHAD, K.D. HYDE, E. LANGER, K.P.D. LATHA, F. LIU, S.L. LIU, T.T. LIU, W. LV, S-X. LV, A.R. MACHADO, D.B. PINHO, O.L. PEREIRA, I.B. PRASHER, A.W.C. ROSADO, J. QIN, W.M. QIN, R.K. VERMA, Q. WANG, Z.L. YANG, X-D. YU, L.W. ZHOU AND B. BUYCK. 2015. Fungal Biodiversity Profiles 1–10. *Cryptogamie, Mycologie* 36(2): 121–166.

AGRAWALA, D. K., M.U. SHARIEF AND B. K. SINGH. 2016. "*Bulbophyllum paramjitii* (Orchidaceae: Epidendroideae), a new species from Sikkim Himalaya, India". *Phytotaxa* 273 (1): 72.

AGRAWALA, D.K., LAWKUSH AND VIKAS KUMAR. 2015. A new synonym of *Herminium monorchis* (Orchidaceae). *Indian J. For.* 38 (2): 155-158.

AGRAWALA, D.K., T.K. MANDAL AND C. RATH. 2015. Conservation status of *Ashtavarga* drug "*Vriddhi*" in Sikkim Himalaya. *Medplant* 8: 2, 8.

ARISDASON, W. AND P. LAKSHMINARASIMHAN. 2015. Know your Botanist – William Roxburgh: The Father of Indian Botany. *ENVIS Newsletter* 20(1): 11.

ARISDASON, W. AND P. LAKSHMINARASIMHAN. 2015. Report on Intensive National Level Capacity Building Training Course in Plant Taxonomy. *ENVIS Newsletter* 20(1): 6.

BANDYOPADHYAY, S. 2015. Author attribution and lectotypification of the name *Bauhinia diphylla* (Fabaceae: Caesalpinioideae). *Edinburgh J. Bot.* 72(2): 215–217.

BANDYOPADHYAY, S. AND A. BHATTACHARJEE. 2015. Updating of records pertaining to world herbaria in Index Herbariorum. *Curr. Sci*. 109(8): 1377.

BANDYOPADHYAY, S. AND A. BHATTACHARJEE. 2015. Ph.D. thesis title. *Curr. Sci.* 109(6): 1009.

BANDYOPADHYAY, S., A. BHATTACHARJEE, AND S. DEY. 2015. (058–059) Proposals to add a new Recommendation and two Examples. *Taxon* 64(3): 656–657.

BANDYOPADHYAY, S. AND A. BHATTACHARJEE. 2015. (101) Proposal to add a new paragraph to Recommendation 9B. *Taxon* 64(6):1338.

BANDYOPADHYAY, S. AND PARTHA PRATIM GHOSHAL. 2015 (30 June). Seven new combinations in *Phanera* (Fabaceae: Caesalpinioideae: Cercideae). *Telopea* 18: 141–144.

BANDYOPADHYAY, S. 2015. On the taxonomic identity of *Phanera jampuiensis* Darlong & D. Bhattach. *Telopea* 18: 155–157.

BASKE, P.K., A.C. HALDER, P.A. DHOLE AND N.R. SIDDHABATULA. 2015. Ethno-Medicinal Plants of Jajpur District, Odisha, *J. Econ. Taxon. Bot.* 39(1):153-168.

BEHERA, KR. SANDIP , SANJAY MISHRA AND LAL JI SINGH. 2015. *Adiantum latifolium* Lam. (Adiantaceae) – An addition to the Fern flora of Andaman and Nicobar Islands, India. *Geophytology* 45(2): 261-264.

BENNIAMIN, A. AND M.S. SUNDARI. 2015. *Ophioglossum pendulum* L. (Ophioglossaceae)- A Critically endangered fern rediscovered from Arunachal Pradesh, North East India. *Keanean journal of Science* 4 : 39-42.

BENNIAMIN, A., D. TRIPATHI AND P. KALE. 2015. *Pteris heteromorpha* Fee New record for Maharashtra. *Bioinfolet* 12(2A): 1-2.

BENNIAMIN, A., G. J. JOTHI AND M.S. SUNDARI. 2015. Rapid In vitro Propagation of *Dodonaea viscosa* (Sapindaceae) through axillary bud multiplication and indirect organogenesis. *Jour. of Non Timber Forests Products* 22 (1): 33-35.

BENNIAMIN, A., M.S. SUNDARI AND D. TRIPATHI. 2015. Additions to the fern flora of Nagaland, North East India. *Keanean journal of Science* 4: 15-18.

BHATTACHARJEE, A. AND P. LAKSHMINARASIMHAN. 2015. Status and

distribution of *Panax bipinnatifidus* (Araliaceae) in Mayudia area of Lower Dibang Valley district, Arunachal Pradesh. *ENVIS Newsletter* 20(1): 11.

BHATTACHARJEE, A. 2015. A new species of *Amitostigma* (Orchidinae, Orchidaceae) from India. *Phytotaxa* 230(3): 267 – 273.

BHATTACHARJEE, A., SANGEETA DEY, S., BANDYOPADHYAY AND P. SINGH. 2015. (086) Proposal to amend Art. 9.19. *Taxon* 64(4): 862 – 863.

BHAUMIK, M. AND K. PAGAG. 2015. *Saurauia sinohirsuta* J.Q. Li & Soejarto (Actinidiaceae), a new distributional record from India. *Indian J. For*. 38(3): 259-262.

BHAUMIK, M. 2015. 'wild onions' in ENVIS website.

BHOGAONKAR, P.Y., V.N. CHAVHAN AND P.A. DHOLE. 2015 Some new additions to the flora of Amravati district (M.S.) India**.** *Wjpls*, 1(2): 91-96.

BHOGAONKAR, P.Y., V.N. CHAVHAN AND P.A. DHOLE. 2015. Some New reports for the Flora of Yavatmal District (M.S.) India. *Bioscience Discovery* 6(1):18-21.

BISWA, S., P. LAKSHMINARASIMHAN AND A. LOKHO. 2015. Phytodiversity of Koderma Wildlife Sanctuary, Jharkhand – An Overview. *Phytotaxonomy* 15: 22-27.

CHAKRABORTY, D AND K. DAS. 2015. A new generic record of Boletaceae for Indian mycobiota. *Current Research in Environmental & Applied Mycology* 5(2): 138–144.

CHAKRABORTY, D., K. DAS. A. BAGHELA, S. K. SINGH AND B.T.M., SINGHAND DENTINGER, 2015. *Boletus recapitulatus* (Boletaceae), a new species from India with peculiar mushroom-shaped cells. *Phytotaxa* 236(2): 150-160.

CHANDRASEKAR, K. , LALIT GIRI, ASEESH PANDEY AND S.K. SRIVASTAVA.2015. A note on *Juniperus semiglobosa* in Uttarakhand, India. *Indian J. For.* 38 (1): 79–80.

CHANDRASEKAR, K., ASEESH PANDEY, S.K. SRIVASTAVA AND LALIT GIRI. 2015. Invasive Alien Plant of Himachal Pradesh, India. *Indian Forest*. 141 (5): 520–527.

CHAUDHURY S. AND HARISH SINGH. 2016. Traditional uses of the Indian Crested Porcupine (*Hystrix indica* Kerr, 1722) by Birhor tribe of Purulia district, West Bengal". *Small Mammal mail*, 8(1):20-21.

CHORGHE, ALOK, K. CHANDRA MOHAN, P. S. ANNAMMA, M. BHANJA AND E. VENKATESH. 2015. Addition to the Grasses (Poaceae) of Telangana from Kawak Tiger Reserve, Adilabad District. *Journal of Threatened Taxa*. Vol 7 (9): 7589-7594.

CHORGHE, ALOK, K. PRASAD, P. V. PRASANNA AND Y. V. RAO. 2016. A new species of *Themeda* (Poaceae: Panicoideae) from the Eastern Ghats, India. *Phytotaxa* 245 (2): 183-186.

CHORGHE, ALOK, S. DEY, K. PRASAD, P. V. PRASANNA AND Y. V. RAO. 2015. *Tripogon mahendragiriensis* sp. nov. (Poaceae) from the Eastern Ghats of Odisha (Orissa) State, India. *Nordic Journ. of Botany* 33: 655-658.

CHOWLU, K. 2016. Erratum to '*Oberonia manipurensis* sp. nov. (Orchidaceae) from Manipur, India' *Nordic Journ. Botany* 34: 384.

DAIMARY, R., AND B.K. SINHA. 2015. New Distributional Record of a rare species *Amomum pauciflorum* Baker (Zingiberaceae) from Assam, India. *Journal of Non Timber Forest Products* 21(3): 179-180.

DAS DAS, S.K. AND J. JAYANTHI. 2015. Note on a little known endemic legume *Crotalaria lutescens* from Western Ghats, India. *Nelumbo* 57: 66 – 68.

DAS, DAS M., D. MAITY AND A. PRAMANIK. 2015. Typification of the name *Memecylon talbotianum* Brandis (Melastomataceae)" *Phytotaxa* 203(2):210-212.

DAS, DAS M., K. A. SUJANA, A. PRAMANIK AND D. MAITY. 2016. A new variety of *Memecylon lawsonii* Gamble (Memecylaceae) from Kerala, South India and status of *Memecylon kurichiarensis* Sibu & al. *NeBIO* 7(1):1 - 5.

DAS, K., D. CHAKRABORTY, AND H.V.T. COTTER, 2015. *Suillus adhikarii*: a new species from the subalpine Himalaya of India and Nepal associated with *Larix*. *Phytotaxa* 219(3): 289-295.

DAS, K., D. CHAKRABORTY, A. BAGHELA, S.K. SINGH AND B. T. M.DENTINGER, 2015. *Boletus lakhanpalii*, a new species in Boletaceae from Sikkim (India) with uncertain phylogenetic

placement. *Sydowia* 67: 11-19.

DAS, K., M.E. HEMBROM, A. PARIHAR AND R.L. ZHAO. 2015. A new species of *Cyathus* (Agaricaceae) from India. *Turk. J. Bot.* 40: 97-103.

DAS, K., M. E. HEMBROM, A.K., DUTTA, A. PARIHAR AND K. ACHARYA. 2016. *Ramaria subalpina* (Gomphaceae): a new edible fungus from India. *Phytotaxa* 246(2): 137–144.

DAS, K., V., HOFSTETTER, D., CHAKRABORTY, A., BAGHELA, S.K. SINGH AND B. BUYCK. 2015. *Cantharellus sikkimensis sp.nov*. (Cantharellales, Agaricomycetes) from the Indian Himalayas. *Phytotaxa* 222(4): 267–275.

DAS, K., A. VERBEKEN, AND J. NUYTINCK. 2015. Morphology and phylogeny of four new *Lactarius* species from Himalayan India. *Mycotaxon* 130(1): 105–130.

DAS, S.K. AND R.K. GUPTA. 2015. Cyanobacterial diversity and colonization at different temperature gradient in a remote hot spring of Jharkhand, India. *Bioglobia* 2(2): 12-17.

DAS, SUDIPTA KUMAR AND ONKAR NATH MAURYA. 2015. Floristic Survey of Algae in Vikramshila Gangetic Dolphin Sanctuary, Bihar (India). *Nelumbo* 57:1-11.

DASH, S.S., V. JAIN AND S.K. JAIN. 2015. Notable name changes in plant names in Purans. *Nelumbo* 57 : 80-85.

DATTA, S., T. K. PAUL AND B.K. SINHA. 2015. *Aeschynanthus angustioblongus* W.T. Wang (Gesneriaceae) an addition to Indian Flora. *Phytotaxonomy* 14: 23-24.

DEORI, B.B., C. DEORI AND S.R. TALUKDAR. 2015**.** Traditional knowledge associated with *hukati*-an ethnic dry fish product by Deori tribes of Assam, Northeast India with special reference to its importance in their socio-cultural life. *NeBio* 6(4): 13-18.

DEORI, C. AND S.R. TALUKDAR. 2015. Floristic diversity of Barnadi Wildlife Sanctuary, Assam. *Nelumbo* 57:19-28.

DEORI, C. 2015. Morphological diversity within the genus *Dendrobium* Swartz (Orchidaceae) in Northeast India. *Richardiana* 16:85-110.2015

DEORI, C., N. ODYUO AND A. A. MAO. 2015. *Pennilabium labanyaeanum* (Orchidaceae), a new species from Meghalaya, North-east India, *Gardens' Bulletin Singapore* 67(1): 143-149.

DEY, M. AND D. K. SINGH. 2016. Three foliicolous taxa of Lejeuneaceae (Marchantiophyta) new to India from Great Nicobar Biosphere Reserve, Andaman and Nicobar Islands. *Acta. Bot. Hung.* 58: 49–68.

DEY, SANGITA AND P.V. PRASANNA (In P. Singh and Sangita Dey- eds.). 2015. Flora of India-Fascicle 27-Cyperaceae: Mapanioideae, Cyperoideae Tribes: *Schoeneae* and *Sclerieae*. Botanical Survey of India, Kolkata.

DHOLE, P.A., P.K. BASKE, A.C. HALDER AND K.A. SUJANA. 2015. *Tragia praetervisa* Chakrab. & N.P. Balakr. (Euphorbiaceae)- an addition to the flora of Odisha from Nayagarh, *Zoo's Print* 30(12):13-14.

DILIP KUMAR ROY AND DURGESH VERMA. 2015. *Ormosia fordiana* (Fabaceae), An Addition to the Flora of India. *J. Jap. Bot*. 90 (2) 124–128

DOGRA, K. S., S. CHAUHAN AND J. S. JALAL. 2015. Assessment of Indian medicinal plants for the treatment of asthma. *Journal of Medicinal Plants Research* 9(32): 851-862.

DUBEY, R. AND S. SENGUPTA. 2015. *Sporidesmium bilgiriense* - A new species of microfungi from Western Ghats of India". *Current Research in Environmental & Applied Mycology* 5 (4): 390–393.

DUTTA PRAMANICK, DEBASMITA AND AMBER SRIVASTAVA. 2016. Notes on *Maclura cochinchinensis* (Lour.) Corner (Moraceae)-A less known medicinal plant with potent antioxidant and antimicrobial properties facing population depletion. *Journ. Non-Timber Forest Products* 23(1): 1-4.2016.

DUTTA PRAMANICK, DEBASMITA, G.G. MAITI AND AMBER SRIVASTAVA. 2015. Micro-morphological Study of 'BALA' Plant (*Sida cordifolia* L., Malvaceae) with Special Reference to Its Propagation Technique. *Journal of Medicinal Plants Studies* 3 (4): 127-131.

DUTTA PRAMANICK, DEBASMITA, G.G. MAITI AND M.S. MONDAL. 2015. A Taxonomic Revision of the Genus *Boerhavia* L. (Nyctaginaceae) in India. *Journ. Global Bioscience* 4 (3) :1704-1717.

DUTTA PRAMANICK, DEBASMITA, G.G. MAITI AND M.S. MONDAL. 2015. Taxonomic Study of the Genus *Pisonia* L.(Nyctaginaceae) in India. *Annals of Plant Sciences* 4(8): 1179-1184.

DUTTA PRAMANICK, DEBASMITA. 2016. Anatomical Studies on the leaf of *Gymnema sylvestre* (Retz.) R.Br. ex Schult. (Apocynaceae): A magical herbal medicine for Diabetes. *International Journ. Herbal Medicine.* Vol. 4(1): 70-72.

DUTTA PRAMANICK, DEBASMITA. 2016. Pharmacognostic Studies on the pseudobulb of *Coelogyne cristata* Lindl. (Orchidaceae)-An epiphytic Orchid of ethno-medicinal importance. *Journ. of Pharmacognosy & Phytochemistry* 5(1): 120-123.

DUTTA, A.K., K. DAS AND K. ACHARYA. 2015. A new species of *Marasmius* sect. *Globulares* from Indian Himalaya with tall basidiomata. *Mycosphere* 6(5): 560–567.

EKKA, GAUTAM ANUJ AND P. JOJU P. ALAPPATT. 2015. Note on Distribution of *Nephelaphyllum pulchrum* Blume (Orchidaceae) in Bay Islands. *Journal of Non-Timber Forest Products* 22(1) 37-38.

ELLIS, L.T., M. ALEFFI, V.A. BAKALIN, H. BEDNAREK-OCHYRA, A. BERGAMINI, P. BEVERIDGE, S.S. CHOI, V.E. FEDOSOV, R. GABRIE, M.T. GALLEGO, S. GRDOVIC, R. GUPTA, V. NATH, A.K. ASTHANA, L. JENNINGS, H. KÜRSCHNER, M. LEBOUVIER, M.C. NAIR, K.M. MANJULA, K.P. RAJESH, M. NOBIS, A. NOWAK, S.J. PARK, B.-Y. SUN, V. PLÁŠEK, L. ÈÍHAL, S. POPONESSI, M.G. MARIOTTI, A. SABOVLJEVIÆ, M.S. SABOVLJEVIÆ, J. SAWICKI, N. SCHNYDER, R. SCHUMACKER, M. SIM-SIM, D.K. SINGH, D. SINGH, S. MAJUMDAR, S. SINGH DEO, S.S¸ TEFÃNUT¸ M. SULEIMAN, C.M. SENG, M.S. CHUA, J. VÁÒA, R. VENANZONI, E. BRICCHI AND M. J. WIGGINTON 2015. New national and regional bryophyte records, 42. *J. Bryol.* 37 (1): 68–85.

GAJENDRA, S., I.D. RAI, G.S.RAWAT, G.S. GORAYA AND J.S. JALAL. 2015. Addition to the Flora of Great Himalayan National Park, Western Himalaya. *Indian J. For.* 18(4): 175-181.

GOGOI, R., S. BORAH AND P. SATYANARAYANA. 2015. *Impatiens fugongensis, I. yui* and *I. xanthina* (Balsaminaceae), Three new additions to flora of India, *J. Jap. Bot.* 90(4): 270-275

GOGOI, R. AND S. BORAH. 2015.*Impatiens adamowskiana* sp. nov. (Balsaminaceae) from Arunachal Pradesh, northeast India, *Nordic J. Botany* 33(5): 586-590.

GOGOI, R. AND S. BORAH. 2015.*Impatiens pathakiana* (Balsaminaceae), a new species from Arunachal Pradesh, north-eastern India. *Telopea* 18: 121–125

GOGOI, R. AND S. BORAH. 2015. *Impatiens dalaiensis* (Balsaminaceae) a new species from Arunachal Pradesh, India .*Phytotaxa* 207 (3): 286–290.

GOGOI, R. AND S. BORAH. 2015. *Impatiens ashihoi*, a new species of Balsaminaceae from Dibang Valley of Arunachal Pradesh, India. *Phytotaxa* 238 (3): 278–282

GOGOI, R., N. ODYUO AND R. DAIMARY. 2015. *Impatiens parkinsonii* C.E.C. Fisch. (Balsaminaceae), a new addition to flora of India and notes on its typification, *Telopea* 18: 383–387.

GUPTA, C. AND S.S. DASH. 2015. *Rubus sengorensis* (Rosaceae): A new record to India from Arunachal Pradesh. *Nelumbo* 57: 50-55.

HAMEED, S.S. 2015. A maiden fruit set in the 'Double Coconut' palm [*Lodoicea maldivica* (J.F. Gmel.) Pers. - Arecaceae] in India by artificial pollination. *Phytotaxonomy* 14: 69-75.

HAMEED, S.S. 2016 .Artificial pollination and fruit set in double coconut growing in India. *Current Science* 110(6):976-978.

HEMBROM, M.E., A. PARIHAR, K. DAS. 2016. Three interesting wood rotting macro-fungi from Jharkhand, India. *Journal of Threatened Taxa* 8(2): 8518–8525.

HU C., H., TIAN, H., LI, A., HU, F., XING, A., BHATTACHARJEE, T., HSU, P. KUMAR AND S. CHUNG. 2016. Phylogenetic analysis of a 'Jewel Orchid' genus *Goodyera* (Orchidaceae) based on DNA sequence data from Nuclear and Plastid regions. *PLoS ONE* 11(2): e0150366.

INGLE, PRIYANKA AND A. DHABE. 2015. Anatomical Investigation of *Terminalia chebula* Retz. *Phytotaxonomy* 15: 55 – 62.

JAGADEESH RAM, T.A.M. 2015. Additional lichen records from the Andaman and Nicobar Islands – 2. *Indian J. For.* 38(2): 165-170.

JAGADEESH RAM, T.A.M. 2015. Additional new species in Roccellaceae *s.l.* from the Andaman and Nicobar Islands, India. *Phytotaxa* 246(4): 281–286.

JAKHA H.Y., C.R. DEB, S.K. SINGH, D. VERMA, S. DEY AND N.S. JAMIR. 2015. *Pendulorchis* (Orchidaceae) - A new generic record for Nagaland, India. *Keanean J. Sci*. 4: 31-34.

JALAL, J. S., J. JAYANTHI AND P. LAKSHMINARASIMHAN. 2015. Two species of *Peristylus* Blume (Orchidaceae), new additions to the flora of Goa, Western Ghats, India. *Richardiana* 16: 18 – 25.

JALAL, J.S, J. JAYANTHI AND P. LAKSHMINARASIMHAN. 2015. *Habenaria suaveolens* Dalzell (Orchidaceae), a new distributional record for Goa state. *Phytotaxonomy* 15: 206-208.

JALAL, J.S. AND P. SINGH. 2015. Threatened orchids of Maharashtra: A preliminary assessment based on IUCN regional guidelines and conservation prioritization. *The Orchid Society of India* 29: 1 – 14.

JALAL, J.S. AND J. JAYANTHI. 2015. An Annotated Checklist of the Orchids of Western Himalaya, India. *Lankesteriana* 15(1): 7—50.

JANA, B. AND V. SAMPATH KUMAR. 2015. Lectotypification of five names in *Carex L.* (Cyperaceae). *Taiwania* 60(4): 213–215.

JAYANTHI, J. AND J.S.JALAL. 2015. Angiosperm diversity of the Great Indian Bustard Wildlife Sanctuary: a semi-arid grassland, Maharashtra, India in *Checklist* 11 (2): 1602.

JAYANTHI, J. AND J.S.JALAL. 2015. Invasive alien species of the Great Indian Bustard Wildlife Sanctuary, Maharashtra, India. *Indian J. For.* 38(1): 51 – 56.

JAYANTHI, J. AND J.S. JALAL. 2015. Life-form and biological spectrum of semi-arid grassland: Great Indian Bustard Wildlife Sanctuary, Maharashtra. *Phytotaxonomy* 14: 44 – 60.

JAYANTHI, J., K. KARTHIGEYAN AND R. SUMATHI. 2015. *Phyllanthus gracilipes* (Miq.) Muell.- Arg. (Euphorbiaceae) – A new record for India from Great Nicobar Island. *Malayan Nature Journal* 65(4): 243 – 246.

JOSEPH, JOHN, K.A. SUJANA, P.R. RAGI AND N. ANIL KUMAR. 2015. Screening of antidiarrheal properties and phytochemicals of four rare plants used in traditional medicine. *J. Bio. Sci. Opin.* 3(6):266-270.

JOSHI, PUSHPESH, BRIJESH KUMAR, HIMANSHU DWIVEDI AND CHHAYA SINGH, 2015. Conservation status and diversity of ethnobotanically important ferns in Tehri district of Uttarakhand Himalaya. *Journal of Applied Forest Ecology*, 3 (1): 48-57.

KARTHIGEYAN, K. AND W. ARISDASON. 2015. *Ixora longibracteata* Bremek. (Rubiaceae), An addition to flora of India, with notes on its status and distribution. *Taiwania* 60(2): 95 – 98.

KRISHNA, G. AND S. BANDYOPADHYAY. 2015. (095) Proposal to include two terms in the Glossary. *Taxon* 64(5): 1067.

KUMAR AMBRISH AND S.K. SRIVASTAVA. 2015. *Senna alata* (L.) Roxb. (Caesalpiniaceae): A New Record for Northern India from Uttarakhand. *Indian Forester* 141(12): 1318-1319.

KUMAR, A. AND T.K. PAUL. 2015. *Grewia villosa* Willd. (Malvaceae): a new record from Eastern India. *Pleione* 9(1). 240-243.

KUMAR ANANT AND HEMANT KUMAR. 2015. *Aristolochia indica* (Aristolochiaceae)- A host plant for caterpillars of *Pachliopta aristolochiae*. *BSI-ENVIS Newslett.* 20 (2): 8.

KUMAR, BRIJESH, PUSHPESH JOSHI, B. S. KHOLIA AND S.K. SRIVASTAVA. 2015. Extended distribution of the least Moon wart, *Botrychium simplex* E. Hitchcock. *Indian J. For.* 38(3): 241-243.

KUMAR, R., A. BHATTACHARJEE, S.K.SINGH AND S. SHARMA. 2015. *Cheirostylis griffithii* (Orchidaceae) – a new record for Mizoram. *BSI-ENVIS Newsleter* 20(1): 5.

KUMAR, R., S. K. SINGH, S. SHARMA AND P. TRIBOUN. 2015. Two new *Zingiber* (Zingiberaceae) species from Northeast India. *Phytotaxa* 233 (1): 080–084.

KUMAR, S., C.S.PUROHIT AND R.N. KULLOLI. 2015. A typical desert plant: *Neurada procumbens*. *Desert Environment Newsletter, CAZRI* 17(4): 4.

KUMAR, VIKAS, A.N. RAO D.K. AGRAWALA. 2015.

Tropidia namasiae (Orchidaceae): A New Distributional Record for India from Manipur. *Richardiana* 15: 317-322.

KUMARI, PUSHPA 2015. Reports of Flowering in Reed Bamboos. *ENVIS News Letter* Vol. 20(2).

LAWKUSH AND M.R. DEBTA. 2015. Notes on a rare species of the genus *Androcorys* (Orchidaceae) – *A. josephi* (Rchb.f.) Agrawala & H.J. Chowdhery in India. *Indian J. For.* 37(4): 473-476.

MADHUKAR, V.K., S.K. SRIVASTAVA AND N.K. DUBEY. 2015. Systematic account of the genus *Kigelia* D.Don (Bignoniaceae) in India, in *Phytotaxonomy* 15: 15–21.

MAJI, A. AND V.P. PRASAD. 2015. *Carex kotagirica* : A new species of Cyperaceae from the Nilgiris, Southern India. *Rheedea*: 25(2): 81-85.

MAJI, A. AND V.P. PRASAD. 2015. *Carex polycephala* (Cyperaceae): New distribution record for Western Himalaya. *Zoo's Print* 30 (8): 3-4.

MANIKANDAN, R AND S.K. SRIVASTAVA. 2015. Threatened medicinal plants protected *in-situ* in Govind Pashu Vihar Wildlife Sanctuary, Western Himalaya. *Phytotaxonomy* 15: 90-95.

MANIKANDAN, R. AND S.K. SRIVASTAVA. 2015. Diversity, Medicinal and Threatened Plants in Govind Pashu Vihar Wildlife Sanctuary, Western Himalaya. *Indian Forester* 141 (9): 966-973.

MAO, A. A., N. SARMA AND D. K. ROY. 2015. *Adenophora capillaries* subsp. *dzukoensis* (Campanulaceae), a new subspecies from North East India with a note on other Indian taxa of the genus. *Pleione* 9(1): 211 - 216.

MAO, A.A. AND M. BHAUMIK. 2015**.** *Rhododendron pseudomaddenii* (Ericaceae) :A new species from India, *Edinburgh Journal of Botany* 72(2): 209-213.

MASATAKAR, V.K., P. LAKSHMINARASIMHAN AND M. MODAK. 2015. A report of the extended distribution of *Polycarpaea aurea* (Caryophyllaceae), an endemic herbaceous species, to Chota Nagpur Plateau, Jharkhand, India. *J. Threatened Taxa* 7: 7950-7952.

MASTAKAR, V.K., P. LAKSHMINARASIMHAN AND M. MODAK. 2015. *Crotalaria bifaria* L.f. (Leguminosae-Papilionoideae): A new distributional record for Eastern India. *Indian J. Pl. Sci.* 4(3): 13-16.

MAURYA, ONKAR NATH, ANAND KUMAR, GOPAL KRISHNA AND SUMAN HALDER. 2015. On the Occurrence of a Non-native plant species *Bromelia pinguin* L. (Bromeliaceae) in India. *Phytodiversity* 2(1):32-38.

MEITEI, L.R., D. VERMA AND B. ATANU. 2015. *Tainia angustifolia* (Orchidaceae): An Addition to the flora of Meghalaya, India. *The McAllen International Orchid Society Journal* 16 (3): 2-6, 2015.

MISHRA, MONIKA AND AINUL HAQ KHAN. 2015 . Comparative genotoxic potential of ´ rays in two varieties of isabgol (*Plantago ovata* Forsk.). *Chromosome Botany*, 10(1):31-38.

MISHRA, SANJAY, C.P. VIVEK AND LAL JI SINGH. 2016. *Eleocharis spiralis* (Rottb.) Roem. & Schult. (Cyperaceae): A New Addition to Flora of Andaman and Nicobar Islands. *Tropical Plant Research* 3(2): 289-291.

MITAL, R., M.R, BHATT, J.S.JALAL AND P.S. NAGAR. 2015. Extended distribution of *Geodorum laxiflorum* (Orchidaceae) in Gujarat, India. *Richardiana* 15: 333-341.

MURUGAN, C., GAUTAM ANUJ EKKA AND P. MURUGAN. 2014. *Oropetium* Trin. (Poaceae): A generic record for Andaman & Nicobar Islands, India. *J. Andaman Sci. Asso.* 19(2) 157-159.

MURUGESAN, M AND V. BALASUBRAMANIAM. 2015. Notes on the occurrence of some less known endemic, rare and threatened trees from Velliangiri hills, a part of Nilgiri Biosphere Reserve, India. *J. Sci. Trans. Environ. Technov.* 8(4): 195-203.

NENGPILHING A., H.B. SHARMA, K. CHOWLU, AND A.N. RAO. 2015. Foliar anatomy in some species of *Bulbophyllum* Thou in *Journal of Orchid Society of India* 29: 67-74.

ODYUO, N., C. DEORI AND RANJIT DAIMARY. 2016. *Panisea panchaseensis* (Orchidaceae): an addition to the flora of India. *Richardiana* 16:141-145.

ODYUO, N., CHAYA DEORI AND R. GOGOI. 2015. Rediscovery of *Impatiens khasiana* Hook.f. after more than a century. *Telopea* 18: 85–89

ODYUO, N.,D.K. ROY, S. DEY AND A.A. MAO. 2015. *Sauromatum horsfieldii* (Araceae – Areae): an addition to the Flora of India. *Telopea* 18: 227-232.

P. VENU AND K. PRASAD. 2015. The existential crisis in Indian *Brachystelma* (Apocynaceae). *Current Science* 109(4): 680-682.

PAGAG, K., S.K. SINGH AND D. K. ROY. 2015: Notes on blooming of a rare orchid *Flickingeria macraei*. *Keanean Journal of Sciences* 4: 35-38. 2015.

PANDA, S.P., 2015. A checklist of weeds in rice fields of Coastal Orissa. *Journal of Agricultural Sciences* 7(6):207-206.

PANDA, S.P., B.K. SINGH AND A. PRAMANIK. 2016. The Genus *Zeuxine* Lindl. (Orchidaceae) in Tripura State, India. *J. Threatened Taxa* 8(14): 9675-9677.

PANDA, S.P., M.U. SHARIEF, S.S. HAMEED AND A. PRAMANIK. 2015. Traditional phytotheraphic record of Orchids of Odisha and their conservation strategies. *Annals of Plant Sciences* 4(11):1204-1207.

PANDAY, SAMIRAN, DURGESH VERMA, S. K. SINGH AND B. K. SINHA. 2015. Three new distributional records of orchids from Mizoram. *Nelumbo* 56: 252–254.

PANWAR, G. S. AND GURU, S.K. GURU, 2015. Stimulation of reserpine production in the whole plant culture of *Rauwolfia serpentina* L. by elicitors and precursor feeding. *J. Plant Biochem. & Biotech*. 24 (1):49-55.

PANWAR, G. S., S.K. SRIVASTAVA AND P.L. UNIYAL. 2015. *In vitro* propagation of *Eremostachys superba* Royle ex Benth. - An endangered, medicinal and ornamental herb of North-West Himalaya. *Medicinal Plants*. 7 (4):264-271.

PATIL, R.T. AND V.P. PRASAD. 2016. Achene morphology and its taxonomic significance in Cyperaceae of Goa, India: 1. Genus *Fimbristylis*. *Indian J. Pl. Sci.* 5(1): 87-96.

PATIL, S., P. LAKSHMINARASIMHAN, M. LEKHAK AND A. PANDEY. 2015. Neotypification of *Pancratium sanctae-mariae* (Amaryllidaceae). *Phytotaxa* 224 (2): 199–200.

PATIL, SAMIR AND P. LAKSHMINARASIMHAN. 2015. Request for a binding decision on whether *Ceropegia oculata* Hook. and *C. occulta* R.A. Dyer (Apocynaceae) are sufficiently alike to be confused'. *Taxon* 64: 1065.

PRASAD G., A.A. MAO, D. VIJAYAN, S. MANDAL, K. CHAUDHURI AND T. SEAL. 2016. Comparative HPLC Fingerprinting and Antioxidant Activities of *in vitro* and *in vivo* Grown *Aerides odorata*, A Medicinal Orchid. *J. Chem. Bio. Phy. Sci*. Sec. B. 2016, 6(2): 454-468.

PRASAD V.P. AND V.S. KUMAR. 2015. *Gymnostemma* Blume (Cucurbitaceae), a new generic record for Kerala, India. *Indian J. Forestry* 38(1): 81-82.

PRASAD, K. AND P.V. PRASANNA. 2016. *Brachystelma annamacharyae* (Apocynaceae), a new species from the Seshachalam hills of Andhra Pradesh (India). *Bangla Journ. Plant Taxon*. 23(1): 53-57.

PRASAD, K. AND P. VENU. 2015. A New Generic Status to Section *Plectoglossa* (Orchidaceae: *Habenaria*). *Rheedea* 25(2): 86-93.

PRASAD, K. AND P.V. PRASANNA. 2016. *Euphorbia seshachalamensis* (Euphorbiaceae), a new species from Andhra Pradesh, India. *Ann. Bot. Fennici* 53: 73-76.

PRASAD, V.P. 2015. *Cyperus conglomeratus* subsp. *curvulus* - a new distribution record for India. *Zoo's Print* 30(11): 7.

PRASAD, V.P. 2015. *Pycreus bolei* and *P. lancelotii* two new synonyms of *P. pumilus* (Cyperaceae). *Nelumbo* 57: 37-39.

PRASAD. K., PRASANNA. P. V., MEVE. U AND THULASAIAH. T. 2016: *Brachystelma annamacharyae sp. nov*. (Apocynaceae) from the Seshachalam hills of Andhra Pradesh, India. *Nordic J. Bot.* 34: 360-363.

PRATIBHA, J. AND A. PRABHUGAONKAR. 2015. New record of *Thysanorea papuana* from India. *Mycosphere* 6(4), 481–485.

PRATIBHA, J. AND A. PRABHUGAONKAR 2015. Distribution and phylogeny of *Mycosisymbrium cirrhosum. Mycosphere* 7 (1): 44-50.

PUROHIT C.S., R. KUMAR AND V. MAINA 2016. An article entitled "Know Your Institutions – Botanical Survey of India, Arid Zone Regional Centre, Jodhpur" in *Desert Environment News Letter* (CAZRI) 17(4): 7.

PUROHIT, C.S. 2015. *Diapensia purpurea* Diels (Diapensiaceae), a new record to India from Sikkim. *Nelumbo* 57: 56-59.

PUSALKAR, P.K. AND S.K. SRIVASTAVA, 2015. *Circium arvense* L. var. *alpestre* Nageli

(Asteraceae), a new record for Indian Flora. *Indian J. For.* 38 (1): 75–76.

PUSALKAR, P.K. AND S.K. SRIVASTAVA, 2015.Two new records for Indian flora *Phytotaxonomy.* 14: 150-151.

PUSALKAR, P.K. AND S.K. SRIVASTAVA, 2015. *Stellaria devendrae sp. nov*. (Caryophyllaceae) from Western Himalaya, India. *Nordic Journal of Botany* 33(4): 385–512.

PUSALKAR, P.K. AND D.K. SINGH, 2015. Taxonomic Rearrangement of *Arenaria* (Caryophyllaceae) in Indian Western Himalaya. *J. Jap. Bot.* 90: 77–91

PUSALKAR, P.K. AND S.K. SRIVASTAVA. 2015. *Carpesium cordatum* F.H. Chen & C.M. Hu (Asteraceae) – A New Record for Indian flora. *Ann. Forest.* 22(2): 207-2.9.

PUSALKAR, P.K. 2015. Redefining *Thylacospermum* and a new tribe *Thylacospermeae*. *J. Jap. Bot*. 90(5): 351-355.

RAI, I.D, J.S.JALAL, GAJENDRA SINGH AND G.S. RAWAT. 2015. Extended distribution of *Platanthera cumminsiana* (King and Pantl.) J. Renz (Orchidaceae) in Western Himalaya, India. *Indian J. For.* 38(1): 95-98.

RAI, I.D., J.S.JALAL, GAJENDRA SINGH AND P. KUMAR. 2015. A note on the occurrence of *Eulophia flava* (Lindl.) Hook. f. (Orchidaceae) in Kumaon Himalaya. *Indian J. For.* 38(3): 263-264.

RANJAN, VINAY AND ANANT KUMAR. 2015. Conspectus of family Rubiaceae in West Bengal, India.*Geophytology* 45(2): 161-174.

RANJAN, VINAY AND ANANT KUMAR. 2015. Floristic Diversity in Gorumara National Park, West Bengal. *J. Non-Timb. For. Prod*. 22(2): 97-102.

RANJAN, VINAY, ANANT KUMAR AND GOPAL KRISHNA.2015. *Prunus ceylanica* (Wight) Miv.: An endangered species collected after eight decades from West Bengal. *Indian J. For*. 38(2):185-186.

RAO, B.R.P., M.C. NAIK, S. SALAMMA, M.V.S. BABU AND L. RASINGAM. 2015. The discovery of a new sub-population and the mapping of threatened *Cycas beddomei* Dyer (Cycadales: Cycadaceae) from southern Andhra Pradesh, India, with updated Red List assessment. *Journal of Threatened Taxa* 7(12): 7902-7909.

RASINGAM, L. 2015. *Theriophonum infaustum* N.E. Br. (Araceae), an addition to the flora of Tamil Nadu, India. *Journal of Basic and Applied Biology* 8(2): 205-206.

RAWAT, V.K. AND P. SATYANARAYANA. 2015. Pteridophytes of India; Diversity, Distribution and Conservation. *Uttar Pradesh Biodiversity Board Journal* 128-133.

RAWAT, V.K. AND P. SATYANARAYANA. 2015. Taxonomic studies on the family Polypodiaceae in Mehao Wild Life Sanctuary, Arunachal Pradesh, *J. Econ. Taxon. Bot*. Vol. 39 (1): 1 – 15.

ROY, D. K. AND D. VERMA. 2015. *Ormosia fordiana* (*Fabaceae*), an Addition to the Flora of India. *Journal of Japanese Botany* 90: 126–130. 2015.

SAMPATH KUMAR, V. 2015. Notes on distribution of *Crotalaria paniculata* Willd. and status of its variety *nagarjunagondensis* Thoth. *Indian J. For.* 38 (2): 181–184.

SAMPATH KUMAR, V. 2015. *Grewia nagensium* Prain vs *Grewia denticulata* Wall. ex Prain (Tiliaceae) – which is to be accepted? *Phytotaxa* 222(1): 81–82.

SAMPATH KUMAR V. AND T. CHAKRABORTY. 2016. *Teucrium tomentosum* - B. Heyne ex Benth. (Lamiaceae), an unnoticed later homonym for almost two centuries. *Phytotaxa* 243 (2): 197–198.

SAMPATH KUMAR, V. AND S. KARTHIKEYAN. 2015. Nomenclatural notes on a few flowering plants of India. *Phytodiversity* 2(1): 5–7.

SANJAPPA, M., P. VENU AND S. BANDYOPADHYAY. 2015. Obituary: Sri Ratan Lal Mitra. *Nelumbo* 56: 346–347.

SELVAM, A.B.D. 2015. Indian Aconites: Boon or Bane?, *J. Pharm. Nat. Prod.* 1(1): 104.

SELVAM, A.B.D. 2015. Standardization of organoleptic terminology with reference to Description of vegetable crude drugs, *Int. J. Pharm. Tech.* 7(2) : 3282-3289.

SHALINI, S., P. LAKSHMINARASIMHAN AND W. ARISDASON. 2015. Lectotypification of *Lepidagathis bella* (Acanthaceae). *Telopea* 18: 391-393.

SHARIEF, M. U. 2015. "The Pitcher Plants" by in *ENVIS News Letter* 20(2):3.

SHARMA, K. B., B. KUMARI, D. VIJAYAN AND S.

SHARMA. 2015 Isolation of high quality DNA from *Dalbergia sissoo* Roxb., an economically important tree species. *Ann. For*. 23(1): 59-62.

SINGH, S. K. D. VERMA, B.S. KHOLIA, S. SHARMA, B.K. SINHA AND S. PANDEY. 2015. Pteridophytes of Tawi Wildlife Sanctuary, Mizoram, India. *Keanean J. Sci*. 4: 19-30.

SINGH, S.K. AND S. MAJUMDAR. 2015. Contributions to the Hepaticae and Anthocerotae of Mizoram VIII *Bazzania hainanensis* (Lepidoziaceae, Marchantiophyta), new record for India *Acta botanica hungarica* 57 (1-2): 219-223.

SINGH, H., P.K. BASKE, R. SARAVANAN AND P.A. DHOLE. 2015. Traditional uses and marketing of crude oleoresin (Jhuna) of *Shorea robusta* (Dipterocarpaceae) by tribes in Odisha, *ENVIS Newsletter* 20(1):5.

SINGH, HARISH, P.A. DHOLE, P.K. BASKE AND R. SARAVANAN. 2015 Ethnobotanical observations on Deogarh district, Odisha,India. *J.Econ.Taxon. Bot*. 39(2):223-265.

SINGH, L.J. AND VINAY, RANJAN. 2015. *Heterotis* Benth. (Melastomataceae), a new addition to Indian flora from Andaman Islands. *Geophytology* 45(1): 101-106.

SINGH, LAL JI AND D. R. MISRA. 2005. Morpho-Anatomical Diversity of Roots of *Syzygium cumini* Skeels (Myrtaceae), an Adaptive Strategy Under Stress Ecosystem (2005), *Phytomorphology* 65 (1&2): 42-55.

SINGH, LAL JI, B. KUMAR, B. S. KHOLIA AND P. JOSHI. 2016. *Diplazium proliferum*, an addition to the Indian Pteridophytic Flora from Little Andaman. *J. Jap. Bot*. 91: 57–60.

SINGH, LAL JI. 2015 *Scurrula paramjitii* L. J. Singh, a new species (Loranthaceae) from the Andaman and Nicobar Islands, India. *Taiwania* 60(3):123 128.

SINGH, P., S.S. DASH AND SANJAY KUMAR, 2015. New additions to the Indian flora in 2013; *Phytotaxonomy* 15: 01-14.

SINGH, S. K., DURGESH VERMA, B. S. KHOLIA, S. SHARMA, B. K. SINHA AND S. PANDAY. 2015. Pteridophytes of Tawi Wildlife Sanctuary, Mizoram, India. *Keanean J. Sci.* 4: 19–30.

SINGH, S. K., T. POCS AND S. KUMAR. 2015. Notes on four new and noteworthy records of *Lejeunea* from Meghalaya, India. *Acta Botanica Hungarica* 57(3–4): 407–418.

SINGH, S.K. AND S. MAJUMDAR. 2015. Less known *Plagiochila pychanthoidea* newly recorded species from India with new morphological details. *J. Bryol*. 37 (4):332-335.

SINGH, S.K. AND SHASHI KUMAR. 2015. *Lejeunea exilis* (Marchantiophyta) - new to the bryoflora of North-east, India. *Geophytology* 45 (2): 265-268.

SINGH, S.K., R. KUMAR, A. BHATTACHARJEE AND S. SHARMA. 2015. *Eria merguensis* Lindl. (Orchidaceae) – a new addition to the Indian flora. *Telopea* 18: 171 – 176.

SINGH, S.K. AND T. POCS. 2016. Reinstatment of *Cololejeunea indica* Pande & Mishra a name previously synonymous with *C. spinosa* (Horik.) Pande & Mishra. *Cryptog. Bryol*. 37(1):27-32.

SINGH, VINEET AND S.K. SRIVASTAVA. 2015. Utilization of Wild Plants during Tin chhath festival in eastern Uttar Pradesh. *Ethnobotany:* 26 (1&2):103–105.

SRIVASTAVA, R. C. AND LAL JI SINGH. 2015. A New Species of Indian *Cycas*, *International Journal of Current Research in Biosciences and Plant Biology* 2(8): 35-37.

SRIVASTAVA, R.C., P. LAKSHMINARASIMHAN, W. ARISDASON AND M.M. SARDESAI. 2015. Angiosperms of India known only by type collection. *J. Threatened Taxa* 7(8): 7465–7470.

SRIVASTAVA, S.K. AND P. K. PUSALKAR. 2016. Ethno-conservation of threatened plants of Western Himalaya – Traditional practices and current scenario. *J. Econ Taxon. Bot*., Addl. Ser. 44: 122-137.

SRIVASTAVA, S.K. AND P. K. PUSALKAR. 2016. Lectotypification and new locality report for monotypic and critically endangered genus *Catamixis* (Asteraceae: Pertyoideae: Pertyeae). *Nelumbo* 57: 11-18.

SUJANA K.A. AND JOHN JOSEPH. 2015. Panamkutty-A traditional water harvesting system in Wayanad district, Kerala. *ENVIS Newsletter* 20(1):8.

SUJANA K.A., S. NAGARAJU, M.K. RATHEESH NARAYANAN AND N. ANIL KUMAR 2015. A new species of *Salacia* (Celastraceae) from India. *Taiwania* 60(2): 91-94.

SUJANA, K.A., A. BHATTACHARJEE, D.K. AGRAWALA AND S. BANDYOPADHYAY. 2015. Miscellaneous notes on *Bauhinia phoenicea* (Fabaceae: Caesalpinioideae), *International Journal of Innovative Research and Review*, 3(3): 58-61.

SUJANA K.A., P.A. DHOLE AND M. MISHRA. 2016. A note on occurrence of *Aponogeton crispus* Thunb (Aponogetonaceae) in Odisha. *Zoo's Print* 31(2):14-15.

SWAMY, J., G. PRABHAKAR, L. RASINGAM AND P. KAMALAKAR. 2015. *Gymnanthemum amygdalinum* (Asteraceae) , a new addition to the Flora of Peninsular India. *Int. J. Adv. Res. Sci. Technol.* 4 (7): 449-451.

SWAMY, J., P.S. ANNAMMA, K. CHANDRA MOHAN AND L. RASINGAM. 2015. *Hyoscyamus albus* (Solanaceae), a new distributional record for India. *Rheedea* 25 (1): 54-56.

SWAMY, J., S. NAGARAJU, K. CHANDRAMOHAN AND SANKARA RAO, M. 2016: *Glochidion zeylanicum* var. *arborescens* (Phyllanthaceae), a new distributional record for South India. *Annals of Plant Sciences.* 5 (4): 1324-1325.

TALUKDAR, A. D., H.A. BARBHUIYA, D. K. ROY, M. DUTTA CHOUDHURY AND B. K. SINHA. 2015. Recollection of *Trigonostemon viridissimus* var. *chatterjii* (Deb & G.K.Deka) N. P. Balakr. & Chakrab. (Euphorbiaceae) from Meghalaya, India and its conservation status. *Science Research Reporter*, 5(1):09-13.

TALUKDAR, A.D., D.VERMA, D. KR. ROY AND M.D. CHOUDHURY. 2015: A new species of *Zingiber* (*Zingiberaceae–Zingibereae*) from Northeast India. *J. Jap. Bot.* 90: 293-298. 2015.

TALUKDAR, S.R. AND C. DEORI. 2015. Life form and biological spectrum of the flora of Barnadi wildlife sanctuary, Assam, India. *Indian forest*. 141(11):1161-1171.

VERMA, D., S. LAVANIA, D. K. ROY AND B. K. SINHA. 2016. Lectotypification of *Impatiens mengtszeana* (*Balsaminaceae*), an Addition to Flora of India. *J. Jap. Bot.* 91(1): 52–56.

VERMA, DURGESH. 2015. Lectotypification of five species in *Impatiens* (Balsaminaceae). *Phytotaxa* 226(3): 298–300.

YADAV, R. B., AJAY KUMAR, LAL JI SINGH AND SANJAY K. VERMA. 2015, Ethnomedicinal weed species of Auraiya District, Uttar Pradesh, India. *Geophytology* 45(2): 227-232.

ZENG, L., Y.-N. LIU, R. GOGOI, L.-J. ZHANG AND S-X. YU. 2015.*Impatiens tianlinensis* (Balsaminaceae), a new species from Guangxi, China, *Phytotaxa* 227 (3): 253–260.

BOOKS PUBLISHED BY BSI, KOLKATA (2015-16)

MAO, A.A. AND R. GOGOI 2016. Flora of Dziiko/ Dzuko Valley. Botanical Survey of India, Kolkata.

MURTHY, G.V.S. AND V.J. NAIR 2016. The Flora of Kerala, Vol. 2. Botanical Survey of India, Kolkata.

PARAMJIT SINGH, P.K. PUSALKAR, S.K. SRIVASTAVA, P. LAKSHMINARASIMHAN AND BRIJESH KUMAR 2015. Kedarnath Natural Disaster Impact on Flora. Botanical Survey of India, Kolkata.

RANJAN, V., P. LAKSHMINARASIMHAN, S.S. DASH AND H.J. CHOWDHERY (ed.) 2016. Flora of West Bengal Vol. III, Botanical Survey of India, Kolkata.

SINGH, K.P., K.K. KHANNA AND G.P.SINHA (ed.) 2016. Flora of Uttar Pradesh (Ranunculaceae-Apiaceae) Vol. I. Botanical Survey of India, Kolkata.

SINGH, P. , K. KARTHIGEYAN, P. LAKSHMINARASIMHAN AND S.S. DASH (2015). Endemic Vascular Plants of India. Botanical Survey of India, Kolkata.

SINGH P. AND SANGITA DEY (ed.) 2016. Cyperaceae: Mapanioideae, Cyperoideae; Tribes: Schoeneae & Sclerieae. In: Fascicles of Flora of India (Fascicles 27). Botanical Survey of India, Kolkata.

SRIVASTAVA, S.K. AND ACHUTA NAND SHUKLA 2016 2015. Flora of Cold Desert, Western Himalaya, India, Vol. 2. Botanical Survey of India, Kolkata.

BOOK/CHAPTER PUBLISHED

BISWA, S., P. LAKSHMINARASIMHAN AND A. LOKHO. 2016. Ethno-Medicinal plants of Bihar and the Native Community of Koderma Wildlife Sanctuary, Jharkhand, India". In H.K. Chourasia (ed.) *Conservation of Medicinal Plants Conventional and Modern Approaches*. Omega Publications, New Delhi. pp. 118-134.

KUMAR, ANAND AND B.K. SINGH, 2016

"Traditional medicinal plants recorded in proposed Eastern Dedicated Freight Corridor passing through the Gautam Buddha Wildlife Sanctuary and its environ in Bihar & Jharkhand" in Chourasia, H.K. (ed.), Conservation of Medicinal Plants : conventional and modern approaches, (pp 181-194).

LAKSHMINARASIMHAN, P. AND A. GARG. 2016. Plant Diversity of Lakshadweep Islands – An Overview. [www.bsienvis.nic.in; under Status of Plant Diversity in India].

LAKSHMINARASIMHAN, P. AND W. ARISDASON. 2016. Plant Diversity of Maharashtra State – An Overview. [www.bsienvis.nic.in; under Status of Plant Diversity in India].

LAKSHMINARASIMHAN, P., S. DEY AND A. BHATTACHARJEE. 2016. Importance of Taxonomy in the study of Medicinal Plants – case studies with *Panax* L. (Araliaceae) and *Picrorhiza* Royle ex Benth. (Scrophulariaceae). In: Chourasia, H.K. (ed.), Conservation of Medicinal Plants: Conventional and Modern Approaches: 1 – 6. Omega Publications, New Delhi.

LAKSHMINARASIMHAN, P., W. ARISDASON, S. GANTAIT AND SUBIR BANDYOPADHYAY. 2015. *Bibliography and abstracts of papers on flora of Karnataka*. Compiled for ENVIS Centre on Floral Diversity, Botanical Survey of India, Howrah.

M. SANKARARAO. 2016. Role of Sacred groves in conservation of medicinal plants in Northern part of Andhra Pradesh, India In : Chourasia H.K. (ed.), *Conservation of medicinal plants: conventional and modern approaches*, Omega publications, New Delhi. pp. 167-173. (ISBN: 978-81-8455-588-2).

MASTAKAR, V.K., P. LAKSHMINARASIMHAN AND M. MODAK. 2016. Ethnomedicinal Plants of Palkot Wildlife Sanctuary, Jharkhand, India. In H.K. Chourasia (ed.), *Conservation of Medicinal Plants Conventional and Modern Approaches*. Omega Publications, New Delhi. pp. 270-280.

MISHRA SANJAY, GAUTAM ANUJ EKKA, VINAY RANJAN AND LAL JI SINGH. 2016. Role of DEGCA, BSI Garden in Conservation of Medicinal Plant Diversity of Andaman and Nicobar Islands, India In: Chourasia, H.K. (ed.), Conservation of Medicinal Plants Conventional and Modern Approaches. pp. 95-108.

MISHRA, S., GAUTAM ANUJ EKKA, VINAY RANJAN AND L. J. SINGH. 2016. Role of DEGCA, BSI Garden in conservation of medicinal plant diversity of Andaman and Nicobar Islands,India. In: Conservation of Medicinal plants conventional and modern approaches (Ed. H.K. Chourasia). pp. 95-108, Omega Publications, New Delhi.

MISHRA, SANJAY, ASHUTOSH TRIPATHI, DURGESH KUMAR TRIPATHI, AND DEVENDRA KUMAR CHAUHAN. 2015, Role of sedges (Cyperaceae) in wetlands, environmental cleaning and as food material: Possibilities and future perspectives. Plant Environment Interaction: Responses and Approaches to Mitigate Stress : 327-345, Wiley publication.

MORAN, L, A.A. MAO, AND J.GAMLIN. 2016. *Rhododendrons of the Eastern Himalayas*, Published by Department of Science & Technology, Govt. of Arunachal Pradesh.

LEELA RANI, P., M. YAKADRI, T. RAMPRAKASH, J. SWAMY, P. SPANDANA BHATT AND CH, PALLAVI. 2015. *Weed Flora at a Glance*. Professor Jayashankar Telangana State Agricultural University Press, Hyderabad.

PRAMANIK A., P. R. SUR, P. K. BASKE AND A. C. HALDER. 2015. Medicinal plant resources in traditional village-Home gardens of Rayagada district, Odisha – A study Report :61-69, In: Recent Advances in Ethnobotany. S. Kumar (ed). Recent Advances in Ethnobotany. Deep Publications, New Delhi.

RANJAN V., P. LAKSHMINARASIMHAN, S.S. DASH AND H.J. CHOWDHERY (eds.), 2016. Flora of West Bengal Volume – III (Apiaceae-Boraginaceae). Botanical Survey of India, Kolkata.

RANJAN VINAY, HARISH SINGH AND LAL JI SINGH. 2016, Medicinal and Aromatic Plants of Bihar with Their Biological Activity and Strategies for Their Conservation In: Chourasia, H.K. (ed.), Conservation of Medicinal Plants Conventional and Modern Approaches. 142-166

RANJAN, VINAY 2015. Glycininae.In: Flora of West Bengal (eds. T. K. Paul & al.)3: 164-170.

RANJAN, VINAY AND P.G. PILLAI. 2015. Erythrininae.In: Flora of West Bengal (eds. T. K. Paul & al.)3: 157-164.

RAO C.S AND S.K. SINGH 2015.Wild Orchid of Meghalaya– A pictorial guide. Meghalaya Biodiversity Board, Shillong.

RAO, P.S.N. AND R.K. GUPTA, 2015. Algae of India (Excluding Diatoms and Dinoflagellates) Vol.3. Botanical Survey of India, Kolkata. p. 103.

RASINGAM, L. *Forest Plants of the Nilgiris, Southern Nilgiri Biosphere Reserve – A Pictorial Field Guide*. Keystone Foundation, Kotagiri. pp. 1-370. 2015.

SAHOO, A. K. 2016. Botanical Survey of India: The Epicenter of Ethnobotanical studies of Dr. S. K. Jain p.315-322 in Jain, A.K. (ed.) Indian Ethnobotany: emerging trends. Scientific Publishers, Jodhpur.

SAMPATH KUMAR, V. 2015–16 (Compiled and Edited). *BSI Newsletter*, The monthly electronic newsletter of Botanical Survey of India, Vol. 2, Issues 2–12 (co-compiler Avishek Bhattacharjee,) and Vol. 3, Issues 1–2.

SAMPATH KUMAR, V. 2016. Sarcospermataceae. In: V. Ranjan, P. Lakshminarasimhan, S.S. Dash and H.J. Chowdhery (eds.), Flora of West Bengal, Vol. 3, pp. 347–348. Botanical Survey of India, Kolkata.

SAMPATH KUMAR, V. 2016. Symplocaceae. In: V. Ranjan, P. Lakshminarasimhan, S.S. Dash and H.J. Chowdhery (eds.), Flora of West Bengal, Vol. 3, pp. 352–357. Botanical Survey of India, Kolkata.

SHARMA, S.C. AND C.S. PUROHIT. 2015. Geographical distribution of grasses of North-west Rajasthan and their importance in human welfare. In Kapoor BBS, Sharma SC, Arora A and Jain RR (eds.) Ethno-botany a Recent approach. pp- 102-117, Madhu Publication.

SHARMA, S.C., C.S. PUROHIT, J. KANTIYA AND R. K. AGGRAWAL. 2015. Traditional significant medicinal plants of Rajasthan. In Kapoor BBS, Sharma SC, Arora A and Jain RR (eds.) Ethno-botany a Recent approach. pp- 191-196, Madhu Publication.

SINGH, D.K. AND S.K.SINGH. 2015. Manual of Liverwort and hornworts of Himachal Pradesh, India. Bishen Singh Mahendra pal Singh, Dehradun (inaugurated on 28th September in Conference of Cryptogams at Lucknow.

SINGH, HARISH. 2016. Promising Ethnobotanical Plants and Prospects of Plant based Cottage industries in Tribal areas of Odisha, India. In: Jain, A.K. (ed.) *Indian Ethnobotany: Emerging trends (Dr. S.K. Jain Felicitation volume)*, Scientific Publishers, Jodhpur. pp.33-50.

SINGH, HARISH, P.A. DHOLE, P. BASKE AND R. SARAVANAN. 2016, Ethnomedicinal plants and their traditional conservation in Deogarh district, Odisha. In: Chaurasia, H.K. (ed.) Conservation of medicinal plants: Conventional and Modern Approaches, Omega Publications, New Delhi. Pp 28-66.

SINGH, P., K. KARTHIGEYAN, P. LAKSHMINARASIMHAN AND S.S. DASH. 2015. Endemic Vascular Plants of India. Botanical Survey of India, Kolkata. pp. xiii + 339, 58 maps & 289 color photos.

SINGH, P., P.K. PUSALKAR, S.K. SRIVASTAVA, P. LAKSHMINARASIMHAN AND BRIJESH KUMAR, 2015. Kedarnath Natural Disaster - Impact on Flora. BSI, Kolkata.

SUJANA, K.A. 2016 "Prospects and challenges of conservation traditional medicine and medicinal plants in tropical forests of India . In: Chaurasia, H.K. (ed.), Conservation of medicinal plants: Conventional and Modern Approaches, Omega Publications, New Delhi. pp 109-117.

ABSTRACT PUBLISHED

BEHERA, KR. SANDIP , SANJAY MISHRA AND LAL JI SINGH. 2016. An endeavour to conserve the Pteridophytes of Andaman and Nicobar Islands in the Botanical garden of Botanical survey of India, Andaman and Nicobar Regional centre, Port Blair. National Conference on Indian Botanic Gardens. 18-20 November, 2015, Abs. 58.

BEHERA, SANDIP KR. , SANJAY MISHRA, LAL JI SINGH, AND C. P. VIVEK 2015. Some Interesting Pteridophytes of South Andaman, India. National Conference on 'Cryptogam Research in India, Progress and Prospects" Lucknow 28-29 September Abs. 109.

VIVEK C.P., LAL JI SINGH AND M.Y. KAMLE. 2015. Aquatic and Wetland plant diversity and Climate change in Andaman & Nicobar Islands.
In: National Seminar on Harmonizing Biodiversity and Climate Change: Challenges and Opportunities, Port Blair. Abs. 91

DAS, K. 2016. Mycobiota of Wild Mushrooms (Ectomycorrhizal, Saprophytic and Parasitic) in

North Sikkim: Morphological Diversity and Taxonomic Treatment. Abstracts. National Seminar on Plant and Microbe: Diversity and Utilization, Visva-Bharati, Santiniketan, West Bengal.

EKKA, GAUTAM ANUJ, LAL JI SINGH AND M.Y. KAMBLE. 2015 Plant Diversity and Climate change in the coastal zone of the Andaman and Nicobar Islands In: National Seminar on Harmonizing Biodiversity and Climate Change: Challenges and Opportunities, Port Blair. ABS. 92-93

GUPTA, R.K. 2015. Thermal algae of India with special reference to Jharkhand. (Special Lecture). *Abstracts of National Conference on Cryptogam Research in India: Progress & Prospects*. p. 133.

HAMEED, S.S. 2015. *Ex-situ* conservation initiatives of Lodoicea maldivica (J.F. Gmelin) Persoon (The Double Coconut Palm) at Acharya Jagadish Chandra Bose Indian Botanic Garden (AJCBIBG), Howrah in the Proceedings of National Conference on Indian Botanic Gardens, Lucknow.

MANIKANDAN, R AND S.K. SRIVASTAVA. 2016. Note on Floristic diversity of Govind Pashu Vihar Wildlife Sanctuary, Western Himalaya-In: Abstract and Souvenir, 10th Uttarakhand State Science and Technology Congress. pp. 88.

MISHRA SANJAY, GAUTAM ANUJ EKKA, VINAY RANJAN AND LAL JI SINGH. 2016. Role of DEGCA, BSI Garden in Conservation of Medicinal Plant Diversity of Andaman and Nicobar Islands, India In: National Conference on Conservation of Medicinal Plants: Conventional and Modern Approaches, Bhagalpur March, 16 – 18, 2016. Abs. 39

MOUMITA, DAS DAS, A. PRAMANIK AND D. MAITY. 2015. Taxonomic studies on Memecylaceae of India" (Abstract) in Proceedings of International Seminar on Advancement in Angiosperms Systematic & Conservation, Calicut.

PANWAR, G. S. AND S. K. SRIVASTAVA. 2016. Conservation measures for the *Pittosporum eriocarpum* Royle: an endangered and endemic medicinal shrub of Uttarakhand- In: Abstract and Souvenir 10th Uttarakhand State Science and Technology Congress 2015-16 held on 10-12 February 2016.

PRABHU, S., R. SATHIYASEELAN, S. ARON AND LAL JI SINGH. 2015. Endemic Plants Diversity of Great Nicobar Biosphere Reserve (GNBR) and Conservation Strategies In: National Seminar on Harmonizing Biodiversity and Climate Change: Challenges and Opportunities, Port Blair. Abs. 72-73.

RANJAN VINAY, HARISH SINGH AND LAL JI SINGH. 2016 Medicinal and Aromatic Plants of Bihar with Their Biological Activity and Strategies for Their Conservation In: National Conference on Conservation of Conservation of Medicinal Plants: Conventional and Modern Approaches, Bhagalpur March, 16 – 18, 2016 Abs. 56.

ROY, RIJUPALIKA N AND A. PRAMANIK. 2015. Notes on serration pattern in leaves of *Myrsine* (Myrsinaceae) (Abstract) in Proceedings of International Seminar on Advancement in Angiosperms Systematic & Conservation, Calicut.

SINGH, D. 2015. Collection, preservation and identification of liverwort and hornwort. In: a National workshop on 'Capacity Building Training Course' in Plant Taxonomy organised by T.N.B College, Bhagalpur & University Department of Botany, T.M. Bhagalpur University, Bhagalpur – 812 007 in collaboration with Botanical Survey of India MoEF & CC, Govt. of India & ENVIS Centre on Floral Diversity, BSI, MoEF & CC, Govt. of India, Howrah. pp. 60–62.

SINGH, LAL JI, GAUTAM ANUJ EKKA, SANJAY MISHRA, SANDIP KR. BEHERA AND C. P. VIVEK. 2015. Endemic Pteridophytes: A Conservation Appraisal in The Andaman And Nicobar Islands, India. National Conference on ' Cryptogam Research in India, Progress and Prospects" Lucknow 28-29 September Abs. 107.

SINGH, LAL JI, SANJAY MISHRA, SANDIP KUMAR BEHERA AND GAUTAM ANUJ EKKA. 2015, Role of DEGCA, BSI Garden in conservation of Plant Diversity of Andaman and Nicobar Islands, India (2015) National Conference on Indian Botanic Gardens. 18-20 November, 2015, Abs. 31.

YADAV R. B., S. K. VERMA, AJAY KUMAR AND LAL JI SINGH, 2016. An Investigation on the Aquatic Vascular Plants of Farrukhabad District, U.P. In: National Conference on Science for Rural India, Deoria, January, 30- 31, 2016 Abs. 46

YADAV, R. B., S. K. VERMA, LAL JI SINGH AND AJAY KUMAR. 2016 ,Medicinal Plants of Vindhyan Hills of Chitrakoot District of U. P. In: National Seminar on Biodiversity Conservation and Sustainable development, Kanpur on 20th January, 2016. Abs. 129

NEWS ARTICLES

BENNIAMIN, A. 2015. "Wispy Plants: "Some ferns can grow as large as Coconut trees". Times of India, Pune Edition, on 13th July.

R. DUBEY. 2015. Sawantwadi throws two new species. Times of India, Pune Edition, on 16th July.

पुरोहित,चन्दन सिंह एवं विनोद मैना 2015. जालोर जिलें की महत्वपूर्ण औषधिय वनसंपदा, भारतीय वनस्पति सर्वेक्षण, शुष्क अंचल क्षेत्रीय केन्द्र, जोधपुर ।

पुरोहित, चन्दन सिंह एवं विनोद मैना 2015. राजस्थान का विलुप्त प्राय : (१) पादप : *सिरोपिजिया बल्बोसा*, भारतीय वनस्पति सर्वेक्षण, शुष्क अंचल क्षेत्रीय केन्द्र, जोधपुर ।

हिन्दी प्रकाशन

कुमार, अम्बरीश, अरविन्द कुमार एवं एस. के. श्रीवास्तव. 2015 अल्मोड़ा जनपद (कुमाँऊ हिमालय) की वन एवं वनस्पतियाँ, वनस्पति वाणी 24:1.

गर्ग आरती, पी. लक्ष्मीनरसिम्हन एवं पुष्पी सिंह. 2015 लक्षद्वीप की जैव विविधता, वनस्पति वाणी 24:4

कुमार संजय एवं एस. एस. दाश, 2015 उत्तराखण्ड हिमालय का प्रसिद्ध दयारा बुग्याल संरक्षण और संवर्धन, वनस्पति वाणी 24:9

मणिकंदन आर., एस. के. श्रीवास्तव एवं संजय उनियाल. 2015 गोविंद पशु विहार वन्यजीव अभयारण्य, पश्चिमी हिमालय के संकटग्रस्त औषधीय पौधे, वनस्पति वाणी 24: 13

सिंह विनीत कुमार एवं एस. के. श्रीवास्तव. 2015 पार्वती अरंगा वन्य जीव अभयारण्य, तराई क्षेत्र (गोंडा) उत्तर प्रदेश की जैव–विविधता, वनस्पति वाणी 24:18

तिवारी अर्जुन प्रसाद एवं भोलानाथ 2015. रानीपुर वन्य जीव विहार की वानस्पतिक विविधता एवं उपयोगी पौधे, वनस्पति वाणी 24:22

बेंजामिन जे. एच. फ्रेंकलिन एवं राकेश जी. वाद्यार. 2015 मालाबार वन्य जीव अभयारण्य, केरल की एक झलक वनस्पति वाणी 24:28

पुरोहित चन्दन सिंह, 2015 भारतीय वनस्पति सर्वेक्षण, सिक्किम हिमालय क्षेत्रीय केन्द्र, गान्तोक के वानस्पतिक उद्यान की पादप विविधता एक अवलोकन वनस्पति वाणी 24: 31

महापात्र एच. एस. 2015 अरूणाचल प्रदेश के तवांग जिले की उच्च पर्वतीय आर्द्र भूमि और उसका संरक्षण, वनस्पति वाणी 24: 37

गुप्ता प्रतिभा 2015 क्लोरेला का औषधीय उपयोग एवं स्वास्थ्यवर्धन में योगदान वनस्पति वाणी 24: 39

गुप्ता आर. के. एवं सुदीप्त कुमार दास. 2015 पादप जीवाश्म : राजमहल की पहाड़ी, झारखण्ड वनस्पति वाणी 24: 40

सिंह देवेन्द्र, 2015 मंदार पर्वत की हरितोद्भिद विविधता : एक सिंहावलोकन वनस्पति वाणी 24: 42

श्रीवास्तव अम्बर, बश्जेश कुमार एवं सुनील कुमार श्रीवास्तव. 2015 ब्राह्मी : आयुर्वेद की एक सुविख्यात व संदिग्ध वनस्पति, वनस्पति वाणी 24: 44

श्रीवास्तव अम्बर, पुष्पेश जोशी, संजय उनियाल एवं देबस्मिता दत्ता प्रामाणिक. 2015 हल्दी के विभिन्न रूप व उनके उपयोग, वनस्पति वाणी 24: 48

कुमार अम्बरीश एवं संजय उनियाल, 2015 संकटग्रस्त वश्क ''बीजा साल''का औषधीय महत्व, वनस्पति वाणी 24: 52

गुप्ता पूजा एवं भोलानाथ. 2015 अंजीर– एक बहुगुणीय औषधीय वनस्पति, वनस्पति वाणी 24: 53

मधुकर वीरेन्द्र, अम्बर श्रीवास्तव एवं सुनील कुमार श्रीवास्तव. 2015 बालमखीरा (किगेलिया अफ्रीकाना) : एक बहुउपयोगी वनस्पति, वनस्पति वाणी 24: 55

गर्ग आरती एवं पुष्पी सिंह. 2015 वनककड़ी (सिनोपोडोफायलम हेक्सेड्रम) के औषधीय उपयोग एवं संरक्षण नीति, वनस्पति वाणी 24 : 56

साहु ए. के. बी. के. सिन्हा एवं सुदेशना दत्ता. 2015 औद्योगिक अनुभाग की वनस्पति गैलरी स्थित रेशा प्रदत्त पौधो का परिचय, वनस्पति वाणी 24 : 57

डोगरा कुलदीप सिंह . 2015 गठिया (आर्थिराइटिस और रूह्मेटिज्म) के निदान में सहायक औषधीय पौधे, वनस्पति वाणी 24:60

मैना विनोद, रमेश कुमार एवं बी. के. सिन्हा, 2015 अण्डमान निकोबार द्वीप समूहों के आदिम जन–जातिय औषधीय पादप, वनस्पति वाणी 24:64

सिंह हरीश. 2015 2015 ओडिशा के आदिवासियों में वनस्पतियों से संबंधित कुछ प्रचलित लोक–विश्वास, वनस्पति वाणी 24:72

जैन वर्तिका और डॉ एस. के. वर्मा. 2015 सेमल पर नेजा–परंपरागत मान्यता द्वारा सरंक्षण की अनूठी प्रथा, वनस्पति वाणी 24:78

पंवार गिरिराज सिंह 2015 पिट्टोस्पोरम इरियोकारपम –उत्तराखण्ड राज्य की स्थानीय, संकटापन्न, औषधीय एवं बहुआयामी प्रजाति का सूक्ष्म प्रवर्धन विधि द्वारा संरक्षण, वनस्पति वाणी 24: 81

सिंह बसंत कुमार एवं हिमांशु शेखर महापात्र. 2015 आचार्य जगदीश चंद्र बोस भारतीय वनस्पति उद्यान की झीलों पर प्रदूषण का प्रभाव एवं उसका उपचार, वनस्पति वाणी 24 : 86

श्रीवास्तव निति‍षा एवं सुबीर सेन. 2015 जैव प्रौद्योगिकी एवं पर्यावरण प्रबंधन, वनस्पति वाणी 24 : 88

गुप्ता भरत. 2015 राष्ट्रीय हरित न्यायाधिकरण पर्यावरण संरक्षण के लिए एक विशेष कोर्ट, वनस्पति वाणी 24 : 91

रॉय ऋजुपालिका बसन्त कुमार सिंह एवं अरविंद प्रमाणिक़. 2015, सूर्योदय की धरती : अरूणाचल प्रदेश की एक यात्रा, वनस्पति वाणी 24 : 92

गुप्ता आर. के. एवं सुदीप्त कुमार दास. 2015 प्रो. एच. पी. गांधी (1920–2008) : भारतीय डायटमोलोजिस्ट वनस्पति वाणी 24 : 94

गुप्ता प्रतिभा 2015, सायनोजीवाणु की सर्वव्यापी विविधता वनस्पति वाणी 24: 96

भोलानाथ 201, यदि बचें रहेगें बाघ वनों में वनस्पति वाणी 24: 97

गुप्ता आर. के. 2015 पर्यावरण, वनस्पति वाणी 24: 98

कुमार संजय 2015 भारत की विविधता, वनस्पति वाणी 24: 99

गुप्ता भरत 2015 बनाओ सतुंलन, वनस्पति वाणी 24: : 100

सिंह देवेन्द्र 2015 धरा की करूण पुकार, वनस्पति वाणी 24: 101

प्रसाद रवि 2015 स्वच्छ निर्मल भारत, वनस्पति वाणी 24: 102

उनियाल संजय 2015 पौधे की दास्तान, वनस्पति वाणी 24: 103

दास संजीव कुमार एवं संजय कुमार 2015 पर्यावरण समाचार, वनस्पति वाणी 24: 104

Bulbophyllum chyrmangensis D. Verma & al.

Some of the in-house publications of BSI during 2015-16

SYMPOSIUM/ CONFERENCES/ WORKSHOP/ TRAINING COURSES ATTENDED

DR A. PRAMANICK

Attended training programme on PFM system conducted by PAO, Kolkata at Committee Room, BSI, HQ, Kolkata on 29.03.2016.

Attended a training (with Sri Sajal Kr. Sardar) on enhanced PFMS application for online payment of MoEF & CC under the payment control of PAO, BSI/ZSI, Kolkata on 02.03.2016.

Attended exhibition on the celebration of World wetlands day at Gosaba, Sunderban on 02.02.2016.

Attended Hindi Workshop organized by Central Botanical Laboratory, BSI, Howrah on 04.02.2016.

Delivered lecture at Moulana Azad College, Kolkata in connection with the celebration of 30th Anniversary of DBT, on 17.12.2015.

Delivered a talk on the botanic garden in All India Radio on 13.08.2015.

DR. M.U. SHARIEF

Delivered Lecture on Floral & Cultural Diversity of Andaman & Nicobar Islands organized by Dr. NGP Arts & Science College, Coimbatore on 12.02.2016.

Delivered lecture at the Indian Schools of Mines, Kolkata on 02.12.2015.

DR. S.S. HAMEED

Attended National Conference on "Indian Botanic Gardens" held at Lucknow from 18-20th November, 2015.

Delivered lecture on Indigenous palms of India and sustainable use during the celebration of Biodiversity Day at Central National Herbarium, Howrah on 22.04.2015.

DR. S.P. PANDA

Attended training on Communication skill and time management held at Institute of Govt. Accounts & Finance, Ministry of Finance, Regional Training Centre, Kolkata from 10.09.2015-11.09.2015.

Attended training programme on PFM system conducted by PAO, Kolkata at Committee Room, BSI, HQ, Kolkata on 29.03.2016.

DR. C.M. SABAPATHY

Participated (along with Sri S.C. Mohanty) in exhibition on occasion of Annual Flower Show organized by Botanic Garden of Indian Republic, BSI, Noida from 25.02.2016-28.02.2016.

DR. B.K. SINGH

Attended exhibition on the celebration of 'World wetlands day' at Gosaba, Sunderban on 02.02.2016.

Attended a meeting with Chairman, IBRAD on the development of Agro-biodiversity in Sunderban Biosphere Reserve specially on wetlands on 08.03.2016.

Delivered lecture on Plant Conservation (*ex-situ* & *in-situ*) in the State Level Seminar organized by Bhairab Ganguly College, Belgharia, Kolkata 29.02.2016.

Attended an exhibition at MMC College, Kolkata during the Platinum Jubilee celebration on 09.12.2015-11.12.2015.

All scientists & staffs attended 80th Regional Council Meeting of Botanical Survey of India held at AJC Bose Indian Botanic Garden, Howrah from 03.09.2015-04.09.2016.

All scientists and staff participated Hindi Pakhwara at AJC Bose Indian Botanic Garden, Howrah from 01.09.2015-15.09.2015.

DR. KANAD DAS

Attended and delivered a talk entitled "MYCOBIOTA OF WILD MUSHROOMS (ECTOMYCORRHIZAL, SAPROPHYTIC AND PARASITIC) IN NORTH SIKKIM: MORPHOLOGICAL DIVERSITY AND TAXONOMIC TREATMENT" was delivered in a National Seminar on 'Plant and Microbe: Diversity and Utilization' held in Visva-Bharati, Santiniketan by the Dept. of Botany, Siksha Bhavana on March 19-20, 2016.

Delivered an invited talk on DBT sponsored seminar on 'Identification of Wild Mushrooms' in the Bodoland University, Assam on 22nd April, 2015.

A talk entitled "WILD HIMALAYAN MUSHROOMS: MORPHOLOGICAL DIVERSITY AND TAXONOMIC APPROACH" was delivered in the Dept. of Botany,

Mrinalini Datta Mahavidyapith, Birati, Kolkata on March 17, 2016.

Delivered practical demonstration on 'Preservation and identification of macrofungi in a training course on Herbarium Technique & Methodology' organized by ENVIS, BSI.

DR. R.K. GUPTA

As a resource person provided training on Herbarium Techniques and Methodology related to algae to University students, organized by ENVIS centre on Floral Diversity of BSI.

Attended the Platinum Jubilee International Conference on the Recent trends in Biotechnology and Biodiversity at TNB College Bhagalpur, Bhagalpur University on 27 – 29 July 2015, Organized by the Department of Botany and Zoology, TNB College Bhagalpur and Presented a paper on "Thermal Algae of Jharkhand" in Plenary Lecture on 28.07. 2015.

Presented a special lecture on 'Thermal algae of India with special reference to Jharkhand' in National Conference on Cryptogam Research in India: Progress and Prospects at NBRI, Lucknow, *w.e.f.* 28-29 September, 2015.

DR. DEVENDRA SINGH

Delivered a lecture on 'Diversity of liverwort and hornwort of Sikkim' on the International Day of Biological Diversity at Central National Herbarium, Howrah**.**

DR. MONALISA DEY

Attended International Day for Biological Diversity at Central National Herbarium, Botanical Survey of India, Howrah on 22.05.2015 and delivered a talk on "Bryophytes: Uses, threats and sustainable development".

MR. M.E. HEMBROM

Delivered one oral presentation on "Wood rotting fungi of Rajmahal hills, Jharkhand", in National Conference on "Challenges and Opportunities in Mycological Research" (NCCOMR-2016), 11–12 February, 2016 under the theme Fungal diversity, systematic and evolution held at CAS-Botany, University of Madras, Chennai.

Posters presentation was done at Barrackpore railway station in SCIENCE EXPRESS TRAIN on 18th January 2016 and attended about 500 students' teachers and visitors.

MR. ARVIND PARIHAR

Attended seminar on "Wet preservation techniques" delivered by Mrs. Rani Tiwari of British Natural History Museum, London in August 2015.

Attended one lecture on Foliaceous fungi delivered by eminent Scientist Dr. V.B. Hosagoudar.

DR. LAL JI SINGH

Attended National Seminar on '*Harmonizing Biodiversity and Climate Change: Challenges and Opportunities*' at CIARI, Port Blair from 17.04.2015 to 19.04.2015.

Participated *in a National Workshop on Less Known Marine Animals of India*, at ZSI, MOEF & CC, Port Blair from 11.06.2015 to 13.06.2015.

Attended pre PhD thesis seminar *on " Diversity of Nicobares gut microbiome and its relation to the expression of immune related functions, dietary habits and disease prevalence of host* at Indian Council of Medical Research, Regional Medical Research Centre, Port Blair on 18.03.2016.

Attended one day seminar *on " Strategies for the development of food processing sector in the Islands"* at CIARI, Port Blair on 23.03.2016.

Attended two days *Hindi workshop* at main office as well as Dhanikhari Experimental Garden cum Arboretum (DEGCA), Nayashahar on 29.06.2015 to 30.06.2015, 28.09.2015 to 29.09.2015, 28.12.2015 to 29.12.2015. and 28.03.2016 to 29.03.2016.

DR. JAGADEESH RAM T.A.M

Participated in a National Workshop on *'Less Known Marine Animals of India'*, at ZSI, MOEF & CC, Port Blair from 11.06.2015 to 13.06.2015.

Attended Ph.D. Synopsis presentation on the thesis title entitled 'Studies on Leptospiral biofilms – ecological aspects' on 16.10.2015 at Regional Medical Research Centre, Port Blair.

Attended the launch of distribution of double fortified salt (DEC + Iodine) for elimination of filariasis to the community at risk on 20.11.2015 at Regional Medical Research Centre, Port Blair.

Attended the synopsis presentation of the Ph.D. thesis entitled 'studies on Nicobar Crab-eating macaque (*Macaca facicularis umbrosa*) in Great Nicobar Island' on 11.12.2015 at Zoological Survey of India, Port Blair.

Attended Biannual Meeting of TOLIC in CIARI – ICAR, Port Blair on 02.02.2016.

Attended the Synopsis presentation of the Ph.D. thesis entitled 'Bionomics of Sea Anemones from Andaman Coast' in Zoological Survey of India on 03.02.2016.

Attended one day training/seminar *on 'Administrative Matters'* at ANRC, Port Blair on 31.03.2016.

DR. A.A MAO

Attended "Technical Workshop on Bio Resources & Sustainable Development – Emerging Opportunities" organized by Bio-resources Development Centre, Shillong, 15th May 2015 and delivered a brief talk on the 'Floristic wealth of Meghalaya and its opportunities'.

Attended and presented a paper entitled "Conservation of North East India Flora" at the National seminar on conservation biotechnology and DNA Barcoding organized by Gujarat State Science & Biotechnology Mission, Gandhinagar 18-19th May 2015.

Attended and delivered keynote address at the National Seminar on "Sustainable utilization of plant Resources of North East India" at the Department of Botany, Gauhati University, Guwahati, 23rd May 2015.

Attended and celebrated 'Biodiversity Day' (22 May 2015) Organised by Biodiversity Board of Meghalaya at Sosothom auditorium, Shillong.

Attended a workshop on 'Conservation Assessment and Management Prioritization (CAMP) Processing Using IUCN Red list categories and criteria for the state of Nagaland' held *w.e.f.* 22nd to 25th September, 2015.

Attended inaugural function of workshop 'Fauna of Hotspots-3 Eastern Himalaya' organized on 17th March 2016 by Zoological Survey of India North Eastern Regional Centre, Shillong.

Attended State Medicinal Board Meeting on 21.07.2015.

Attended a review meeting on the progress of ongoing DBT project along with Dr. Padma Raj Gajurel from Department of Forestry, NERIST and Dr. Nicolee Lyngdoh from PASIGHAT on 22.08.2015.

Attended the inaugural function of office building of MoEF & CC, Shillong, inaugurated by Shri Prakash Javadekar, Union Minister of State for Forest, Environment and Climate Change on 18th November, 2015.

Participated in biodiversity exhibition at 'International Terra Madre' slow food festival at Mawphlang held on 7th Nov, 2015.

Attended ongoing DBT-Project review meeting held at Kashmir University, Srinagar on 9.11.2015.

DR. N. ODYUO

Attended the workshop on 'Conservation Assessment and Management Prioritization(CAMP) Processing using IUCN Red list categories and criteria for the state of Nagaland' held *w.e.f.* 22nd to 25th September, 2015.

Participated in biodiversity exhibition at 'International Terra Madre' slow food festival at Mawphlang held on 7th Nov, 2015.

Attended the inaugural programme of office building of MoEF & CC, Shillong inaugurated by Shri Prakash Javadekar, Union Minister of State for Forest, Environment and Climate Change on 18th November, 2015.

DR. CHAYA DEORI

Attended inaugural function of workshop 'Fauna of Hotspots-3 Eastern Himalaya' organized on 17th March 2016 by Zoological Survey of India, North Eastern Regional Centre, Shillong.

Attended the inaugural of office building of MoEF, Shillong inaugurated by Shri Prakash Javadekar, Union Minister of State for Forest, Environment and Climate Change on 18th November, 2015.

DR. S.K.SINGH

Attended inaugural function of workshop 'Fauna Of Hotspots-3 Eastern Himalaya' organized on 17th March 2016 by Zoological Survey of India, North Eastern Regional Centre, Shillong.

Attended a consultative meeting called by Executive Director MBDA, Meghalaya, held at Conference room of Meghalaya Secretariat on 28th April 2015 to dicuss about "Proposal for inclusion of Natural Assets of Meghalaya in to the world heritage site of UNESCO under Natural Category.

Attended Biodiversity Day (22 May 2015) celebration programme organised by Biodiversity Board of Meghalaya at Sosothom auditorium, Shillong.

Participated in biodiversity exhibition at 'International

Terra Madre' slow food festival at Mawphlang held on 7th Nov, 2015.

Attended the inaugural programme of office building of MoEF & CC, Shillong inaugurated by Shri Prakash Javadekar, Union Minister of State for Forest, Environment and Climate Change on 18th November, 2015.

Attended biannual meeting of Nagar Rajbhasha Karyanvayan Samiti, Shillong on 25th June at Conference of Assam Riffles, Laitkor.

Attended a meeting called by Chief Srecretary of Meghalaya with reference to Enforcement of Wildlife Protection Act 1972 in the State on 20th January 2016 at chamber of Chief Secretary, Secretariat, Shillong.

Participated in National Seminar on 'Cryptogams (28-29 September) organized by NBRI, Lucknow and made two presentation (1 poster & 1 oral: 1. Contributions to the Hepaticae and Anthocerotae of Mizoram X. Marchantiales (oral, S.K.Singh); 2. Two new *Drepanolejeunea;* [Marchantiophyta: Lejeuneaceae] added to bryoflora of Meghalaya (Poster by Shashi Kumar & S.K.Singh).

DR. DEEPU VIJAYAN

Attended the inaugural programme of office building of MoEF & CC, Shillong inaugurated by Shri Prakash Javadekar, Union Minister of State for Forest, Environment and Climate Change on 18th November, 2015

Attended a review meeting on the progress of ongoing DBT project along with Dr. Padma Raj Gajurel from Department of Forestry, NERIST and Dr. Nicolee Lyngdoh from PASIGHAT on 22.08.2015.

Participated in biodiversity exhibition at 'International Terra Madre' slow food festival at Mawphlang held on 7th Nov, 2015.

DR. ASHISH V. PRABHUGAONKAR

Participated in Workshop on 'Northeast India Biodiversity Portal' organized by ATREE and NEHU during 23rd to 25th September, 2015.

Participated and helped in organization of International conference ' Asian Mycological Congress, 7-10 October 2015 at Goa University under aegis of 'Mycological Society of India' and 'Asian Mycological Asssociation'.and Presented two poster entitled: 1.Glimpse of Micro-fungal diversity of Meghalaya; 2. Studies on diversity of micro-fungi associated with indigenous palms of Western Ghats, India.

Attended inaugural function of workshop 'Fauna Of Hotspots-3 Eastern Himalaya' organized on 17th March 2016 by Zoological Survey of India' North Eastern Regional Centre' Shillong.

Participated in biodiversity exhibition at 'International Terra Madre' slow food festival at Mawphlang held on 7th Nov, 2015.

DR. S. BORAH

Attended a workshop on the 'Portal and launching the Northeast India Biodiversity Portal' in North-Eastern Hill University, Shillong from 23rd to 25th September, 2015.

DR. K.A. SUJANA

Participated in the exhibition in connection with the platinum jubilee celebration of Maharaja Manindra Chandra College at 20, Ramkanto Bose Street, Kolkata – 700 003 from 9th -11th December 2015.

Attended a National Level Conference on 'Conservation of Medicinal plants: Conventional and Modern Approaches' as a resource person and presented a paper entitled "Prospects and challenges of conservation of traditional medicine and medicinal plants in tropical forests of India" held at T. N. B. College Bhagalpur, Bihar on 17 March, 2016.

DR. HARISH SINGH

Attended a National Level Conference on 'Conservation of Medicinal plants: Conventional and Modern Approaches' as a resource person and presented a paper entitled "Ethnomedicinal plants and their traditional conservation in Deogarh district, Odisha, India" held at T. N. B. College Bhagalpur, Bihar on 16 March, 2016.

Attended a 'National workshop on 'Participatory Natural Resources Management and Integrated Tribal development in the context of Climate change' as a resource person and presented a paper entitled "Promising Ethnobotanical Plants and Prospects of Plant based Cottage industries in Tribal areas of Odisha, India" held at Indian Bio-Social Research and development (IBRAD), Kolkata on 30 March, 2016.

DR. L. RASINGAM

Attended a National Conference cum workshop on

"Advances in Orchid Biology with focus on Climate Change" held at Dr. YSR Horticultural University, Venkataramannagudem, Andhra Pradesh from 25th to 26th February 2016 and the NCDDO training programme on enhanced PFMS application for online payment of MoEF & CC under the payment control of PAO (BSI/ZSI), Kolkata from 1st March to 4th March 2016 at Regional Training Centre, Kolkata.

DR. D.K. AGRAWALA

Attended "International Conference on 'Conservation of Natural and Cultural Values of Khangchendzonga National Park, Sikkim" at Gangtok during 15-16 May 2015.

Attended as a special invitee, the 14th meeting of Institute Research Committee of National Research Centre for Orchids, Pakyong during 19 – 20 May 2015.

Attended as invited speaker, the World Environment Day celebration at GBPIHED, Sikkim unit. On 05.06.2015.

Attended Task Force meeting of PPV & FRA at NRC Orchid, Pakyong as a special invitee on 29.06.2015.

Attended GBPIHED, Sikkim Unit on 10.09.2015 as invited speaker during "2nd Himalayan Popular Lecture" and Annual Day; delivered a talk on "Glimpses of Orchid diversity in Sikkim Himalaya" through power point presentation.

Attended a meeting in State Forest Department, Gangtok as a member in the State level Khangchendzonga Biosphere Reserve Steering Committee for finalization of draft Management Action Plan.

Attended the Annual Research Council meeting of ICRI, Spice Board Gangtok on 30.09.2015.

Attended ARRI, Gangtok to visit Yuksom on 06.11.2015 for identification of medicinal plants to be displayed during the National seminar.

Participated in the International symposium on "Next generation approaches for sustainable development of Hill and Up land horticulture" organized by Sikkim University during 5th – 7th November, 2015 and co-chaired a technical session on 'Biodiversity and Conservation'.

Participated in the one day 'Awareness programme on Biological Diversity Act 2002 and its provisions' organized by the state biodiversity board, Government of Sikkim on 18.11.2015.

Participated in the National seminar on 'Value addition of Ayurvedic herbal resources through good agricultural and field collection practices' organized by ARRI, Gangtok during 20th – 21st November 2015 and co-chaired a technical session.

Attended the brainstorming session on "Impact of environmental protection and conservation initiatives in Sikkim between 1995 – 2015" at Forest Department, Government of Sikkim on 16.03.2016.

Attended ARRI, Gangtok as a member of Institute Ethical Committee for implementation of in-house projects.

DR. SANKARARAO MUDADLA

Attended as a Delegate, Training cum demonstration of Kitchen Gardening, Bonsai making and flower arrangement organized by Govt. of Sikkim Horticulture and cash crop department on 07.07 2015.

Delivered a talk as a Key Note speaker on "Sacred groves and its role in Conservation of floristic diversity through Biotechnological tools in a National seminar at Govt. Degree College, Srikakulam, Andhra Pradesh. from 04.11.2015 to 07.11.2015.

Attended as a delegate in a National seminar on 'Value addition of Ayurveda herbal resources through good agricultural and field collection practices' organized by ARRI, Gangtok during 20.11.2015 to 21.11. 2015.

Attended as a Resource person and delivered talk on "Role of Sacred groves in conservation of medicinal plants in Northern part of Andhra Pradesh, India." In a National Seminar held at TNB College, Bhagalpur, Bihar from 15-03-2016 to 18.03.2016.

DR. DAVID LALSAMA BIATE

Attended GBPIHED, Sikkim Unit on 10.09.2015 during "2nd Himalayan Popular Lecture" and Annual Day.

Attended National Seminar on 'Value Addition of Ayurvedic Herbal Resources through Good Agriculture & Field Collection Practices' on 20.11.2015 at Chintan Bhawan, Gangtok organized by ARRI, Sikkim and CCRAS, Ministry of Ayush, Govt. of India.

DR. P. LAKSHMINARASIMHAN

Delivered a talk entitled "An introduction to the Convention on Biological Diversity for people working with botanical collections" on 19-10-2015 at Seminar Hall, Dept. of Botany, Dr. Babasaheb Ambedkar

Marathwada University, Aurangabad to commemorate late Prof. V.N. Naik death anniversary and on 16-11-2015 in the Department of Environment Science, Mizoram University for the benefit of M.Sc. and research students.

Delivered a talk entitled "Botanic Gardens in Conservation of Threatened Tree species of India" at the National Seminar ("Conservation of Trees – Perspectives and Strategies") on 2nd February at Bhavan's College, Mumbai.

Attended the National Conference on 'Conservation of Medicinal Plants' at Dept. of Biotechnology, TNB College, Bhagalpur from 16-18 March, 2016 organised by TNB College, Bhagalpur & Univ. Dept. of Home Sc.-Food & Nutrition, T.N. Bhagalpur University, Bhagalpur; as Guest of Honour addressed the gathering during the inaugural function on 16-3-16 at TNB College Centenary Hall; chaired two technical sessions; gave a talk on Importance of taxonomy in the study of medicinal plants (plenary lecture on 17th March, 2016).

DR. RASHMI DUBEY

Attended a Training Programme in Next Generation Sequencing Data Analysis part of "Advanced Next Generation Sequencing-Bioinformatics and Data Analysis" held in MIT, Anna University, Chennai from 14.10.2015 to 17.10.2015.

DR. J.S. JALAL

Attended the National Conference on "Advances in Orchid Biology with focus on Climate Change, Medicinal and Floricultural Plants and Sustainable Economic Utilization" at Dr.Y.S.R. Horticultural University, West Godavari Dist., Andhra Pradesh, during the period 26th – 28th February 2016, organized by the Orchid Society of India (TOSI); presented a paper on "Orchid Diversity of Madei Wildlife Sanctuary, Goa" in the conference.

DR. PRIYANKA INGLE

Attended "Silver Jubilee Conference of IAAT & Council Meeting of IAPT & International Seminar on Advancement on Angiosperm Systematics and Conservation" held at University of Calicut, Kerala, India from 19 – 21 November, 2015 and presented a paper entitled "*Terminalia elliptica* Willd. in India – A Complex".

Attended the National level workshop of Paul Hebert centre for DNA Bar-coding on the subject entitled "DNA Barcoding: Hands on practice for Beginners" held at Molecular Biodiversity Research Division, Department of Zoology & Wildlife, Govt, Arts college, Udhagamandalam, Coimbatore during 30 – 31st March 2016.

DR. S.K SRIVASTAVA

Attended inaugural function of the National Workshop on Fauna of Shivalik Ecosystem (Uttarakhand) and Application of GIS in Conservation of Fauna on 20.07.2015, organized by Zoological Survey of India, Dehradun at FRI, Dehradun.

Attended inaugural session of "International Workshop and Training on the role of Natural World Heritage Sites in Disaster Risk Reduction" on 24.08.2015 at WII, Dehradun.

Attended meeting on A National Dialogue on Himalayan Conservation at HESCO, Chaired by Shri Prakash Javedkar Honble. Minister of Environment Forests & Climate Change, New Delhi on 31.08.2015.

Acted one of the members of the Evaluation Committee for Elocution competition on 4th Dec. 2015 at CSWCRTI, Dehradun on occasion of International year of Soil, on the topic "Value of soil is more than oil"

Attended 'Spring Festival' at Governer house, Dehradun-also acted as one of the judges in cut flower in Flower Show on 05.03.2016.

Attended inaugural session of Regional Science Centre, Dehradun by UCOST, Dehradun and National Council of Science Museum, Ministry of Culture, Govt. of India.

DR. P.K. PUSALKAR

Attended 'National Launch Workshop on Species Recovery Programme' at Wildlife Institute of India, Dehradun on 16.05.2016.

Attended training on 'Economic Evaluation of Ecosystem Services' organized jointly by GIZ German cooperation, Values, Conservation Strategy Fund and Wildlife Institute of India from 14.03.2016 to 17.03.2016 at Wildlife Institute of India, Dehradun.

Attended Annual Flower Show [Vasantostav] on 5-6th March 2016 at Rajbhavan, Dehradun as invited judge to assess Flower Show Competition under five categories, namely Cut Flowers (Dahlias, Roses, Gladiolus, Orchids, Marigold, Lilies, Others), Bonsai, Succulents, Cacti and Hanging Pots.

Attended two days National level Stakeholders meet at FRI, Dehradun on "DPR Preparation of Forestry intervention for Ganga" under NMCG on 2-3, July 2015 held in presence of H'ble ministers of GOI, Sh. P. Javdekar, Miss Uma Bharti, Sh. Sarbanand sonowal & Sh, Sripad Naik and chief guest Sh. Harish Rawat C.M. UK.

Attended Regional Consultation of Multi stakeholders Himalayan Sustainable Development Forum (HSDF) on 'Disaster Risk Reduction, Tourism and Environmental Governance in context of Climate Change Adaptations" organized by G.B. Pant Institute of Himalayan Environment and Development in collaboration with Swiss Embassy at Dehradun on 4th August 2015.

DR. B.S. KHOLIA

Attended inaugural function on National training Workshop on 'Fauna of Sivalik ecosystem (Uttarakhand) and the application of GIS in conservation of fauna' at FRI.

Attended national seminar on Cryptogams organised at NBRI Lucknow.

DR. K. AMBRISH

Attended "National Training Workshop on Fauna of Shivalik Ecosystem and the applications of GIS in conservation of Fauna" on 20.07.2015, organized by ZSI, Dehradun.

Attended PAC meeting as one of the experts on 22nd of July, 2015 organized by Uttarakhand Science Education and Research Centre (USERC), 33, Vasant Vihar, phase II, Dehradun.

Delivered a lecture as a Biology expert in the National seminar on I-next Engineering Gate Way, 2015 at Survey of India, Dehradun, organized by VIT University, Vellore, Chennai.

Participated as DDO in a training on " Bhavishya (An online Pension processing and Tracking System" in MOEF & CC, Paravaran Bhavan, Jor Bagh, N. Delhi on 12.02.2016.

Attended IIRS User Interaction Meet-2016 on February 18, 2016 at Indian Institute of Remote Sensing Dehradun, India as delegate.

Attended "Spring Festival-2016" in Rajbhavan, Dehardun *w.e.f.* 05.03.2016-06.03.2016 as competition judge.

Attended "Training program on Economic valuation of ecosystem services" *w.e.f.* 14.03.2016-17.03.2016 at Wildlife Institute of India, Dehradun, as one of the delegate, organized by WII, Dehradun and GIZ, Germany.

DR. R. MANIKANDAN

Attended IIRS User Interaction Meet-2016 in Indian Institute of Remote Sensing, Dehradun on 18.02.2016.

Attended 10th Uttarakhand State Science and Technology Congress (UCOST), Dehradun during 10-12 February, 2016 and presented oral presentation on 'Note on Floristic diversity of Govind Pashu Vihar Wildlife Sanctuary, Western Himalaya'.

Attended two days workshop on High Altitude Medicinal Plants organized by ICFRE, Dehradun during 21st -22nd March, 2016 at ICFRE, Dehradun and Presented oral presentation on 'High Altitude Medicinal Plants of Govind Pashu Vihar Wildlife Sanctuary, W. Himalaya' during the workshop on 21st March,16.

Attended '*Spring Festival-2016'* at Rajbhavan, Dehradun on 5th-6th March, 2016 as competition judge for the categories for potted plants (Central, State Government and Private nurseries) and potted flowers (Hobby) and also fleshy vegetables and foliage.

DR. G.S. PANWAR

Attended the National Training Workshop on 'Fauna of Shivalik Ecosystem (Uttarakhand) and the application of GIS in conservation of Fauna' Organized by Zoolgical Survey of India, Northern Regional Centre, Dehradun on 20-24th July, 2015.

Attended three days 10th Uttarakhand State Science and Technology Congress 2015-16, organized by Uttarakhand Council for Science and Technology on 10-12 February 2016.

Attended the two days workshop on "High Altitudes Medicinal Plants" organized by the Biodiversity and Climate Change division of ICFRE, Dehradun on 21-22 March, 2016.

Attended IIRS User Interaction Meet-2016 in Indian Institute of Remote Sensing, Dehradun on 18.02.2016.

Attended '*Spring Festival-2016'* on 5-6th March, 2015 at Rajbhavan, Dehradun as competition judge for the category: *Potted Plants Arrangement*.

Attended the inaugural function of National Training

workshop on 'Fauna of Shivailik Ecosystem (Uttarakhand) and the Applications of GIS in Conservation of Fauna organized by Zoological survey of India, Northern Regional Centre, Dehradun at FRI on 20.07.2015.

Attended a training programme on " Economic Valuation of Ecosystem Services" at Wildlife Institute of India, Dehradun *w.e.f.* 14.03.16 to 17.03.16.

DR. PUNEET KUMAR

Attended 19th Punjab Science Congress on February 07-09, 2016 at Shri Udham Singh Group of Institutions, Tangori, Mohali, Punjab.

DR. M.R.DEBTA

Attended IIRS User Interface Meet at Indian Institute of Remote Sensing, Dehradun on 18.02.16.

DR. MANAS BHAUMIK

Delivered a power point presentation at CESC Southern generating station, Garden Reach road, Kolkata-24 on Observance of World Environment Day on 5.06.2015.

Attended a special lecture on Indigo by Dr Jenifer Balfour Paul at J.D. Birla Institute, Kolkata on 29.1.2016.

DR. A. K. SAHOO

Attended a Seminar and discussion on the scope of 'Inclusive cultural leadership' programme jointly organized by British Council and International Institute for the Inclusive Museum held at ABC hall on 12-8-2015.

Participated in the "National Symposium on Ethnobotanical importance in North-East India" organized by Mizoram University, AIZWAL held during October 13-15, 2015 and presented the scientific paper entitled "Ethnomedicines of Odisha and North-Eastern states :some Bioperspective observation.

Participated in the meeting and discussions held at CNH committee room on 8-10- 2015 (presided by Dr. A.A.Mao, Scientist-E, ERC, BSI, Shillong) for a role of BSI in collection of plant materials, identifications, neutraceutical screening, DNA mapping, etc. and in preparation of a project proposal introduced by Dr. N. Medury of CSFD (Council of Sustainable Development), New Delhi on "Lifestyle diseases: Diabetes & fatty Levers" as a multi-institutional collaborative research programme.

As a member of DPC committee, attended the MACP meeting (for 49 cases of candidates of 12 variety category of posts of BSI) held at HQRS on 19-1-2016. The posts for promotion include for OS, UDC, LDC, SLIA, Fieldman, Artist, Fieldman, Stenographer, Garden overseer, MTS, Asst. Librarian, Botanist, etc. of BSI.

Attended a Seminar on 'Indigo' on 29-1-2016 (talk by Ms.Jennifer Paul) at JD Birla Institute,11-Lower Rawdon Street,Kolkata.

Participated in preparatory meeting (jointly convened by BSI & ZSI) held at ZSI, Headquarters ,New Alipore on 29-1-2016, regarding arrangement of 1st Consultative Committee meeting of MPs attached to MoEF & CC, to be held at Sundarban BR (Feb.1-2,2016) ; performed duties of the Liasion officer for official visit of Rajyasabha Honbl'e MP Mr.Narayan Lal Panchariya during 1st Consultative Committee meeting of MPs attached to MoEF & CC of BSI/ZSI.

Attended a Flower show and Exhibition programme for "Awareness programme on curious and Useful plants of India" during Feb.23-29, 2016 organised in BGIR, Noida. The programme at BGIR was inaugurated by Dr. (Mrs.) R. Dalwani, Advisor, MoEF & CC in the presence of Director, BSI on 25-02-2016 and was completed on 28-02-2016 with celebration on 'National Science day'. Participated in this programme with display of 12 nos of exhibit materials, posters, Botanical Gallery booklets, etc. The student from local schools of Noida and researchers of Delhi visited the pavilion and enthusiastically participated.

SHRI VINOD MAINA

Attended a National Seminar on "Recent Innovations in Technical Terminology & Biodiversity" held on 11-12 August 2015 at Zoological Survey of India, Jodhpur organized by Govt. of India, Commission for Scientific & Technical Terminology, Ministry of Human Resource Development (Department of Higher Education), New Delhi.

Attended two days Hindi work- shop on "Use of technical terminology in higher education "organized by Commission for Scientific and Technical Terminology, Ministry of Human Resources Development, Government of India, New Delhi and Department of Hindi, Jai Narayan Vyas University, Jodhpur on 27–28 March 2016.

DR. S.L. MEENA

Attended a National Seminar on "Recent Innovations in Technical Terminology & Biodiversity" held on 11-12

August 2015 at Zoological Survey of India, Jodhpur organized by Govt. of India, Commission for Scientific & Technical Terminology, Ministry of Human Resource Development (Department of Higher Education), New Delhi.

Attended and delivered a talk on "Floristic Diversity of Gujarat in Present Scenario" in the National Seminar on "Impact of Climate Change on Biodiversity" at M.S. University, Vadodara, Gujarat on 25.03.2015.

DR. RAMESH KUMAR

Attended a National Seminar on "Recent Innovations in Technical Terminology & Biodiversity" held on 11-12 August 2015 at Zoological Survey of India, Jodhpur organized by Govt. of India, Commission for Scientific & Technical Terminology, Ministry of Human Resource Development (Department of Higher Education), New Delhi.

DR. CS PUROHIT

Attended a National Seminar on "Recent Innovations in Technical Terminology & Biodiversity" held on 11-12 August 2015 at Zoological Survey of India, Jodhpur organized by Govt. of India, Commission for Scientific & Technical Terminology, Ministry of Human Resource Development (Department of Higher Education), New Delhi.

Attended two days Hindi work- shop on "Use of technical terminology in higher education "organized by Commission for Scientific and Technical Terminology, Ministry of Human Resource Development, Government of India, New Delhi and Department of Hindi, Jai Narayan Vyas University, Jodhpur on 27–28 March 2016.

DR. V.P. PRASAD

Attended the Silver Jubilee celebrations and the International Conference of the Indian Association for Angiosperm Taxonomy (IAAT) at the Calicut University from 19 to 21 Nov. 2015 and chaired one session of lead lectures and attended certain presentations.

DR. VINAY RANJAN

Attended the Eastern Region Awareness Raising Workshop – International Year of Soils organized by FAO, at Indian Institute of Bio-Social Research and Development (IBRAD), Prafulla Kanan, Kestopur, Kolkata on 20.08.2015.

Attended one day workshop on 'Biodiversity assessment through people participation' at Indian Institute of Bio - Social Research and Development (IBRAD), Kolkata on 04.11.2015.

Attended seminar on "Conservation of Medicinal Plants: Conventional and Modern Approaches" on 17.03.2016 in T.M. Bhagalpur University and given a talk on "Ethnomedicinal Plants of Parasnath Wildlife Sanctuary, Giridih, Jharkhand" and also chaired one technical session; full scientific paper also published in the proceeding.

DR. AVISHEK BHATTACHARJEE

Attended Silver Jubilee conference of IAAT and Council Meeting of IAPT & International Seminar on Advancements in Angiosperm Systematics and Conservation' organised by Calicut University from 19.11.15 to 21.11.15 and presented 2 papers.

Acted as Co-Chair in a technical session during the conference on 21.11.15.

Attended the National Conference cum Workshop on 'Advances in Orchid Biology with Focus on Climate Change, Medicinal and Floricultural Plants and Sustainable Economic Utilization & Orchid Show' at Dr. Y.S.R. Horticultural University, Venkataramannagudem, Andhra Pradesh from 26th to 28th February, 2016.

Participated in training course entitled 'Communication Skills and Time Management' on 10th and 11th September, 2015 (as per nomination from the BSI Hqrs., Kolkata vide letter no. BSI-31/01/2011 - Admn. dt.04.08.2015) organised by Institute of Govt. Accounts & Finance, Regional Training Centre, Kolkata.

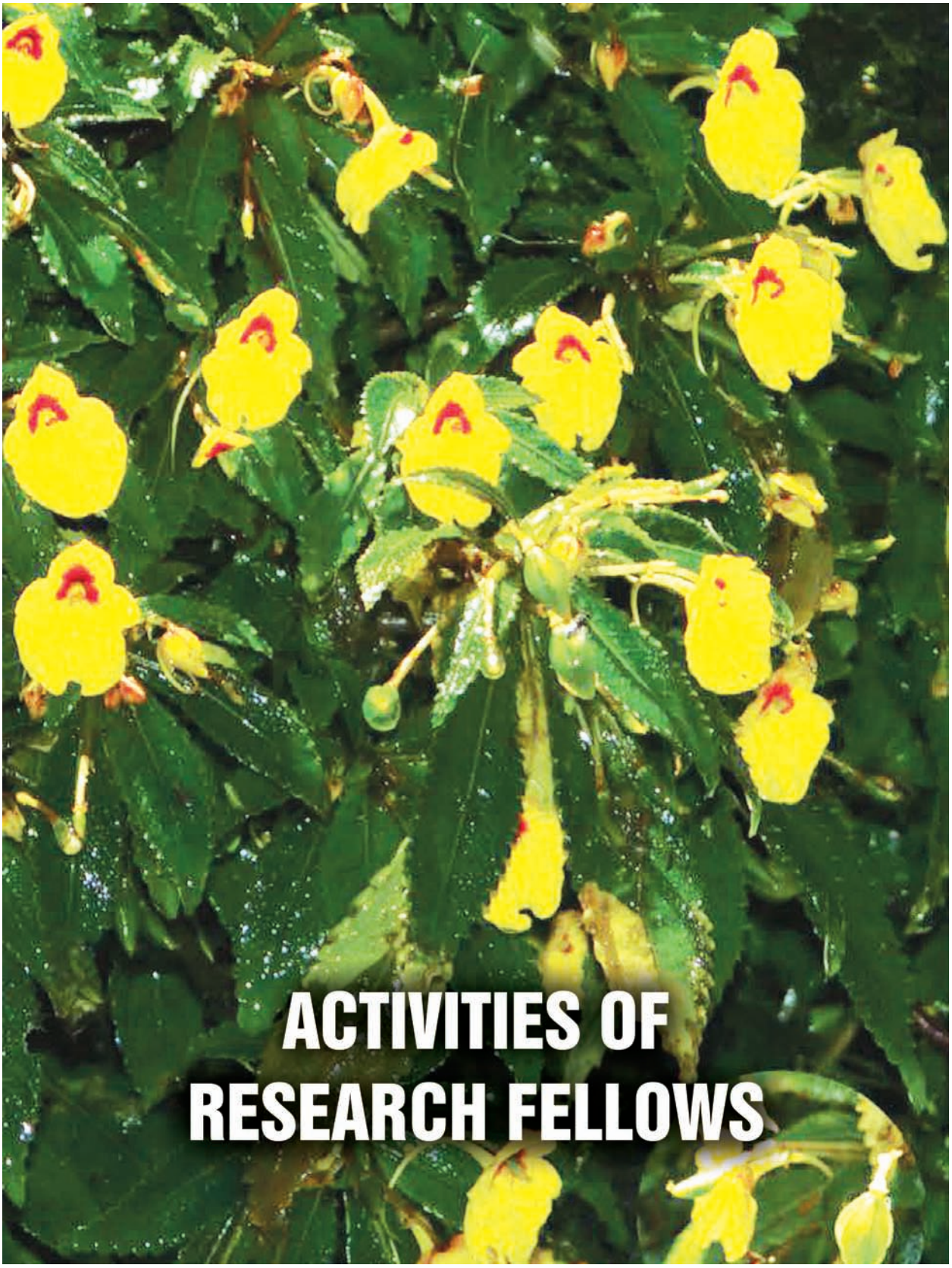
AWARDS & HONOURS

Dr. Pushpa Kumari, Sci-'D' receiving
Dr. V. Mudgal Medal

Dr. V. Sampath Kumar, Scientist-'D' receiving
Prof. B.A. Razi Medal

Dr. R.K. Gupta, Scientist-'D' receiving
Prof. B.N. Prasad Medal

Desmostachya bipinnata (L.) Stapf.



ACTIVITIES OF RESEARCH FELLOWS

Impatiens xanthina H.F. Comber

ACTIVITIES OF RESEARCH FELLOWS

A. PROGRESS REPORT OF AJC BOSE PDF

Gingers of Nagaland by Dr. Moaakum, AJC Bose PDF:

During 2015-16, 60 specimens were labelled, identified the remaining unidentified specimens collected in the previous year and submitted the same at BSI, Shillong. Identification of some taxa is still under process as the flowering is yet to be observed with those germplasms growing in botanical garden collected in first year. Routine maintenance and checking of germplasm growing in botanical garden was regularly carried out. During this period, 04 field tours to different parts of Nagaland were carried out and a total of 54 taxa were collected. Rhizome of those plants which were not collected in the first year were collected and grown in botanical garden. The following 31 taxa were identified *Alpinia galanga, A. malaccensis, Amomum dealbatum, A. mizoramense, A. pauciflorum, A. carnosum, A. subulatum, Amomum* sp., *Cautleya cathcartii, Curcuma aromatica, C. longa, C. zedoria, Etlinger linguiformis, Globba orixensis, G. racemosa, Hedychium marginatum, H. coronarium, H. ellipticum, H. gardnerianum, H. greenii, H. marginatum, H. rubrum, H. spicatum, H. stenopetallum, H. flavum, Hornstedia arunachalensis, Larsenianthus careyanus.* Herbarium specimens of all the identified taxa were prepared for submission. Dissection of flowering parts and digital illustration was performed with all the identified taxa.

Revisionary studies on family Ophioglossaceae Martinov in India by Dr. Pushpesh Joshi, AJC Bose PDF:

During this period, 01 field tour was conducted during which 10 localities of Almora and Champawat district were surveyed with GPS data; 120 field no. were collected and identified; 08 species, *viz. Botrychium daucifolium, Botrychium virginianum, Helminthostachys zeylanica, Ophioglossum gramineum, Ophioglossum nudicaule, Ophioglossum pendulum, Ophioglossum petiolatum, Ophioglossum costatum*, were described along with illustration of 07 species, *viz. Botrychium virginianum, Ophioglossum gramineum, Ophioglossum nudicaule, Ophioglossum pendulum, Ophioglossum petiolatum, Helminthostachys zeylanica, Botrychium daucifolium*; nomenclature of 11 species *viz. Osmunda ternata, Botrypus virginianus, Botrypus lanuginosus, Osmunda virginiana, Botrychium virginianum* var. *lanuginosum, Ophioderma pendula, Ophioglossum aitchisonii, Ophioglossum fibrosum, Ophioglossum pedunculosum, Ophioglossum parvifolium, Ophioglossum nudicaule* var. *macrorrhizum* were updated. During this period, 04 Herbarium consultation tour were conducted during which 222 specimens were studied, 166 specimens were re-examined, determitavit slip was attached on 56 specimens. In addition, a training course on "Classical and Modern Methods in Plant Taxonomy and Biosystematics" *w.e.f.* from 29.10.15 –4.11.15 was attended. In 2015-16 , 03 papers were published in peer reviewed journal.

Revision of the subtribe Tripogoninae (Poaceae) in India by Dr. Sangita Daschowdhury, AJC Bose PDF:

The revision of the subtribe Tripogoninae with 05 genera *Desmostachya*, *Eragrostiella*, *Melanocenchris* Nees, *Oropetium*, *Tripogon*, 35 species and 1 variety in India is being continued and taxonomic account of 25 species has been completed during this period. First and second field tour during (September – October 2015 & December 2015) to Northern Western Ghats (Pune, Kolhapur and Aurangabad) and Meghalaya (Cherrapunji & Shillong) respectively, yielded collection of 12 species belonging to *Tripogon*, *Melanocenchris*, *Oropetium* and *Eragrostiella*. Among them 05 endemic species (i.e. *Oropetium villosulum*, *O. roxburghianum*, *Tripogon lisboae* & *T. polyanthus* from Maharashtra and *Eragrostiella leioptera* from Cherrapunji) has also been collected. *Tripogon pungens* erroneously reported from Marathwada, Maharashtra (due to misidentification) has been excluded from grasses of Maharashtra and till date this endemic species is confined to Nilgiri & Pulney hills only. About 325 herbarium specimens were studied during consultation of CAL, BSI, AHMA, BAMU and SUK. Among them identity of 173 specimens were re-checked/ corrected**.** Data entry of 342 herbarium sheets (at CAL) belonging to genera *Melanocenchris*, *Oropetium* and *Eragrostiella, Desmostachya and Tripogon* has also been done. During this period, 02 books and 02 papers were published. In addition, served as Resource person on the occasion of "Biodiversity Day" on 22nd May 2015 at Central National Herbarium, Howrah and delivered lecture on "Utilization of grasses".

Taxonomic diversity and ecology of cyanobacteria and algae in the alpine regions of Eastern Himalayas by Dr. Sudipta Kumar Das, AJC Bose PDF:

During this period, 02 field tours to West and South Sikkim districts of Sikkim (13th to 19th September, 2015) and Lower Dibang Valley and Dibang Valley districts of

Arunachal Pradesh (31st January to 15th February, 2016) covering several habitats were conducted during which a total of 151 specimens were collected, 142 algal species were identified belonging to 94 genera (17 taxa of Cyanophyta under 11 genera, 32 taxa of Chlorophyta under14 genera, 02 taxa of Euglenophyta under 02 genera, 98 taxa of Bacillariophyta under 65 genera, 02 taxa of Xanthophyta under 02 genera). Three new species i.e. *Johannesbaptistia Ecballocystopsis dichotomus* var. *lateharii* var. nov. (Chlorophyta) *Schmidleinema santiniketanense* sp. nov. (Cyanophyta) *Stigonema tagorum* sp. nov. (Cyanophyta) were documented from Jharkhand and West Bengal respectively. Studies were also carried out on the Antarctic algal samples collected by Dr. Devendra Singh from Larsemann Hills, East Antarctica. A total of 2,539 algal taxa belonging to 392 genera and nine classes as endemic to India, which include 1,482 species, 679 varieties, 374 forms and 4 subspecies were documented. During the period, 10 research papers (03 International + 07 National) along with 01 popular Hindi article were published in peer reviewed journals. During this period, have also participated and presented research findings in National conference on "Cryptogam Research in the Indian: Progress and Prospects", held at CSIR-NBRI, Lucknow, Uttar Pradesh, *w.e.f.* 28th to 29th September, 2015.

B.PROGRESS REPORT OF BSI PROJECT FELLOWS

Grasses of Odisha State by Dr. Alok R. Chorghe, SPF & Dr. P. V. Prasanna, Scientist F:

Study on grasses of Odisha state has resulted in recording 266 species belonging to 100 genera. During this study, *Tripogon mahedragiriensis* and *Themeda odishae were* discovered as new to science; *Phacelurus zea* was reported as new record for Peninsular India; *Arundinella ciliata, Schoenefeldia gracilis, Ottochloa nodosa* and *Isachne pulchella* are reported for the first time from Odisha; *Dimeria mooneyi* & *Dimeria orissae* were recollected from type localities and other places after a lapse of 6 decades. Detailed descriptions of 266 species along with colour photo plates of 71 species were provided elucidating different parts of spikelet; 15 photo plates to show different habits and habitat types and three more plates depicting diversity in glumes and caryopses were provided; keys for 15 tribes, 100 genera and 266 species were provided along with maps for new species, endemic species, and new distributional records prepared using GPS Coordinates and Google Earth. Final report of the project has been submitted in November 2015.

Taxonomic Revision of subgenus *Carex* of genus *Carex* L. (Cyperaceae) in India by Sri Animesh Maji, SPF & Dr. V.P.Prasad, Scientist-D:

Tripogon lisboae Stapf.

During 2015-2016, six (06) herbarium (RHT Tiruchirappalli, MH Coimbatore, FRC Coimbatore, CALI Kozhikode, KFRI Peechi and TBGRI Thiruvananthapuram) were consulted and studied about 300 specimens of different species of *Carex*. A total of 35 species of *Carex* was described along with illustrations. One new species *Carex kotagirica* Maji & V.P. Prasad was described, *Carex capillaris* L. was communicated as new record for India and *Carex polycephala* Boott was reported as a new distribution record for Western Himalaya. Also he has presented one paper during the International Seminar on "Advancements in angiosperm systematics and conservation' organized by India Association for Angiosperm Taxonomy (IAAT), at Calicut University, Kerala.

Pteridophytic flora of Kudremukh National Park Central Western Ghats with 10% periphery by Devendra Tripathi, SPF & Dr. A. Benniamin, Scientist-D:

During this year, one (01) field tour *w.e.f.* 14.11.2015 – 03.12.2015 was undertaken to different parts of Kudremukh town, Bhagvathi Nature Camp, Kurinjal peak forest area, Kadambi falls forest area, Hanuman Gundi, Kerekatte, Malakibetta, Ganeshkatti, Manii Gudda, S K Border, Suttanigudda, Sringeri forest Checkpost, Machakibetta of Kudremukh National Park, Karnataka and surveyed approx. 75 sq. km. area and collected 50 species of Pteridophytes. All the collected specimens have been processed, identified and kept in Herbarium of BSI, WRC, Pune. During this survey, a total 97 field numbers belonging to 50 species were collected along with collection of 5 live ferns belonging to 5 species (

Christella dentata, Actinopteris evecta, osmunda regalis, Pteris biaurita, Adiantum concinnum) were introduced in the botanical garden. Some of the common epiphytic and terrestrial ferns, such as *Pyrrosia porosa, lepisorus nudus, Microsorim membranaceum, Christella dentata, Pteris quadraurita* species were very common in Kudremukh National Park. *Cyathea spinulosa, Angiopteris evecta, Osmunda regalis, Diplazium brachylobum, Asplenium crinicaule, Elaphoglossum stigmatolepis, Leptochilus baupunctika, Trignospora ciliata, Botrychium daucifolium, Adiantum concinnum* only found in one or two locality in Kudremukh National Park. A total of 27 species were identified along with detailed description of 10 species; prepared herbarium notes of 80 specimens of Pteridophytes collected from Kudremukh National Park, Karnataka; prepared herbarium sheets of 116 specimens of Pteridophytes collected from Maharashtra by Dr. Vineet Kumar Rawat, Scientist C, APRC, Itanagar; prepared herbarium notes of 155 specimens collected from Maharashtra by Dr. A. Benniamin Scientist 'D', WRC, BSI, Pune. Arranged Pteridophytes specimens collected from Maharashtra according to the classification and prepared list. Presented poster in National Conference on "Cryptogams Research in India: Progress and Prospects" at CSIR- National Botanical Research Institute, Lucknow, Uttar Pradesh during 28th -29th September, 2015. During the above said period, received First prize for Poster presentation titled "Assessment of Rare and Threatened Pteridophytes from Northern Western Ghats of Maharashtra" during the National Conference at National Botanical Research Institute, Lucknow during 28-29 September 2015. The study revealed 2 new reports to Kudremukh National Park, Kurinjal Peak forest, Karnataka. 03 papers were published in peer reviewed journal.

Revision of Indian Hymenochaetaceae by Mrs. Deepa Mishra, SPF & Dr. J.R. Sharma (PI):

During this period, one (01) Herbarium Consultation tour *w.e.f.* 13-11-15 to 24-11-15 was conducted to herbarium at Dhanora College, Bheed Distt, Maharastra and Tropical Botanic Garden Research Institute, Kerala. A field tour was conducted to different places of Chamoli Distt and Bageshwar, Uttarakhand from 22.09.15 to 17.10.2015 and collected 40 specimens of Hymenochaetaceae and took about 25 photographs of different types of vegetation and ecological habitat etc. A total of 34 speciemens of Hymenochaetaceae were studied at Dhanora College, Bheed Distt, Maharashtra, were studied MU-453, 454, *Phellinus gilvus;* MU- 448, 449,450, *P. contiguous;* MU-192, 90, 92, *Hymenochaete tabacina;* MU-93, MU-89, *H. tabacina;* MU-70, MU-57, *H. tabacina;* MU-168, 193, 164, *H. dissimilis* Cunn.*;* MU-7, 84, 82, 61, *Phellinus sublinteus;* Mu-59, 69, 207, *P. troyanus;* Mu-123, 109, 117, *P. wahlbergii;* Specimens studied at TBGRI, Thiruvariathapuram, Kerala, *CALI-G64, Phellinus adamantius;* CALI-G215, *P. allardii;* CALI-G155, G-364,*P. contiguous;* CALI-G-350, G-4335, *P. dependens;* CALI- G163, G-154, G-40, *P. fastuosus;* CALI- G365, *P. ferreus;* CALI-G249, *P. ferrugineovelutinus;* CALI-G269 G219, *P. hohnelii*; CALI- G-343, *P. pseudosenex;* CALI G-126, G83, *P. senex*, G-153, 152, 280, *P. rimosus*. Completed the microscopic studies of about 60 remaining field numbers of Hymenochaetaceae and also completed the final report writing along with the camera lucida drawings of microstructures and final report was submitted.

Studies on the families Agaricaceae, Boletaceae, Hygrophoraceae, Suillaceae and Cantharellaceae of East and South Districts of Sikkim by Dyutiparna Ckakraborty, SPF & Dr. Kanad Das, Scientist D:

During this period, a macrofungal survey tour *w.e.f.* 01.07.2015 to 11.07.2015 was undertaken to different part of East Sikkim during which 26 field numbers were collected and all the specimens were well preserved. Micromorphological characterization and microphotography of the 12 specimens were undertaken [DC 15-001, DC 14-011, DC 14-009, DC 15-015, DC 15-010, DC 15-027, DC 15-018, DC 15-024, DC 15-004,DC 15-002, DC 15-011, DC 15-013]. Complete (macro- and micromorphological) descriptions along with the micromorphological drawings of the 12 specimens were prepared [DC 15-001, DC 14-009, DC 14-011, DC 15-010, DC 15-015, DC 15-018, DC 15-024, DC 15-027, DC 15- 004, DC 15- 002, DC 15-011, DC 15-013]. Following 10 field numbers had been identified {DC 14-009 as *Hygrocybe conica* [Hygrophoraceae], DC 14-007 as *Hygrocybe cantharellus* [Hygrophoraceae], DC 14-002 as *Hortiboletus* sp. nov. [Boletaceae], DC 15-015 as *Lichenomphalia umbellifera* [Hygrophoraceae], DC 15-018 & 024 *Hygrophoruos* sp. 1 [Hygrophoraceae], DC 15-002 as *Calvatia* sp. [Agaricaceae], DC 15-027 as *Boletus eduls* [Boletaceae], DC 15- 011 & 013 as *Lichenomphalia* sp. 1 [Hygrophoraceae]}. During this period, 04 papers were published in peer reviewed journal.

Flora of Satkosia Tiger Reserve, Odisha by K. Chandra Mohan, SPF & Dr. P. V. Prasanna, Scientist F:

In this period, three field tours *w.e.f.* 09-06-2015 to 24.06.2015, 17.09.2015 to 31.09.2015 & 08.10.2015 to 21.10.2015 were conducted to Satkosia Tiger Reserve, Odisha during which 139, 96 & 75 field numbers were

collected respectively. A total of 234 species from earlier collections were identified along with compilation of earlier data and preparation of description of 50 species. 05 research papers were published in peer reviewed journal.

Flora of Kawal Tiger Reserve & Two National Parks of Hyderabad (Telangana) by Annamma P. S., SPF & Dr. P. Venu., Scientist-F:

In this period, 05 field tours *w.e.f.* 14/4/15, 15/5/15 - 19/5/15, 18/8/15 - 22/8/15, 25/07/16 - 05/08/16 and 10/12/15 were conducted to different parts of Kawal Tiger Reserve, Adilabad District during which a total of 116 field no. of plant specimens were collected. Among the collected specimens, 148 specimens were identified and detailed description was written for nearly about 80 taxa. A Herbarium consultation tour was carried out to Central National Herbarium, Kolkata in connection with the project. 05 research publications were published in peer reviewed journal. Attended the Silver Jubilee Conference of IAAT, council meeting of IAPT and International Seminar on Advancements in Angiosperm Systematics and Conservation", at Calicut University, Kerala from 17.11.2015 to 22.11.2015 and submitted an abstract on the topic "Floral Diversity and Threats of Kawal Tiger Reserve, Adilabad District (Telangana)".

Taxonomic revision of *Pteris* (Pteridaceae) in India by Piu Das, SPF & Dr. P. M. Padhye, Scientist-F:

During 2015-2016, two (02) field tours were undertaken in Uttarakhand: (Dehradun, Mussoorie, Dhanaulti and Surkanda Devi temple, Chakrata); Arunacahal Pradesh: (Ziro Valley, Itanagar). During these field tours, 40 field numbers of *Pteris* L. specimens were collected from different parts of Uttarakhand and Arunacahal Pradesh during which *Pteris aspericaulis, Pteris biaurita, Pteris cretica, Pteris ensiformis* Burm., *Pteris khasiana, Pteris multifida* Poir., *Pteris pseudopellucida, Pteris semipinnata, Pteris stenophylla, Pteris vittata, Pteris wallichiana* were collected in sterile as well as fertile form. More than 454 specimens housed in different herbaria e.g. BSD (Uttarakhand), DD (Uttarakhand), ARUN (Arunachal Pradesh), and PAN (Chandigarh), PUN (Punjab) were consulted. Procured type images from L (Naturalis), G (Conservatoire et Jardin botaniques de la Ville de Genève), P (Muséum National d'Histoire Naturelle), K (Royal Botanic Gardens), LE (V. L. Komarov Botanical Institute) and a total of 551 herbarium specimens were studied. During the mentioned period, 8 numbers of *Pteris* L. species were identified; a total of 30 number of *Pteris* L. species based on live plant collection from different parts of India as well as herbarium collection were described; 12 numbers of Illustrations and 6 photo plates for various *Pteris* L. species were prepared. S.E.M. studies for spores of available fertile *Pteris* L. species were also carried out. 01 paper published in peer reviewed journal.

Lichens of Terai Region of Uttar Pradesh by Dr. Pooja Gupta, SPF & Dr. G.P. Sinha, Scientist-E:

During this period, a field trip *w.e.f.* 30.09.15 to 14.10.15 was organized for collection of lichens in Terai Region of Balrampur and Shravasti District (Uttar Pradesh) and about 200 lichen specimens were collected from different localities of above districts. A total of 164 specimens were studied. Total no. of specimens identified upto generic or specific level – *c.* 83. *Protoparmelia hesperia* (Kantivilas & Elix) Kantvilas, Papong & Lumbsch and *Stirtonia punctiformis* Aptroot & Sipman are reported as a new record for India. Ten species *viz. Arthonia tumidula* (Ach.) Ach., *Bacidina apiahica* (Müll. Arg.) Vìzda, *Bacidia medialis, Byssoloma subdiscordans* (Nyl.) P. James, *Chaenothecopsis savonica* (Räsänen) Tibell, *Coenogonium dilucidium* (Kremp.) Kalb & Lücking, *Coenogonium minimum* (Müll. Arg.) Lücking, *Fellhanera rhapidophylli* (Rehm) Vézda, *Fellhanera semicarpi* (Vain) Vézda, *Fissurina cingalina* (Nyl.) Staiger, *Graphis caesiella* Vain., *G. filiformis* Adaw. & Makhija, *G. lineola* Ach., *G. pyrrhocheiloides* Zahlbr., *Letrouitia domingensis* (Pers.) Hafellner & Bellem., *Mycomicrothelia nonensis* (Stirt.) D. Hawksw. and *M. thelena* (Ach.) D. Hawksw. are reported as new to Uttar Pradesh. During this project also reported 11 species *viz. Aspicilia caesiocinerea* (Nyl.ex Malbr.) Arnold, *Aspicilia cinerea* (L.) Korb., *Buellia nilgiriensis* S. R. Singh & D.D. Awasthi, *Buellia quartziana* S. R. Singh & D.D. Awasthi, *Buellia stellulata* (Taylor) Mudd, *Buellia subglaziouana* S. R. Singh & D.D. Awasthi, *Caloplaca poliotera* A. Massal, *Lecanora subrugosa* Nyl., *Lecidella stigmatea* (Ach.) Hertel & Leuckert, *Leucodecton fissurinum* (Hale) A. Frisch, *Pertusaria leucoplaca* Müll. Arg., as new records for Rajasthan and *Arthonia tumidula* (Ach.) Ach., *Arthopyrenia analepta* (Ach.) A. Massal., *Bacidia convexula* (Müll. Arg.) Zahlbr., *Bacidia incongruens* (Stirt.) Zahlbr., *Bacidia laurocerasi* (Delise ex Dubey) Zahlbr., *Bacidia phaeolomoides* (Müll. Arg.) Zahlbr., *Caloplaca flavorubescens* (Huds.) J.R. Laundon, *Caloplaca squamosa* (de Lesd.) Zahlbr., *Candelariella vitellina* (Ehrh.) Müll. Arg., *Chapsa leprocarpa* (Nyl.) A. Frisch, *Diorygma heiroglyphicum* (Pers.) Staiger & Kalb, *Fissurina dumastii* Fée, *Glyphis scyphulifera* (Ach.) Staiger, *Graphis glaucescens* Fée, *Graphis pertricosa* (Kremp.) A.W. Acher, *Graphis pertricosa* (Kremp.) A.W. Acher, *Lecanora gangaleoides* Nyl. *Lecanora horiza*

(Ach.) Röhl., *Letrouitia domingensis* (Pers.) Hafellner & Bellem., *Myriotrema clandestinum* (Fée) Hale, and *Tylophoron nidulans* Stirt., are the additions to Sikkim. 08 papers were published in peer reviewed journals. During this year, a paper was presented in – National conference on Cryptogam Research in India : Progress and Prospects 28th to 29th September 2015 organized by Indian Lichenological society, CSIR–National Botanical Research Institute, Lucknow. In addition, attended a National conference on Recent Trends and Advances in Biotechnology. 20th to 21th February, 2016 organized by centre of Biotechnology, University of Allahabad.

Taxonomic studies on non thelotremoid Graphidaceae, India by Dr. Pushpi Singh, SPF and Dr. K.P. Singh, Emiretus Scientist:

During the period under report about 300 specimens of non Thelotremoid Graphidaceae collected earlier from Arunachal Pradesh, Andaman and Nicobar Islands, Meghalaya, Sikkim, Karnataka, and West Bengal and preserved in different herbaria (ASSAM, BSA, BSHC, PBL) were investigated morphologically, anatomically and chemically and identified up to specific level. During this period and also visited in cement factory area in Cherrapunji and collected 40 specimens from polluted area. The specimens are being investigated for pollution oriented aspect. In this period, seventeen species reported as new records for India have been discovered including one new generic record for India. Six research papers have been published in peer reviewed International and National journals.

Revision of the family Myrsinaceae in India by Rijupalika Roy, SPF & Dr. A. Pramanik, Scientist-E:

01 field as well as herbarium consultation tour was conducted to Rapinat Herbarium, Tiruchirapallli (RHT), Madras Herbarium, Coimbatore (MH), Fischer Herbarium at IFGTB, Calicut University Herbarium (CALI), Kerala Forest Research Institute (KFRI), Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI). Dissections of live or dried flowering specimens were done for the following taxa: *Maesa* (*M. montana, M. chisia, M. andamanica, M. ramentacea, M. manipurensis, M. grandiflora, M. dentata, M. argentea, M. perrottetiana*); *Myrsine* (*M. semiserrata, M. semiserrata var. subspinosa*); *Embelia* (*E. ribes, E. basal, E. floribunda, E. viridiflora, E. gardneriana, E. nutans, E. vestita, E. parviflora, E. gamblei, E. nagushia, E. adnata, E. sessiliflora, E. clarkei, E. tsjeriam-cottam, E. microcalyx*); *Aegiceras* (*Aegiceras corniculatum*). Description made for 11 species along with illustration of 03 taxa. Distributional map of 3 genera in Indian circumscription were prepared. Type material of *Maesa* sp. deposited in CAL was consulted and photograph taken. 01 abstract was published along with 01 popular Hindi article. During this time, attended International Seminar on "Advancements in Angiosperm Systematics and Conservation" (November 19 – 21, 2015) at University of Calicut, Kerala, India and presented one paper entitled "Notes on serration pattern in the leaf of *Myrsine* L." in the section 'Modern trends in plant taxonomy'.

Ethnobotanical study of Lodha (A primitive tribal Group) of West Bengal and nutraceutical analysis of selected plant species by Sagari Chaudhury, SPF & Dr. Harish Singh, Scientist-D:

During this period, three (03) field tours were undertaken in two districts [Paschim Midnapur district from 02.04.15 to 04.04.15); Bankura district (from 05.09.15 to 07.09. 15); Bankura district from 23.01.16 to 27.01.16)] and collected 105 field numbers with 136 ethnobotanical informations. All the collected plant specimens were dried, poisoned and mounted in the herbarium sheets. About 103 specimens were identified. Nutraceutical analyses of six plant species were done. During this period a Biennial report (2013-2015) was prepared and submitted in hard copy and given a Power point presentation for selection in SPF. In addition, attended 17 talks delivered by various scientists in Central National Herbarium. During this period, herbarium database was prepared on 516 herbarium sheets of Genus *Ilex* and 601 herbarium sheets of Genus *Vitis* and *Ampelocissus* in Microsoft excel 2010. 02 papers were published in peer reviewed journals. Attended one National Seminar at Visva-bharati, Santiniketan and one abstract was published on "Documentation of ethnomedicinal plants used by the Lodha, a primitive tribal group in West Bengal, India: a quantitative approach".

Taxonomic revision of the family Fagaceae in India by Shankhamala Mitra, SPF & Dr. Vinay Ranjan, Scientist D:

During this period, 01 field tour *w.e.f.* 20/03/2016 to 01/ 04/2016 was conducted to Singalila National Park and collected the following specimens of family Fagaceae: 02 species of *Quercus* (*Q. lamellosa* & *Q. lineata*) and 01 species of *Castanopsis* (*C. tribuloides*) and 01 species of *Lithocarpus* (*L. pachyphyllus*). Herbarium specimens deposited in CAL, CUH and Lloyd Botanical Garden herbarium were consulted along with critical study of 38 specimens taken on loan from ARUN, BSD and ASSAM herbaria. Completed dissection & description prepared for 25 species, *viz. Lithocarpus* sp. (*L. dealbatus, L. listeri, L. fenestratus, L. xylocarpus, L. truncatus, L. polystachyus, L. pachyphyllus, L. elegans*); *Quercus* sp.

Lodha imformant giving information on plants of West Bengal

(*Q. serrata, Q. mespilifolia, Q. lineata, Q. helferiana, Q. lamellosa, Q. semecarpifolia, Q. griffithii, Q. glauca*); *Castanopsis sp.* (*C. indica, C. tribuloides, C. purpurella, C. ferox, C. longispina, C. armata, C. wattii, C.hystrix*) and *Castanea sp.* (*Castanea sativa*). Rearranged *c.* 3500 specimens according to Flora of British India and the Phytogeographical regions of India of the family Caprifoliaceae and Fagaceae deposited in CNH. 950 herbarium specimens of the family Caprifoliaceae and Fagaceae were digitized.

Floristic Study of Liverworts and Hornworts of Arunachal Pradesh with special reference to West Siang District by Siddhartha Singh Deo, SPF & Dr. D.K.Singh, Scientist-G:

During this period, 51 species were worked out and identified of which illustrations were made for 21 species. 04 research papers were published in peer reviewed journals.

Revisionary Studies on Family *Rocellaceae sensu lato* in India by Mr. Siljo Joseph, SPF & Dr. G.P. Sinha, Scientist, E:

During this period, one (01) herbarium cum library consultation tour conducted to National Botanical Research Institute (LWG) *w.e.f.* 27.07.2015 to 31.07.2015; 52 lichen specimens were studied and identified into 30 species; besides these, loan specimens from BM, LWG and PBL were studied; discovered 02 new species of *Synarthonia*; published 04 papers; prepared and submitted final project report of the project period (Nov. 2010 to Nov. 2015) comprising 88 species under 24 genera.

Microfungi of Biligiri Rangaswamy Temple Wildlife Sanctuary, Karnataka by Shreya Sengupta Chatterjee, SPF & Dr.(Mrs.) Rashmi Dubey, Scientist D:

During this period, two (02) fungal exploration tour *w.e.f.* 23.03.2015 – 06.04.2015 and 01. 09.2015 to 15.09.2015

were undertaken and surveyed different areas of the sanctuary such as Gumbanibetta, Kataribetta, Hoonametti coffee estate, Bylore, Attiken coffee estate, Arre Palya, k.Gudi, Dodda Sampigge etc. A total of 101 infected follicolous plant specimens (field Nos.) along with 38 samples of leaf litter and near about 161 decaying wood material were collected. After processing all the collected specimens, 49 dried specimens were identified. In this period, 02 research papers were published in peer reviewed journals.

Revision of the genus *Festuca* in India by Ms. Sutrishna Kar, SPF & Dr. P. Singh, Scientist G:

During this period, 23 specimens were worked out along with preparation of description and illustration. 02 papers were published in peer reviewed journals and delivered a lecture on Revision of the genus *Festuca* L. (Poaceae) in India as Pre- PhD Seminar in Department of Boany, University of Calcutta.

Revision of the tribe *Vernonieae* Cass. (Asteraceae) in India by Mrs. Bandana Bhattacharjee, SPF & Dr. P. Lakshminarasimhan, Scientist E:

During this period, dissection of different floral parts (based on live and herbarium specimens) of *Vernonia anthelmintica*, *V. cumingiana*, *V. fysoni*, *V. ornata*, *V. patula*, *V. subsessilis* DC. var. *bracteolata*. f. were done. Prepared taxonomic account of 9 genera, 64 species (including 1 cultivated and 5 doubtful species), 1 subspecies and 3 varieties (including 1 doubtful variety; excluding variety propers) belonging the tribe Vernonieae. 02 seminars attended, a. 'Biodiversity for Sustainable Development' – a seminar organized by Central National Herbarium, Botanical Survey of India, Howrah on International Day for Biological Diversity, on 22.05.2015; b. 'Silver Jubilee conference of IAAT and Council Meeting of IAPT & International Seminar on Advancements in Angiosperm Systematics and Conservation' (19th–21th November 2015, Calicut) and delivered a presentation entitled, "The genus *Vernonia* Schreb. (Asteraceae) in India: An overview". 170 specimens were entered in excel sheets, changed genus covers (12) and species covers (14) of Asteraceae-specimens (including types) at CAL. Changed species covers (6) of 3 species of *Vernonia* at CAL.

Micropropagation and screening of secondary metabolites of six medicinal orchids in Meghalaya by Ms. Gargi Prasad, SPF, Dr. A.A. Mao, Scientist-E & Dr. D. Vijayan, Scientist-B:

During this period, *in vitro* regeneration of *Dendrobium chrysotoxum*, *Bulbophyllum odoratissimum* and *Cephalanceropsis gracilis* through shoot multiplication; *Malaxis acuminata* through pseudobulb culture was carried out; effect of different additives on the growth pattern of *Dendrobium nobile* was studied. The *in vitro* raised well rooted plantlets were carefully taken out from the culture flasks, washed thoroughly with water to remove the culture medium and transferred to root trainer in green house for hardening. For phytochemical screening of active constituents of *in vitro* raised plantlets of selected orchids, leaf and root parts were used. Chemical tests were employed in the preliminary phytochemical screening for various secondary metabolites such as carbohydrate, protein, flavonoids, terpenoids, steroids and glycosides. In connection with the project work, 02 field tours, one *w.e.f.* 26.08.15 to 15.09.15 and other on 20.09.15 were carried out to AJCB Indian Botanic Garden, Howrah and Pomlum forest (behind primary health centre), Shillong, Meghalaya respectively. During this period, attended a workshop cum Hands on training on "Techniques in Molecular Biology and Biochemistry" at Dept. of Zoology, Gauhati University from 06th July 2015 to 12th July 2015. Presented a poster on a DST sponsored seminar "Sustainable Conservation Strategies for Bio-resources of North East India" at Arya Vidyapeeth College (Department of Botany) Guwahati on 6th & 7th November, 2015. Published a paper title "Comparative HPLC Fingerprinting and Antioxidant Activities of *In vitro* and *In vivo* grown *Aerides odorata*, A Medicinal Orchid" in *Journal of Chemical, Biological and Physical Sciences* (JCBPS).

Taxonomic Studies on the genus *Rubus* L. in India by Ms. Chandani Gupta , JPF and Dr. S. S. Dash, Scientist-D:

Consulted different National herbaria such as BSD, DD, ARUN, ASSAM, APF, CALI, MH and BSI in between April and November 2015 and studied about 1709 specimens of *Rubus*. Undertaken a field tour to West Siang, Upper & Lower Subansiri & Kurungkumey districts of Arunachal Pradesh and collected 132 specimens of *Rubus* belonging to 21 species. Complete description along with the detailed illustrations of 30 species of *Rubus* were prepared. Solved two species complex *viz.*, *Rubus hexagynus* and *R. ellipticus* complex. Reported *Rubus sengorensis* D.G. Long & Grierson as a new record to India. Published paper on "*Rubus sengorensis* (Rosaceae): A New Record to India from Arunachal Pradesh." *Nelumbo* 57: 1-6. 2015 and communicated "Nomenclatural Notes on *Rubus franchetianus* (Rosaceae) and Two New Additions to Indian *Rubus"* article to *Nelumbo.* Presented papers on "An Appraisal to the *Rubus hexagynus/assamensis*

(Rosaceae) complex – A Native to the South-east Asia" at International Seminar on Advancements in Angiosperm Systematics and Conservation, Calicut University, Calicut, India and on "Distribution and Diversity of Genus *Rubus* L. in Eastern Himalaya, India: A Preliminary Appraisal" at International Conference on the Trends in Plant Systematics (TIPS), Bharathidasan University, Tiruchirappalli, India.

Taxonomic Studies on Lejeuneaceae Schizostipae (Marchantiophyta) in Northeast India including Sikkim by Mr. Sashi Kumar, JPF & Dr. S.K. Singh, Scientist-D:

During the period, three (03) field trips undertaken (01 extensive collection to Tripura and 02 Short tours to Meghalaya and collected 232 field samples related to the project work. Of which 77 samples identified and 26 species were described. Camera-lucida drawing were prepared for all the 26 species. These include 4 new reports for Meghalaya and 1 new to Tripura. During the period 04 Research articles published in different journals and a poster presentation made in National Conference held in NBRI (28– 29 September, 2015).

C.PROGRESS REPORT OF FUNDED PROJECT FELLOWS:

Inventorization of Indian *Calanthe* R. Br. (Orchidaceae) with focus on micro-morphology of pollinia [SERB- Young Scientist Project; DST No: SB/FT/LS- 397/2012] by Dr. Avishek Bhattacharjee, Scientist 'B':

During this period, five (05) field cum herbarium consultation tours were undertaken in Eastern and Western Himalaya, and collected 8 taxa of *Calanthe* till date. The collected taxa are *C. biloba*, *C. herbacea*, *C. masuca*, *C. plantaginea* var. *plantaginea*, *C. puberula*, *C. sylvatica*, *C. tricarinata* and *C. triplicata*, studied specimens of *Calanthe* deposited in 6 Indian herbaria (CAL, AHMA, BLAT, BSD, BSI, DD). The types preserved at the herbarium of The Natural History Museum, London (BM), Natural History Museum, Paris (P) and Royal Botanic Gardens, Kew (K) are also studied (online). Detailed taxonomic accounts of 19 taxa of *Calanthe* were prepared along with SEM studies of pollinia of 8 taxa. Typification related problems of *Calanthe herbacea*, *C. odora*, *C. trulliformis* and *C. whiteana* were resolved. 02 presentations delivered in International conferences are A. 'A glimpse of Indian *Calanthe* (Orchidaceae) with typification of four names' in the 'Silver Jubilee conference of IAAT and Council Meeting of IAPT & International Seminar on Advancements in Angiosperm Systematics and Conservation' (19th to 21th November 2015, Calicut) and B. Contribution to Indian orchid flora' in the National Conference cum Workshop on 'Advances in Orchid Biology with Focus on Climate Change, Medicinal and Floricultural Plants and Sustainable Economic Utilization & Orchid Show' organized by The Orchid Society of India (TOSI) and Dr. Y.S.R. Horticultural University, Venkataramannagudem, Andhra Pradesh (26th to 28th February 2016, Venkataramannagudem).

Preventing Extinction and Improving Conservation Status of Threatened Plants through Application of Biotechnological Tools (DBT-Funded) by Sri Amber Srivastava, SRF & Dr. S. K. Srivastava, Scientist-E:

During the period, a total number of 11 field tours were conducted in different regions of the Western Himalaya to locate the concerned species. A total number of *Pittosporum eriocarpum* (1000), *Lilium polyphyllum* (200), *Ephedra gerardiana* (200), *Crepidium acuminatum* (500) and *Skimmia anquetilia* (200) saplings were propagated in the nursery of BSI, NRC. Of the total propagated saplings *Pittosporum eriocarpum* (150), *Lilium polyphyllum* (100), *Ephedra gerardiana* (100), *Crepidium acuminatum* (200) and *Skimmia anquetilia* (150) were planted in the suitable wild habitats. Besides above mentioned species other interesting threatened species *viz. Incarvillea emodi*, *Eremostachys superba*, *Selaginella adunca*, *Nepenthes khasiana*, *Ilex khasiana*, *Catamixis baccharoides*, *Elaeocarpus angustifolius*, *Paris polyphylla*, *Dioscorea deltoidea*, *Frerea indica etc.* were also propagated and maintained for *ex-situ* conservation. Attended 02 seminar and presented 02 papers.

ASSISTANCE TO BOTANIC GARDEN SCHEME OF MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, NEW DELHI

Botanical Survey of India, the apex research institute under Ministry of Environment, Forests & Climate Change, administer the funding of the ABG Scheme of MoEF & CC, New Delhi. According to the framed guidelines, every year BSI receives and process proposals to facilitate different leading agencies. After meticulous scrutiny of the proposals by BSI experts, proper inspection of the proposed site is conducted and recommended to the Expert Group. During FY 2015-16, a fund of 1,35,00000/-(Rupees One Crore Thirty Five Lakh only) is released to strengthen the infrastructure of Botanic Gardens especially to conserve and preserve Orchids, Ferns, Rare and Endemic plants and Economically important plant species. A total of 06 new proposals were received during this period of which sanction was not disbursed for one proposal due to non submission of bank details. 05 proposals were sanctioned by the Expert Groups of BSI (**Annexure I**). Inspection of various gardens to which financial support has already been provided during previous years, is being carried out in regular intervals by Scientists of BSI to evaluate the progress of the project.

Annexure I: ABG GRANT- IN -AID, FUND DISBURSED IN 2015-16

Grant-in-Aid Available	Sl. No.	Date of Sanction	Name of the Institution	Amount sanctioned in 2015-16	Balance Amount
1, 35, 00, 000/-	1	24. 7. 2015	BSI, ERC, Shillong	40, 00,000	95, 00, 000
	2	24. 7. 2015	BSI, SRC, Coimbatore	61, 26, 039	33, 73, 961
	3	07. 09. 2015	Ashok Vihar, New Delhi	4, 00, 000	29, 73, 961
	4.	13. 10. 2015	Shivaji University , Kolhapur	16, 19, 649	13, 54, 312
	5.	30. 03. 2016	Tezpur University	10, 89, 312	2, 65, 000
	6.	Not disbursed due to non -submission of bank details in time	Indian Institute of Horticultural Research	2, 65, 000	2, 65, 000

Total amount disbursed in 2015-16= 13235000

HERBARIUM INFORMATION

Sl. No	Herbarium Maintenance	ANRC	APRC	AZRC	ERC	DRC	SHRC	WRC	NRC	CRC	CNH	CBL	ISIM	TOTAL
1	No of Specimens mounted/labelling	700	3310	3605	3430	-	814	625	2924	1190	2200	1032	-	**19830**
	No. of Specimens Labelling	-	1450	-	4119	14	200	-	-	948	1800	-	-	**8531**
2	No. of Specimens segregated/remounted	-	240	30	-	782	1500	-	2120	1646	1590/2500	-	30	**7938/ 2500**
3	Stitching/ re stitching	373	4376	3555	4491/377	-	1910	961	11904	1686	2200	654	-	**32110/ 377**
4	Changing cover(species cover)	-	356	358	60	50	21	-	8	310	128	-	55	**1346**
5	Changing cover(Genus cover)	-	288	244	42		11			0	272	-	-	**857**
6	No. of Specimens sent on loan	-	72	-	743	-	77	22	104	0	-	-	-	**1018**
7	No. of Specimens received on exchange	-	-	03	09	-	-	07	124	125	10	-	-	**278**
8	Type photographs received from Kew	-	-	0	02	-	-	-	-	0	0	-	-	**02**
9	Received as gifts	-	-	-	-	3000	-	-	2504	-	06	-	-	**5510**
10	No. of Specimens poisoned/fumigated	913	2110	910	3179	1712	7305	600	6295	1190	2200	1122	-	**27536**
11	No. of Species identified	-	150	921	2263	2262	416		1043	2413	48	843	-	**10,359**
12	Herbarium sheets accessioned: old/new	-	1818	1002	1927/ 1517	-	1616	782	491	3423	-	-	-	**11059/ 1517**
13	Addition of species cover	-	-	-	-	-	-	-	-	-	-	-	-	--
14	Type Specimens/Images received	-	-	-	-	-	-	-	-	-	-		-	--
15	No. of Specimens received on loan	-	-	-	-	-	-	-	-	-	10	-	-	**10**
16	No. of loan specimens returned	-	123	05	81+1	-	-	14	-	21	0	-	-	**245**
17	Dusting herbarium/Duplicate specimens	-	-	-	19749	-	-	-	-	1190	1000	-	2087	**24,026**
18	Field Data written	-	1450	832	523	902	778	782	-	1540	-	523	-	**7,330**
19	Herbarium Data Entry	2123	-	-	-	-	-	-	-		850		-	**2973**
20	Herbarium sheets scanned/digitization	847	-	-	-	4648	1270	814	2481	-	-	-	-	**10,060**
21	No. of Specimens incorporated	-	1759	10, 674	1705	487	3733	45	4717	2256	-	-	-	**25,376**
22	Type Specimens deposited other	-	-	-	21	-	-	-	-	-	-	-		**21**

SERVICE RENDERED

A. Public Services Rendered

During this period, BSI Scientists of different Regional Centers provided information to general public and assisted students, researchers, academicians and scientists in pursuing researches on plant taxonomy and other disciplines. During 2015-16, c. 5,00,000 general visitors, including scientists, students, teachers and VIPS, visited Botanic Gardens, herbaria and museum of different regional centres of BSI. Apart from that, more than 2500 students from 80 different schools exclusively visited AJCBIBG, Howrah and enriched their knowledge about AJCBIBG. Various scientific queries on plant nomenclature, classification, identification, herbarium techniques and methodology, distribution of endemic taxa, biodiversity and conservation were attended by experts time to time; specimens of angiosperm, pteridophytes, bryophytes, fungi and algae received from students/scientists/academicians were identified by BSI experts time to time. Research scholars from different Universities and Institutions were assisted in identification of plant specimens, herbarium consultation and field collection. A total of 22 crude drug samples, received from various enforcing agencies of Government, were authenticated. During this period, Scientists of BSI reviewed research articles for National and International Journals; evaluated scientific projects for further process; performed duties as external examiner of Practical examination in Universities and colleges.

B. Scientific Workshop/Seminar organized

During this period, Botanical Survey of India organized 'Herbarium methodology' workshop for 20 students from Serampore college, Serampore; Hindi Workshop was organized by Central Botanical Laboratory, BSI, Howrah on 04.02.2016. International Biodiversity Day was celebrated on 22nd May 2015 at Central National Herbarium; Flower show and Exhibition programme for "Awareness programme on curious and Useful plants of India" was organised by BGIR, Noida, BSI during Feb.23-29, 2016. A National workshop on 'Capacity Building Training Course' in Plant Taxonomy was organized by T.N.B College, Bhagalpur & University Department of Botany, T.M. Bhagalpur University, Bhagalpur in collaboration with Botanical Survey of India, MoEF & CC, Govt. of India & ENVIS Centre on Floral Diversity, BSI, MoEF & CC, Govt. of India, Howrah on 24.02.2015-28.02.2015.

C. Revenue earnings

During this period, Botanical Survey of India earned total revenue of Rs. 4,543,913/- which include Rs. 204,615/- towards identification charges of plant specimens/crude drug samples, Rs. 120,766/- towards sale of BSI Publication and rest amount towards miscellaneous services.

EVENTS AND ACTIVITIES

Plantation programme in AJC Bose Indian Botanical Garden on Vanmohostav 2016

Celebrating International Yoga Day in AJC Bose Indian Botanic Garden, Kolkata on 21st, June 2016

Visit of Dignitories in ISIM, Kolkata

a&b. Visit of parliamentary committee to AJC Bose Indian Botanical Garden, Howrah;
c. Sri Prakash Javadekar, Honbl. Minister of States of Environment, Forest and Climate Change visiting the ENVIS BSI stall, at New Delhi;
d. Plantation of tree by Retd. Justice Bhagabati Prasad Banerjee during Vanmahotasava.

a. Prize distribution at ANRC, Port Blair on the occasion of World Environment day; **b.** Director, BSI, addressing on the occasion of Vanmahotsava 2016; **c.** Dr. Anandi Subramaniyam, Sr. Economic advisor, MoEF&CC visiting ENVIS stall at New Delhi; **d.** Officials and students during celebration of International day of Biological Diversity at BSI, AZRC, Jodhpur; **e.** Cleaning of Garden premises under "Swachch Bharat Abhiyan" at ANRC, Port Blair.

Glimpses of Vanmahotsava at AJC Bose Indian Botanical Garden, Howrah

BOTANICAL SURVEY OF INDIA

Budget Estimates

2015-2016

(Rupees in thousand)

		Plan	Non-Plan	Total
Demand No.32				
3435	Ecology & Environment			
03	Environmental Research & Ecological Regeneration			
103	Research & Ecological Regeneration			
12	Environmental Protection and Monitoring			
01	Research & Development for Conservation & Development			
Scheme	Botanical Survey of India			
Object Head				
01	Salaries	5,91,50	31,00,00	36,91,50
02	Wages	50	2,20	2,70
03	O.T.A.	0	19,35	19,35
06	Medical Treatment	5,00	49,00	54,00
11	Domestic Travel Expenses	84,85	22,60	1,07,45
12	Foreign Travel Expenses	2,50	50	3,00
13	Office Expenses	4,60,00	30,90	4,90,90
16	Publication	15,00	0	15,00
20	Other Administrative Expenses	0	4,00	4,00
21	Supplies & Materials	3,00	0	3,00
27	Minor Works	95,00	0	95,00
28	Professional Services	6,80	0	6,80
30	Other Contractual Services	74,85	0	74,85
31	Grant-in-aid	0	45	45
34	Scholarship & Stipend	75,00	0	75,00
	Total : BSI	**14,14,00**	**32,29,00**	**46,43,00**

Rhododendron grande Wight

Rhododendron niveum Hook. f.

भारतीय वनस्पति सर्वेक्षण
BOTANICAL SURVEY OF INDIA

BOTANICAL SURVEY OF INDIA

CGO Complex, 3rd MSO Building, F-Wing, 5th & 6th Floor
DF-Block, Sector-1, Salt Lake City, Kolkata-700064 (WB)
Website: http//bsi.gov.in, Email: nelumbo.bsi@gmail.com