

Project Title : **Developing a Digital Herbarium of Angiospermic Plants of the Western Ghat Regions of Maharashtra.**

Project Sanctioned by : **University Grants Commission
Bahadur Shah Zafar Marg
New Delhi – 110 002**

UGC File No. : **42-943/2013 (SR)**

Duration of the Project : **01/04/2013 to 31/03/2016**

Place of Work : **Post-Graduate Research Centre,
Department of Botany,
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune-411005,
(MAHARASHTRA, INDIA).**

Work carried out by

**Prin. (Dr.) R. S. Zunjarrao,
Principal Investigator.**

**Dr. R. B. Barmukh,
Co-Investigator.**

**Ms. Anita Kindre,
Research Fellow.**

CONTENTS

| Sr. No. | Title | Page No |
|----------------|--|----------------|
| | Certificate | |
| | Acknowledgments | 7 |
| 1. | Project Report No. | 8 |
| 2. | UGC Ref. File No. | 8 |
| 3. | Period of report | 8 |
| 4. | Title of research Project | 8 |
| 5. | (a)Name of the Principal Investigator and Co- Investigator(s) | 8 |
| | (b) Department | 8 |
| | (c) University/College where work has progressed | 8 |
| 6. | Effective date of starting of the project | 8 |
| 7. | Grant approved and expenditure incurred during the period of the report: a. Total amount approved: b. Total expenditure | 9 |
| 8. | Brief objective of the project | 9 |
| 9. | Introduction | 10 |
| 10. | Importance of Digital Herbarium | 12 |
| 11. | Materials and Methods | 13 |
| 12. | Field work | 13 |
| 13. | Laboratory work | 15 |

.....contd.....

| | | |
|-----|--|----|
| 14. | Website management | 17 |
| 15. | Results | 19 |
| 16. | Conclusions summarizing the achievements | 20 |
| 17. | Indication of scope for future work | 21 |
| 18. | List of research publications | 22 |
| 19. | Manpower trained on the project | 23 |
| 20. | No. of Ph.D. produced | 23 |
| 21. | Financial Position | 24 |
| 22. | Procurement/ Usage of Equipment | 25 |
| 23. | Plans for utilizing the equipment facilities in future | 26 |
| 24. | References | 27 |

LIST OF PLATES

| Plate. No. | Title | After page |
|---------------|--|------------|
| 1 | Regions of Western Ghat of Maharashtra covered in the project | 14 |
| 2A | Forest Types of Western Ghat Regions of Maharashtra | 14 |
| 2B | Forest Types of Western Ghat Regions of Maharashtra | 14 |
| 2C | Sacred groves (<i>Devrai</i>) of Western Ghat regions of Maharashtra | 14 |
| 3 | Field localities of Western Ghat regions of Maharashtra | 14 |
| 4 | Photographic documentation of <i>Capparis divaricata</i> Lam. | 16 |
| 5 | Inauguration and launching of the website: www.indianflora.org | 18 |
| 6 | Home page of the website: www.indianflora.org | 18 |
| 7A | Web page of the website www.indianflora.org : Plants search by A-Z Botanical name | 18 |
| 7B | Web page of the website www.indianflora.org : Plants search by A-Z Common name | 18 |
| 7C | Web page of the website www.indianflora.org : Plants search by A-Z Family name | 18 |
| 8 | Web page of the website www.indianflora.org : Identification of plants by inputting key characters | 18 |
| 9A | Web page of the website www.indianflora.org : Plant Photos: <i>Desmodium oojeinense</i> (Roxb.) H.Ohashi | 18 |
| 9B | Web page of the website www.indianflora.org : Plant Photos: <i>Dysoxylum gotadhora</i> (Buch.-Ham.) Mabb. | 18 |
| 9C | Web page of the website www.indianflora.org : Plant Photos: <i>Moullava spicata</i> (Dalzell) Nicolson | 18 |
| 9D | Web page of the website www.indianflora.org : Plant Photos: <i>Nothapodytes nimmoniana</i> (J.Graham) Mabb. | 18 |
| 10A-F | Plants species from Western Ghat regions of Maharashtra. | 18 |

LIST OF TABLES

| Table No. | Title | After page |
|------------------|---|-------------------|
| 1a | Details of Field visits with locations | 14 |
| 1b | Geographical coordinates of 80 localities | 14 |
| 2 | List of research publications | 21 |
| 3 | Financial position | 23 |
| 4 | Procurement/usage of equipment: | 24 |

LIST OF ANNEXURES

| Annexure No. | Title |
|---------------------|---|
| 1 | Shrubs and trees from the Western Ghat regions of Maharashtra |
| 2 | Field data sheet for plant identification |
| 3 | Research paper published |



Progressive Education Society's
MODERN COLLEGE OF ARTS, SCIENCE & COMMERCE
Shivajinagar, Pune 411 005.

- NAAC Re-accredited 'A' Grade
- 'College with Potential for Excellence', UGC
- 'Best College Award', SPPU
- 'Star College Status', DBT
- ISO 9001:2006 Certified
- Community College Scheme, UGC

Dr. Rajendra Zunjarrao
M.Sc. Ph.D.
PRINCIPAL

- P.U. AFFILIATION No. (Id No. PU/PN/ASC/022/1970)
- U.G.C. RECG. NO. included U/S 2 (F) of the U.G.C. Act 1956, Letter No. F.13-371(CD) dated 1st Sept.71
- Govt. RECG. No. D.E.M.S. Pune Oct.77, Code No. PA/ASC-13
- Jr. College Permission No. HSC/1077/31029/XII-HS dt/4-5-77, HSC College Code No. J-11.11.005

Ref. No. : MCASC/877g-2015-16

Date : 27/04/2016

Certificate

This is to certify that, the work presented in this report on a project entitled, 'Developing a Digital Herbarium of Angiospermic Plants of the Western Ghat Regions of Maharashtra' [UGC File No.: 42-943/2013 (SR)], a Major Research Project funded by University Grant Commission, is an original work carried out successfully by us in the Post-Graduate Research Centre, Department of Botany, Modern College of Arts, Science and Commerce, Shivajinagar, Pune-5., from the period of 1st April 2013 to 31st March 2016.

Dr. R. B. Barmukh
(Co-Investigator)
Mob. No. 09822868062

Prin. (Dr.) Rajendra S. Zunjarrao,
Principal Investigator,
UGC MRP: File No. 42-943/2013 (SR)
Head, Department of Botany &
Principal, Modern College of Arts,
Science and Commerce,
Shivajinagar, Pune-5.
Mob. No. 09922007302

ACKNOWLEDGEMENTS

On behalf of myself, the Co-Investigator of this project, colleagues, and the staff/research personnel appointed in the project, I, Principal (Dr.) R.S. Zunjarrao, in my capacity as the Principal Investigator, wish to express our sincere gratitude to the authorities of University Grant Commission, Government of India, New Delhi, for financial support for this project. Grateful thanks are also due to the Chairperson and the Honorable Members of the concerned PAC for approving the project and for the encouragement.

We are very much thankful to Hon'ble Prof. Dr. G. R. Ekbote, Chairman, Business Council, Progressive Education Society, Shivajinagar, Pune – 5, for his unstinted guidance and support for all the activities we undertake at the Modern College of Arts, Science and Commerce, Shivajinagar, Pune-5.

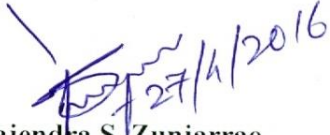
Our grateful thanks are extended to Dr. J. Jayanthi, Scientist D and Dr. C. R. Jadhav, Botanist, Botanical Survey of India, Western Regional Center, Pune, for their valuable help in identification of species.

We wish to thank Dr. Sharad Kambale, Post-Doctoral Fellow, Department of Botany, Goa University, Goa, for valuable help in plant identification and field visits at Sindudurg district. We are also thankful to Dr. Mayur Nandikar, Senior Scientist, Naoroji Godrej Centre for Plant Research, Lawkim Motors Division, Shirwal, Ms. Archana Kindre, Saswad and Mr. Avinash Bhagat, Thane, for their help in field visits in Western Ghat regions of Maharashtra.

We are indeed thankful to Signy IT Solutions Pvt. Ltd., Pune, for developing and maintaining the website www.indianflora.org for Digital Herbarium as per our requirements.

The authorities of Modern College of Arts, Science & Commerce, Shivajinagar, Pune-5, also deserve special thanks for their support and guidance during the field as well as lab work of the project.




Prin. (Dr.) Rajendra S. Zunjarrao,
Principal Investigator,
UGC MRP: File No. 42-943/2013 (SR)
Head, Department of Botany &
Principal, Modern College of Arts,
Science and Commerce,
Shivajinagar, Pune-5.

PROJECT COMPLETION (FINAL) REPORT
UGC MAJOR RESEARCH PROJECT 2013-2016

- 1. Project Report No.** : Final
- 2. UGC Ref. File No.** : 42-943/2013 (SR)
- 3. Period of report** : From 1st April 2013 to 31st March 2016
- 4. Title of Research Project** : “Developing a digital herbarium of angiospermic plants of the Western Ghat regions of Maharashtra”.
- 5. Name of the Principal Investigator and Co-Investigator(s)**

PI (a) Name & (b) Deptt.:

Dr. R. S. Zunjarrao
Principal Investigator of the Project,
Head, Department of Botany and
Principal, Progressive Education Society
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune-411005.

Co-PI (a) Name & (b) Deptt.:

Dr. R. B. Barmukh,
Department of Botany
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune 411005.

(c) University/College where work has progressed:

Post-Graduate Research Centre,
Department of Botany,
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune-411005,
(Maharashtra, India).

- 6. Effective date of starting of the project:** 1st April 2013

7. Grant approved and expenditure incurred during the period of the report:

a. Total amount approved: Rs. 9,86,750/- (Rs. Nine lac eighty six thousand seven hundred fifty only)

First Installment: Rs.6,29,750/- (Rs. Six lac twenty nine thousand seven hundred fifty rupees only)

Second Installment : Rs. 2,49,368/- (Rs. Two lac forty nine thousand three hundred sixty eight only)

Total Grants Released : Rs. 8,79,118/- (Rs. Eight lac seventy nine thousand one hundred eighteen only)

b. Total expenditure: Rs. 8,86,832/- (Year 2013-2016)

(Rs. 3,40,113/- Year 2013-2014,

Rs. 2,75,105/- Year 2014-2015,

Rs. 2,71,614/- Year 2015-2016).

Brief objective of the project:

The present project was undertaken with the following objectives:

1. Visiting Western Ghat regions of Maharashtra for studying tree species.
2. Taking photographs of these plants by making repeated visits in different seasons.
3. Identification of these plants with the help of available literature such as regional floras and taxonomic experts at the Botanical Survey of India, Western Regional Circle, Pune.
4. Organization of the digital images into a searchable database.
5. Sharing of this database through a dedicated website, www.indianflora.org

INTRODUCTION

Herbarium is a repository of preserved and labeled plants and is used for botanical and ecological research. Each herbarium specimen of angiospermic plant comprises a dried flowering twig of a plant, mounted on archival paper, and affixed with a label providing descriptive data. However, as the time passes by, these herbarium specimens fade and the plant parts may get damaged. This may create difficulties in plant identification.

Herbarium specimen is key to taxonomic and anatomical research work. However, there are few limitations of traditional herbarium. Preparation of traditional herbarium requires utmost care while collecting, pressing, preserving, and mounting the specimen along with accurate, detailed labels. Moreover, if the herbarium specimens are damaged, then it becomes necessary to take expert's advice for correct identification. Though quality herbarium specimens are important recourse, as the number of herbarium sheets increase, need of space and cupboards also increases. For the maintenance of herbarium, more manpower and greater expenses are also needed. Even with proper maintenance and care, sometimes these herbarium sheets are damaged.

For overcoming these limitations of traditional herbarium, a 'Digital Herbarium' of angiospermic tree species found in the Western Ghat regions of Maharashtra is prepared. This digital herbarium can help in accurate and efficient identification even in the absence of expert taxonomist and has negligible expenses on maintenance of herbarium. The infrastructural facility needed is one computer connected to internet. No destruction of natural vegetation and habitat has occurred in making of this digital herbarium.

Digital Herbarium is a well-organized collection of digital images of plants, along with fairly detail botanical description. This digital herbarium can help in accurate and efficient identification even in the absence of expert taxonomist and has negligible expenses on maintenance of herbarium. To share this asset, the infrastructural facility needed is one computer connected to the internet.

Western Ghats is one of the important biodiversity hot spots in India. In Maharashtra, it is spread over the area of 58,400 sq. km. The data on about 650 tree species from Western Ghat regions of Pune, Thane, Satara, Sangali, Kolhapur, Raigad, Ratnagiri and Sindhudurg districts of Maharashtra is collected.

The database of 350 plants is now online and made accessible at free of cost to the world through the dedicated website www.indianflora.org that has been developed through this project.

IMPORTANCE OF DIGITAL HERBARIUM

1. Provides data for floristic studies.
2. Determines native ranges and documents the plants growing in the region through time (invasive species, climate change, habitat destruction, etc.)
3. Helps in documentation on plant associations for phytogeographical and ecological studies.
4. Database provides information on common names and local uses of plants, which is useful for studies in the areas of Anthropology, Ethnobotany and Economic Botany.
5. This database provides the information about common, occasional, endemic, endangered and rare species, which will be useful in conservation biology, environmental, impact statements, endangered species, etc.
6. This database provides material for teaching different aspects of Botany, such as Taxonomy, Field Botany, Plant Communities, Ethnobotany, Forestry etc.)
7. This database will promote appreciation of botanical diversity by making digital specimens available online for viewing by students, researchers, and the public as well.
8. Provides locality data for planning field trips for studies related to Plant Taxonomy and Systematics.

MATERIALS AND METHODS

a) MATERIALS

High quality digital images of angiospermic shrubs and tree species were captured on Canon 600D D-SLR camera equipped with Canon 18-55 mm IS II wide angle and Canon EF-S 55-250 mm 1:4-5.6 IS II telephoto lenses.

These images were stored on a computer (HP Desktop P2-1402 IN Pavilion with HP LED Backlit Monitor W1972a) equipped with scanner (HP Scanner SJ G4010) and printer (HP Laserjet Pro P1108).

The images were edited to add the scale bar and also to suit the website requirements.

b) METHODS

• FIELD WORK

1. As per the flowering and fruiting season, an inventory of shrubs and tree species was prepared using various regional floras. A list of about 1000 plant species, which can be included in this digital herbarium, was made.
2. Fieldwork was done in eight districts of Western Ghat regions of Maharashtra such as Pune, Nashik, Thane, Satara, Kolhapur, Raigad, Ratnagiri, and Sindhudurg districts for photographic documentation and field notes (Plate 1).
3. For the field notes and data collection, various forests were visited such as, evergreen forests, semi-evergreen forests, deciduous forests, scrub forests, mangrove forests, sacred groves (SG) and wildlife sanctuaries (WLS) as well (Plate 2A-2C)
4. Eighty localities were visited during seventy field visits made from April 2013 to March 2016 (Plate 3, Table 1a and 1b)
5. High quality digital images of angiospermic shrubs and tree species were captured during each field visit. These images of plant species included

habitat, habit, stem, upper and lower surface of leaf, flowering twig, buds, close-up of flower, fruit and special character of a flower, if any (Plate 4).

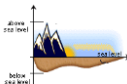
6. For correct identification and photographic documentation of the plants, repeated season wise visits were made and the data of about 650 (total) tree species was collected.

Table 1a. Details of Field visits with locations

| Name of the place visited | Duration of the Visit | |
|---|-----------------------|------------|
| | From | To |
| Kolhapur District: Dajipur WLS, Kolhapur City | 09.10.2013 | 11.10.2013 |
| Kolhapur District: Radhanagari WLS, Gagan bavda | 14.10.2013 | 17.10.2013 |
| Mumbai, Navi Mumbai & Thane District | 03.01.2014 | 06.01.2014 |
| Pune District Katraj Ghat, Baneshawar | 23.02.2013 | 23.02.2013 |
| Satara District: Mahabaleshwar, Pratapgad | 21.03.2013 | 21.03.2013 |
| Pune City: Hadapsar, Poolgate, Talegav, Lonawala, Lohiya udyan, Kamala Neharu Park, Chittranjan vatika and Empress Botanical Garden | 16.05.2014 | 16.05.2014 |
| | 29.05.2014 | 29.05.2014 |
| | 04.06.2014 | 04.06.2014 |
| | 05.06.2014 | 05.06.2014 |
| | 06.06.2014 | 06.06.2014 |
| Pune City: Pune Municipal Gardens | 07.06.2014 | 07.06.2014 |
| | 09.06.2014 | 09.06.2014 |
| | 12.06.2014 | 12.06.2014 |
| Pune District: Bhimashankar Wild Life Sanctuary | 13.06.2014 | 13.06.2014 |
| | 14.06.2014 | 16.06.2014 |
| Pune City: Botanical Survey of India, Pashan Road, Chaturshrungi, Shivajinagar | 18.06.2014 | 18.06.2014 |
| | 27.06.2014 | 28.06.2014 |
| Pune District: Junnar, Bhimashankar Wild Life Sanctuary | 13.07.2014 | 14.07.2014 |
| Pune City: Modern College Campus, Fergusson College Road, Deccan Gymkhana | 16.07.2014 | 16.07.2014 |
| | 18.07.2014 | 18.07.2014 |
| Satara District: Madhardevi, Vai | 19.07.2014 | 21.07.2014 |
| Pune District: Sinhgad fort | 17.09.2014 | 17.09.2014 |
| Raigad District: Murud, Janjhira, Alibag | 20.09.2014 | 20.09.2014 |
| Pimpri-Chinchwad | 28.09.2014 | 28.09.2014 |
| Satara District: Kaas Plateau | 30.09.2014 | 30.09.2014 |
| Raigad District: Alibag, Revdanda, Phansad WLS | 02.10.2014 | 04.10.2014 |
| Pune City: Hadapsar, Pune Station region, Bund Garden Road | 20.10.2014 | 21.10.2014 |
| | 25.11.2014 | 25.11.2014 |
| | 05.12.2014 | 05.12.2014 |
| New Delhi: UGC Mid-term Evaluation meeting | 13.01.2014 | 13.01.2014 |
| Pune city: Katraj Road, Kondhava, Magarpatta | 02.01.2015 | 02.01.2015 |
| | 05.01.2015 | 05.01.2015 |
| | 10.01.2015 | 10.01.2015 |
| Sindudurg District: Amboli, Malvan, Kudal | 16.01.2015 | 18.01.2015 |
| Pune District: Purandar Taluka | 22.01.2015 | 22.01.2015 |

| | | |
|---|------------|------------|
| Pune District: Velha Taluka | 23.01.2015 | 26.01.2015 |
| Pune District: Dive Ghat, Saswad | 01.02.2015 | 01.02.2015 |
| Pune City: Vetral Tekdi, Sarasbag | 03.02.2015 | 03.02.2015 |
| | 04.02.2015 | 04.02.2015 |
| Pune District: Tamhini Ghat WLS | 05.02.2015 | 05.02.2015 |
| Pune City: Botanical Survey of India, Pune | 07.02.2015 | 07.02.2015 |
| Satara District: Mahabaleshwar, Panchgani, Vai | 10.02.2015 | 10.02.2015 |
| Pune City: Botanical Survey of India, Pune | 13.02.2015 | 13.02.2015 |
| | 16.02.2015 | 16.02.2015 |
| | 18.02.2015 | 18.02.2015 |
| | 20.02.2015 | 20.02.2015 |
| Goa: Taxonomy Workshop at Deptt. Of Botany, Goa University | 25.02.2015 | 28.02.2015 |
| Pune City: NCL, Pashan | 02.03.2015 | 02.03.2015 |
| Pune City: Botanical Survey of India, Pune | 20.03.2015 | 20.03.2015 |
| | 26.03.2015 | 26.03.2015 |
| Pune District: Tamhini Ghat and Kalkai Mata Mata Sacred grove | 05.04.2015 | 05.04.2015 |
| Pune District: Bhimasnagar WLS, Junnar | 11.04.2015 | 11.04.2015 |
| Pune City: Botanical Survey of India, Pune, Empress Botanical Garden | 20.04.2015 | 20.04.2015 |
| | 21.04.2015 | 21.04.2015 |
| Satara District: Kas plateau, Bamnoli, Panchgani, Mahabaleshwar, Vai, Satara city | 22.04.2015 | 25.04.2015 |
| Pune District: Bhore taluk, Shirwal and adjoining area, Veer dam, Purandar taluk and adjoining area | 28.04.2015 | 28.04.2015 |
| | 02.05.2015 | 20.05.2015 |
| | 20.06.2015 | 20.06.2015 |
| Pune District: Katraj Ghat and adjoining area, Bhore taluk, Shirwal, Jejuri, Malhargad, Backside of Purandar, Ghera Purandar, Dive Ghat and adjoining villages of Saswad. | 21.06.2015 | 21.06.2015 |
| | 05.07.2015 | 05.07.2015 |
| | 24.09.2015 | 24.09.2015 |
| | 18.10.2015 | 18.10.2015 |
| | 11.11.2015 | 11.11.2015 |
| Thane District: Murbad, Shahapur, Thane city | 12.12.2015 | 15.12.2015 |
| Kolhapur District: Tilarji Ghat Sindhudurg District: Amboli ghat, Malwan, Kudal, Vengurla and Bandha | 23.12.2015 | 28.12.2015 |
| Pune District: Khalad.Kumbharwala, Purandar | 11.01.2016 | 11.01.2016 |
| Satara District: Mandhardevi, Vai and adjoining villages | 18.01.2016 | 18.01.2016 |
| Satara District: Mahabaleshwar, Panchgani, Vai | 23.02.2016 | 23.02.2016 |
| Pune City: Botanical Survey of India, Pune, Savitribai Phule Pune University, Pune and Agharkar Research Institute, Pune | 25.02.2016 | 25.02.2016 |
| | 26.02.2016 | 26.02.2016 |

Table 1 b. Geographical coordinates of 80 localities

| Name of the location | Geographical coordinates |  Altitude from mean sea level (m) |
|--|--------------------------------|---|
| Ghisar SG, Velha | 18°17'25.24"N, 73°33'12.68"E | 976 |
| Waghjai SG, Bor | 18°6'42.86"N, 73°51'27.76"E | 782 |
| Kalkai Mata SG, Tamhini | 18°26'48.85"N, 73°25'49.95"E | 810 |
| Tamhini Ghat WLS | 18°26'30.48"N, 73°24'9.06"E | 815 |
| Bhimashankar WLS | 19°3'52.49"N, 73°31'59.63"E | 929 |
| Purandar fort | 18°17'20.45"N, 73°58'29.392"E | 1363 |
| Sinhgad fort | 18°21'56.17"N, 73°45'20"E | 1350 |
| Rajgad fort | 18°14'44.83"N, 73°40'74.06"E | 1279 |
| Torana Fort | 18°16'17.84"N, 73°37'3.267"E | 1064 |
| Malhargad | 18°24'43.45"N, 74°2'58.02"E | 858 |
| Purandar taluk | 18°21'7.456"N, 74°1'58.61"E | 778 |
| Velha taluk | 18°17'46.56"N, 73°38'14.75"E | 686 |
| Bhor taluk | 18°8'30.97"N, 73°50'43.04"E | 620 |
| Junnar taluk | 19°12'11.46"N, 73°52'27.3"E | 689 |
| Dive ghat | 18°24'56.12"N, 73°59'39.95"E | 722 |
| Pabe ghat | 18°19'15.84"N, 73°39'58.06"E | 930 |
| Chivewadi ghat | 18°18'17.95"N, 73°58'31.47"E | 681 |
| Malshej ghat | 19°20'26.25"N, 73°46'28.38"E | 566 |
| Varandha ghat | 18°6'36.58 "N, 73°39'41.71"E | 730 |
| Katraj ghat | 18°25'53.56"N, 73°51'29.39"E | 709 |
| Baneshwar, Nasarapur | 18°34'12.39"N, 73°47'11.49"E | 1293 |
| Lonawala | 18°43'31.13 "N, 73° 18' 33.4"E | 384 |
| Talegaon | 18°44'6.32"N, 73°40'20.25"E | 590 |
| Pimpri-Chinchwad | 18°37'22.15"N, 73°49'14.05"E | 580 |
| Savitribai Phule Pune University campus, Pune | 18°33'16.19"N, 73°49'14.05"E | 590 |
| Botanical Survey of India, Western Regional Centre, Pune | 18°32'4.563"N, 73°55'3.433"E | 562 |

| | | |
|--|------------------------------|------|
| Pune City (Urban) | 18°24'33.57"N, 73°46'03.71"E | 558 |
| Nashik City | 20°00'17.15"N, 73°47'20.98"E | 591 |
| Kasara Ghat | 19°40'17.35"N, 73°28'59.99"E | 334 |
| Tansa WLS | 19°31'29.00"N, 73°15'53.06"E | 325 |
| Tungreshawar WLS | 19°4'33.54"N, 72°52'39.56"E | 340 |
| Naneghat Hills | 19°17'51.27"N, 72°52'39.56"E | 832 |
| Yeoor hills | 19°14'1.55"N, 72°56'40.48"E | 325 |
| Mahuli Fort | 19°14'1.55"N, 72°56'40.48"E | 503 |
| Sidhhgad | 19°9'29.99"N, 73°31'20.72"E | 670 |
| Murbad | 19°15'33.45"N, 73°23'22.92"E | 80 |
| Shahapur | 19°27'21.32"N, 73°19'46.57"E | 56 |
| Thane city | 19°12'45.41"N, 73°59'3.25"E | 40 |
| Pasarni ghat | 17°56'36.46"N, 73°51'23.83"E | 1135 |
| Khambataki ghat | 18°1'53.27"N, 74°1'16.73"E | 710 |
| Yavateshawar ghat | 17°41'42.19"N, 73°55'48.33"E | 815 |
| Pateshawar | 17°35'18.77"N, 74°3'3.48"E | 850 |
| Kas Platuae | 17°43'4.61"N, 73°48'43.15"E | 1140 |
| Bamnoli | 17°50'48.32"N, 73°52'49.79"E | 719 |
| Thoseghar | 17°36'11.15"N, 73°50'52.03"E | 1126 |
| Chalakeswadi | 17°28'20.45"N, 73°53'51.96"E | 1096 |
| Shirwal | 18°8'54.25"N, 73°58'38.93"E | 588 |
| <i>Khandala taluka</i> | 18°3'15.64"N, 74°0'30.86"E | 659 |
| Mahabaleshwar | 17°52'41.24"N, 73°40'15.17"E | 1438 |
| Wai | 17°56'59.97"N, 73°53'45.97"E | 718 |
| Panchgani | 17°55'7.09"N, 73°47'25.29"E | 1293 |
| Pratapgad fort | 17°56'14.05"N, 73°34'38.81"E | 1086 |
| Palsambe devrai | 16°34'39.01"N, 73°55'6.047"E | 837 |
| Gagan bavda SG | 16°31'27.53"N, 73°50'23.27"E | 628 |
| Radhanagari WLS | 16°21'1.62"N, 73°57'58.10"E | 830 |
| Dajipur WLS | 16°24'40.08"N, 73°59'42.02"E | 578 |
| Amba Ghat | 16°58'20.27"N, 73°47'36.53"E | 645 |
| Tilari Ghat | 15°47'51.14"N, 74°9'35.18"E | 745 |
| Vishalgad | 16°34'21.65"N, 73°44'38.78"E | 762 |
| Udagiri | 17°4'24.76"N, 73°49'27.34"E | 890 |
| Wakoli | 16°59'12.91"N, 73°51'2.62"E | 710 |
| Panhala region | 16°48'25.81"N, 74°7'51.36"E | 901 |
| Shivaji University Campus, Kolhapur | 16°41'3.26"N, 74°15'32.45"E | 590 |
| Kolhapur city | 16°41'52.88"N, 74°14'16.98"E | 567 |
| Phansad WLS | 18°41'30.91"N, 72°56'3.28"E | 209 |
| Alibag | 18°39'9.90"N, 72°55'30.67"E | 20 |
| Revdanda | 18°35'34.39"N, 72°56'15.16"E | 30 |
| Roha | 18°26'20.22"N, 73°7'0.305"E | 32 |
| Murud | 18°19'56.51"N, 72°57'39.21"E | 48 |

| | | |
|-----------------|------------------------------|-----|
| Janjira fort | 18°20'1.21"N, 72°29'35.83"E | 14 |
| Adivare SG | 16°43'10.44"N, 73°21'19.08"E | 23 |
| Jaitapur | 16°37'34.31"N, 73°22'9.82"E | 20 |
| Nate | 16°38'16.00"N, 73°21'45.95"E | 40 |
| Dapoli | 17°45'11.20"N, 73°11'17.02"E | 223 |
| Hiranyakeshi SG | 15°58'12.02"N, 74°0'40.97"E | 840 |
| Parle SG | 15°50'23.35"N, 74°8'58.11"E | 630 |
| Amboli Ghat | 15°55'21.49"N, 73°59'41.66"E | 715 |
| Sawanwadi | 15°57'40.78"N, 73°55'27.31"E | 108 |
| Malvan | 16°10'1.90"N, 73°36'59.89"E | 5 |
| Kudal | 15°59'59.84"N, 73°40'58.98"E | 38 |
| Bandha road | 15°48'40.89"N, 73°51'29.80"E | 14 |
| Vengurla | 15°53'14.55"N, 73°42'36.07"E | 8 |

Plate 1

Regions of Western Ghat of Maharashtra covered in the project

Year I: Pune and Kolhapur

Year II: Thane, Raigad and Ratnagiri

Year III: Satara, Sindhudurg and Nashik

Plate 1

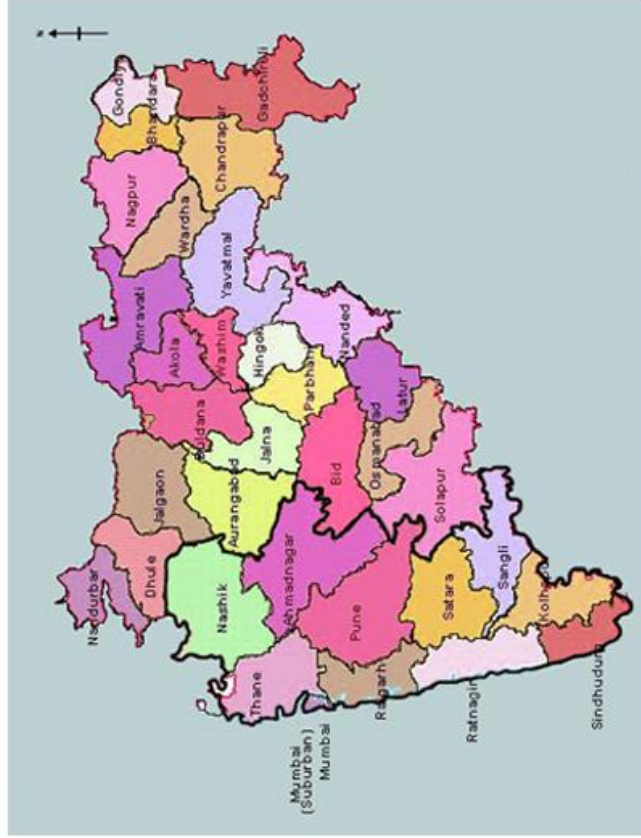


Plate 2A

Forest Types of Western Ghat Regions of Maharashtra

A. Evergreen Forests: Amboli, Dist. Sindhudurg

B. Evergreen Forests: Amboli Ghat regions, Dist. Sindhudurg

Plate 2 A



A



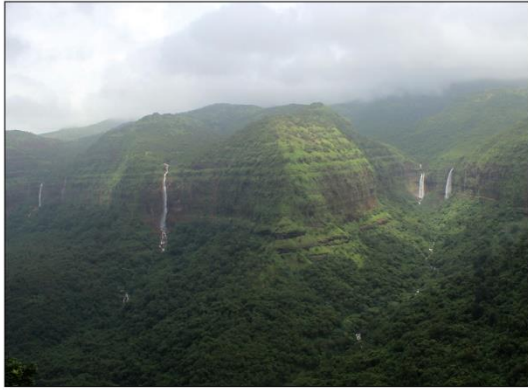
B

Plate 2B

Forest Types of Western Ghat Regions of Maharashtra

- A. Evergreen Forests: Pune district: Varandha Ghat
- B. Semi-evergreen Forests: Pune district: Bhimashankar Wildlife Sanctuary
- C. Semi-evergreen Forests: Kolhapur district: Tilari Ghat
- D. Deciduous Forests: Thane district: Sidhhagad
- E. Littoral Mangroves: Thane district
- F. Scrub Forests: Pune district

Plate 2 B



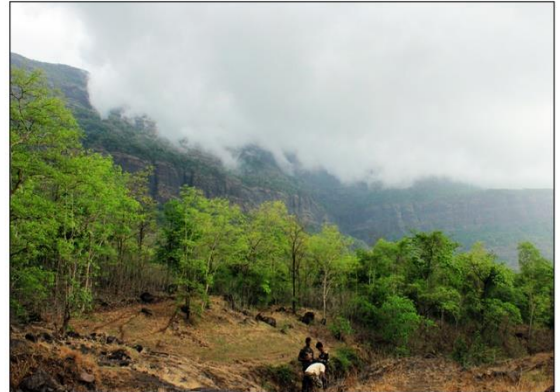
A



B



C



D



E



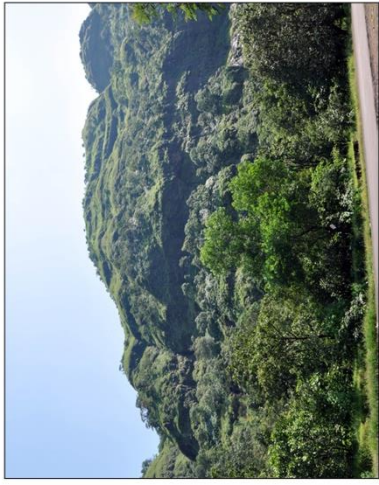
F

Plate 2C

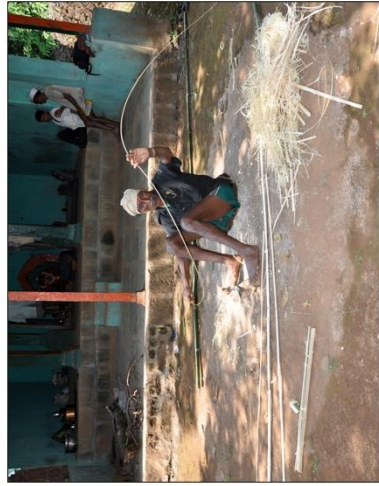
Sacred groves (*Devrai*) of Western Ghat regions of Maharashtra

- A. Pune district: *Kalkai Mata devrai* of Tamhini Ghat
- B. Pune district: Temple of *Jugai devi devrai* of Ghisar village; Velha taluk, Local people are making Irali (rainwear) from the Bamboos obtained in the scared grove.
- C. Pune district: Water sources; stream near *Mari Aai devrai* of Ghisar village; velha taluk.
- D. Kolhapur district: *Palsambe devrai* of Palsambe village, Local people did deforestation and made roads for easy access in the sacred grove which is directly affects plant diversity.
- E. Sindhudurg district:
 - i. Mahadev temple of *Hiranyakeshi devrai*; Amboli
 - ii. *Hiranyakeshi devrai*, Amboli

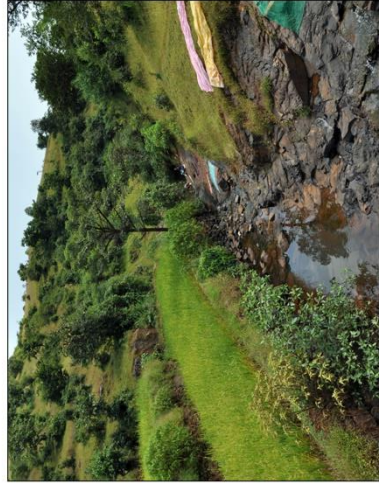
Plate 2 C



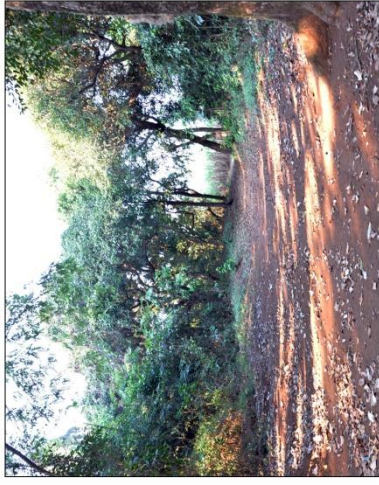
A



B



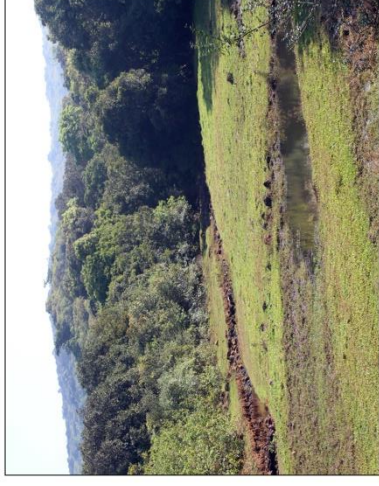
C



D



E-i)



E-ii)

Plate 3

Field localities of Western Ghat regions of Maharashtra

A. Total 70 visits at 80 localities of Western Ghat regions from Maharashtra: Field work was done in 08 districts:

Pune district: Jugai Devi and Mari Aai Devi Sacred grove - Ghisar, Waghjai Sacred grove - Bhor, Kalkai Mata Sacred grove - Tamhini, Tamhini Ghat wildlife sanctuary, Bhimashankar wildlife sanctuary, Purandar fort, Rajgad fort, Torana fort, Sinhgad fort, Malhargad, Purandar taluk, Velha taluk, Bhor taluk, Junnar taluk, Dive ghat, Pabe ghat, Chivewadi ghat, Malshej ghat, Varandha ghat, Katraj ghat, Lonawala, Talegaon, Pimpri-Chinchwad, Botanical Survey of India, Western Regional Centre-Pune, Savitribai Phule Pune University campus and Pune City (Urban).

Nashik district: Kasara Ghat and Nashik City.

Thane district: Tansa wildlife sanctuary and Tungreshwar wildlife sanctuary, Naneghat Hills, Yeoor hills, Mahuli fort, Sidhghad, Murbad, Shahapur and Thane city.

Satara district: Pasarni ghat, Khambataki ghat, Yavateshwar ghat, Pateshwar, Kas Platuae, Bamnoli, Thoseghar, Chalakewadi, Mahabaleshwar, Wai, Panchgani, Shirwal and Khandala taluk.

Kolhapur district: Radhanagari wildlife sanctuary, Dajipur wildlife sanctuary, Palsambe devrai and Gaganbavda Sacred grove, Amba ghat, Tilar ghat, Vishalgad, Udagiri, Wankoli, Panhala region, Shivaji University Campus, and Kolhapur city.

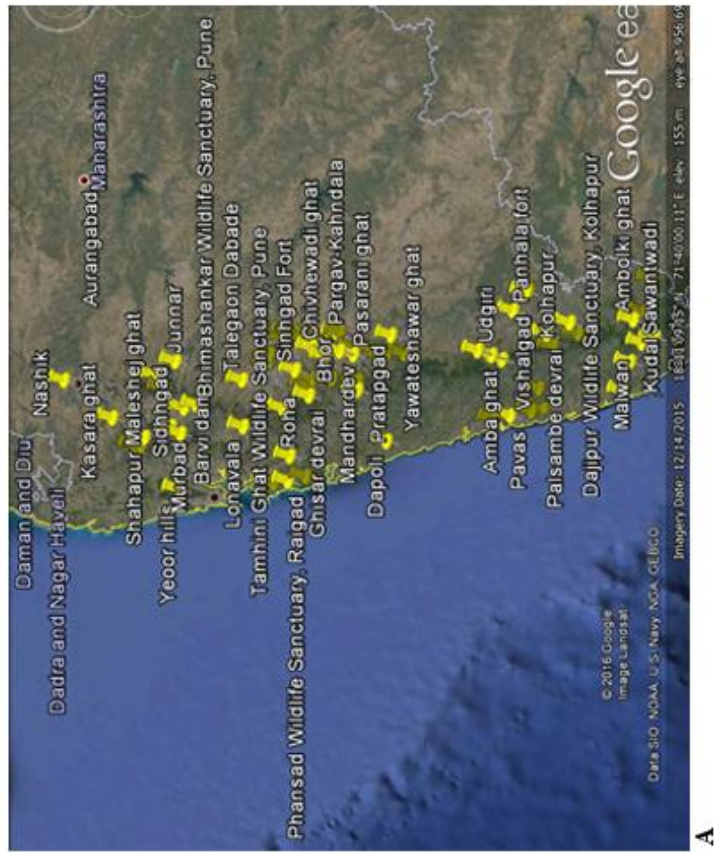
Raigad district: Phansad wildlife sanctuary, Alibag, Revdanda, Roha and Murud-Janjira fort.

Ratnagiri district: Adivare Sacred Grove, Jaitapur, Nate and Dapoli.

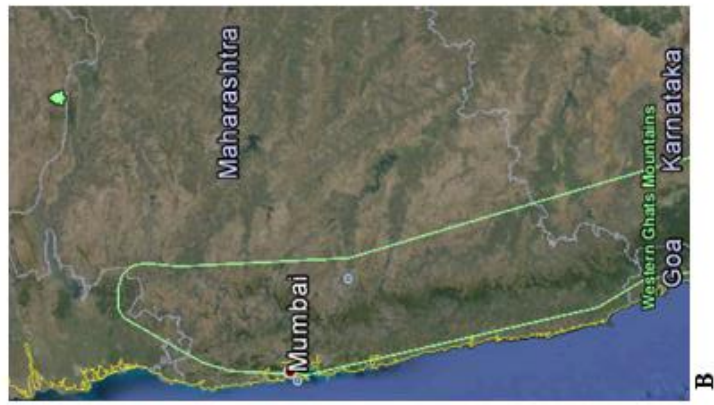
Sindhudurg district: Hiranyakeshi Sacred grove, Parle Sacred grove, Amboli ghat, Sawanwadi, Malwan, Kudal, Vengurla and Bandha road.

B. Google earth image of Western Ghat region of Maharashtra.

Plate 3



A



B

• **LABORATORY WORK:**

1. The plants were identified with the help of available and literature such as regional floras (Dalzell and Gibson, 1861; Brandis D, 1874; Cooke, 1901-1908; Lakshinarasimhan and Sharma, 1991; Kothari and Moorthy, 1993; Deshpande *et. al.*, 1995; Almeida, 1996, 1998, 2001; Yadav and Sardesai 2002;), books and field guides (Nayar and Sastry, 2000; Mishra and Singh 2001 and Neginhal 2011) and field guides (Sardesai *et.al.*, 2013; Ingalhalikar, 2014).
2. For the correct botanical name, synonyms and common names, literature available online on the websites www.biotic.org, www.flowersofindia.net, www.ipni.org, www.theplantlist.org, and www.tropicos.org was used.
3. The taxonomic experts at Botanical Survey of India, Western Regional Circle, Pune, Maharashtra, were also consulted for the confirmation of plant identifications.
4. Each digital photograph was supplemented with a scale bar (Plate 4) and image editing was done using the free trial version of Adobe Photoshop CS 6.
5. Brief description and key characters of each plant species was also compiled with the help of regional floras, field observations, and notes.
6. The angiospermic plant families on which the data was collected were arranged according to APG III classification system. The status of each plant such as rare, endemic, wild, occasional, common and cultivated was also included in the database. (Annexure 1)
7. The data generated was compiled in the form of a dedicated website www.indianflora.org. The website was launched for public access on 29th February 2016 at the hands of Dr. P. Laxminarsimhan, Scientist In-charge, Botanical Survey of India, Western Regional Centre, Pune, (Plate 5-6).
8. To make user-friendly interface of the website, the plants were listed alphabetically by their botanical names, common names, and families (Plate 7A-C).

9. A list of key characters for plant identification was prepared with the help of field observations and notes. A field data sheet of 15 taxonomic characters was used for preparing this key (Plate 8 and Annexure 2)

Plate 4

Photographic documentation of *Capparis divaricata* Lam.

A. Habit of the plant, B. Branches, C. Leaves: upper surface, D. Leaves: lowers surface, E. Fruit and F. Flower

Capparis divaricata Lam.

Botanical Name: *Capparis divaricata* Lam.

Synonym: *Capparis horrida* Banks ex Wight & Arn.

Capparis stylosa DC.

Common Name: Spreading caper, Pachunda, पाचुंदा

Family: Capparaceae

Characters:

Erect shrubs or small tree, thorny, grey stellate pubescent trees. Stipular thorns stout, divaricate, straight or hooked. Leaves coriaceous, linear or ovate-lanceolate, apex mucronate, base cuneate, 5-7 nerved, rounded at the base, the young leaves tomentose, the older glabrous. 6 x 2.5 cm. Flowers axillary, solitary, yellow or greenish, buds beaked, tomentose. Sepals ovate, acute, tomentose on both surfaces. Petals oblong, rounded to acuminate at apex, deciduous. Stamens many, filaments longer than petals, yellowish. Ovary glabrous, ribbed. Fruit a berry, globose, scarlet, warted, 5-6 ribbed, beaked, red at maturity. Seeds numerous, ovoid.

Flowers: January-September

Notes: Occasional along roadsides on hill slopes and scrub forests.

Plate 4



A



B



C



D



E



F

- **WEBSITE MANAGEMENT**

1. The data on each tree species was uploaded on a dedicated website www.indianflora.org developed for the project.
2. The website was developed on the PHP (Hypertext Pre-processor) application platform, which is an HTML-embedded, server-side scripting language, designed for web development. PHP scripts are executed on the server. A PHP interpreter processes PHP code. A major advantage of PHP is that it can be run on all major operating systems. It is compatible with almost all servers. It has multiple layers of security to prevent threats and other malicious attacks.

Code Igniter (CI) was used as an ‘Application Development Framework’, a toolkit used for developing a web site using PHP.

The database on tree species generated in the project was managed with MySQL, a relational database management system (RDBMS).

3. The data on the website is presented in a user-friendly interface (Plate 9 A-D).
4. The users i.e., students, researchers, NGOs, and people in general may access the information on the website as follows:
 - a. Select tab ‘Search by Name’. Enter the name of the plant in the search box provided.
 - b. Select tab ‘Botanical Name A-Z’ where plants are listed alphabetically as per botanical names. Click on the name of plant to retrieve the details.
 - c. Select tab ‘Common Name A-Z’ where plants are listed alphabetically as per common names. Click on the name of plant to retrieve the details.
 - d. Select tab ‘Search by Criteria’. On the web page, select the characters as observed in the specimen under study. A list of possible plants meeting the inputted criteria is presented. Click on the name of plant to retrieve the details.

5. So far, the botanical description and digital photographs of about 350 tree species has been uploaded to the website www.indianflora.org.
6. For any queries, the user has to select the tab 'Contact us' and fill in the details in the boxes provided. Alternatively, the user can contact us on phone or on the email address provided on the same web page.

Plate 5

Inauguration and launching of the website: www.indianflora.org

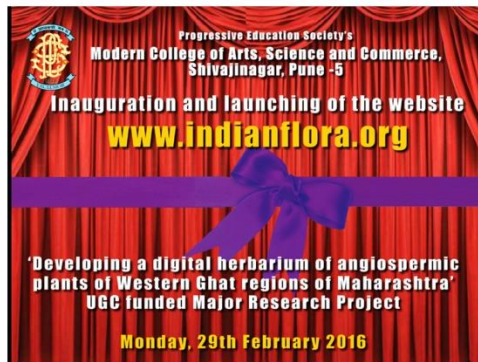
A & B: Inauguration and launching of the website: Digital Herbarium of angiospermic plants of Western Ghat regions of Maharashtra: www.indianflora.org on 29th February 2016

C. Website was launched by the hands of Chief guest: Dr. P. Laxminarsimhan, Scientist In-charge, Botanical Survey of India, Western Regional Centre, Pune

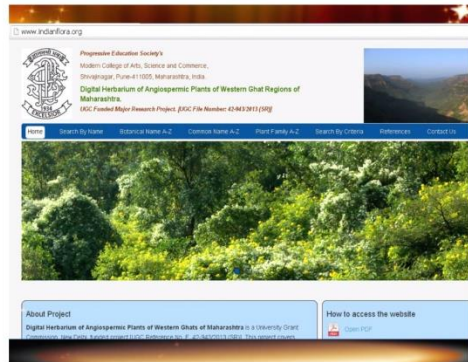
D. Principal Investigator, Dr. R. S. Zunjarrao, giving information about Digital Herbarium and website

E. Project JRF Ms. Anita Kindre, giving information about website and sharing her experiences.

Plate 5



A



B



C



D



E

Plate 6

Home page of the website: www.indianflora.org

Plate 6

The screenshot shows a web browser window with the following elements:

- Browser Address Bar:** Shows the URL "Digital Herbarium of /".
- Page Header:** Includes "Digital Herbarium of Angiospermic Plants of Western Ghats" and "Checklist of Rare, Endemic and Threatened Plants of Western Ghats".
- Navigation Menu:** Contains links for "Home", "Project Team", "Search By Name", "Botanical Name A-Z", "Common Name A-Z", "Plant Family A-Z", "Search By Criteria", "References", and "Contact Us".
- Main Content Area:** Features a large image of a purple and white flower cluster. To the left of the image is a smaller image of a plant stem with small white flowers.
- About Project Section:** Contains the following text:

About Project
Digital Herbarium of Angiospermic Plants of Western Ghats of Maharashtra is a University Grant Commission, New Delhi, funded project (UGC Reference No. F-42-443/2013 (SR)). This project covers prominent tree species and shrubs from 10 districts, located in Western Ghats regions of Maharashtra, viz., Pune, Ahmednagar, Satara, Sangli, Kolhapur, Ratnagiri, Thane, Sindhudurg, Raigad and Nask. A list of about 1000 species was made, of which 650 plants were identified and the data on 250 plants is currently available on the website. The project is currently in progress. The plants are being photographed and documented with respect to habit, stem, upper and lower surface of leaf, inflorescence, cross-section of flower and fruit. A brief description of each species is also included. The database covers wild as well as cultivated plants. For identification and description of plant species regional flora published by Botanical Survey of India (BSI) were used. Primary objective of this project is to capture and store high quality digital images of plant species and make this database available to students, researchers and general public to disseminate the awareness of regional plants.
We are thankful to the University Grant Commission, New Delhi, for providing financial assistance worth Rs. 9.86.750/- for this project.
- How to access the website:** Includes a link to "Open PDF" and a video player showing a thumbnail of the website.
- Footer:** Displays the date and time "14:59 22-03-2016" and the language "ENG INTL".

Plate 7A

Web page of the website www.indianflora.org : Plants search by A-Z
Botanical name

Plate 7 A



Progressive Education Society's
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune-411005, Maharashtra, India.
Digital Herbarium of Angiospermic Plants of Western Ghats
Regions of Maharashtra.
UGC Funded Major Research Project. [UGC File Number: 42-943/2013 (SR)]



[Home](#) [Project Team](#) [Search By Name](#) [Botanical Name A-Z](#) [Common Name A-Z](#) [Plant Family A-Z](#) [Search By Criteria](#) [References](#) [Contact Us](#)

Home > Botanical Name

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z | A-Z

B

- Baileya pruriens*, (Family : Acanthaceae)
- Baileya prurioides*, (Family : Acanthaceae)
- Barringtonia acutangula*, (Family : Lecythidaceae)
- Barringtonia asiatica*, (Family : Lecythidaceae)
- Bauhinia acuminata*, (Family : Leguminosae-Caesalpinioideae)
- Bauhinia monandra*, (Family : Leguminosae-Caesalpinioideae)
- Bauhinia purpurea*, (Family : Leguminosae-Caesalpinioideae)
- Bauhinia tomentosa*, (Family : Leguminosae-Caesalpinioideae)
- Bauhinia variegata*, (Family : Leguminosae-Caesalpinioideae)
- Beilschmiedia obcordata*, (Family : Lauraceae)
- Bixa orellana*, (Family : Bixaceae)
- Bombax ceiba*, (Family : Malvaceae)
- Bombax insigne*, (Family : Malvaceae)
- Bonellia macrocarpa*, (Family : Primulaceae)
- Boswellia serrata*, (Family : Burseraceae)
- Bryonia retusa*, (Family : Phyllanthaceae)
- Buddleia montana*, (Family : Phyllanthaceae)
- Buddleia retusa*, (Family : Phyllanthaceae)
- Buddleia stipularis*, (Family : Phyllanthaceae)
- Broussonetia papyrifera*, (Family : Moraceae)
- Brownia coccinea*, (Family : Leguminosae-Caesalpinioideae)
- Brugmansia arborea*, (Family : Solanaceae)
- Brugmansia versicolor*, (Family : Solanaceae)
- Bryophyllum pinatum*, (Family : Crassulaceae)
- Buchanania cochinchinensis*, (Family : Anacardiaceae)
- Burkea monocarpa*, (Family : Leguminosae-Papilionoideae)

Copyright © 2016



[Home](#) [Search By Name](#) [Search By Criteria](#) [Contact Us](#)

Plate 7B

Web page of the website www.indianflora.org : Plants search by A-Z
Common name

Plate 7 B

Digital Herbarium of Ang...
indianflora.org/plant_list_criteria?id=A
The Western Ghats: WWF - Western Ghats: Schmuck Kollektionen: Checklist of Rare, End T Tallerge Macro Photo: Flower Names - Com: Digital Herbarium of...
Progressive Education Society's
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune-411005, Maharashtra, India.
Digital Herbarium of Angiospermic Plants of Western Ghat Regions
of Maharashtra.
UGC Funded Major Research Project, [UGC File Number: 42-34/2013 (SR)]



Home Project Team Search By Name Botanical Name A-Z Common Name A-Z Plant Family A-Z Search By Criteria References Contact Us

Home > Common Name

A
African tulip tree, *Rugosora*, Pichkaari, *Spathodea campanulata*, (Family : Bignoniaceae)
Air Plant, Donkey ears, Amar pol, *Bryophyllum pinnatum*, (Family : Crassulaceae)
Anla, *Avla*, *Phyllanthus emblica*, (Family : Phyllanthaceae)
Angel's trumpet, Tulari, *Bugmansia arborea*, (Family : Solanaceae)
Apple cactus, *Harrisia bomplandii*, (Family : Cactaceae)
Azara nut, *Joannesia princeps*, (Family : Euphorbiaceae)
Asian bushbeech, Asiatic beechberry, Baidhara, Kall shivan, *Gmelina asiatica*, (Family : Lamiales)
Australian babool, *Acacia auriculiformis*, (Family : Leguminosae-Mimosoideae)
Australian bottle plant, *Jatropha podagrica*, (Family : Euphorbiaceae)
Australian chestnut, *Castanospermum australe*, (Family : Leguminosae-Caesalpinioideae)
Autograph tree, *Clusia rosea*, (Family : Clusiaceae)
Able wood tree, Dhavda, *Angiosais latifolia*, (Family : Combretaceae)


Copyright © 2015 Home Search By Name Search By Criteria Contact Us


Plate 7C

Web page of the website www.indianflora.org : Plants search by A-Z
Family name

Plate 7 C

Digital Herbarium of Ang... x
indianflora.org/plant_family_list?id=A
The Western Ghats: G... WWF - Western Ghats: Checklist of Rare, End... Tallerge Macro Photo: Flower Names - Com: Digital Herbarium of... Other bo


Progressive Education Society's
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune-411005, Maharashtra, India


Digital Herbarium of Angiospermic Plants of Western Ghats Regions
of Maharashtra.
UGC Funded Major Research Project. [UGC File Number: 42-943/2013 (SR)]

Home Project Team Search By Name Botanical Name A-Z Common Name A-Z Plant Family A-Z Search By Criteria References Contact Us

Home > Family Name

A
Acanthaceae - 6(*Barleria prattensis* *Barleria prionitis* *Calacanthus grandiflorus* *Justicia adhatoda* *Strobilanthes callosus* *Thelepaepale hiocephala*)
Anacardiaceae - 10(*Anacardium occidentale* *Buchanania cochinchinensis* *Holigarna amoliana* *Holigarna grahmani* *Mangifera indica* *Seasia mysorensis* *Semecarpus anacardium*)
Annonaceae - 8(*Annona reticulata* *Annona squamosa* *Artabotrys hexapetalus* *Milusa tomentosa* *Polyalthia longifolia* *Sageraea laurifolia* *Uvaria narum* *Cenanga odorata*)
Apocynaceae - 14(*Aleonia scholaris* *Carissa hirsuta* *Carissa spinarum* *Carissa carandas* *Cascabela theveta* *Cerbera manghas* *Holarthra pubescens* *Nerium oleander* *Plumeia obtusa* *Plumeia rubra* *Tabernaemontana alternifolia* *Tabernaemontana divaricata* *Wrightia arborea* *Wrightia tinctoria*)
Araliaceae - 2(*Schefflera actinophylla* *Schefflera venulosa*)
Asclepiadaceae - 2(*Calotropis gigantea* *Calotropis procera*)
Asteraceae - 1(*Chromolaena odorata*)

Copyright @ 2016 Home Search By Name Search By Criteria Contact Us

Plate 8

Web page of the website www.indianflora.org : Identification of plants
by inputting key characters

Plate 8

The screenshot displays the 'Advanced Search' page on the Indianflora.org website. The browser's address bar shows the URL 'indianflora.org/plant_search_advanced'. The page features a navigation menu with links for 'Home', 'Project Team', 'Search By Name', 'Botanical Name A-Z', 'Common Name A-Z', 'Plant Family A-Z', 'References', and 'Contact Us'. A search bar is located at the top right, with a dropdown menu set to 'Search By Criteria'. Below the navigation, the page title is 'Digital Herbarium of Angiospermic Plants of Western Ghat Regions of Maharashtra', with a sub-title 'IISCC Funded Major Research Project. [IISCC File Number: 42-9412017 (SR)]'. The page includes a logo for the 'Progressive Education Society's' and a photograph of a mountain landscape. The 'Advanced Search' section contains several dropdown menus for filtering results: 'Habitat' (Evergreen forest, Semi-evergreen forest, Deciduous forest), 'Flowering season' (January, February, March, April), 'Leaf Type' (Solitary Axillary, Solitary Terminal, Raceme), 'Inflorescence' (Solitary Axillary, Solitary Terminal, Raceme), 'Flower size' (Flower size), 'Fruit type' (Fruit), 'Abundance' (Common, Occasional, Endemic, Rare), 'If compound' (If compound), 'Corolla/Perianth' (Corolla/Perianth), and 'Family' (Family). A footer at the bottom of the page reads 'Copyright © 2016' and includes a secondary navigation menu with links for 'Home', 'Search By Name', 'Search By Criteria', and 'Contact Us'.

Plate 9A


Web page of the website www.indianflora.org

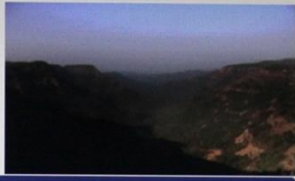
Plant Photos: *Desmodium oojeinense* (Roxb.) H.Ohashi

Plate 9 A

ndianflora.org/plant_botnical_list?id=D

The Western Ghats: G WWF - Western Ghat: S Schmuck Kollektioner: Checklist of Rare, End T Tallenge Macro Photo Flower Names - Com Digital Herbarium of

 **Progressive Education Society's**
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune-411005, Maharashtra, India.
Digital Herbarium of Angiospermic Plants of Western Ghat Regions of Maharashtra.
UGC Funded Major Research Project. [UGC File Number: 42-943/2013 (SR)]



Home Project Team Search By Name **Botanical Name A-Z** Common Name A-Z Plant Family A-Z Search By Criteria References Contact Us

Home > Botanical Name

Desmodium oojeinense

[Back](#)

Botanical Name: *Desmodium oojeinense* (Roxb.) H. Ohashi

Synonym: *Ougeinia dalbergioides* Benth.

Ougeinia oojeinensis (Roxb.) Hochr.







Common Name: Sandan, Kala-palas, Tewas

Family: Leguminosae-Papilionoideae

Description:
Large deciduous tree. Short crooked trunk, bark dark brown, deeply cracked. Branches slender, terete. Leaves pinnate, 3-foliolate, stipules lanceolate, acute, caduceous. Leaflets rigidly coriaceous, the terminal broadly elliptic or roundish, opposite, obliquely ovate, cordate, all glabrous above, main nerves 4-8 pairs, prominent. Flowers numerous, in short fascicled racemes from the nodes of old branches, fragrant, pedicels colored, filiform, bracts ovate, acuminate, broader than long, villous outside. Calyx pubescent, teeth short, triangular. Corolla white or pinkish white colored. Pods reticulately veined, 5-8 cm long.

Flowers: February-May

Gallery - *Desmodium oojeinense*



Copyright @ 2016 Home Search By Name Search By Criteria Contact Us

Plate 9B


Web page of the website www.indianflora.org

Plant Photos: *Dysoxylum gotadhora* (Buch.-Ham.) Mabb.


Plate 9 B

org/plant_botanical_list?id=D

ern Ghats: G WWF - Western Ghat: S Schmuck Kollektionen: Checklist of Rare, End T Tallenge Macro Photo: Flower Names - Com Digital



Progressive Education Society's
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune-411005, Maharashtra, India.
Digital Herbarium of Angiospermic Plants of Western Ghat Regions of
Maharashtra.
UGC Funded Major Research Project. [UGC File Number: 42-943/2013 (SR)]



[Home](#) [Project Team](#) [Search By Name](#) [Botanical Name A-Z](#) [Common Name A-Z](#) [Plant Family A-Z](#) [Search By Criteria](#) [References](#) [Contact Us](#)

[Home](#) > [Botanical Name](#)

Dysoxylum gotadhora

[Back](#)

Botanical Name: *Dysoxylum gotadhora* (Buch.-Ham.) Mabb.

Synonym: *Dysoxylum binectanifolium* C.DC.

Dysoxylum reticulatum King

Common Name: Cup-calyx white cedar, Devadaru, Erandi

Family: Meliaceae



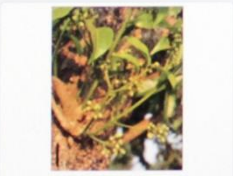








Description:

Large trees. Leaves imparipinnate, leaflets 5-9, alternate or subopposite, coriaceous, elliptic-oblong, apex acuminate, base oblique or inequilateral, to 15 x 6 cm. Flowers in axillary or supra-axillary subglabrous panicles. Pedicels short, articulated. Calyx cup shaped, nearly half as long as the flower, coriaceous, subentire, glabrous. Petals 4, greenish-yellow, valvate except at the apex, tomentose outside. Staminal-tube cylindric, anthers 8. Ovary ribbed, villous, attenuated into the style, 4-celled, ovules 2 in each cell. Stigma hemispheric, truncate. Capsules obovoid or subglobose, grooved, glabrous, orange-colored when ripe, 4-seeded. Seeds purplish brown, shining.

Flowers: July-December

Notes: Common in semievergreen to evergreen forests.

Gallery - *Dysoxylum gotadhora*



Copyright © 2016 [Home](#) [Search By Name](#) [Search By Criteria](#) [Contact Us](#)

Plate 9C


Web page of the website www.indianflora.org

Plant Photos: *Moullava spicata* (Dalzell) Nicolson


Plate 9 C

indianflora.org/plant_botnical_list?id=M

The Western Ghats: G WWF - Western Ghat: Schmuck Kollektioner: Checklist of Rare, End: Tallenge Macro Photo: Flower Names - Com: Digital Herbarium of /



Progressive Education Society's
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune-411005, Maharashtra, India.
Digital Herbarium of Angiospermic Plants of Western Ghat Regions
of Maharashtra.
UGC Funded Major Research Project. [UGC File Number: 42-943/2013 (SR)]



Home Project Team Search By Name Botanical Name A-Z Common Name A-Z Plant Family A-Z Search By Criteria References Contact Us

Home > Botanical Name

Moullava spicata

[Back](#)

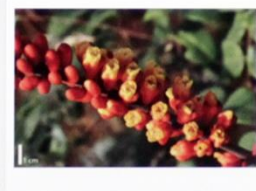





Botanical Name: *Moullava spicata* (Dalzell) Nicolson
Synonym: *Caesalpinia spicata* Dalzell
Wagatea spicata (Dalzell) Wight
Common Name: Candy Corn Plant, Wagati, Wakeri
Family: Leguminosae-Caesalpinioideae

Description:
Woody, scandent shrubs. Branches armed with numerous recurved prickles. Bark corky, rough and furrowed, covered with scattered cones. Leaves dark, shining, bipinnate; leaflets 5-7 pairs, coriaceous, oblong, apex obtuse, base rounded or cordate, 4 x 2 cm. Flowers in dense spicate racemose, orange-yellow, nearly sessile. Calyx red, tomentose; lobes oblong, obtuse. Stamens 10, alternately long and short. Pods linear-oblong, fleshy, 5-6 cm. Seeds 3-4, obovate-oblong, brown polished.

Flowers: November-May

Notes: Endemic to Western Ghats. Common in moist deciduous and semievergreen forests.

Gallery - *Moullava spicata*



Copyright @ 2016 Home Search By Name Search By Criteria Contact Us

Plate 9D


Web page of the website www.indianflora.org

Plant Photos: *Nothapodytes nimmoniana* (J.Graham) Mabb.

Plate 9 D


dianflora.org/plant_botnical_list?id=N

The Western Ghats: G WWF - Western Ghat: Schmock Kollektioner Checklist of Rare, End T Tallenge Macro Photo Flower Names - Com Digital Herbarium



Progressive Education Society's
Modern College of Arts, Science and Commerce,
Shivajinagar, Pune-411005, Maharashtra, India.

Digital Herbarium of Angiospermic Plants of Western Ghat Regions of Maharashtra.
UGC Funded Major Research Project. [UGC File Number: 42-943/2013 (SR)]



Home Project Team Search By Name **Botanical Name A-Z** Common Name A-Z Plant Family A-Z Search By Criteria References Contact Us

Home > Botanical Name

Nothapodytes nimmoniana

[Back](#)

Botanical Name: *Nothapodytes nimmoniana* (J.Graham) Mabb.

Synonym: *Mappia foetida* (Wight) Miers

Neoleretia dimorpha (Craib) Baehni

Common Name: Fetid Tree, Ghanera, Narkya

Family: Icacinaceae

Description:


Small trees. Branches with wrinkled bark. Leaves crowded towards the ends of the branches, dark green above, paler beneath; ovate to obovate, apex acute to acuminate, base rounded, 25 x 12 cm. Flowers in terminal panicles; white to yellow. Calyx small, pubescent outside. Petals linear-oblong, acute, densely sericio-villous on both surfaces. Stamens 5, alternate with the petals. Disk shallow, cup shaped, villous within. Drupes ellipsoid or obovoid, to 1.5 cm. long, glabrous, purple when ripe.

Flowers: June-January

Notes: Common in the semievergreen forests. Flowers are having strong foetid smell.

Uses: Plant is exploited for its medicinal value.

Gallery - *Nothapodytes nimmoniana*



Copyright @ 2016 Home Search By Name Search By Criteria Contact Us

Plate 10 A

Plants species from Western Ghat regions of Maharashtra:

| Sr. No. | Botanical Name | Common Name | Vernacular Name | Family | Status |
|---------|--|----------------------|------------------|---------------|----------|
| 1. | <i>Beilschmiedia dalzellii</i> (Meisn.) Kosterm. | - | - | Lauraceae | R, E-IND |
| 2. | <i>Meiogyne pannosa</i> (Dalzell) J. Sinclair | Malabar Finger sop | - | Annonaceae | E-IND |
| 3. | <i>Sageraea laurifolia</i> (Graham) Blatt. | Laurel bow-wood | Harkinjal, Sager | Annonaceae | E-WG |
| 4. | <i>Knema attenuata</i> Warb. | Wild nutmeg | Ran Jayphal | Myristicaceae | E-WG |
| 5. | <i>Lophopetalum wightianum</i> Arn. | Wight's lophopetalum | Balpale | Celastraceae | O |
| 6. | <i>Garcinia talbotii</i> Raizada ex Santapau | Talbot garcinia | Limboti, Pansara | Clusiaceae | E-WG |

C: Common, En: Endangered, E-IND: Endemic to India, E-WG: Endemic to Western ghats

O: Occasional, R: Rare

Plate 10 A



1



2



3



4



5



6

Plate 10 B

Plants species from Western Ghat regions of Maharashtra:

| Sr. No. | Botanical Name | Common Name | Vernacular Name | Family | Status |
|---------|---|---------------------------------|------------------------|----------------|--------|
| 1. | <i>Macaranga peltata</i> (Roxb.) Müll.Arg. | - | Chandva d, Chandada | Euphorbiaceae | C |
| 2. | <i>Mallotus philippensis</i> (Lam.) Müll.Arg. | Scarlet croton, Kaamala tree | Kesari, Shendri | Euphorbiaceae | O |
| 3. | <i>Glochidion ellipticum</i> Wight | - | Bhoma | Phyllanthaceae | C |
| 4. | <i>Carallia brachiata</i> (Lour.) Merr. | Fresh water mangrove | Phanshi | Rhizophoraceae | O |
| 5. | <i>Desmodium oojeinense</i> (Roxb.) H.Ohashi | Sandan | Kala-palas, Tewas | Fabaceae | R |
| 6. | <i>Moullava spicata</i> (Dalzell) Nicolson | Candy Corn Plant | Wagati, Wakeri | Fabaceae | E-IND |

C: Common, En: Endangered, E-IND: Endemic to India, E-WG: Endemic to Western ghats
O: Occasional, R: Rare

Plate 10 B



7



8



9



10



11



12

Plate 10 C

Plants species from Western Ghat regions of Maharashtra:

| Sr. No. | Botanical Name | Common Name | Vernacular Name | Family | Status |
|---------|---|------------------------------------|---------------------|-----------------|--------|
| 1. | <i>Lagerstroemia speciosa</i> (L.) Pers. | Pride of India, Queen crape myrtle | Jarul, Taman | Lythraceae | C |
| 2. | <i>Memecylon umbellatum</i> Burm. f. | Ironwood tree | Anjan | Melastomataceae | C |
| 3. | <i>Holigarna grahamii</i> (Wight) Kurz | Blistering varnish Tree | Ran bibba | Anacardiaceae | O |
| 4. | <i>Lannea coromandelica</i> (Houtt.) Merr. | Indian ash tree, Moya | Moi, Shemat, Shinti | Anacardiaceae | C |
| 5. | <i>Garuga pinnata</i> Roxb. | Garuga | Kakad | Burseraceae | O |
| 6. | <i>Dysoxylum gotadhora</i> (Buch.-Ham.) Mabb. | Cup-calyx white cedar | Devadaru, Erindi | Meliaceae | R |

C: Common, En: Endangered, E-IND: Endemic to India, E-WG: Endemic to Western ghats
O: Occasional, R: Rare

Plate 10 C



13



14



15



16



17



18

Plate 10 D

Plants species from Western Ghat regions of Maharashtra:

| Sr. No. | Botanical Name | Common Name | Vernacular Name | Family | Status |
|---------|--------------------------------------|-----------------------------|-----------------|------------------|--------|
| 1. | <i>Murraya koenigii</i> (L.) Spreng. | Curry Leaf | Kadhi patta | Rutaceae | C |
| 2. | <i>Dimocarpus longan</i> Lour. | Dragon's eyes, Eyeball tree | Wumb, Omb | Sapindaceae | O |
| 3. | <i>Vateria indica</i> L. | White Damar | Dhup | Dipterocarpaceae | E-WG |
| 4. | <i>Grewia umbellifera</i> Bedd. | Ghat crossberry | - | Malvaceae | E-IND |
| 5. | <i>Helicteres isora</i> L. | East-Indian screw tree | MuradSheng | Malvaceae | O |
| 6. | <i>Sterculia urens</i> Roxb. | Gum karaya | Kandol, Pandruk | Malvaceae | O |

C: Common, En: Endangered, E-IND: Endemic to India, E-WG: Endemic to Western ghats
O: Occasional, R: Rare

Plate 10 D



19



20



21



22



23



24

Plate 10 E

Plants species from Western Ghat regions of Maharashtra:

| Sr. No. | Botanical Name | Common Name | Vernacular Name | Family | Status |
|---------|--|-----------------------|-----------------|--------------|--------|
| 1. | <i>Capparis moonii</i> Wight | Large caper | Waghati | Capparaceae | O |
| 2. | <i>Santalum album</i> L. | Sandal wood | Chandan | Santalaceae | E-IND |
| 3. | <i>Symplocos cochinchinensis</i> var. <i>laurina</i> (Retz.) Noot. | Laurel Sapphire Berry | - | Symplocaceae | O |
| 4. | <i>Nothapodytes nimmoniana</i> (J.Graham) Mabb. | Fetid Tree | Ghanera, Narkya | Icacinaeae | O |
| 5. | <i>Tabernaemontana alternifolia</i> L. | - | Nag kuda | Apocynaceae | E-WG |
| 6. | <i>Catunaregam spinosa</i> (Thunb.) Tirveng. | Mountain pomegranate | Gela | Rubiaceae | C |

C: Common, En: Endangered, E-IND: Endemic to India, E-WG: Endemic to Western ghats
O: Occasional, R: Rare

Plate 10 E



25



26



27



28



29



30

Plate 10 F

Plants species from Western Ghat regions of Maharashtra:

| Sr. No. | Botanical Name | Common Name | Vernacular Name | Family | Status |
|---------|--|----------------------------------|--------------------|-------------|--------|
| 1. | <i>Meyna laxiflora</i> Robyns | Muyna | Hulu, Alu | Rubiaceae | C |
| 2. | <i>Calacanthus grandiflorus</i> (Dalzell) Radlk | Large flowered calacanthus | Mugut | Acanthaceae | E-WG |
| 3. | <i>Justicia santapau</i> Bennet | Santapau's Justicia | - | Acanthaceae | E-IND |
| 4. | <i>Strobilanthes callosus</i> Nees | - | Karvy | Acanthaceae | E-IND |
| 5. | <i>Callicarpa tomentosa</i> (L.) L. | Velvety beauty berry | Kaarivaati | Lamiaceae | O |
| 6. | <i>Olea dioica</i> Roxb. | Rose sandalwood | Parjamb, Hadkya | Oleaceae | O |

C: Common, En: Endangered, E-IND: Endemic to India, E-WG: Endemic to Western ghats
O: Occasional, R: Rare

Plate 10 F



31



32



33



34



35



36

RESULTS

Before beginning the fieldwork of the project, a list of about 1150 angiospermic tree species found in the Western Ghat regions of Maharashtra was made. By repeated field visits in three years i.e., from 2nd May 2013 to 23rd February 2016, the data on about 650 tree species was collected. Out of these 650 tree species, 610 are correctly identified and the identification of 40 species is yet to be confirmed. The data on 610 tree species belonging to 90 plant families of angiosperms include 51 plants endemic to India, 19 plants endemic to Western Ghats, one plant species endemic to Maharashtra, 11 rare tree species. Further, from the data, 206 plants are found occasionally, 216 plants are found commonly and 65 plants bear edible fruits. Some rare plants were also observed during field visits viz., *Artabotrys zeylanicus* Hook.f. & Thomson, *Beilschmiedia dalzellii* (Meisn.) Kosterm., *Dillenia indica* L., *Eriolaena quinquelocularis* (Wight & Arn.) Wight, *Grewia umbellifera* Bedd., *Justicia santapau* Bennet, *Knema attenuata* (Wall. Ex Hook.f. & Thomas) Warb., *Desmodium oojeinense* (Roxb.) H.Ohashi, *Memecylon talbotianum* Brandis, *Sterculia villosa* Roxb. Ex. DC., and *Meiogyne pannosa* (Dalzell) J. Sinclair (Plate 10 A-F). In this database, the families with highest number of representatives were Fabaceae with 80 species, Malvaceae with 44 species and Rubiaceae with 35 species.

The output of the project is development of a dedicated website www.indianflora.org by the project team where the students, researchers, nature lovers, NGOs and people in general can find the information on tree species found growing in the Western Ghat regions of Maharashtra.

Part of the data generated in this project has also been published in a research paper entitled 'Digital Herbarium of Angiospermic Tree Species from Western Ghat Regions of Maharashtra' in the journal 'Dnyanmay'.

CONCLUSIONS SUMMARIZING THE ACHIEVEMENTS

The present work is one such example where ICT facilities can be used to build searchable databases useful in botanical studies. Such databases can be shared online for the benefit of users from different sectors like students, researchers, NGOs, and general population. Moreover, preparation of digital herbaria is also an eco-friendly approach since the natural vegetation is not disturbed in its development.

The searchable database of digital herbarium of angiospermic trees of Western Ghat regions of Maharashtra has been made available online from 29th February 2016.

This website can help in accurate and efficient identification of trees from Western Ghat regions of Maharashtra, even in the absence of expert taxonomist and has negligible expenses on maintenance of herbarium. This database can provide a home for global, regional, or local studies. It can also provide digital study material for teaching Taxonomy, Field Botany, Plant Communities, Ethnobotany, Agriculture, Dendrology, Forestry, etc. It is useful in providing information on common names and local uses of plants, which is essential for studies related to Ethnobotany and Economic Botany. This website can also be used for getting a detailed botanical description of tree species found in the Western Ghat regions of Maharashtra.

INDICATION OF SCOPE FOR FUTURE WORK

Western Ghats of Maharashtra is rich in floristic diversity. These plants exhibit different habits such as herbs, shrubs, climbers, and trees. The scope of the present project was on the angiospermic trees and shrubs only. Thus, there is a good opportunity and scope for compiling a similar Digital Herbarium of herbs and climbers as well.

LIST OF RESEARCH PUBLICATIONS

As planned and indicated in the Progress Report for the 2nd year of the project, the following two publications were made. The details are as under:

Table 2. List of publications

| Sr. No. | Authors | Title of paper/publication | Name of the Journal/publication | Volume | Pages | Year |
|---------|--|--|---------------------------------|--------|-------|--------------------------------|
| 1 | *R S ZUNJARRAO, R B BARMUKH and ANITA KINDRE | Digital Herbarium of Angiospermic Tree Species from Western Ghat Regions of Maharashtra. (Annexure 3) | <i>Dnyanmay</i> | 1(1) | 11-13 | 2015 |
| 2 | R S ZUNJARRAO, R B BARMUKH and ANITA KINDRE | Website launched: Digital herbarium of angiospermic tree species from Western Ghat regions of Maharashtra. | www.indianflora.org | - | - | 29 th February 2016 |

MANPOWER TRAINED ON THE PROJECT

a) Junior research fellow (JRF)

| No. | Name | Designation | Date of Joining | Date of leaving | Total no. of months spent |
|------------|---------------------|--------------------|------------------------|------------------------|----------------------------------|
| 1 | Mr. Shrikant Gund. | JRF | 02/05/2013 | 30/04/2014 | 12 Months |
| 2 | Miss. Anita Kindre. | JRF | 06/05/2014 | 31/03/2016 | 22 Months 26 days |

b) No. of Ph.D. produced: NIL

FINANCIAL POSITION

The financial position of the project is summarized in Table 3.

Table 3: Financial position of the project

| No | Financial Position/ Budget Head | Amount Approved (Rs.) | Grant Released 1 st Instalment (Rs.) | Grant Released 2 nd Instalment (Rs.) | Expenditure Incurred 1 st April 2013- 31 st March 2016 |
|-----|---|--------------------------|---|--|---|
| I | Books | 10,000/- | 10,000/- | - | 8,247/- |
| II | Equipment | 2,01,350/- | 2,01,350/- | - | 2,01,126/- |
| III | Contingency | 36,000/- | 18,000/- | 14,400/- | 34,155/- |
| IV | Field Work/Travel | 1,00,000/- | 50,000/- | 40,000/- | 62,962/- |
| V | Hiring Services | 50,000/- | 25,000/- | 20,000/- | 7,200/- |
| VI | Overhead | 61,400/- | 61,400/- | | 61,400/- |
| VII | Project fellow: 14,000/- pm for initial 2 years) 16,000/- pm in 3 rd year | 5,28,000/- | 2,64,000/- | 1,74,968/- | 5,11,742/- |
| | Total | 9,86,750/- | 6,29,750/- | 2,49,368/- | 8,86,832/- |

PROCUREMENT/USAGE OF EQUIPMENT

The details on procurement and usage of the equipment are presented in Table 4.

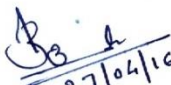
Table 4: Procurement and usage of equipment

| Sr. no. | Name of Equipment | Make / Model | Cost (FE/Rs) | Date of installation | Utilization Rate (%) | Remarks regarding maintenance/ break down |
|----------------|---------------------------------------|--|---------------------|--------------------------------------|-----------------------------|---|
| 1 | Computer Desktop, Printer and Scanner | HP Desktop P2-1402IN – Pavilion, HP LED Backlit Monitor W1972a, HP Laserjet Pro P1108 Printer, HP Scanner SJ G4010 | Rs.49,800/- | 12-06-2013 | 100% | Maintenance not required so far. |
| 2 | Canon DSLR Camera with two lenses | Canon zoom lens EF-S 55-250 1:4-5.6 IS II Camera body-600D, 18-55 ISII lens, SD card and camera bag | Rs. 51,400/- | 05-07-2012 | 100% | Servicing of camera body was done in the month July 2015. |
| 3 | Website | Custom web application – PHP Database – My SQL | Rs. 99,926/- | 29-02-2016 (website was made online) | 100% | Maintenance of website was part of website development. |

PLANS FOR UTILIZING THE EQUIPMENT FACILITIES IN FUTURE:

Updating the website www.indianflora.org is going to be a continuous process. The digital camera purchased from the financial assistance for this project from UGC will remain in the custody of the Head of the Department of Botany and will be used to capture the digital images of species that are yet to be included in the database. For storing and editing of these digital images and also for maintaining the website, the computer facility generated in the project will be used.

The institution has various science departments that have Post Graduate Research Centers approved by Savitribai Phule Pune University, Pune. Amongst these science departments, Botany, Zoology, Microbiology and Biotechnology, are actively engaged in research. The staff members are awarded research projects by different funding agencies. Thus, the college, which has been awarded prestigious 'Star College Scheme' by DST and 'College with Potential for Excellence' scheme by UGC, will meaningfully utilize the equipment to cater the needs of Post Graduate Academic and Research Activities in many ways.


27/04/16
Dr. R. B. Barmukh
(Co-Investigator)


27/4/2016
Dr. R. S. Zunjarrao
(Principal Investigator)
P. I., UGC MRP
Digital Herbarium
(2013-2016)

REFERENCES

Almeida, M. (1996, 1998, 2001). Flora of Maharashtra Vol I and II, Blatter Herbarium, St. Xavier's College, Mumbai-411001.

APG III. (2009). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III. *Botanical Journal of the Linnean Society* 161, 105–121.

Awaskar, U., Kulkarni, A., Datar, M., Upadhye, A. (2014). Checklist of Angiosperms of Bhor Taluka, Pune District, Northern Western Ghats of Maharashtra, India, Based on Herbarium Records. *Journal of Checklist*, 10(4), 835-849.

Brandis, D. (1874). Forest Flora of North-West and Central India, London.

Chase, M. & Reveal, J. (2009). A phylogenetic classification of the land plants to accompany APG III. *Botanical Journal of the Linnean Society*, 161, 122–127.

Cooke, T. (1901-1908) Flora of the Presidency of Bombay, London (Reprinted vols. I-II).

Dalzell, N. & Gibson, A. (1861). Bombay Flora or Short Descriptions of All the Indigenous Plants, Education Society's Press, Byculla, Mumbai.

Deshpande, S., Sharma, B. & Nayar, M. (1995). Flora of Mahabaleshwar and adjoining area, Vol 1-2, Botanical Survey of India, P-8, Brabourne Road, Calcutta-700001.

Gaikwad, S., Gore, R., Garad, K. & Gaikwad, S. (2014). Endemic flowering Plants of Northern Western Ghats of India: A checklist. *Journal of Checklist*, 10(3), 461-472.

Ingalhalikar, S (2001). Flowers of Sahyadri, Corolla publications, 12, Varshnand Society, Anandnagara, Sinhgad Road, Pune-411051.

Ingahlalikar, S. (2007). Further Flowers of Sahyadri, Corolla publications, 12, Varshnand Society, Anandnagara, Sinhgad road, Pune-411051.

Ingahlalikar, S. (2007). Trees of Pune, Corolla publications, 12, Varshnand Society, Anandnagara, Sinhgad road, Pune-411051.

Ingahlalikar, S. (2014). Additions to Flowers of Sahyadri, Corolla Publications, 12, Varshnand Society, Anandnagara, Sinhgad Road, Pune-411051.

Kehimkar, I. (2000). Common Indian Wild Flowers, Bombay Natural History Society and Manzar Khan, Oxford University press, Oxford house, Apollo bunder, Mumbai-400039.

Kothari, J. & Moorthy, S. (1993). Flora of Raigad District of Maharashtra, Botanical Survey of India, P-8, Brabourne Road, Calcutta-700001.

Lakshinarasimhan, P. & Sharma, B. (1991) Flora of Nashik District, Botanical Survey of India, P-8, Brabourne Road, Calcutta-700001.

Mahajan, S. (2010). Deshi Vruksha (Aaple vruksh-bhag 2), Nature Walk, A/10, Ashok Kiran Society, Ashok Path, Chiplunkar Marg, Pune-411004.

Mishra, D. and Singh, N. (2001). Endemic and Threatened Flowering Plants of Maharashtra, Botanical Survey of India, P-8, Brabourne Road, Calcutta-700001.

Nayar, M. & Sastry, A. (2000). Red data book of Indian plants, Botanical Survey of India, P-8, Brabourne Road, Calcutta-700001.

Neginhal, S. (2011). Forest Trees of the Western Ghats, Neginhal S G, IFS (Retd.), No. 6433, 2nd Cross, 9th Main III Stage, III Block, Basaveshwaranagar, Bangalore-560079.

Santapau, H. (1967). Flora of Khandala on the Western Ghats of India, The Manager of Publications, Civil Lines, Delhi.

Sardesai, M., Govekar, R., & Yadav, S. (2013). Field Guide to the Plants of Sahyadri and Konkan, Research wing, Forest Department, Government of Maharashtra. 4th floor, New PMT Buliding, Swargate, Pune-411042

Tetali, P., Waghchaure, C., Daswani, P., Antia, N. & Birdi, T. (2009). Ethnobotanical survey of antidiarrhoeal plants of Parinche valley, Pune district, Maharashtra, India *Journal of Ethnopharmacology*, 123, 229-236.

Yadav, S. & Sardesai, M. (2002) Flora of Kolhapur District, Shivaji University, Kolhapur-416004.

WEBLIOGRAPHY

1. www.biotic.org
2. www.flowersofindia.net
3. www.ipni.org
4. www.theplantlist.org
5. www.tropicos.org
6. www.florakarnataka.ces.iisc.ernet.in

Annexure 1

Shrubs and trees from the Western Ghat Regions of Maharashtra

| Sr. No. | Botanical Name | Common Name | Vern Name | Family | Status |
|---------|--|----------------------------|-------------------------|---------------|--------------|
| 1. | <i>Actinodaphne hookeri</i> Meisn. | | Pisa | Lauraceae | C |
| 2. | <i>Alseodaphne semecarpifolia</i> Nees | | Phudgus | Lauraceae | O |
| 3. | <i>Beilschmiedia dalzellii</i> (Meisn) Kosterm. | | | Lauraceae | R, E- IND |
| 4. | <i>Cinnamomum cassia</i> (L.) J.Presl | Grey bollywood | Chirchira | Lauraceae | O |
| 5. | <i>Cinnamomum verum</i> J.Presl | Cinnamon | Dalchini | Lauraceae | O, CI |
| 6. | <i>Cryptocarya lawsonii</i> Gamble | | | Lauraceae | E-WG |
| 7. | <i>Litsea deccanensis</i> Gamble | Deccan Tallow Laurel | Chikana | Lauraceae | O |
| 8. | <i>Litsea josephii</i> S.M. Almeida | Joseph's Laurel | Naramba | Lauraceae | O |
| 9. | <i>Litsea stocksii</i> Hook.f. | Joseph's Laurel | Naramba | Lauraceae | E-IND |
| 10. | <i>Persea macrantha</i> (Nees) Kosterm. | Large-flowered bay tree | Gulaamba | Lauraceae | O |
| 11. | <i>Pimenta dioica</i> (L.) Merr. | Allspice | | Lauraceae | CI |
| 12. | <i>Annona muricata</i> L. | Soursop | Hanuman phal | Annonaceae | CI |
| 13. | <i>Annona reticulata</i> L. | Netted custard apple | Ramphal | Annonaceae | O,CI |
| 14. | <i>Annona squamosa</i> L | Custard apple | Sitaphal | Annonaceae | O,CI |
| 15. | <i>Artabotrys hexapetalus</i> (L.f.) Bhandari | Tail grape | Hirva chafa | Annonaceae | C |
| 16. | <i>Artabotrys zeylanicus</i> Hook.f. & Thomson | Ceylon green champa | Ran Chapha | Annonaceae | R |
| 17. | <i>Cananga odorata</i> (Lam.) Hook.f. & Thomson | Ylang-ylang tree | | Annonaceae | O |
| 18. | <i>Meiogyne pannosa</i> (Dalzell) J. Sinclair | Malabar Fingersop | | Annonaceae | E-IND |
| 19. | <i>Miliusa tomentosa</i> (Roxb.) J.Sinclair | Hoom | Humb | Annonaceae | O |
| 20. | <i>Polyalthia longifolia</i> (Sonn.) Thwaites | Mast tree | Ashok | Annonaceae | C,CI |
| 21. | <i>Sageraea laurifolia</i> (Graham) Blatt. | Laurel bow- wood | Harkinjal, Sager | Annonaceae | E-WG |
| 22. | <i>Uvaria narum</i> (Dunal) Blume | | | Annonaceae | O |
| 23. | <i>Magnolia champaca</i> (L.) Baill. ex Pierre | Golden champa | Son champa, Sonchafa | Magnoliaceae | C |
| 24. | <i>Knema attenuata</i> Warb. | Wild nutmeg | Ran Jayphal | Myristicaceae | R, E-WG |
| 25. | <i>Myristica fatua</i> var. <i>magnifica</i> Sinclair | Magnificent Nutmeg | | Myristicaceae | E-WG |
| 26. | <i>Adonidia merrillii</i> (Becc.) Becc. | Manila palm | | Arecaceae | CI |
| 27. | <i>Areca catechu</i> L. | Areca palm | Pophali | Arecaceae | C |
| 28. | <i>Calamus pseudotenuis</i> Becc. | Slender Rattan Cane | Vet | Arecaceae | C |

| | | | | | |
|-----|--|-----------------------------|--------------------------|----------------|-------|
| 29. | <i>Caryota urens</i> L. | Fishtail Palm | Maadi | Areaceae | C |
| 30. | <i>Cocos nucifera</i> L. | Coconut | Nariyal, Shriphal | Areaceae | C |
| 31. | <i>Latania loddigesii</i> Mart. | | | Areaceae | Cl |
| 32. | <i>Phoenix sylvestris</i> (L.) Roxb. | Wild date Palm | Khajur | Areaceae | C |
| 33. | <i>Roystonea regia</i> (Kunth) O.F.Cook | Royal Palm | | Areaceae | Cl |
| 34. | <i>Washingtonia filifera</i> (Linden ex André) H.Wendl. ex de Bary | California Fan Palm | | Areaceae | Cl |
| 35. | <i>Dendrocalamus strictus</i> (Roxb.) Nees | Calcutta bamboo | Bamboo | Poaceae | C |
| 36. | <i>Dendrocalamus giganteus</i> Munro | Giant bamboo | Bamboo | Poaceae | Cl |
| 37. | <i>Platanus orientalis</i> L. | Oriental plane | Chinar | Platanaceae | Cl |
| 38. | <i>Grevillea robusta</i> A.Cunn. ex R.Br. | Silver oak | | Proteaceae | Cl |
| 39. | <i>Macadamia ternifolia</i> F.Muell. | Maroochy Nut, Gympie Nut | | Proteaceae | Cl |
| 40. | <i>Dillenia indica</i> L. | Elephant Apple | Karmal | Dilleniaceae | R |
| 41. | <i>Dillenia pentagyna</i> Roxb. | Dog teak | Karmal | Dilleniaceae | O |
| 42. | <i>Bryophyllum pinnatum</i> (Lam.) Oken | Air Plant, Donkey ears | Amar poi | Crassulaceae | Cl |
| 43. | <i>Cayratia trifolia</i> (L.) Domin | Bush Grape | Amboshi | Vitaceae | O |
| 44. | <i>Cissus javana</i> DC. | Climbing Begonia | | Vitaceae | O |
| 45. | <i>Leea asiatica</i> (L.) Ridsdale | | Banchalita | Vitaceae | O |
| 46. | <i>Leea indica</i> (Burm. f.) Merr. | Bandicoot berry | Karkani | Vitaceae | C |
| 47. | <i>Leea macrophylla</i> Roxb. ex Hornem. | Hathikana | Gajakarni | Vitaceae | O |
| 48. | <i>Arnicratea grahamii</i> (Wight) N.Hallé | Running Straggler | Daushir, dhavashi | Celastraceae | O |
| 49. | <i>Cassine paniculata</i> (Wight & Arn.) Loobr.-Callen | Panicled cassine | Motha Bhutya | Celastraceae | O |
| 50. | <i>Celastrus paniculatus</i> Willd. | Black Oil Plant | Malkangani | Celastraceae | O |
| 51. | <i>Euonymus indicus</i> B.Heyne ex Wall | Indian Spindle Tree | | Celastraceae | E-WG |
| 52. | <i>Gymnosporia senegalensis</i> (Lam.) Loes. | Red spike thorn | Henkal | Celastraceae | O |
| 53. | <i>Loeseneriella ovata</i> (Lam.) M.R.Almeida | Oval-leaved hippocratea | Daushir | Celastraceae | O |
| 54. | <i>Lophopetalum wightianum</i> Arn. | Wight's lophopetalum | Balpale | Celastraceae | O |
| 55. | <i>Maytenus rothiana</i> Loobr.- Callen | Roth's spike thorn | Lokhandi, Makar khana | Celastraceae | E-IND |
| 56. | <i>Salacia chinensis</i> L. | Chinese Salacia | Saptrangi | Celastraceae | O |
| 57. | <i>Salacia macrosperma</i> Wight | | | Celastraceae | E-WG |
| 58. | <i>Connarus monocarpus</i> L. | Indian zebrawood | Sumdari, Sundar | Connaraceae | O |
| 59. | <i>Elaeocarpus serratus</i> L. | Wild Olive tree | Kasava | Elaeocarpaceae | O |
| 60. | <i>Averrhoa bilimbi</i> L. | Cucumber tree | Bilimbi | Oxalidaceae | O |
| 61. | <i>Calophyllum inophyllum</i> L. | Beauty leaf | Undi | Clusiaceae | O |
| 62. | <i>Clusia rosea</i> Jacq. | Autograph tree | | Clusiaceae | Cl |

| | | | | | |
|-----|--|-------------------------------------|--------------------|-----------------|-------|
| 63. | <i>Garcinia indica</i> (Thouars) Choisy | Kokam | Bheranda, Ratambi | Clusiaceae | C |
| 64. | <i>Garcinia spicata</i> Hook.f. | | | Clusiaceae | O |
| 65. | <i>Garcinia talbotii</i> Raizada ex Santapau | Talbot garcinia | Limboti, Pansara | Clusiaceae | E-IND |
| 66. | <i>Mammea suriga</i> (Buch.-Ham. ex Roxb.) Kosterm. | | Surangi | Clusiaceae | E-IND |
| 67. | <i>Mesua ferrea</i> L. | Cobra saffron | Nag keshar | Clusiaceae | O |
| 68. | <i>Dichapetalum gelonioides</i> (Roxb.) Engl. | Gelonium Poison-Leaf | | Dichapetalaceae | O |
| 69. | <i>Acalypha hispida</i> Burm.f. | Cat's tail | | Euphorbiaceae | Cl |
| 70. | <i>Agrostistachys indica</i> Dalzell | Leaf-Litter Plant | | Euphorbiaceae | O |
| 71. | <i>Baliospermum solanifolium</i> (Burm.) Suresh | Red physic nut | Danti, Dantika | Euphorbiaceae | C |
| 72. | <i>Blachia andamanica</i> subsp. <i>denudata</i> (Benth.) N.P.Balacr. & Chakrab. | Sahyadri Blachia | | Euphorbiaceae | E-WG |
| 73. | <i>Codiaeum variegatum</i> (L.) Rumph. ex A.Juss. | Croton | | Euphorbiaceae | Cl |
| 74. | <i>Croton bonplandianus</i> Baill. | | Ban tulsi | Euphorbiaceae | C |
| 75. | <i>Euphorbia antiquorum</i> L. | Triangular spurge | Tindhari nivdung | Euphorbiaceae | C |
| 76. | <i>Euphorbia caducifolia</i> Haines | Leafless milk hedge | Thor | Euphorbiaceae | C |
| 77. | <i>Euphorbia cotinifolia</i> L. | Caribbean copper plant | | Euphorbiaceae | C |
| 78. | <i>Euphorbia leucocephala</i> Lotsy | Snow bush | | Euphorbiaceae | C |
| 79. | <i>Euphorbia milii</i> fo. <i>lutea</i> Leandri | Yellow crown of thorns | | Euphorbiaceae | Cl |
| 80. | <i>Euphorbia milii</i> var. <i>splendens</i> (Bojer ex Hook.) Ursch & Leandri | Crown of thorns | | Euphorbiaceae | Cl |
| 81. | <i>Euphorbia rothiana</i> Spreng. | Common hill spurge | Dudhi | Euphorbiaceae | C |
| 82. | <i>Euphorbia tirucalli</i> L. | Pencil tree | Sher-kandvel | Euphorbiaceae | C |
| 83. | <i>Falconeria insignis</i> Royle | Tiger's milk spruce, Chinese tallow | Khiron, Sherod | Euphorbiaceae | O |
| 84. | <i>Homonoia retusa</i> (Graham ex Wight) Müll.Arg. | Leaved water Croton | Machim | Euphorbiaceae | E-IND |
| 85. | <i>Jatropha curcas</i> L. | Physic Nut, Barbados nut | Mogali Erand | Euphorbiaceae | C |
| 86. | <i>Jatropha gossypifolia</i> L. | Cotton-leaf physic nut | Ratanjot | Euphorbiaceae | C |
| 87. | <i>Jatropha integerrima</i> Jacq. | Pink Peregrina, Spicy jatropha | | Euphorbiaceae | C |
| 88. | <i>Jatropha podagrica</i> Hook. | Australian bottle plant | | Euphorbiaceae | Cl |
| 89. | <i>Joannesia princeps</i> Vell. | Arara nut | | Euphorbiaceae | Cl |
| 90. | <i>Macaranga peltata</i> (Roxb.) Müll.Arg. | | Chandvad, Chandada | Euphorbiaceae | O |

| | | | | | |
|------|---|------------------------------|------------------------|----------------|-------|
| 91. | <i>Mallotus aureopunctatus</i> (Dalzell) Müll.Arg. | Yellow-spotted kamala | | Euphorbiaceae | E-IND |
| 92. | <i>Mallotus philippensis</i> (Lam.) Müll.Arg. | Scarlet croton, Kaamala tree | Kesari, Shendri | Euphorbiaceae | O |
| 93. | <i>Mallotus polycarpus</i> (Benth.) Kulju & Welzen | | Petari | Euphorbiaceae | E-IND |
| 94. | <i>Mallotus resinusus</i> (Blanco) Merr. | Resinous Kamala | | Euphorbiaceae | O |
| 95. | <i>Manihot esculenta</i> Crantz | Tapioca | Kalpakanda | Euphorbiaceae | Cl |
| 96. | <i>Ricinus communis</i> L. | Castor oil plant | Arand | Euphorbiaceae | C |
| 97. | <i>Trevis nudiflora</i> L. var. <i>polycarpa</i> (Benth.) Susila & N.P. Balakr. | Many-fruited Trevis | Petari | Euphorbiaceae | O |
| 98. | <i>Galphimia gracilis</i> Bartl. | Goldshower | | Malpighiaceae | Cl |
| 99. | <i>Ochna obtusata</i> DC. | Golden champak | Ramdhan Champa | Ochnaceae | O |
| 100. | <i>Turnera ulmifolia</i> L. | Yellow buttercups | | Passifloraceae | O |
| 101. | <i>Antidesma ghaesembilla</i> Gaertn. | Black currant tree | | Phyllanthaceae | O |
| 102. | <i>Aporosa cardiosperma</i> (Gaertn.) Merr. | Lindley's Aporosa | | Phyllanthaceae | O |
| 103. | <i>Breynia retusa</i> (Dennst.) Alston | Cup-socur | Dalphodi | Phyllanthaceae | C |
| 104. | <i>Bridelia montana</i> (Roxb.) Willd. | Hamilton's bridelia | Chikani | Phyllanthaceae | E-IND |
| 105. | <i>Bridelia retusa</i> (L.) A.Juss. | Spinous kino tree | Asana | Phyllanthaceae | C |
| 106. | <i>Bridelia stipularis</i> (L.) Blume | Climbing bridelia | Phatarpodi | Phyllanthaceae | C |
| 107. | <i>Flueggea leucopyrus</i> Willd. | Bushweed, Indian snow berry | Pandharphali | Phyllanthaceae | C |
| 108. | <i>Glochidion ellipticum</i> Wight | | Bhoma | Phyllanthaceae | O |
| 109. | <i>Glochidion hohenackeri</i> (Müll.Arg.) Bedd. | | | Phyllanthaceae | E-IND |
| 110. | <i>Phyllanthus acidus</i> (L.) Skeels | Star gooseberry | Harpharori, Ray aawla | Phyllanthaceae | Cl |
| 111. | <i>Phyllanthus emblica</i> L. | Amla | Aawla | Phyllanthaceae | C |
| 112. | <i>Drypetes venusta</i> (Wight) Pax & K.Hoffm. | | | Putranjivaceae | O |
| 113. | <i>Putranjiva roxburghii</i> Wall. | Lucky bean tree | Putranjiva, Patravanti | Putranjivaceae | C |
| 114. | <i>Carallia brachiata</i> (Lour.) Merr. | Freshwater mangrove | Phanshi | Rhizophoraceae | O |
| 115. | <i>Ceriops tagal</i> (Perr.) C.B.Rob. | Tagal Mangrove | | Rhizophoraceae | O |
| 116. | <i>Rhizophora mucronata</i> Lam. | Asiatic Mangrove | Kandal | Rhizophoraceae | O |
| 117. | <i>Casearia esculenta</i> Roxb. | Chilla | | Salicaceae | O |
| 118. | <i>Casearia graveolens</i> Dalzell | Chilla | Bhokoda | Salicaceae | O |
| 119. | <i>Flacourtia montana</i> J.Graham | Mountain sweet thorn | Raan-tambut | Salicaceae | E-IND |

| | | | | | |
|------|--|--------------------------|------------------|------------|-------|
| 120. | <i>Oncoba spinosa</i> Forssk. | Fried egg tree | | Salicaceae | Cl |
| 121. | <i>Salix tetrasperma</i> Roxb. | Indian Willow | | Salicaceae | |
| 122. | <i>Acacia auriculiformis</i> Benth. | Australian babbol | | Fabaceae | Cl |
| 123. | <i>Acacia chundra</i> (Rottler) Willd. | | | Fabaceae | C |
| 124. | <i>Acacia concinna</i> (Willd.) DC | Soap-pod | Shikekai | Fabaceae | C |
| 125. | <i>Acacia leucophloea</i> (Roxb.) Willd. | White bark Acacia | Himvar | Fabaceae | C |
| 126. | <i>Acacia pennata</i> (L.) Willd. | | Shembarati | Fabaceae | C |
| 127. | <i>Acacia polyacantha</i> Willd. | | | Fabaceae | C |
| 128. | <i>Acacia catechu</i> (L.f.) Willd. | Cutch tree | Khair | Fabaceae | C |
| 129. | <i>Acacia nilotica</i> (L.) Delile | Babbol | Bhabul | Fabaceae | C |
| 130. | <i>Acrocarpus fraxinifolius</i> Arn. | Pink cedar | Tokphal | Fabaceae | O |
| 131. | <i>Adenanthera pavonina</i> L | Red sandalwood | Thorla goonj | Fabaceae | O |
| 132. | <i>Albizia amara</i> (Roxb.) B.Boivin | Oil cake tree | Krishna shiris | Fabaceae | O |
| 133. | <i>Albizia lebbeck</i> (L.) Benth. | Siris tree | Shirish | Fabaceae | C |
| 134. | <i>Albizia lucidior</i> (Steud.) I.C.Nielsen | | Potka Siris | Fabaceae | Cl |
| 135. | <i>Albizia procera</i> (Roxb.) Benth. | White shiris | Kinhai | Fabaceae | C |
| 136. | <i>Albizia saman</i> (Jacq.) Merr. | Rain tree | Parjanya-vruksha | Fabaceae | C, Cl |
| 137. | <i>Bauhinia acuminata</i> L. | Dwarf white orchid tree | Safed kanchan | Fabaceae | C |
| 138. | <i>Bauhinia blakeana</i> Dunn | Hong Kong orchid tree | | Fabaceae | O |
| 139. | <i>Bauhinia monandra</i> Kurz | Pink orchid tree | | Fabaceae | O |
| 140. | <i>Bauhinia purpurea</i> L. | Butterfly tree | Devkanchan | Fabaceae | C |
| 141. | <i>Bauhinia racemosa</i> Lam. | Bidi leaf Tree | Apta | Fabaceae | C |
| 142. | <i>Bauhinia roxburghiana</i> Voigt | Roxburgh's Bauhinia | Semla kanchan | Fabaceae | O |
| 143. | <i>Bauhinia tomentosa</i> Vell. | Yellow orchid tree | Piwala kanchan | Fabaceae | O |
| 144. | <i>Bauhinia variegata</i> L. | White-purple orchid tree | Kanaraj | Fabaceae | O |
| 145. | <i>Brownea coccinea</i> Jacq. | Scarlet flame bean | Lal zumbar | Fabaceae | Cl |
| 146. | <i>Butea monosperma</i> (Lam.) Taub. | Flame of the forest | Palas | Fabaceae | C |
| 147. | <i>Caesalpinia cucullata</i> Roxb. | Ragi | | Fabaceae | O |
| 148. | <i>Caesalpinia decapetala</i> (Roth) Alston | Mysore thorn | Chilar | Fabaceae | C |
| 149. | <i>Caesalpinia pulcherrima</i> (L.) Sw | Peacock flower | Shankasur | Fabaceae | Cl |
| 150. | <i>Caesalpinia mimosoides</i> Lam | Mimosa thorn | Narkati | Fabaceae | O |
| 151. | <i>Cajanus cajan</i> (L.) Millsp. | Red gram | Tur | Fabaceae | Cl |
| 152. | <i>Calliandra haematocephala</i> Hassk. | Red powder puff | | Fabaceae | Cl |
| 153. | <i>Cassia fistula</i> L. | Golden shower tree | Bahawa | Fabaceae | C |

| | | | | | |
|------|--|--------------------------|------------------------|----------|-------|
| 154. | <i>Cassia roxburghii</i> DC. | Red cassia | | Fabaceae | O |
| 155. | <i>Cassia grandis</i> L.f. | Horse cassia | | Fabaceae | C |
| 156. | <i>Cassia renigera</i> Benth. | Pink cassia | | Fabaceae | C |
| 157. | <i>Castanospermum australe</i> A.Cunn. & C.Fraser | Australian chestnut | | Fabaceae | CI |
| 158. | <i>Colvillea racemosa</i> Bojer | Colville's glory | Kilibili | Fabaceae | CI |
| 159. | <i>Crotalaria retusa</i> L. | Rattlebox | Gagra | Fabaceae | C |
| 160. | <i>Crotalaria spectabilis</i> Roth | Showy rattlepod | Ghungri, Dingala | Fabaceae | C |
| 161. | <i>Dalbergia horrida</i> (Dennst.) Mabb. | Prickly Dalbergia | | Fabaceae | E-IND |
| 162. | <i>Dalbergia lanceolaria</i> subsp. <i>paniculata</i> (Roxb.) Thoth. | | Phanshi | Fabaceae | O |
| 163. | <i>Dalbergia melanoxylon</i> Guill. & Perr. | Dalbergia | | Fabaceae | O |
| 164. | <i>Dalbergia rubiginosa</i> Roxb. | Rusty Dalbergia | | Fabaceae | E-IND |
| 165. | <i>Dalbergia sissoo</i> DC. | Indian rosewood | Shisham | Fabaceae | C |
| 166. | <i>Delonix regia</i> (Hook.) Raf. | Flame tree | Gulmohar | Fabaceae | CI |
| 167. | <i>Dendrolobium triangulare</i> (Retz.) Schindl. | Triangular horse bush | | Fabaceae | O |
| 168. | <i>Desmodium laxiflorum</i> DC. | Loose flowered Desmodium | Aasud, Jangliganja | Fabaceae | O |
| 169. | <i>Desmodium oojeinense</i> (Roxb.) H. Ohashi | Sandan | Kala-palas, Tewas | Fabaceae | R |
| 170. | <i>Dichrostachys cinerea</i> (L.) Wight & Arn. | Sickle bush | Kunali, Durangi babool | Fabaceae | C |
| 171. | <i>Erythrina suberosa</i> Roxb. | Corky coral tree | Pangara | Fabaceae | O |
| 172. | <i>Erythrina variegata</i> L. | Indian coral tree | Pangara | Fabaceae | C |
| 173. | <i>Flemingia strobilifera</i> (L.) W.T.Aiton | Wild hops, Luck plant | Kanphuti | Fabaceae | C |
| 174. | <i>Gliricidia sepium</i> (Jacq.) Walp. | Quickstick | | Fabaceae | CI |
| 175. | <i>Indigofera tinctoria</i> L. | West Indian Indigo | Vilayati nil | Fabaceae | C |
| 176. | <i>Lysiloma latisiliquum</i> (L.) Benth. | | | Fabaceae | C |
| 177. | <i>Millettia peguensis</i> Ali | Moulmein rosewood | Lal karanj | Fabaceae | CI |
| 178. | <i>Mimosa hamata</i> Willd. | Hooked Mimosa | Gulabi babul | Fabaceae | O |
| 179. | <i>Mimosa pudica</i> L. | Touch-me-not | Lajalu, Lajwanti | Fabaceae | C |
| 180. | <i>Moullava spicata</i> (Dalzell) Nicolson | Candy Corn Plant | Wagati, Wakeri | Fabaceae | E-WG |
| 181. | <i>Parkia biglandulosa</i> Wight & Arn. | Badminton ball tree | Chendu phul | Fabaceae | CI |
| 182. | <i>Parkinsonia aculeata</i> L. | Jerusalem thorn | Vedi babhul | Fabaceae | CI |
| 183. | <i>Peltophorum pterocarpum</i> (DC.) K.Heyne | Copperpod | Piwala gulmohar | Fabaceae | CI |
| 184. | <i>Pithecellobium dulce</i> (Roxb.) Benth. | Sweet tamarind | Vilayati chinch | Fabaceae | CI |

| | | | | | |
|------|--|---|--------------------------|--------------|-------|
| 185. | <i>Pongamia pinnata</i> (L.) Pierre | Pongam tree, Indian beech tree | Karanj | Fabaceae | C |
| 186. | <i>Prosopis cineraria</i> (L.) Druce | | Shami | Fabaceae | O |
| 187. | <i>Pterocarpus indicus</i> f. <i>echinatus</i> (Pers.) Rojo | | | Fabaceae | O |
| 188. | <i>Pterocarpus marsupium</i> Roxb. | Indian kino tree | Bija | Fabaceae | En |
| 189. | <i>Pterocarpus santalinus</i> L.f. | Red sandalwood | Raktachandan | Fabaceae | O |
| 190. | <i>Saraca asoca</i> (Roxb.) Willd. | Sorrowless tree | Sita ashok | Fabaceae | O |
| 191. | <i>Senna alata</i> (L.) Roxb. | Candle bush, Ringworm shrub | Dadmurdan | Fabaceae | C |
| 192. | <i>Senna auriculata</i> (L.) Roxb. | Tanner's Cassia | Tarvad | Fabaceae | C |
| 193. | <i>Senna siamea</i> (Lam.) H.S.Irwin & Barneby | Siamese Cassia | Kassod | Fabaceae | C |
| 194. | <i>Senna sophora</i> (L.) Roxb. | Sophera Senna | Kashawada | Fabaceae | O |
| 195. | <i>Senna spectabilis</i> (DC.) H.S.Irwin & Barneby | Spectacular Cassia | | Fabaceae | C |
| 196. | <i>Senna surattensis</i> (Burm.f.) H.S.Irwin & Barneby | Glaucous Cassia | Motha tarwad | Fabaceae | O |
| 197. | <i>Senna tora</i> (L.) Roxb. | Stinking Cassia | Takla | Fabaceae | C |
| 198. | <i>Sesbania grandiflora</i> (L.) Pers. | Agati | Hatga | Fabaceae | C |
| 199. | <i>Sesbania sesban</i> (L.) Merr. | Common Sesban | Shewri | Fabaceae | Cl |
| 200. | <i>Tamarindus indica</i> L. | Tamarind | Imali, Chinch | Fabaceae | C |
| 201. | <i>Xylia xylocarpa</i> (Roxb.) Taub. | Burma Ironwood | Yerul | Fabaceae | O |
| 202. | <i>Trema orientalis</i> (L.) Blume | Indian Charcoal Tree | Ghol, Kapshi, Khargol | Cannabaceae | C |
| 203. | <i>Elaeagnus conferta</i> Roxb. | Wild olive | Ambgul | Elaeagnaceae | O |
| 204. | <i>Artocarpus altilis</i> (Parkinson ex F.A.Zorn) Fosberg | Breadfruit | Nirphanas | Moraceae | C |
| 205. | <i>Artocarpus gomezianus</i> Wall. ex Trecul | | Otamb | Moraceae | O |
| 206. | <i>Artocarpus heterophyllus</i> Lam | Jackfruit | Phanas | Moraceae | O |
| 207. | <i>Artocarpus hirsutus</i> Lam. | | Ran phanas | Moraceae | E-IND |
| 208. | <i>Artocarpus lacucha</i> Buch.- Ham. | Lacoocha | Badhar | Moraceae | Cl |
| 209. | <i>Broussonetia papyrifera</i> (L.) L'Hér. ex Vent. | Paper malberry | Jangli toot | Moraceae | Cl |
| 210. | <i>Ficus amplissima</i> Sm. | | | Moraceae | O |
| 211. | <i>Ficus arnottiana</i> (Miq.) Miq. | Indian rock fig | Paras pipal, Payar | Moraceae | O |
| 212. | <i>Ficus benghalensis</i> L. | Banyan tree | Wad | Moraceae | C |
| 213. | <i>Ficus benghalensis</i> var. <i>krishnae</i> (C.DC.) Corner | Krishna fig, Krishna's butter cup | Krishna- pimpal | Moraceae | Cl |
| 214. | <i>Ficus benjamina</i> L. | Weeping fig | Nandaruk | Moraceae | Cl |
| 215. | <i>Ficus callosa</i> Willd. | Calloused fig | | Moraceae | O |
| 216. | <i>Ficus carica</i> L. | Fig | Anjeer | Moraceae | Cl |

| | | | | | |
|------|---|--------------------------------------|--------------------------|---------------|----------|
| 217. | <i>Ficus elastica</i> Roxb. ex Hornem. | Rubber tree | Rubber Plant | Moraceae | CI |
| 218. | <i>Ficus exasperata</i> Vahl | Sand paper fig | Karwat | Moraceae | O |
| 219. | <i>Ficus hispida</i> L.f. | Hairy fig | Kala umbar | Moraceae | O |
| 220. | <i>Ficus microcarpa</i> L.f. | Laurel Fig, Indian Laurel | Kamarup | Moraceae | O |
| 221. | <i>Ficus microphylla</i> Salzm. ex Miq. | Moreton bay fig | | Moraceae | CI |
| 222. | <i>Ficus mollis</i> Vahl | Soft Fig | | Moraceae | O |
| 223. | <i>Ficus natalensis</i> Hochst. | Natal fig, Triangular leaf fig | | Moraceae | CI |
| 224. | <i>Ficus racemosa</i> L. | Cluster fig | Umbar | Moraceae | C |
| 225. | <i>Ficus religiosa</i> L. | Peepal, Bodhi tree | Pimpal | Moraceae | C |
| 226. | <i>Ficus retusa</i> L. | Laurel fig | | Moraceae | O |
| 227. | <i>Ficus tinctoria</i> subsp. <i>gibbosa</i> (Blume) Corner | Dye fig | | Moraceae | O |
| 228. | <i>Ficus virens</i> Aiton | White fig | Bassari | Moraceae | O |
| 229. | <i>Hopea ponga</i> (Dennst.) Mabb. | Ponga | Kavshi | Moraceae | O |
| 230. | <i>Morus alba</i> L. | White mulberry, Silkworm mulberry | Shahtoot | Moraceae | CI |
| 231. | <i>Streblus asper</i> Lour. | Sand paper tree | Kharoli, Kharota | Moraceae | O |
| 232. | <i>Scutia myrtina</i> (Burm.f.) Kurz | Cat Thorn | Cheemat | Rhamnaceae | C |
| 233. | <i>Ziziphus caracutta</i> Buch.-Ham. ex Roxb. | | Ghatbor | Rhamnaceae | E-IND |
| 234. | <i>Ziziphus jujuba</i> Mill. | Indian Jujube | Ber | Rhamnaceae | CI |
| 235. | <i>Ziziphus nummularia</i> (Burm.f.) Wight & Arn. | | Jhar Beri, Chanya-bor | Rhamnaceae | C |
| 236. | <i>Ziziphus oenopolia</i> (L.) Mill. | Jackal Jujube | Makai, Burgi | Rhamnaceae | C |
| 237. | <i>Ziziphus rugosa</i> Lam. | Wild Jujube, wrinkled jujube | Toran | Rhamnaceae | C |
| 238. | <i>Ziziphus xylopyrus</i> (Retz.) Willd. | | | Rhamnaceae | C |
| 239. | <i>Prunus ceylanica</i> (Wight) Miq. | Ceylon Cherry | Daka | Rosaceae | O |
| 240. | <i>Prunus serrulata</i> Lindl. | Cherry blossom | | Rosaceae | O |
| 241. | <i>Celtis tetrandra</i> Roxb. | Eastern nettle tree | Brumaj | Ulmaceae | O |
| 242. | <i>Celtis timorensis</i> Span. | | | Ulmaceae | O |
| 243. | <i>Holoptelea integrifolia</i> Planch. | Indian elm, jungle cork tree | Papri, Vavala | Ulmaceae | O |
| 244. | <i>Boehmeria caudata</i> Sw. | Japanese false nettle | Badami karwat | Urticaceae | O |
| 245. | <i>Debregeasia longifolia</i> (Burm.f.) Wedd. | Orange Wild Rhea | Khargul | Urticaceae | O |
| 246. | <i>Casuarina equisetifolia</i> L. | Whistling pine | Suru | Casuarinaceae | CI |
| 247. | <i>Anogeissus sericea</i> Brandis | | | Combretaceae | E-IND-MH |

| | | | | | |
|------|--|------------------------------------|-----------------|-----------------|----------|
| 248. | <i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guillem. & Perr. | Axle wood tree | Dhavda | Combretaceae | C |
| 249. | <i>Combretum albidum</i> G.Don | Piluki | Pewar Wel | Combretaceae | O |
| 250. | <i>Combretum latifolium</i> Blume | Large leaved climbing bushwillow | | Combretaceae | O |
| 251. | <i>Combretum rotundifolium</i> Rich. | Monkey brush vine | | Combretaceae | Cl |
| 252. | <i>Getonia floribunda</i> Roxb. | Paper flower climber | Ukshi | Combretaceae | C |
| 253. | <i>Terminalia bellirica</i> (Gaertn.) Roxb. | Beach almond, Bedda nut tree | Behada | Combretaceae | C |
| 254. | <i>Terminalia catappa</i> L. | Indian Almond | Jangli badam | Combretaceae | C |
| 255. | <i>Terminalia chebula</i> Retz. | Chebolic Myrobalan | Hirda | Combretaceae | C |
| 256. | <i>Terminalia elliptica</i> Willd. | Indian Laurel, Silver grey wood | Ain, Satada | Combretaceae | C |
| 257. | <i>Terminalia mantaly</i> H.Perrier | | | Combretaceae | Cl |
| 258. | <i>Terminalia paniculata</i> Roth | Kindal tree | Kinjal | Combretaceae | E-IND |
| 259. | <i>Duabanga grandiflora</i> (DC.) Walp. | Duabanga | | Lythraceae | Cl |
| 260. | <i>Lagerstroemia microcarpa</i> Hance | Ben Teak | Nana | Lythraceae | E-IND |
| 261. | <i>Lagerstroemia parviflora</i> Roxb. | Small flowered crape | Bondara | Lythraceae | O |
| 262. | <i>Lagerstroemia speciosa</i> (L.) Pers. | Pride of India, Queen crape myrtle | Jarul, Taman | Lythraceae | C |
| 263. | <i>Lagerstroemia thorelii</i> Gagnep. | | | Lythraceae | Cl |
| 264. | <i>Lawsonia inermis</i> L. | Henna | Mehendi | Lythraceae | Cl |
| 265. | <i>Punica granatum</i> L. | Pomegranate | Anar, Dalimb | Lythraceae | C, Cl |
| 266. | <i>Sonneratia alba</i> Sm. | Sweet-scented apple mangrove | Karpu | Lythraceae | C |
| 267. | <i>Sonneratia apetala</i> Buch.-Ham. | Sonneratia Mangrove | Kandal | Lythraceae | C |
| 268. | <i>Woodfordia fruticosa</i> (L.) Kurz | Fire Flame Bush | Dhayati | Lythraceae | C |
| 269. | <i>Melastoma malabathricum</i> L. | Malabar Melastoma | Shapti , Rindha | Melastomataceae | O |
| 270. | <i>Memecylon talbotianum</i> Brandis | Talbot Memecylon | | Melastomataceae | R, E-IND |
| 271. | <i>Memecylon umbellatum</i> Burm. f. | Ironwood tree | Anjan | Melastomataceae | C |
| 272. | <i>Callistemon citrinus</i> (Curtis) Skeels | Bottle brush tree | | Myrtaceae | C |
| 273. | <i>Eucalyptus globulus</i> Labill. | | Neelgiri | Myrtaceae | C |
| 274. | <i>Eugenia phillyraeoides</i> Trimen | Ceylon Plum | Ran Jambhul | Myrtaceae | O |
| 275. | <i>Melaleuca bracteata</i> F.Muell. | Golden bottle brush | | Myrtaceae | O |

| | | | | | |
|------|---|-----------------------------|---------------------------|---------------|-------|
| 276. | <i>Psidium guajava</i> L. | Guava | Amrood, Peru | Myrtaceae | C |
| 277. | <i>Syzygium caryophyllatum</i> (L.) Alston | South Indian Plum | Ran lawang | Myrtaceae | O |
| 278. | <i>Syzygium cumini</i> (L.) Skeels | Java plum, Jamun | Jambhul | Myrtaceae | C |
| 279. | <i>Syzygium gardneri</i> Thwaites | | | Myrtaceae | C |
| 280. | <i>Syzygium hemisphericum</i> (Wight) Alston | Hemispheric Rose | Goljamb, Redi jambul | Myrtaceae | O |
| 281. | <i>Syzygium jambos</i> (L.) Alston | Rose apple | Gulab jamun | Myrtaceae | O, CL |
| 282. | <i>Syzygium salicifolium</i> (Wight) J.Graham | | Bhedas | Myrtaceae | E-IND |
| 283. | <i>Syzygium zeylanicum</i> (L.) DC. | Spicate Eugenia | Bhedas, Pitkuli | Myrtaceae | O |
| 284. | <i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven | False primrose | Panlavang | Onagraceae | O |
| 285. | <i>Turpinia cochinchinensis</i> (Lour.) Merr. | Turpinia | | Staphyleaceae | O |
| 286. | <i>Anacardium occidentale</i> L. | Cashew | Kaju | Anacardiaceae | C |
| 287. | <i>Buchanania cochinchinensis</i> (Lour.) Almeida | Chironji tree | Charoli | Anacardiaceae | O |
| 288. | <i>Holigarna arnottiana</i> Hook.f. | Black varnish Tree | Ranbiba | Anacardiaceae | E-IND |
| 289. | <i>Holigarna grahamii</i> (Wight) Kurz | Blistering varnish Tree | Ran bibba | Anacardiaceae | O |
| 290. | <i>Lannea coromandelica</i> (Houtt.) Merr. | Indian ash tree, Moya | Moi, Shemat, Shinti | Anacardiaceae | C |
| 291. | <i>Mangifera indica</i> L. | Mango | Aam, Amba | Anacardiaceae | C |
| 292. | <i>Nothopegia castaneifolia</i> (Roth) Ding Hou | | Amberi | Anacardiaceae | E-IND |
| 293. | <i>Searsia mysorensis</i> (G.Don) Moffett | Mysore sumac | Dasani, Amboni | Anacardiaceae | C |
| 294. | <i>Semecarpus anacardium</i> L. f. | Marking nut, dhobi nut tree | Bhillava, Bibba | Anacardiaceae | C |
| 295. | <i>Spondias pinnata</i> (L. f.) Kurz | Wild Mango | Ambada, Dholamba, Ranamba | Anacardiaceae | C |
| 296. | <i>Boswellia serrata</i> Roxb. ex Colebr. | Indian olibanum | Dhupali | Burseraceae | O |
| 297. | <i>Commiphora wightii</i> (Arn.) Bhandari | | Guggul | Burseraceae | O |
| 298. | <i>Garuga pinnata</i> Roxb. | Garuga | Kakad | Burseraceae | O |
| 299. | <i>Aglaia lawii</i> (Wight) C.J.Saldanha | Law's aglaia | | Meliaceae | O |
| 300. | <i>Azadirachta indica</i> A.Juss. | Neem | Kadunimb | Meliaceae | C |
| 301. | <i>Chukrasia tabularis</i> A.Juss. | Indian redwood | Chikrasi | Meliaceae | O |
| 302. | <i>Cipadessa baccifera</i> (Roth) Miq. | Ranabili | Nalbila | Meliaceae | O |
| 303. | <i>Dysoxylum gotadhora</i> (Buch.-Ham.) Mabb. | Cup-calyx white cedar | Devadaru, Erindi | Meliaceae | R |
| 304. | <i>Khaya grandifoliola</i> C.DC. | | | Meliaceae | C |
| 305. | <i>Khaya senegalensis</i> (Desv.) A.Juss. | Senegal Mahogany | | Meliaceae | Cl |
| 306. | <i>Melia azedarach</i> L. | Chinaberry tree | Bakan-nimb | Meliaceae | C |

| | | | | | |
|------|---|--|----------------------------|-------------|-------|
| 307. | <i>Melia dubia</i> Cav. | Malabar neem | Limbhara, Mahanim | Meliaceae | C |
| 308. | <i>Swietenia mahogani</i> L. | Mahogany, West Indian mahogany | | Meliaceae | C |
| 309. | <i>Toona hexandra</i> M.Roem. | | Toon | Meliaceae | O |
| 310. | <i>Turraea pubescens</i> Hell. | Wild honey suckle | Kapur bhendi | Meliaceae | O |
| 311. | <i>Acronychia pedunculata</i> (L.) Miq. | Indian Aspen | | Rutaceae | C |
| 312. | <i>Aegle marmelos</i> (L.) Corrêa | Stone apple, Wood apple | Bel | Rutaceae | C |
| 313. | <i>Atalantia wightii</i> Yu.Tanaka | Wild Orange | | Rutaceae | E-IND |
| 314. | <i>Atalantia racemosa</i> Wight ex Hook. | Bombay atalantia | Makadlimbu | Rutaceae | O |
| 315. | <i>Chloroxylon swietenia</i> DC. | Ceylon satinwood | Behru | Rutaceae | O |
| 316. | <i>Citrus aurantiifolia</i> (Christm.) Swingle | Lime | Kaghzi-nimbu | Rutaceae | C |
| 317. | <i>Citrus maxima</i> (Burm.) Merr. | Pomelo | Papanas | Rutaceae | Cl |
| 318. | <i>Clausena anisata</i> (Willd.) Hook.f. ex Benth. | | | Rutaceae | O |
| 319. | <i>Glycosmis pentaphylla</i> (Retz.) DC. | Ban nimbu | Kirmira | Rutaceae | O |
| 320. | <i>Limonia acidissima</i> Groff | Wood apple | Kauth | Rutaceae | C |
| 321. | <i>Murraya koenigii</i> (L.) Spreng. | Curry Leaf | Kari patta, Kadhi patta | Rutaceae | C |
| 322. | <i>Murraya paniculata</i> (L.) Jack | Orange Jasmine | Kunti, Pandhari | Rutaceae | C |
| 323. | <i>Ravenia spectabilis</i> Engl. | Lemonia | | Rutaceae | Cl |
| 324. | <i>Toddalia asiatica</i> (L.) Lam. | Forest pepper | Ran marvel | Rutaceae | O |
| 325. | <i>Zanthoxylum rhetsa</i> DC. | Indian prickly ash | Tirphal | Rutaceae | O |
| 326. | <i>Allophylus cobbe</i> (L) Raeusch. | Indian allophylus | Tinpani | Sapindaceae | O |
| 327. | <i>Dimocarpus longan</i> Lour. | Dragon's eyes, Eyeball tree | Wumb, Omb | Sapindaceae | O |
| 328. | <i>Dodonaea viscosa</i> (L.) Jacq. | Hop bush | Vilayti- mehandi | Sapindaceae | O |
| 329. | <i>Harpullia zanguebarica</i> (J.Kirk) Radlk. | Black pearl tree | | Sapindaceae | O |
| 330. | <i>Koelreuteria paniculata</i> Laxm. | Flamegold | | Sapindaceae | O |
| 331. | <i>Lepisanthes tetraphylla</i> Radlk. | | Kurpa | Sapindaceae | C |
| 332. | <i>Litchi chinensis</i> Sonn. | Lichi | | Sapindaceae | Cl |
| 333. | <i>Majidea zanguebarica</i> J. Kirk ex Oliv. | Black pearl tree | | Sapindaceae | C |
| 334. | <i>Sapindus laurifolius</i> Balb. ex DC | South India Soapnut | Phenil, Ritha | Sapindaceae | C |
| 335. | <i>Sapindus trifoliatus</i> L. | South India soapnut, three- leaf soapberry | Phenil, Ritha | Sapindaceae | C |

| | | | | | |
|------|--|--------------------------------------|-------------------|------------------|--------------|
| 336. | <i>Schleichera oleosa</i> (Lour.) Merr. | Ceylon oak, Lac tree | Kusum, Kusumb | Sapindaceae | C |
| 337. | <i>Ailanthus excelsa</i> Roxb. | Indian tree of heaven | Mahrukh | Simaroubaceae | C |
| 338. | <i>Simarouba amara</i> Aubl. | Bitterwood, Paradise-tree | | Simaroubaceae | Cl |
| 339. | <i>Bixa orelliana</i> L. | Lipstick tree | Shendri | Bixaceae | C |
| 340. | <i>Cochlospermum religiosum</i> (L.) Alston | Buttercup tree | Ganeri | Bixaceae | C |
| 341. | <i>Vateria indica</i> L. | White Damar | Dhup | Dipterocarpaceae | E-WG |
| 342. | <i>Shorea robusta</i> Gaertn. | | Sal | Dipterocarpaceae | Cl |
| 343. | <i>Abutilon indicum</i> (L.) Sweet | Indian mallow | Petari | Malvaceae | C |
| 344. | <i>Abutilon persicum</i> (Burm.f.) Merr. | Persian mallow | Madam | Malvaceae | C |
| 345. | <i>Adansonia digitata</i> L. | Baobab | Gorakhchinch | Malvaceae | Cl |
| 346. | <i>Bombax ceiba</i> L. | Silk cotton tree | Kate savar | Malvaceae | C |
| 347. | <i>Bombax insigne</i> Wall. | Showy silk cotton tree | Dev savar | Malvaceae | R |
| 348. | <i>Ceiba pentandra</i> (L.) Gaertn. | Kapok tree | Samali | Malvaceae | Cl |
| 349. | <i>Decaschistia trilobata</i> Wight | Lobed Leaved Mysore Mallow | | Malvaceae | C |
| 350. | <i>Dombeya burgesiae</i> Gerrard ex Harv. | Pink wild pear | | Malvaceae | Cl |
| 351. | <i>Erinocarpus nimmonii</i> J.Graham | | Jangli Bhendi | Malvaceae | E-WG |
| 352. | <i>Eriolaena quinquelocularis</i> (Wight & Arn.) Wight | Bothi | Badjari dhaman | Malvaceae | R, E- IND |
| 353. | <i>Firmiana colorata</i> (Roxb.) R.Br. | Scarlet sterculi | Kaushi | Malvaceae | C |
| 354. | <i>Grewia abutilifolia</i> Vent. ex Juss. | Mallow-leaved crossberry | Kirmith | Malvaceae | O |
| 355. | <i>Grewia asiatica</i> L. | | Phalasa | Malvaceae | C |
| 356. | <i>Grewia damine</i> Gaertn. | Salvia leaved crossberry | Bihul, Bather | Malvaceae | O |
| 357. | <i>Grewia hirsuta</i> Vahl | Kukurbicha | Govli | Malvaceae | O |
| 358. | <i>Grewia serrulata</i> DC. | | Kaori | Malvaceae | O |
| 359. | <i>Grewia tiliifolia</i> Vahl | | Dhaman | Malvaceae | C |
| 360. | <i>Grewia umbellifera</i> Bedd. | Ghat crossberry | | Malvaceae | R,E- IND |
| 361. | <i>Guazuma ulmifolia</i> Lam. | West Indian Elm, Bastard cedar | Rudrakshi | Malvaceae | O |
| 362. | <i>Helicteres isora</i> L. | East-Indian screw tree | MuradSheng | Malvaceae | O |
| 363. | <i>Hibiscus hirtus</i> L. | Lesser Mallow | Dupari | Malvaceae | O |
| 364. | <i>Hibiscus hispidissimus</i> Griff. | Wild Hibiscus | Kateri bhendi | Malvaceae | Cl |
| 365. | <i>Hibiscus lobatus</i> (Murray) Kuntze | Lobed leaf mallow | Lahan Jaswand | Malvaceae | Cl |
| 366. | <i>Hibiscus mutabilis</i> L. | Changeable rose | Bhendi gulab | Malvaceae | Cl |
| 367. | <i>Hibiscus rosa-sinensis</i> L. | China rose | Jaswand | Malvaceae | Cl |
| 368. | <i>Hibiscus schizopetalus</i> (Dyer) Hook.f. | Japanese hibiscus | | Malvaceae | Cl |

| | | | | | |
|------|--|------------------------------|----------------------------|---------------|------|
| 369. | <i>Hibiscus vitifolius</i> L. | Grape leaved mallow | Van kapus | Malvaceae | O |
| 370. | <i>Holmskioldia sanguinea</i> Retz. | Chinese hat | Kapni | Malvaceae | Cl |
| 371. | <i>Kleinhovia hospita</i> L. | Guest tree | | Malvaceae | Cl |
| 372. | <i>Kydia calycina</i> Roxb. | Kydia | Warang | Malvaceae | O |
| 373. | <i>Malachra capitata</i> (L.) L. | Brazil Jute | Ran bhendi | Malvaceae | C |
| 374. | <i>Malvaviscus penduliflorus</i> Moc. & Sessé ex DC. | Pendulous sleeping Hibiscus | | Malvaceae | Cl |
| 375. | <i>Microcos paniculata</i> L. | Microcos | Hasoli | Malvaceae | C |
| 376. | <i>Pterospermum acerifolium</i> (L.) Willd. | Maple-leaved bayur tree | Kanak champa, Muchkund | Malvaceae | O |
| 377. | <i>Pterygota alata</i> (Roxb.) R.Br. | Buddha coconut | Karvati | Malvaceae | O |
| 378. | <i>Sida acuta</i> Burm.f. | Common wireweed | Chikana | Malvaceae | C |
| 379. | <i>Sterculia foetida</i> L. | Wild Indian Almond | Jangali badam | Malvaceae | C |
| 380. | <i>Sterculia guttata</i> Roxb. ex G.Don | Spotted Sterculia | Hirik, Kukar | Malvaceae | O |
| 381. | <i>Sterculia urens</i> Roxb. | Gum karaya | Kandol, Pandruk | Malvaceae | O |
| 382. | <i>Sterculia villosa</i> Roxb. | Hairy Sterculia | Sardol | Malvaceae | R |
| 383. | <i>Thespesia lampas</i> (Cav.) Dalzell | Common Mallow | Jangli bhendi, Raan bhendi | Malvaceae | C |
| 384. | <i>Thespesia populnea</i> (L.) Sol. ex Corrêa | Indian tulip tree | Paras pipal, Raan bhendi | Malvaceae | C |
| 385. | <i>Triumfetta rhomboidea</i> Jacq. | Burr bush | Thinjhira | Malvaceae | C |
| 386. | <i>Urena lobata</i> L. | Caesarweed | Vanbhendi | Malvaceae | C |
| 387. | <i>Muntingia calabura</i> L. | Singapore Cherry | Paanchara | Muntingiaceae | C |
| 388. | <i>Gnidia glauca</i> (Fresen.) Gilg | Fish poison bush | Datpadi, Rametha | Thymelaeaceae | C |
| 389. | <i>Capparis decidua</i> (Forssk.) Edgew. | Bare Caper | Nepati, Karil | Capparaceae | O |
| 390. | <i>Capparis divaricata</i> Lam. | Spreading caper | Pachunda | Capparaceae | C |
| 391. | <i>Capparis grandis</i> L.f. | | | Capparaceae | O |
| 392. | <i>Capparis rotundifolia</i> Rottler | Round leaf caper | Kolisma | Capparaceae | O |
| 393. | <i>Capparis sepiaria</i> L. | Wild caper bush | Kantharyel, Kanthari | Capparaceae | O |
| 394. | <i>Capparis zeylanica</i> L. | Ceylon caper | Govindi, Vyaghranakhi | Capparaceae | O |
| 395. | <i>Capparis moonii</i> Wight | Large caper | Waghati | Capparaceae | O |
| 396. | <i>Cleoserrata speciosa</i> (Raf.) Ilitis | Showy spider flower | | Capparaceae | C |
| 397. | <i>Crateva adansonii</i> subsp. <i>odora</i> (Buch.-Ham.) Jacobs | Garlic pear tree, Caper tree | Varun | Capparaceae | O |
| 398. | <i>Carrica papaya</i> L. | Papaya | Papai | Caricaceae | C |
| 399. | <i>Moringa oleifera</i> Lam. | Drumstick Tree | Shevga | Moringaceae | Cl |
| 400. | <i>Salvadora persica</i> L. | Toothbrush tree | Meswak, Pilu | Salvadoraceae | O |
| 401. | <i>Dendrophthoe falcata</i> var. <i>coccinea</i> Santapau | Red honey suckle mistletoe | Bandgul, Vanda | Loranthaceae | E-WG |

| | | | | | |
|------|---|---------------------------------|----------------|-------------------|-------|
| 402. | <i>Dendrophthoe falcata</i> var. <i>falcata</i> Mistletoe | Honey suckle mistletoe | Bandgul, Vanda | Loranthaceae | C |
| 403. | <i>Macrosolen capitellatus</i> (Wight & Arn.) Danser | South Indian mistletoe | Lahan bandgul | Loranthaceae | O |
| 404. | <i>Tolypanthus lageniferus</i> Tiegh. | Indian Tolypanthus | Pela bandgul | Loranthaceae | E-IND |
| 405. | <i>Olax scandens</i> Roxb. | Parrot Olax | Harduli | Olacaceae | O |
| 406. | <i>Cansjera rheedei</i> J.F.Gmel. | Rheed's False Olive | | Opiliaceae | O |
| 407. | <i>Osyris lanceolata</i> Hochst. & Steud. | Wild tea | Chimat | Santalaceae | O |
| 408. | <i>Santalum album</i> L. | Sandalwood | Chandan | Santalaceae | E-IND |
| 409. | <i>Scleropyrum pentandrum</i> (Dennst.) Mabb. | Hard pear tree | | Santalaceae | O |
| 410. | <i>Viscum articulatum</i> Burm. f. | Leafless mistletoe | Banda | Santalaceae | O |
| 411. | <i>Cereus repandus</i> (L.) Mill. | Apple cactus | | Cactaceae | O |
| 412. | <i>Epiphyllum oxypetalum</i> (DC.) Haw. | Night blooming cereus | Bramhakamal | Cactaceae | C |
| 413. | <i>Nopalea cochenillifera</i> (L.) Salm-Dyck | Cochineal cactus | | Cactaceae | Cl |
| 414. | <i>Ancistrocladus heyneanus</i> Wall. ex J.Graham | Kardol | Kardol | Ancistrocladaceae | E-IND |
| 415. | <i>Plumbago auriculata</i> Lam. | Cape leadwort | Nila chitrak | Plumbaginaceae | Cl |
| 416. | <i>Plumbago zeylanica</i> L. | White leadwort | Chitrak | Plumbaginaceae | C |
| 417. | <i>Coccoloba uvifera</i> (L.) L. | Sea grape | | Polygonaceae | Cl |
| 418. | <i>Persicaria chinensis</i> (L.) H. Gross | Chinese knotweed | Paral | Polygonaceae | C |
| 419. | <i>Alangium salviifolium</i> (L.f.) Wangerin | Sage leaved Alangium | Ankol | Cornaceae | O |
| 420. | <i>Mastixia arborea</i> (Wight) C.B.Clarke | | | Cornaceae | O |
| 421. | <i>Hydrangea paniculata</i> Siebold | | | Hydrangeaceae | O |
| 422. | <i>Diospyros candolleana</i> Wight | | | Ebenaceae | O |
| 423. | <i>Diospyros malabarica</i> (Desr.) Kostel. | Indian persimmon | Gaab, Temburni | Ebenaceae | O |
| 424. | <i>Diospyros melanoxylon</i> Roxb. | Black bony | Temru | Ebenaceae | O |
| 425. | <i>Diospyros montana</i> Roxb. | Bombay ebony | Lohari | Ebenaceae | O |
| 426. | <i>Diospyros nigricans</i> Wall. ex A.DC. | | | Ebenaceae | Cl |
| 427. | <i>Diospyros sylvatica</i> Roxb. | | | Ebenaceae | O |
| 428. | <i>Diospyros vera</i> (Lour.) A.Chev. | Narrow-leaved Ebony | Rakta roda | Ebenaceae | O |
| 429. | <i>Barringtonia acutangula</i> (L.) Gaertn. | Freshwater mangrove, Indian oak | Newar | Lecythidaceae | O |
| 430. | <i>Barringtonia asiatica</i> (L.) Kurz | Sea poison tree | | Lecythidaceae | Cl |
| 431. | <i>Careya arboea</i> Roxb. | Wild guava | Kumbha | Lecythidaceae | C |
| 432. | <i>Couroupita guianensis</i> Aubl. | Cannon ball tree | Shivalingam | Lecythidaceae | Cl |
| 433. | <i>Maesa indica</i> (Roxb.) A. DC. | Wild berry | Ataki | Myrsinaceae | C |

| | | | | | |
|------|--|-----------------------------------|------------------------------|--------------|------|
| 434. | <i>Ardisia solanacea</i> (Poir.) Roxb. | Shoebuttan Ardisia, duck's eye | Dikna | Primulaceae | O |
| 435. | <i>Bonellia macrocarpa</i> (Cav.) B.Ståhl & Källersjö | Jacquinia | | Primulaceae | Cl |
| 436. | <i>Chrysophyllum cainito</i> L. | Star apple | Tarsiphala | Sapotaceae | Cl |
| 437. | <i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A.Chev. | Indian butter tree | Mahua, Moh | Sapotaceae | O |
| 438. | <i>Manilkara zapota</i> (L.) P.Royen | Chikoo, Noseberry | Chiku | Sapotaceae | Cl |
| 439. | <i>Mimusops elengi</i> L. | Spanish cherry | Bakuli | Sapotaceae | C |
| 440. | <i>Xantolis tomentosa</i> (Roxb.) Raf. | Hairy Xantolis | Kate-Kumbal | Sapotaceae | O |
| 441. | <i>Symplocos cochinchinensis</i> var. <i>laurina</i> (Retz.) Noot. | Laurel Sapphire Berry | | Symplocaceae | O |
| 442. | <i>Symplocos racemosa</i> Roxb. | | | Symplocaceae | O |
| 443. | <i>Nothapodytes nimmoniana</i> (J.Graham) Mabb. | Fetid Tree | Ghanera, Narkya | Icacinaceae | O |
| 444. | <i>Allamanda cathartica</i> L. | Golden trumpet vine | | Apocynaceae | C |
| 445. | <i>Alstonia scholaris</i> (L.) R. Br. | Devil tree | Saptparni | Apocynaceae | C |
| 446. | <i>Asclepias curassavica</i> L. | Scarlet milkweed | Haladi-kunku | Apocynaceae | C |
| 447. | <i>Calotropis gigantea</i> (L.) Dryand. | Crown flower | Mandar | Apocynaceae | C |
| 448. | <i>Calotropis procera</i> (Aiton) Dryand. | Rubber bush | Rui | Apocynaceae | C |
| 449. | <i>Carissa inermis</i> Vahl | | | Apocynaceae | C |
| 450. | <i>Carissa spinarum</i> L. | Wild karanda | Jangali Karvand | Apocynaceae | C |
| 451. | <i>Carissa carandas</i> L. | Karanda | Karvand | Apocynaceae | C |
| 452. | <i>Cascabela thevetia</i> (L.) Lippold | Yellow oleander | Piwali kanher | Apocynaceae | Cl |
| 453. | <i>Cerbera manghas</i> L. | Sea mango | Sukanu | Apocynaceae | Cl |
| 454. | <i>Chonemorpha fragrans</i> (Moon) Alston | Frangipani Vine, Wood vine | Moorva | Apocynaceae | O |
| 455. | <i>Holarrhena pubescens</i> Wall. ex G.Don | Indrajao | Kutaja, Pandhra kuda | Apocynaceae | C |
| 456. | <i>Ichnocarpus frutescens</i> (L.) W.T.Aiton | Black Creeper | Shyamalata, Krishna-sarwa | Apocynaceae | O |
| 457. | <i>Nerium oleander</i> L. | Oleander | Kaner, Kanher | Apocynaceae | C |
| 458. | <i>Parsonsia alboflavescens</i> (Dennst.) Mabb. | | | Apocynaceae | C |
| 459. | <i>Plumeria obtusa</i> L. | White Frangipani | Champa, Chafa | Apocynaceae | C |
| 460. | <i>Plumeria pudica</i> Jacq. | | Pandhara chapha | Apocynaceae | C |
| 461. | <i>Plumeria rubra</i> L. | Frangipani | Red champa | Apocynaceae | C |
| 462. | <i>Tabernaemontana alternifolia</i> L. | | Nag kuda | Apocynaceae | E-WG |
| 463. | <i>Tabernaemontana divaricata</i> (L.) R.Br. ex Roem. & Schult. | Crape jasmine | Chandni | Apocynaceae | C |

| | | | | | |
|------|--|---------------------------------|-------------------------|-------------|-------|
| 464. | <i>Wrightia arborea</i> (Dennst.) Mabb. | Woolly Dyeing Rosebay | Pandu kuda, Tambda kuda | Apocynaceae | O |
| 465. | <i>Wrightia tinctoria</i> R.Br. | Sweet Indrajao | Kala kuda | Apocynaceae | O |
| 466. | <i>Strychnos nux-vomica</i> L. | Nux Vomica, Poison Nut | Kajra | Loganiaceae | O |
| 467. | <i>Strychnos potatorum</i> L.f. | Clearing nut tree | Nirmali | Loganiaceae | O |
| 468. | <i>Canthium angustifolium</i> Roxb. | Narrow leaved canthium | Shengali | Rubiaceae | O |
| 469. | <i>Catunaregam spinosa</i> (Thunb.) Tirveng. | Mountain pomegranate | Gela | Rubiaceae | O |
| 470. | <i>Coffea arabica</i> L. | Coffee | Kafi | Rubiaceae | C |
| 471. | <i>Haldina cordifolia</i> (Roxb.) Ridsdale | Haladu | Kadami | Rubiaceae | O |
| 472. | <i>Hamelia patens</i> Jacq. | Firebush | Haman | Rubiaceae | C |
| 473. | <i>Hymenodictyon obovatum</i> Wall. | | Kadwa Sirid | Rubiaceae | E-IND |
| 474. | <i>Hymenodictyon orixense</i> (Roxb.) Mabb. | Bridal couch tree | Bhorsal, Kala bachnag | Rubiaceae | O |
| 475. | <i>Ixora brachiata</i> Roxb. | Gorbale | Gurani | Rubiaceae | E-IND |
| 476. | <i>Ixora chinensis</i> Lam. | Chinese Ixora | | Rubiaceae | CI |
| 477. | <i>Ixora coccinea</i> L. | Pink Ixora | Rugmini | Rubiaceae | CI |
| 478. | <i>Ixora coccinea</i> L. | Red Ixora | Rugmini | Rubiaceae | CI |
| 479. | <i>Ixora elongata</i> B.Heyne ex G.Don | Rosy Ixora | Gulab kuda | Rubiaceae | E-WG |
| 480. | <i>Ixora javanica</i> (Blume) DC. | Javanese ixora, Jungle Geranium | | Rubiaceae | CI |
| 481. | <i>Ixora nigricans</i> R.Br. ex Wight & Arn. | Black Ixora | Katkuda | Rubiaceae | E-WG |
| 482. | <i>Ixora pavetta</i> Andr. | Indian Pavetta | Kankara, Papat | Rubiaceae | |
| 483. | <i>Ixora polyantha</i> Wight | Many-flowered Ixora | Rankuda | Rubiaceae | E-WG |
| 484. | <i>Meyna laxiflora</i> Robyns | Muyna | Hulu, Alu | Rubiaceae | C |
| 485. | <i>Mitragyna parvifolia</i> (Roxb.) Korth. | Kaim | Kadamb | Rubiaceae | O |
| 486. | <i>Morinda citrifolia</i> L. | Indian Mulberry, Great morinda | Bartundi | Rubiaceae | O |
| 487. | <i>Morinda pubescens</i> Sm. | Indian Mulberry, Morinda tree | Aseti | Rubiaceae | O |
| 488. | <i>Mussaenda erythrophylla</i> Schumach. & Thonn. | Red Flag Bush | | Rubiaceae | C |
| 489. | <i>Mussaenda glabrata</i> (Hook.f.) Hutch. ex Gamble | Flag bush, Dhobi Tree | Bhutakesha, Sarvad | Rubiaceae | O |
| 490. | <i>Mussaenda philippica</i> A.Rich. | White Mussaenda | | Rubiaceae | CI |
| 491. | <i>Mussaenda philippica</i> A.Rich. | Queen sirkit Mussaenda | | Rubiaceae | CI |
| 492. | <i>Neolamarckia cadamba</i> (Roxb.) Bosser | Kadam | Kadamb | Rubiaceae | O |

| | | | | | |
|------|--|----------------------------|--------------------|----------------|-------|
| 493. | <i>Ophiorrhiza rugosa</i> Wall. | | | Rubiaceae | O |
| 494. | <i>Oxyceros rugulosus</i> (Thwaites) Tirveng. | Climbing Randia | Vela Gela | Rubiaceae | O |
| 495. | <i>Pavetta crassicaulis</i> Bremek. | | | Rubiaceae | E-IND |
| 496. | <i>Pavetta indica</i> L. | Indian Pavetta | Papat | Rubiaceae | C |
| 497. | <i>Pavetta tomentosa</i> Roxb. ex Sm. | | | Rubiaceae | O |
| 498. | <i>Pentas lanceolata</i> (Forssk.) Deflers | Star flower | | Rubiaceae | O |
| 499. | <i>Psychotria truncata</i> Wall. | Truncate-Calyx Psychotria | | Rubiaceae | E-IND |
| 500. | <i>Psydrax umbellata</i> (Wight) Bridson | Umbelled Canthium | Arsul | Rubiaceae | O |
| 501. | <i>Spermadictyon suaveolens</i> Roxb. | Forest Champa | Gidesa | Rubiaceae | O |
| 502. | <i>Tamlnadia uliginosa</i> (Retz.) Tirveng. & Sastre | Divine Jasmine | Pandhara | Rubiaceae | O |
| 503. | <i>Argyreia cuneata</i> Ker Gawl. | Purple morning glory | Mhalungi | Convolvulaceae | E-IND |
| 504. | <i>Ipomoea carnea</i> Jacq. | Bush morning glory | Besharam | Convolvulaceae | C |
| 505. | <i>Acnistus arborescens</i> (L.) Schtdl. | Hollow heart | | Solanaceae | Cl |
| 506. | <i>Brugmansia arborea</i> (L.) Steud. | Angel's trumpet | Tutari | Solanaceae | Cl |
| 507. | <i>Brugmansia versicolor</i> Lagerh . | Peach angel's trumpet | | Solanaceae | Cl |
| 508. | <i>Cestrum nocturnum</i> L. | Night blooming jasmine | Raatrani | Solanaceae | Cl |
| 509. | <i>Datura innoxia</i> Mill. | Datura | Dhotra | Solanaceae | C |
| 510. | <i>Datura metel</i> L. | Datura | Safed dhotra | Solanaceae | C |
| 511. | <i>Solanum anguivi</i> Lam. | | | Solanaceae | C |
| 512. | <i>Solanum erianthum</i> D. Don | Big Eggplant | Ban tamakhu, Kutri | Solanaceae | C |
| 513. | <i>Solanum torvum</i> Sw. | Turkey Berry | Bhurat, Marang | Solanaceae | C |
| 514. | <i>Withania somnifera</i> (L.) Dunal | Winter cherry | Ashwagandha | Solanaceae | C |
| 515. | <i>Asystasia dalzelliana</i> Santapau | Violet Asystasia | Neelkanth | Acanthaceae | C |
| 516. | <i>Avicennia marina</i> (Forssk.) Vierh. | Grey Mangrove | Tavir | Acanthaceae | O |
| 517. | <i>Avicennia officinalis</i> L. | Indian Mangrove | Tiwar | Acanthaceae | O |
| 518. | <i>Barleria involucrata</i> var. <i>elata</i> (Dalzell) C.B.Clarke | | | Acanthaceae | E-IND |
| 519. | <i>Barleria prattensis</i> Santapau | Pink barleria | Gulabi koranti | Acanthaceae | O |
| 520. | <i>Barleria prionitis</i> L. | Porcupine flower | Vajradanti | Acanthaceae | E-IND |
| 521. | <i>Barleria terminalis</i> Nees | Blue barleria | Nili koranti | Acanthaceae | E-WG |
| 522. | <i>Calacanthus grandiflorus</i> (Dalzell) Radlk | Large flowered calacanthus | Mugut | Acanthaceae | E-WG |
| 523. | <i>Crossandra infundibuliformis</i> | Crossandra | Aboli | Acanthaceae | C |

| | | | | | |
|------|---|--------------------------------|-----------------------------|--------------|----------|
| | (L.) Nees | | | | |
| 524. | <i>Ecbolium ligustrinum</i> (Vahl) Vollesen | Green ice crossandra | Ekboli | Acanthaceae | O |
| 525. | <i>Eranthemum roseum</i> (Vahl) R.Br. | Rosy Eranthemum | Dasamui | Acanthaceae | E-IND |
| 526. | <i>Excoecaria agallocha</i> L. | Blinding Tree | Gewa | Acanthaceae | CI |
| 527. | <i>Justicia adhatoda</i> L. | Malabar nut | Adulsa | Acanthaceae | CI |
| 528. | <i>Justicia santapaui</i> Bennet | Santapau's Justicia | | Acanthaceae | R, E-IND |
| 529. | <i>Lepidagathis cuspidata</i> Nees | Spiny Lepidagathis | Kate adulsa | Acanthaceae | E-IND |
| 530. | <i>Neuracanthus sphaerostachys</i> Dalzell | Pin cushion plant | Golgonda | Acanthaceae | E-IND |
| 531. | <i>Pleocaulis sessilis</i> (Nees) Bremek. | | Topali karvi | Acanthaceae | O |
| 532. | <i>Pseuderanthemum carruthersii</i> (Seem.) Guillaumin | Yellow-vein Eranthemum | | Acanthaceae | O |
| 533. | <i>Rhinacanthus nasutus</i> (L.) Kurz | Snake Jasmine | Gajkarni | Acanthaceae | O |
| 534. | <i>Strobilanthes callosus</i> Nees | | Karvy | Acanthaceae | E-IND |
| 535. | <i>Strobilanthes heyneanus</i> Nees | Karun kurinji | Akra | Acanthaceae | |
| 536. | <i>Strobilanthes integrifolia</i> Kuntze | Wayti | | Acanthaceae | E-WG |
| 537. | <i>Thelepaepale ixiocephala</i> (Benth.) Bremek. | Sky Blue Karvy | Patri | Acanthaceae | E-WG |
| 538. | <i>Thunbergia erecta</i> (Benth.) T.Anderson | Bush clock vine | | Acanthaceae | O |
| 539. | <i>Dolichandrone atrovirens</i> (Roth) K.Schum. | Wavy trumpet flower | | Bignoniaceae | E-IND |
| 540. | <i>Dolichandrone falcata</i> (Wall. ex DC.) Seem. | Medhshingi | Hawar, Medhshingi | Bignoniaceae | E-IND |
| 541. | <i>Dolichandrone spathacea</i> (L.f.) Seem. | Mangrove trumpet tree | Samudrashingi | Bignoniaceae | O |
| 542. | <i>Fernandoa adenophylla</i> (Wall. ex G.Don) Steenis | Katsagon | Marodphali | Bignoniaceae | O |
| 543. | <i>Handroanthus impetiginosus</i> (Mart. ex DC.) Mattos | | | Bignoniaceae | O |
| 544. | <i>Heterophragma quadriloculare</i> (Roxb.) K.Schum. | Murus | Waras | Bignoniaceae | E-IND |
| 545. | <i>Jacaranda mimosifolia</i> D.Don | Blue Jacaranda | Neelmohur | Bignoniaceae | CI |
| 546. | <i>Kigelia africana</i> (Lam.) Benth. | Sausage tree | Balam khira | Bignoniaceae | CI |
| 547. | <i>Millingtonia hortensis</i> L.f. | Indian Cork Tree, Tree Jasmine | Akash chameli, Buchache zad | Bignoniaceae | CI |
| 548. | <i>Oroxylum indicum</i> (L.) Kurz | Broken Bones Tree | Tetu | Bignoniaceae | O |
| 549. | <i>Radermachera xylocarpa</i> (Roxb.) Roxb. ex K.Schum. | Padri tree | Khadshingi | Bignoniaceae | E-IND |
| 550. | <i>Spathodea campanulata</i> P.Beauv. | African tulip tree | Rugtoora, Pichkaari | Bignoniaceae | CI |

| | | | | | |
|------|---|--|----------------------|--------------|-------|
| 551. | <i>Stereospermum tetragonum</i> DC. | Yellow Snake Tree | Paroli, Padal | Bignoniaceae | O |
| 552. | <i>Tabebuia aurea</i> (Silva Manso) Benth. & Hook.f. ex S.Moore | Silver trumpet tree, Yellow Tabebuia | | Bignoniaceae | Cl |
| 553. | <i>Tabebuia pallida</i> (Lindl.) Miers | Cuban pink trumpet Tree, Pink Tabebuia | | Bignoniaceae | Cl |
| 554. | <i>Tabebuia rosea</i> (Bertol.) Bertero ex A.DC. | Pink trumpet tree | | Bignoniaceae | Cl |
| 555. | <i>Tecoma capensis</i> (Thunb.) Lindl. | Cape honeysuckle | | Bignoniaceae | Cl |
| 556. | <i>Tecoma fulva</i> (Cav.) G.Don | | | Bignoniaceae | Cl |
| 557. | <i>Tecoma stans</i> (L.) Juss. ex Kunth | Yellow bells, Yellow trumpet | Ghanti ful | Bignoniaceae | Cl |
| 558. | <i>Anisomeles heyneana</i> Benth. | Western hill catmint | Gopali | Lamiaceae | E-IND |
| 559. | <i>Callicarpa tomentosa</i> (L.) L. | Velvety beauty berry | Kaarivaati | Lamiaceae | O |
| 560. | <i>Clerodendrum chinense</i> (Osbeck) Mabb. | Chinese glory bower | | Lamiaceae | C |
| 561. | <i>Clerodendrum infortunatum</i> L. | Hill glory bower | Bhandira | Lamiaceae | C |
| 562. | <i>Clerodendrum paniculatum</i> L. | Pagoda flower | | Lamiaceae | C |
| 563. | <i>Clerodendrum phlomidis</i> L.f. | Arni | Takalimula | Lamiaceae | C |
| 564. | <i>Clerodendrum splendens</i> G.Don | Flaming glorybower | | Lamiaceae | C |
| 565. | <i>Clerodendrum thomsoniae</i> Balf.f. | Bleeding heart vine | | Lamiaceae | C |
| 566. | <i>Colebrookea oppositifolia</i> Sm. | Indian squirrel tail | Bhamber, Bhaman | Lamiaceae | C |
| 567. | <i>Gmelina arborea</i> Roxb. | Gamhar | Sivan | Lamiaceae | C |
| 568. | <i>Gmelina asiatica</i> L. | Asian bushbeech, Asiatic beechberry | Badhara, Kali shivan | Lamiaceae | O |
| 569. | <i>Hyptis suaveolens</i> (L.) Poit. | Bush mint | Darp tulas | Lamiaceae | C |
| 570. | <i>Ocimum basilicum</i> L. | Sweet basil | Ram tulsi | Lamiaceae | C |
| 571. | <i>Ocimum tenuiflorum</i> L. | Holy basil | Tulasi | Lamiaceae | C |
| 572. | <i>Plectranthus barbatus</i> Andrews | Indian coleus | Manimul | Lamiaceae | C |
| 573. | <i>Pogostemon benghalensis</i> (Burm.f.) Kuntze | Bengal Pogostemon | | Lamiaceae | C |
| 574. | <i>Pogostemon purpurascens</i> Dalzell | Sangbrei | | Lamiaceae | C |
| 575. | <i>Premna coriacea</i> C.B.Clarke | | Rawan, Chambarti | Lamiaceae | O |
| 576. | <i>Salvia splendens</i> Sellow ex Schult. | Scarlet Sage | | Lamiaceae | Cl |
| 577. | <i>Tectona grandis</i> L.f. | Teak | Sag, Sagwan | Lamiaceae | C |
| 578. | <i>Vitex altissima</i> L.f. | Peacock chaste tree | Balage | Lamiaceae | C |
| 579. | <i>Vitex leucoxydon</i> L.f. | White-wood | Songarbi | Lamiaceae | O |

| | | | | | |
|------|--|------------------------------|------------------|----------------|-------|
| | | chaste tree | | | |
| 580. | <i>Vitex negundo</i> L. | Chaste tree | Nirgudi | Lamiaceae | C |
| 581. | <i>Vitex trifolia</i> L. | Three-leaved chaste tree | Nirgudi | Lamiaceae | O |
| 582. | <i>Chionanthus mala-elengi</i> (Dennst.) P.S.Green | Malabar Fringe Tree | Heddi | Oleaceae | E-IND |
| 583. | <i>Ligustrum perrottetii</i> A.DC. | Nilgiri Privet | Kungin, Medsing | Oleaceae | E-IND |
| 584. | <i>Nyctanthes arbor-tristis</i> L. | Coral Jasmine | Parijatak | Oleaceae | C |
| 585. | <i>Olea dioica</i> Roxb. | Rose sandalwood | Parjamb, Hadkya | Oleaceae | O |
| 586. | <i>Russelia equisetiformis</i> Schldl. & Cham. | Coral plant | | Plantaginaceae | Cl |
| 587. | <i>Citharexylum spinosum</i> L. | Fiddlewood | | Verbenaceae | O |
| 588. | <i>Duranta erecta</i> L. | Golden dew drop | | Verbenaceae | Cl |
| 589. | <i>Lantana camara</i> L. | Lantana | Tantani, Ghaneri | Verbenaceae | C |
| 590. | <i>Lantana montevidensis</i> (Spreng.) Briq. | Trailing Lantana | Tantani | Verbenaceae | C |
| 591. | <i>Rotheca serrata</i> (L.) Steane & Mabb. | Blue fountain bush | Bharangi | Verbenaceae | C |
| 592. | <i>Stachytarpheta indica</i> (L.) Vahl | Indian Snakeweed | | Verbenaceae | C |
| 593. | <i>Cordia dichotoma</i> G.Forst. | Indian cherry, Clammy cherry | Lasora, Shelu | Boraginaceae | O |
| 594. | <i>Cordia monoica</i> Roxb. | Snot berry | | Boraginaceae | O |
| 595. | <i>Cordia sebestena</i> L. | Scarlet cordia | Lal Lasora | Boraginaceae | C |
| 596. | <i>Cordia sinensis</i> Lam. | Gondni | | Boraginaceae | O |
| 597. | <i>Ehretia laevis</i> Roxb. | Chamror | Datrang | Boraginaceae | O |
| 598. | <i>Ilex malabarica</i> Bedd. | | | Aquifoliaceae | E-IND |
| 599. | <i>Artemisia nilagirica</i> (C.B.Clarke) Pamp. | Indian wormwood | Dhor dawna | Asteraceae | E-IND |
| 600. | <i>Blumea lanceolaria</i> (Roxb.) Druce | Lanceleaf Blumea | | Asteraceae | C |
| 601. | <i>Chromolaena odorata</i> (L.) R.M.King & H.Rob. | Bitter bush, Devilweed | Tivra gandha | Asteraceae | C |
| 602. | <i>Tithonia diversifolia</i> (Hemsl.) A.Gray | Giant Mexican Sunflower | Kanak gol | Asteraceae | C |
| 603. | <i>Tithonia rotundifolia</i> (Mill.) S.F.Blake | Mexican sunflower, Tithonia | | Asteraceae | C |
| 604. | <i>Hippobroma longiflora</i> (L.) G.Don | Star of Bethlehem | | Campanulaceae | O |
| 605. | <i>Lobelia nicotianifolia</i> Roth ex Schult. | Wild tobacco | Ran tambakhu | Campanulaceae | O |
| 606. | <i>Schefflera actinophylla</i> (Endl.) Harms | Queensland umbrella tree | | Araliaceae | O |
| 607. | <i>Schefflera elliptica</i> (Blume) Harms | Elliptic-Leaved Schefflera | | Araliaceae | Cl |
| 608. | <i>Schefflera venulosa</i> (Wight & Arn.) Harms | Schefflera vine | | Araliaceae | O |

| | | | | | |
|------|------------------------------------|-------------------------|----------|----------------|-------|
| 609. | <i>Pittosporum dasycaulon</i> Miq. | Sahyadri Pittosporum | Gapsundi | Pittosporaceae | E-IND |
| 610. | <i>Sambucus canadensis</i> L. | American elder | | Adoxaceae | Cl |

C: Common, Cl: Cultivations, En: Endangered, E-IND: Endemic to India, E-WG: Endemic to Western ghats, O: Occasional, R: Rare.

Field data sheet for plant identification:

Plant Name:
Common name:

1. Habitat/
1. Evergreen forest /
2. Semi-evergreen forest/
3. Deciduous forest/
4. Scrub forest/
5. Aquatic/
6. Sea
7. Cultivations/
8. All

2. Flowering season/
1. Jan/
2. Feb/
3. March/
4. Apr/
5. May/
6. Jun/
7. Jul/
8. Aug/
9. Sep/
10. Oct/
11. Nov/
12. Dec/
13. All month

4. Phyllotaxy/
1. Alternate/
2. Opposite/
3. Opposite-Decussate/
4. Whorled/
5. Distichous
6. Digitate
7. Crowded at the ends
8. Fascicled

5. Leaf Type/
1. Simple/
2. Compound

6. If compound/
1. Palmate/
2. Pinnate

7. Leaf margin/
1. Entire/
2. Dentate/
3. Serrate/
4. Undulate/
5. Convolute/
6. Crenate/
7. Ciliate/
8. Crispate/
9. Spinous/
10. Lobed/
11. Crenulate/
12. Uneven/
13. Revolute/

Location:
Date:

14. Denticulate/
15. Wavy/
16. Serrulate
8. Inflorescence/
1. Solitary Axillary/
2. Solitary Terminal/
3. Raceme/
4. Cymose/
5. Corymbose /
6. Spike/
7. Catkin/
8. Spadix/
9. Umbel/
10. Umbellate Cyme
11. Hypanthodium/
12. Capitulum/
13. Unipar cyme
14. bipar cyme/
15. Helic cyme/
16. Scorp cyme/
17. Cyathium/
18. Panicle/
19. Axillary Panicle/
20. Terminal Panicle/
21. Verticillaster/
22. Spikelet/
23. Head
24. Terminal corymbose
cymes
25. Terminal polychasial
cymes

26. Terminal peduncled
corymbose
27. Terminal racemes
28. Axillary fascicles
29. Fascicles on leafless
branches
30. Pendulous raceme
31. Pendulous racemes
32. Axillary umbels
33. Axillary corymbose
raceme
34. Terminal racemes
35. Spicate racemose
36. Spherical heads
37. Globose Head
38. Axillary tubercles
39. Densely clustered in raceme
40. Terminal panicles
41. Subglobose clusters
42. Peduncled cymes

9. Inflorescence size/
1. 0-1 cm
2. 1-5 cm
3. 6-10 cm
4. 11-20 cm
5. 21-30 cm
6. 31-50 cm
7. >50 cm

12. Corolla/Perianth
1. Polypetalous/
2. Gamopetalous
3. Monochlamydeae

13. Fruit type/
1. Legume/
2. Follicle/
3. Siliqua/
4. Silicula/
5. Capsule/
6. Caryopsis/

10. Flower Colour/
1. White/
2. Pink/
3. Purple/
4. Red/
5. Green/
6. Blue/
7. Yellow/
8. Orange/
9. Greenish Yellow/
10. Orange Yellow

11. Flower size/
1. Smaller than 1 cm/
2. 1-2 cm/
3. 2-5 cm/
4. 6-10 cm/
5. 10-20 cm/
6. >20

7. Achene/
8. Cypselia/
9. Nut/
10. Samara/
11. Lomentum/
12. Drupe/
13. Syconous/
14. Sorosis/
15. Aggr. Berries/
16. Aggr. Drupes
17. Aggr. Achenes
18. Aggr. Of follicles/
19. Hesperidium/
20. Pome/
21. Peps/
22. Berry/
23. Regma/
24. Pod/

14. Fruit/

1. Edible/
2. Non-Edible

15. Family/

| Sr. No. | Name of the Family |
|---------|--------------------|
| 1. | Lauraceae |
| 2. | Annonaceae |
| 3. | Magnoliaceae |
| 4. | Myristicaceae |
| 5. | Arecaceae |
| 6. | Poaceae |
| 7. | Platanaceae |
| 8. | Proteaceae |
| 9. | Dilleniaceae |
| 10. | Crassulaceae |
| 11. | Vitaceae |

| | |
|-----|------------------|
| 12. | Celastraceae |
| 13. | Comaraceae |
| 14. | Elaeocarpaceae |
| 15. | Oxalidaceae |
| 16. | Clusiaceae |
| 17. | Dichapetalaceae |
| 18. | Euphorbiaceae |
| 19. | Malpighiaceae |
| 20. | Ochnaceae |
| 21. | Passifloraceae |
| 22. | Phyllanthaceae |
| 23. | Putranjivaceae |
| 24. | Rhizophoraceae |
| 25. | Salicaceae |
| 26. | Fabaceae |
| 27. | Cannabaceae |
| 28. | Elaeagnaceae |
| 29. | Moraceae |
| 30. | Rhamnaceae |
| 31. | Rosaceae |
| 32. | Ulmaceae |
| 33. | Urticaceae |
| 34. | Casuarinaceae |
| 35. | Combretaceae |
| 36. | Lythraceae |
| 37. | Melastomataceae |
| 38. | Myrtaceae |
| 39. | Onagraceae |
| 40. | Staphyleaceae |
| 41. | Anacardiaceae |
| 42. | Bursaraceae |
| 43. | Meliaceae |
| 44. | Rutaceae |
| 45. | Sapindaceae |
| 46. | Simaroubaceae |
| 47. | Bixaceae |
| 48. | Dipterocarpaceae |

| | |
|-----|-------------------|
| 49. | Malvaceae |
| 50. | Muntingiaceae |
| 51. | Thymelaeaceae |
| 52. | Capparaceae |
| 53. | Caricaceae |
| 54. | Moringaceae |
| 55. | Salvadoraceae |
| 56. | Loranthaceae |
| 57. | Oleaceae |
| 58. | Oplilaceae |
| 59. | Santalaceae |
| 60. | Cactaceae |
| 61. | Ancistrocladaceae |
| 62. | Plumbaginaceae |
| 63. | Polygonaceae |
| 64. | Cornaceae |
| 65. | Hydrangeaceae |
| 66. | Ebenaceae |
| 67. | Lecythidaceae |
| 68. | Myrsinaceae |
| 69. | Primulaceae |
| 70. | Sapotaceae |
| 71. | Symplocaceae |
| 72. | Leacinaeae |
| 73. | Apocynaceae |
| 74. | Loganiaceae |
| 75. | Rubiaceae |
| 76. | Convolvulaceae |
| 77. | Solanaceae |
| 78. | Acanthaceae |
| 79. | Bignoniaceae |
| 80. | Lamiaceae |
| 81. | Oleaceae |
| 82. | Plantaginaceae |
| 83. | Verbenaceae |
| 84. | Boraginaceae |
| 85. | Aquifoliaceae |

| | |
|-----|----------------|
| 86. | Asteraceae |
| 87. | Campanulaceae |
| 88. | Araliaceae |
| 89. | Pittosporaceae |
| 90. | Adoxaceae |



Digital Herbarium of Angiospermic Tree Species from Western Ghat Regions of Maharashtra

Rajendra S. Zunjarrao*, Rajkumar B. Barmukh, Anita S. Kindre

Post - Graduate Research Centre, Department of Botany

Progressive Education Society's Modern College of Arts, Science and Commerce, Shivajinagar, Pune – 411005.

*rsz.modern@gmail.com

Abstract -

The present investigation reports a digital solution to overcome limitations of traditional herbarium. The data of tree species in the Western Ghat regions of Maharashtra is presented in this paper. The botanical information and digital photographs of about 130 tree species from the Western Ghat regions of Pune, Kolhapur, Thane, Satara, Sangali, Raigad and Sindhudurg districts of Maharashtra were used to build a searchable database to be made available online at the dedicated website www.indianflora.org. So far, the data of about 535 tree species which include 43 endemic to Western Ghats and 7 rare species has been recorded.

Keywords : Digital herbarium, Digital images, Endemic plants, Maharashtra, Plant systematics, Western Ghats

I. Introduction

The term herbarium, used in the strictest sense today, is a collection of preserved plant specimens. The importance of herbarium as a teaching, learning resource has been established from time to time in colleges, universities and research institutions as well. Every institution concerned with Plant Sciences has a collection of such herbarium specimens. The plant species represented in such collections are usually collected during the field visits organized by the institutes and also from the personal collection. These herbarium specimens are usually from the local areas and are easily accessible only to the researchers of the adjoining areas. Furthermore, these are physical specimens and therefore demands sufficiently large, dedicated and well equipped infrastructure. It also demands recurrent expenses on manpower required to maintain such herbaria and for preserving these specimens in acceptable conditions.

Thus, there are four major constraints in relying on conventional herbaria:

- i. The recurring cost for preparation and maintenance of herbarium specimens
- ii. The infrastructural facilities required for herbarium
- iii. Accessibility of such herbarium collection is usually limited to the nearby areas

iv. Disturbance to the vegetation to a certain extent

To overcome this, we are preparing a 'Digital Herbarium' or E-flora of angiospermic tree species. The Digital Herbarium is made of high quality digital images of plants and the related botanical information. This can help in accurate and efficient identification even in the absence of expert taxonomist and has negligible expenses on maintenance of herbarium. The infrastructural facility needed is one computer connected to internet. No destruction of natural vegetation and habitat occurs in making of this digital herbarium. It can be made accessible free of cost and round the clock from any part of the world through a dedicated web site. Online accessibility makes it available not only to researchers but to students and the general population as well.

The present work reports tree species diversity in the Western Ghat regions of Maharashtra, one of the important biodiversity hot spots in India. In Maharashtra, it is spread over the area of 58,400 sq. km. In the present study, so far, the digital herbarium is represented by about 130 tree species from the Western Ghat regions of Pune, Kolhapur, Thane, Satara, Sangali, Raigad and Sindhudurg districts of Maharashtra. The tree species include 43 trees endemic to Western Ghats, 7 rare species, 55 medicinal species and 60 plants species which yield edible fruits from the total 535 tree species.

II. Methodology

According to flowering and fruiting seasons, an inventory of about 950 tree species was prepared with the help of various regional floras^{[1], [2], [3], [4], [5], [6], [7], [8]}. The field work was done in Western Ghats region of Maharashtra such as Pune, Kolhapur, Thane, Satara, Sangali, Raigad and Sindhudurg districts for photographic documentation and field notes. During the field work, visits to various sacred groves and wild life sanctuaries (WLS) from Western regions of Maharashtra, namely, Phansad WLS, Tungreshawar WLS, Bhimashankar WLS, Tamhini WLS and Sanjay Gandhi National Park, Borivali were made for photographic documentation of plants. Each plant was photographed by repeated visits in different seasons for its habit, stem, upper and lower surface of leaf, flowering twig, close-up



of flower and special character of a flower, if any, to make correct identification of these plants.

The plants were identified with the help of literature available which included regional floras^{[1], [2], [3], [4], [5], [6], [7], [8]}, book^[9], field guide^[10] and web sites^{[11], [12]}. The experts from Botanical Survey of India, Pune (Western Regional Circle) were also consulted for correct identification. The digital images were edited with Photoshop software for making them suitable for uploading and viewing on web pages.

The database generated is being organized for displaying on a dedicated web site www.indianflora.org which will be developed on a PHP platform (Fig.1).

Fig. 1. Design of main page of a dedicated website www.indianflora.org of the digital herbarium

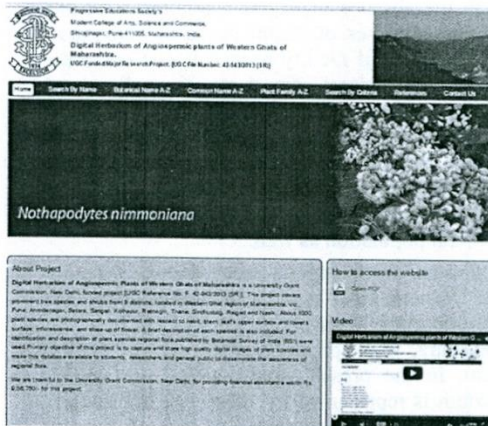


Fig. 1. Design of main page of a dedicated website : www.indianflora.org of the digital herbarium

The website displays the plant lists categorized by common names, botanical names and plant families. In this e-flora, digital images of each plant were arranged in the logical sequence of habit, stem, upper and lower surface of leaf, flowering twig, close-up of flower and special character of a flower, if any (Fig.2). A brief description of each plant also accompanies the set of digital images. A criteria based search programme is also made available on the website for correct identification of tree plant specimens.

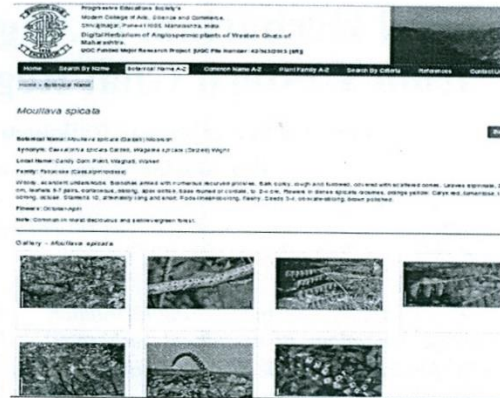


Fig.2. Design of webpage of one tree species

III. Results

Out of more than 950 tree species to be studied, at present the digital herbarium is represented by about 535 tree species. These tree species include 45 trees endemic to Western Ghats, 7 rare species (Table 1), 55 medicinal species and 60 plant species which yield edible fruits.

TABLE 1

List of Endemic and Rare Plants from Western Ghat Regions of Maharashtra

| Botanical Name | Family | Status |
|--|----------------|---------|
| <i>Actinodaphne hookeri</i> Meisn. | Lauraceae | Endemic |
| <i>Aglaia etaeagnoidea</i> (A. Juss.) Benth. | Meliaceae | Endemic |
| <i>Aglaia lavii</i> (Wight) C.J.Saldanha | Meliaceae | Endemic |
| <i>Allophylus cobbe</i> (L) Raesch. | Sapindaceae | Endemic |
| <i>Bombax ceiba</i> L. | Malvaceae | Endemic |
| <i>Buchanania cochinchinensis</i> (Lour.) Almeida | Anacardiaceae | Endemic |
| <i>Carallia brachiata</i> (Lour.) Merr. | Rhizophoraceae | Endemic |
| <i>Careya arboea</i> Roxb. | Lecythidaceae | Endemic |
| <i>Celtis timorensis</i> Span. | Ulmaceae | Endemic |
| <i>Dillenia pentagyna</i> Roxb. | Dilleniaceae | Endemic |
| <i>Dysoxylum binectariferum</i> (Roxb.) Hook. f ex Bedd. | Meliaceae | Endemic |
| <i>Dysoxylum malabaricum</i> Bedd. ex Hiern | Meliaceae | Endemic |
| <i>Garcinia indica</i> (Thouars) Choisy | Clusiaceae | Endemic |
| <i>Garcinia talbotii</i> Raiz. ex Santapau | Clusiaceae | Endemic |
| <i>Garuga pinnata</i> Roxb. | Burseraceae | Endemic |
| <i>Glochidion ellipticum</i> Wight | Euphorbiaceae | Endemic |
| <i>Grewia abutilifolia</i> Vent. ex L. | Tiliaceae | Endemic |
| <i>Grewia nervosa</i> (Lour.) Panigr. | Tiliaceae | Endemic |
| <i>Harpullia arborea</i> (Blanco) Radlk. | Sapindaceae | Endemic |
| <i>Helicteres isora</i> L. | Sterculiaceae | Endemic |



| | | |
|--|----------------|---------|
| <i>Holigarna arnottiana</i> Hook. f | Anacardiaceae | Endemic |
| <i>Holigarna grahamii</i> (Wight) Kurz. | Anacardiaceae | Endemic |
| <i>Lagerstroemia parviflora</i> Roxb | Lythraceae | Endemic |
| <i>Lagerstroemia reginae</i> Roxb. | Lythraceae | Endemic |
| <i>Lagerstroemia microcarpa</i> Wight | Lythraceae | Endemic |
| <i>Lannea coromandelica</i> (Houtt.) Merr. Odinawodier Roxb. | Anacardiaceae | Endemic |
| <i>Macaranga peltata</i> (Roxb.) Muell.Arg. | Euphorbiaceae | Endemic |
| <i>Maesa indica</i> (Roxb.) DC. | Myricaceae | Endemic |
| <i>Maytenus rothiana</i> (Walp.) Lobereau-Callen | Celastraceae | Endemic |
| <i>Memecylon umbellatum</i> N. Burman | Melastomaceae | Endemic |
| <i>Morinda citrifolia</i> L. | Rubiaceae | Endemic |
| <i>Moullava spicata</i> (Dalzell) Nocols | Leguminosae | Endemic |
| <i>Nothapodytes nimmoniana</i> (Grah.) Mabb. | Icacinaceae | Endemic |
| <i>Psydrax dicoccos</i> Gaertn. | Rubiaceae | Endemic |
| <i>Sageraea lauriflora</i> (Grah.) Blatter | Annonaceae | Endemic |
| <i>Sterculia guttata</i> Roxb. ex DC. | Sterculiaceae | Endemic |
| <i>Sterculia wrens</i> Roxb. | Sterculiaceae | Endemic |
| <i>Strobilanthes callosus</i> Nees | Acanthaceae | Endemic |
| <i>Woodfordia fruticosa</i> (L.) Kurz | Lythraceae | Endemic |
| <i>Wrightia arborea</i> (Dennst.) Mabb. | Apocynaceae | Endemic |
| <i>Zanthoxylum rhetsa</i> (Roxb.) DC. | Rutaceae | Endemic |
| <i>Ziziphus rugosa</i> Lam. | Rhamnaceae | Endemic |
| <i>Ziziphus xylopyrus</i> (Retz.) Willd. | Rhamnaceae | Endemic |
| <i>Beilschmiedia dalzellii</i> (Meisn.) Kosterm. | Lauraceae | Rare |
| <i>Elaeocarpus serratus</i> L. | Elaeocarpaceae | Rare |
| <i>Eriolaena quinquelocularis</i> (Wight & Arn.) Wight Bothi | Sterculiaceae | Rare |
| <i>Grewia umbellifera</i> Bedd. | Tiliaceae | Rare |
| <i>Knema attenuata</i> (Wall. Ex Hook.f. & Thomas) Warb. | Myristicaceae | Rare |
| <i>Desmodium oojeinense</i> (Roxb.) H.Ohashi | Leguminosae | Rare |
| <i>Sterculia villosa</i> Roxb. Ex. DC. | Sterculiaceae | Rare |

IV. Conclusion

This database to be published on a dedicated website www.indianflora.org can help to know the tree wealth of Western Ghats of Maharashtra. It can help in accurate and efficient identification of tree species even in the absence of expert taxonomists. It has

negligible expenses on maintenance of herbarium. Moreover, it can be accessed and used free of cost by the NGOs, students, researchers and anybody interested in tree identification.

Acknowledgement

The authors are thankful and wish to express their sincere gratitude to the University Grant Commission, New Delhi for financial support. They are also thankful to Dr. Benniyamian, Director, Dr. J. Jayanthi, Scientist D and Mr. C. R. Jadhav, Botanist, Botanical Survey of India, Pune, for validating identification of plant images.

References

1. T. Cooke, The Flora of the Presidency of Bombay, Vol. I, Taylor and Francis, London, 1903,
2. T. Cooke, The Flora of the Presidency of Bombay, Vol. II Taylor and Francis, London, 1908
3. B. D. Sharma, Saravanam Karthikeyan, N. P. Singh, Flora of Maharashtra (Dicotyledons) Vol I, Botanical Survey of India, 2000
4. B. D. Sharma, Saravanam Karthikeyan, N. P. Singh, Flora of Maharashtra (Dicotyledons) Vol II, Botanical Survey of India, 2001
5. S R Yadav and M M Sardesai, Flora of Kolhapur District, Shivaji University Kolhapur – 416004. Maharashtra (India), 2002
6. Sandhya Deshpande, B. D. Sharma, M. P. Nayar, Flora of Mahabaleshwar and adjoining area, Maharashtra, Vol I, Botanical Survey of India, 1993
7. Sandhya Deshpande, B. D. Sharma, M. P. Nayar, Flora of Mahabaleshwar and adjoining area, Maharashtra, Vol 2, Botanical Survey of India, 1995
8. M. J. Kothari, S. Moorthy, Flora of Raigad District Maharashtra State, Botanical Survey of India, 1993
9. D. K. Mishra, N. P. Singh, Endemic and Threatened Flowering Plants of Maharashtra, Botanical Survey of India, 2001
10. M. Sardesai, R. Govekar, S.R.Yadav, Field Guide to the Plants of Sahyadri and Konkan, Reseach wing, Forest Department, Government of Maharashtra, 2013
11. (2013) Data base on plant names [Online]. Available: <http://www.theplantlist.org>
12. (2005) Flowers of India [Online]. Available: <http://www.flowersofindia.net>

UGC File No. 42-943/2013 (SR)

Annexure - IX

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110 002

PROFORMA FOR SUBMISSION OF INFORMATION AT THE TIME OF SENDING THE
FINAL REPORT OF THE WORK DONE ON THE PROJECT

1. **Title of the Research Project:** Developing a Digital Herbarium of Angiospermic Plants of the Western Ghat Regions of Maharashtra.
2. **NAME AND ADDRESS OF THE PRICIPAL INVISTIGATOR:**
Dr. R. S. Zunjarrao
Head, Department of Botany and
Principal, Progressive Education Society's
Modern College of Arts, Science and Commerce, Shivajinagar, Pune-411005.
3. **NAME AND ADDRESS OF THE INSTITUTION:**
Post Graduate Research Centre,
Department of Botany,
Modern College of Arts, Science and Commerce, Shivajinagar, Pune-411005,
(Maharashtra, India).
4. **UGC APPROVAL LETTER NO. AND DATE:** 42-943/2013 (SR)
Dated 14.03.2013
5. **DATE OF IMPLEMENTATION:** 1st April 2013
6. **TENURE OF THE PROJECT:** 1st April 2013 to 31st March 2016
Junior research fellow (JRF)

| No. | Name | Date of Joining | Date of leaving |
|-----|---------------------|-----------------|-----------------|
| 1 | Mr. Shrikant Gund. | 02/05/2013 | 30/04/2014 |
| 2 | Miss. Anita Kindre. | 06/05/2014 | 31/03/2016 |

7. **TOTAL GRANT ALLOCATED:** Rs.9,86,750/- (Nine lacs eighty six thousand seven hundred fifty rupees only)

8. TOTAL GRANT RECEIVED:

First Installment: Rs.6,29,750/- (Rs. Six lac twenty nine thousand seven hundred fifty rupees only)

Second Installment : Rs. 2,49,368/- (Rs. Two lac forty nine thousand three hundred sixty eight only)

Total Grants Released : Rs. 8,79,118/- (Rs. Eight lac seventy nine thousand one hundred eighteen only)

9. FINAL EXPENDITURE: Rs.8,86,832/-(Rs. Eight lac eight six thousand eight hundred thirty two only.)

10. TITLE OF THE PROJECT: Developing a Digital Herbarium of Angiospermic Plants of the Western Ghat Regions of Maharashtra.

11. OBJECTIVES OF THE PROJECT:

The project was undertaken with the following objectives:

1. Visiting Western Ghat regions of Maharashtra for studying tree species.
2. Taking photographs of these plants by making repeated visits in different seasons.
3. Identification of these plants with the help of available literature such as regional floras and taxonomic experts at the Botanical Survey of India, Western Regional Circle, Pune.
4. Organization of the digital images into a searchable database.
5. Sharing of this database through a dedicated website, www.indianflora.org

12. WHEATHER OBJECTIVES WERE ACHIEVED (GIVE DETAILS):

Yes. The objectives were achieved as per our expectations. Prior to initiate the field work in the first year of the project i.e., in 2013 2014, an inventory of about 1150 tree species found in the Western Ghatrgions of Maharashtra was made.. The progress was made as per our expectations and objectives and the data on about 650 tree species has been collected during the last three years. Of these 650 plants, data on 350 plants has been uploaded on the website www.indianflora.org.

13. ACHIEVEMENTS FROM THE PROJECT:

The most important achievement from the project is the website www.indianflora.org, we have developed and is available free of cost and can be used to correctly identify the tree species found in the regions of Western Ghat in Maharashtra. The website interface is very much user-friendly and can be used with ease by students, teachers, and general people who are interested in knowing the tree wealth of Western Ghat regions of Maharashtra.

Part of the data generated in this project has also been published in a research paper entitled 'Digital Herbarium of Angiospermic Tree Species from Western Ghat Regions of Maharashtra' in the journal 'Dnyanmay'.

14. SUMMARY OF THE FINDINGS (IN 500 WORDS)

There are several limitations of traditional herbarium specimens. Though these traditional herbaria are key in taxonomic studies, as the time passes by, the herbarium specimens fade, and the plant parts may get damaged thereby creating difficulties in plant identification. A Digital Herbarium can be an affordable and easy to use solution for correct identification of plants.

For making a Digital Herbarium of tree species found in the Western Ghat regions of Maharashtra, high quality digital images and field observations were required. Therefore, about 80 locations from eight districts of Maharashtra were visited in total 70 visits arranged during October 2013 to February 2016. The plant images were edited to suit the requirement of the website. The plants were identified with the help of literature such as regional floras published by Botanical Survey of India, field guides and experts in the plant taxonomy at the Botanical Survey of India, Western Regional Circle, Pune. The plant names were updated with the help of websites such as www.tropicos.org, www.ipni.org, www.theplantlist.org. The data on about 650 tree species was collected. Out of these 650 tree species, 610 are correctly identified and the identification of 40 species is yet to be confirmed. The database on 610 tree species belonging to 90 plant families of angiosperms include 51 plants endemic to India, 19 plants endemic to Western Ghats, one plant species endemic to Maharashtra, 11 rare tree species. Further, from the data, 206 plants are found

occasionally, 216 plants are found commonly and 65 plants bear edible fruits. Of these 610 identified plants, the data on 350 Species from 67 plant families of dicotyledonous plants have been uploaded on the website www.indianflora.org. In this database, the families with highest number of representatives are Leguminosae with 50 plant species, Rubiaceae with 26 plant species and Malvaceae with 18 plant Species.

The searchable database of digital herbarium of angiospermic trees of Western Ghat regions of Maharashtra has been made available online from 29th February 2016. The user can access the information on the website for plant identification by:

- a. Selecting the tab 'Search by Name' and entering the suspected name of the plant in the search box provide to retrieve the data to match with the specimen in hand.
- b. Selecting the tab 'Botanical Name A-Z' where plants are listed alphabetically as per botanical names. Clicking on the name of plant retrieves the details.
- c. Selecting the tab 'Common Name A-Z' where plants are listed alphabetically as per common names. Clicking on the name of plant retrieves the details.
- d. Selecting the tab 'Search by Criteria' and on the web page presented, the characters are to be selected as observed in the specimen under study. A list of possible plants meeting the inputted criteria is retrieved. Clicking on the name of plant gives the details of the plant species

This website can help in accurate and efficient identification of trees from Western Ghat regions of Maharashtra, even in the absence of expert taxonomist and has negligible expenses on maintenance of herbarium. This database will provide a home for global, regional or local studies. It can also provide digital study material for teaching Taxonomy, Field Botany, Plant Communities, Ethnobotany, Agriculture, Dendrology, Forestry, etc. It is useful in providing information on common names and local uses of plants which is essential for studies related to Ethnobotany and Economic Botany. This website can also be used for getting a detailed botanical description of tree species found in the Western Ghats regions of Maharashtra.

15. CONTRIBUTION TO THE SOCIETY (GIVE DEATILS):

1. The major outcome of the project is the website www.indianflora.org which we have developed and is available to the society free of cost.
2. The website can give glimpses of tree wealth of Western Ghat in Maharashtra.
3. The searchable database of digital herbarium of angiospermic trees of Western Ghat regions of Maharashtra has been made available online from 29th February 2016. It can help in accurate and efficient identification of trees from Western Ghat regions of Maharashtra, even in the absence of expert taxonomist and has negligible expenses on maintenance of herbarium.
4. This database will provide a home for global, regional or local studies. This database can also provide digital study material for teaching Taxonomy, Field Botany, Plant Communities, Agriculture, Forestry, etc.
5. It is useful in providing information on common names and local uses of plants.
6. Collection of thousands of high quality digital photographs is generated in this project. These digital images can be used for various aspects of teaching and learning the subject Botany, preparation of field guides etc.
7. This initiative can help to popularize the idea of digital herbarium of many other types of plants like herbs, climbers etc.
8. The approach of Digital Herbarium is very eco-friendly in nature since the natural vegetation is not disturbed in any way while preparing a digital herbarium.

16. WHEATHER ANY PH.D. ENROLLED/PRODUCED OUT OF THE PROJECT:Nil

17. NO. OF PUBLICATIONS OUT OF THE PROJECT (PLEASE ATTACH):


Publication No.1:(Annexure 1)

R S ZUNJARRAO, R B BARMUKH and ANITA KINDRE(2015) Digital Herbarium of Angiospermic Tree Species from Western Ghat Regions of Maharashtra.*Dnyannay 1*(1):11-13

Publication No.2:(Annexure 2)

Website:www.indianflora.org

Authors: R S ZUNJARRAO, R B BARMUKH and ANITA KINDRE


PRINCIPAL INVESTIGATOR


CO-INVESTIGATOR




REGISTRAR ~~PRINCIPAL~~

P.E. Society's
Modern College of Arts, Science & Commerce
Shivajinagar, Pune - 411 005