

**Creation of Arboretum**  
**In situ conservation of Medicinal Plants**  
**and Bamboo cultivation at Salungan,**  
**Bhor.**



**Project Report**

**2018-2019**

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## Project Team

- **PI:** Ms. Sangeeta A. Kulkarni  
Address: Jnana Prabodhini Nigdi Kendra, sector 25, Nigdi, Pradhikaran, Pune 411 044.  
Telephone: (020) 27657508
- **PI:** Dr. Medha Paranjape  
Address: Late M.G. alias Rajabhau Achawal Trust, Nayan-Tara, 16/8, Sunita Co Op. Society, Erandawane, Pune 41104.  
Telephone: (020) 25441308
- **Co PI:** Mr. Sagar Tupe  
Address: Jnana Prabodhini Nigdi Kendra, sector 25, Nigdi, Pradhikaran, Pune 411 044.  
Telephone: (020) 27657508
- **Co PI:** Ms. Amruta Bokil  
Address: Jnana Prabodhini Nigdi Kendra, sector 25, Nigdi, Pradhikaran, Pune 411 044.  
Telephone: (020) 27657508

### **Technical support:**

1. Vaidya. Medha Deolekar  
Address: Jnana Prabodhini Nigdi Kendra, sector 25, Nigdi, Pradhikaran, Pune 411 044.  
Telephone: (020) 27657508
2. Vaidya. Vivek Swant
3. Vaidya. Dipti Dharmadhikari  
Address: Jnana Prabodhini Nigdi Kendra, sector 25, Nigdi, Pradhikaran, Pune 411 044.  
Telephone: (020) 27657508
4. Mr. Vinay Kolthe  
Owner of The Bamboo Nursery, Bhor

## **Acknowledgement**

We are very grateful to the Jnana Prabodhini Nigdi Kendra and Late M.G. alias Rajabhau Achawal Trust for giving us this opportunity to work and develop on idea of creating an arboretum at very remote area. We are very thankful of Late M.G. alias Rajabhau Achawal Trust for providing transport facility and taking interest in the subject of **Plantation and conservation of Medicinal Plants**.

We are very grateful of Jnana Prabodhini Nigdi Kendra which always encourages and support us to do new things in the field of biotechnology. We are very thankful to our technical, non-technical staff of Jnana Prabodhini Nigdi Kendra and Late M.G. alias Rajabhau Achawal Trust for their support throughout the project.



## Introduction

In collaboration with Achawal trust and Jnana Prabodhini Navnagar Vidhyalay, Nigdi, pune has taken an initiative work for the well begins of Salungan people. Salungun is the remotely placed village of Taluka .Bhor, District. Pune. It is enriched with the medicinal plants and shrubs, herbs and bamboo species. The main objective of project to create place into training hub for the display of medicinal plants as well as bamboo species and generating income for youth as well as adults of Salungan village. For this activity Smt. Sangeeta Tai Kulkarni prepared project proposal draft. It includes 1.Objectives 2.Networking approach technology based work 3.Salient feature of field intervention4.Methadology5.Expected outcomes. It is of 7 pages. **The main objective of project is to conserve Medicinal plants and Bamboo in the vicinity of Salungan area by creating awareness in the local population along with students of science streams and Vaidya as well as protecting and cultivating them at that site. Also train the local people for the post harvesting processes of the medicinal plants and bamboo to increase their income.**

To fulfill the objectives methodology decided which further classified into three subtopics:

1. Development of Arboretum and facility centre
2. Awareness and training at community level.
3. Skill and entrepreneurship development

Draft was concluded with expected outcomes. The detailed draft is attached along with the report in the Appendix.

Project had started from April of 2018. During the period of project Miss. Amruta Bokil and Mr.Sagar Tupe worked as Co PI Ratilal karia department of biotechnology members Mr.Sagar Tupe and Miss.Amruta Bokil was Co PI of the project. Mr. Sagar Tupe performed field visits and Project management. During the period of project Sagar Tupe and Amruta Bokil visited site for 16times and 4 times respectively in the APRIL and JUNE 2018 for project management. Initially these visits were performed on Thursday, Saturday. Later on, these visits were twice in a week on Wednesday, Thursday.

Miss .Amruta Bokil has responsibility for development of food products which has medicinal value and train Mahila Bachat gat .Gather the information about Medicinal plants at the location site.

### **Work done in the Month of April:**

- 1. Resource Mapping:** On 7<sup>th</sup> April 2018, Mr.Sagar Tupe first time visited project area to check available recourse at the site. On 19<sup>th</sup> of April 2018 he conducted survey regarding plant species at site. The details of survey are attached in the appendix.
- 2. Meeting with experts :**
  - Shmt .Sangeeta Tai Kulkarni conducted meeting with AATMA Krushibhavan Mr.Ajay Deshmukh for the Bamboo Farm School Permission.
  - Shmt .Sangeeta Tai Kulkarni conducted meeting with Visit and discussion at ecological Society with Priya Phulambarikar for project concept reporting.
- 3. Post harvest processing:** On 25<sup>th</sup> of April 2018Mr.Sagar Tupe and Miss Amruta Bokil visited Salungan for first time field visit and Collection of the Karvand from the site. Karvand utilized for the preparation of Karvand syrup. Karvand syrup prepared from 1 kg of Karvand on respective days near about 250ml extract extracted and 700gm of sugar added to prepare 750 ml of Karvand syrup.Meynalaxiflora(Aalu)candy is one of the shortlisted products for Mahila Bachat Gat training. Aalu is helpful against the gastric disorders.
- 4. Project Management:** During project period water found excess in the rainy season while scarcity of water in summer season .There is one shettale at the site which was filled during rainy season while in summer season it has less amount of water. To overcome this problem, we contacted to Water shed development **department of Dnyanprabodhini. Mr. Deshpande member of water shed development.** He stated that the land area is under ecological sensitive zone where blast for well is impossible. He gave the quotation for the well blast around rupees 2, 50,000. He visited survey site for 3 times during period of the project on the 7<sup>th</sup>, 12<sup>th</sup> and 19<sup>th</sup> of April 2018



**Photo graph of MR. Deshpande during visit**

- 5. Tissue culture trials:** Miss. Amruta Bokil performed tissue culture protocol trials for 2 times of Hemidesmus indicus on 21 and 26 April 2018.

### **Work done in the Month of May:**

1. **Post harvest processing:** On 10<sup>Th</sup> and 17<sup>Th</sup> of May 2018 karwad were collected for the Karvand Syrup Preparation. This time it was prepared by using different method i.e. without using seeds.
2. **Project Management:** On the 17<sup>Th</sup> May 2018 both of CO PI visited Site for the preplanning and inviting people from different village for the official inauguration of the project. On 19<sup>Th</sup> May 2018, inguaral program of the project carried out at the project site in the presence of dignitaries Rural development head Of Jana Prabodhini Mr. Subhashrao Deshpande, Dr. Anil Paranjape Achawal trustees Dr. Medha Paranjape, Centre supredent of the Nigdi Mr. Manojrao Devalekar and Mrs. Medha Devalekar , Organizational head Mr. Yashwant rao Limaye Mr. swant kaka, Head of Ratilal karia department of biotechnology Smt. Sangeeta tai Kulkarni, Head of The bamboo nursery Mr. Vinay kolthe and villagers of Salungan, kondgaon ,rajiwadi , BAIF ex director Mr. Dev etc were present. On the day of inauguration project named as “**Neelambar Vruksha Prabodhini**”



**Photograph of Bhoomipoojan Dignitaries on dice along with villagers**

The program was of 2 hrs. Special Pothi was prepared by head of the biotechnology department Shmt. Sangeeta Kulkarni. It was for vruksha avahan at place. Purohit Mr. Yashwant Limaye performed pooja of the Panchtatv. Dignitaries planted Bale, Tulsi, and Vavading at the site.

### 3. **Meeting with experts:**

- On 21<sup>st</sup> of May 2018 Meeting held at Nayan Tara Hospital along with PI and Co .PI of project for the cultivation of grasses at project site. Mr. Sagar Tupe

(B.Sc. Agriculture) conducted meeting for cultivation of grasses who suggested different type of grasses for cultivation. It includes hatti grass, Fountain grasses, Multicutjawari. All seeds of grasses available at Naik Krushi Bandar.

- On 24<sup>th</sup> of May 2018 Shmt.Sangeeta Kulkarni and Co PI Sagar Tupe visited to Mr. Datttray Pingale for counter Mapping and Head of landscaping Tejaswini Kulkarni.



Photo graph of meeting with head of landscaping at Nanded City

- On 25<sup>th</sup> of May 2018 Shmt.Sangeeta Tai visited to Dr.Mandar Datar a well known taxonomist. She also visited to Vaidya Vivek swant and Gangotri architect for briefing of concept of project and establishing rapport.
- 4. Project Management:** On 30<sup>th</sup> and 31<sup>st</sup> of May 2018 Contour mapping performed for counting total area of project. Contour mapping survey conducted by Mr. Datttray Pingale and colleagues at project site. It stated that project area is of 13 ½ Acers. They have submitted report in the form of soft copy
- 5. Training at site:** On 30<sup>th</sup> and 31<sup>st</sup> of May 2018 Mr.Sagar Tupe provided Bamboo plantation guidance to rajiwadi and Jayatpad farmers.

#### **Wok done in the month of June:**

##### **1. Meeting with experts:**

- On 4<sup>th</sup> June 2018 and 26<sup>th</sup> of June meeting with Dr.Taittali for bamboo plantation.
- On 11<sup>th</sup> June and 14<sup>th</sup> June meeting with AATMA Krushibhavan Director for sanction of Farm Schools for Salungan village.
- On 18<sup>th</sup> June Visit to Vinay Kolthe's The Bamboo Nursery for inviting as Guest lecturer for Bamboo farm School.



2. **Project management:** On 20<sup>th</sup> June Visit of Gangotri architect and Vaidya vivek swant for site visit. Vaidya Vivek Swant Visited for identification of medicinal plants at site.



Photograph of Shmt. Sangeeta Tai, Dr. Pranjape along with architect team.

3. **Training at site:** On 21<sup>st</sup> of June and 27<sup>th</sup> of June Farm School conducted by Mr. Vinay Kolthe and Mr. Sagar Tupe for Farmers of Salungan and Vicinity villages.



**Photograph of Vinay Kolthe during Farm School**

- 3. Outcomes of project:** Three surveys were conducted for resource mapping along with experts and project members. The surveys were conducted before monsoon i.e. plants occurring in the summer season enlisted. Total 48 plant species identified.

The list of resource mapped plants is in the annexure

<b>Sr.No.</b>	<b>Plants</b>	<b>Number</b>
1	Oil Seed	2
2	Trees	4
3	Edible plants	5
4	Medicinal plants	15
5	Climber	5
6	Creepers	2
7	Aesthetic	11
8	Bamboo	2
9	Miscellaneous	2

Medicinal Plants should cultivate on top of hill where soil is in abundant amount, moist, and red in colour. In the other part of land soil layer is absent. It has more stone part. It is observed during the survey. It has one solution which was provided by Head of landscaping Mrs. Tejaswini Kulkarni she stated that we can use vermicomposting to increase organic content of it. 12 medicinal plants were shortlisted for cultivation at the site. These are selected on the basis of its conservation status, commercial importance and its occurrence at the site. These plants were shortlisted by Vaidya, Sharangdhar pharmaceuticals and CFO Mr. Khandekar and colleagues.

We contacted Gangotri architects for constructing structures with the help of bamboos for display of utilization of bamboo to local people and to agro tourists. It also provides aesthetic value to project area. We identified climbers which can be used for decoration of these structures.

As the one of the aspect from the project draft we conducted bamboo plantation training program for the Salungan farmers. It was conducted by the expert owner of The Bamboo nursery Mr. Vinay Kolthe, and retired forest officer Mr. Shankar Jagtap. We conducted it for 25 farmers for two times before monsoon season at the site.

We also tried initiation protocol for medicinal plants Sarpagandha, Anantmool using axillary buds. Later on, after discussion with Vaidya we decided to perform micro propagation of Sarpagandha and Amnatmool using seeds.

During project period Miss. Amruta gathered information about shortlisted plants in the form of Synonym, family Vernacular name, description, distribution, medicinal uses, traditional uses and Phytochemistry. The information was collected from the Ayurvedic books "Plants for Health and Nutritional Security" supported by Department of biotechnology, Govt. of India" Plantation of Medicinal Plants and aromatic Plants by Bh. Pa. Joshi. And Internet.

We contacted 7 nurseries in the vicinity of Pune for procurement of medicinal plants. 1. Pranjal nursery 2. Vivek broom 4. Koops nursery 4. Ajit

Thakur5.Mr.dhole6.Bhanudas Chavan and 7.The Bamboo nursery. Quotation for shortlisted plants was obtained from Pranjal Nursery.

On the field Mr.Sagar Tupe carried out Macro propagation of Huda bamboo using Nodal segments. The trail failed due to fungal contamination.

In the month of November 2018 Dr.Mandar Datar's field visit was decided by shmt.Sangeeta Tai. The program was arranged for Farmers, students and trust members. It was one day workshop.Dr.Digambar Mokat, Vaidya Vivek savant also were invited for the workshop. The whole day program was decided. The program was canceled.

# Annexure

## Annexure no.1

### 1. List of Plants for Plantation

		Botanical name	Vernacular name	Local Name
	<b>Oil Seed</b>			
1		<i>Aphanomyxis polystachya</i>	Lohita,Laxmipana,Pitraj	Raktrohida
2		<i>Pongamia pinnata</i>	Kranj	karanj
	<b>Trees</b>			
3		<i>Hardwickia binata</i>	Anjani	Anjani
4		<i>Actinodaphne hookeri</i>	Pisa	
5		<i>Ixora brachita</i>	Rankuda	
6		<i>Callicarpa tomentosa</i>	Aisar	
	<b>Edible plants</b>			
7		<i>Elaeagnus latifolia</i>	Amab guli ,Snake fruit	Nurgi
8		<i>Syzygium cumini</i>	Jambhul	Jambhul
9		<i>Carissa carandas</i>	Karvand	Karvand
10		<i>Meyna laxiflora</i>	alu	alu
11		<i>Pueraria tuberosa</i>	vidari kand	
	<b>Medicinal Plants</b>			
12		<i>Hemidesmus indicus</i>	Anatmool	Anantmool
13		<i>Rauwolfia serpentina</i>	Sarpgandha	Sarpgandha
14		<i>Withania somnifera</i>	Ashwgandha	Ashwgandha
15		<i>Sermecarpus anacardium</i>	Bhilwa, biba	
16		<i>Saraca asoca</i>	Seeta ashok	
17		<i>Celastrus paniculatus</i>	Jyotishmati	
18		<i>Terminalia chebula</i>	Hirda	Hirda
19		<i>Termanalia bellirica</i>	Behada	Behada
20		<i>Phyllanthus embilca</i>	Amala	Amala
21		<i>Pogostermon bengalhensis</i>	Pangali	
22		<i>Gymnema sylvestre</i>	Bedkicha pala,Gudmar,Madhunashini	
23		<i>Randia dumetorum</i>	Madanphal	Gela



24		<i>Flemingia strobilifera</i>	Kanphuti	
25		<i>Zizyphus rugosa</i>	Toran	
26		<i>Embelica robusta</i>	Vavding	
	<b>Climber</b>			
27		<i>Maesa indica</i>	Kramighna phal	
28		<i>Jasminum malabanicum</i>	Kusoor	
29		<i>Smilax zeylanica</i>	Gutti, Ghotvel	
30		<i>Argyreia nervosa</i>	Samudra ashok	
31		<i>Ipomoea purpurea</i>	Morning glory	
	<b>Creeper</b>			
32		<i>Dichanthium caricosum</i>	Marvel gavat	
33		<i>Sehima nervosum</i>	Pavnaya gavat, Rattali	
	<b>Asthetic</b>			
34		<i>Bombax malabaricum</i>	Sawar	
35		<i>Butea monosperma</i>	Plas	
36		<i>Erythrina stricta</i>	Pangara, Mandar	
37		<i>Cassia fistula</i>	Bahawa	
38		<i>Gnidia glauca</i>	Rametha	
39		<i>Diospyrous montana</i>	Govinda, lohari,timuragi	
40		<i>Macarango peltata</i>	Chandda	
41		<i>Cajunus lineata</i>	Rantur	
42		<i>Glochidion hohenackeri</i>	Bhoma	
43		<i>Albizia chinesis</i>	Udal	
44		<i>Nothapodytes nimmoniana</i>	Narkya	
	<b>Bamboo</b>			
45		<i>Dendrocalamus richie</i>	Huda	
46		<i>Dendrocalamus stocksii</i>	Mess	
47		<i>Pteris aquilina</i>	Nече	
48		<i>Phoenix sylvestris</i>	Shindi	

## 2. List of Plant for Conservation

Sr.No.	Botanical name	Vernacular name
1	<i>Celastrus paniculatus</i>	Jyotishmati
2	<i>Piper longum</i>	Pimpli
3	<i>Smilax zeylanica</i>	Ghet vel
4	<i>Woodfordia fruticosa</i>	Dhyati
5	<i>Embelica robusta</i>	Vavading
6	<i>Rauvolfia serpentina</i>	Sarpagandha
7	<i>Apodytes nimmoniana</i>	Narkya
8	<i>Hemidesmus indicus</i>	Amnatmool
9	<i>Leea indica</i>	Karkani
10	<i>Uraria picta</i>	Pitvan, Prsniparni, Ranganja
11	<i>Gymnosporia routhiana</i>	Lokhandi, Makar Khana, Lechi
12	<i>Holerrhena antidysenterica</i>	Kutaj

#### 4. List of availability of shortlisted plants in nurseries

Sr.No.	Botanical name	Vernacular name	Availability
1	<i>Celastrus paniculatus</i>	Jyotishmati	Pranjal nursery
2	<i>Piper longum</i>	Pimpli	Pranjal nursery
3	<i>Smilax zeylanica</i>	Ghet vel	Vivek Vrum Nursery
4	<i>Woodfordia fruticosa</i>	Dhyati	Pranjal nursery
5	<i>Embelica robusta</i>	Vavading	Pranjal nursery
6	<i>Rauvolfia serpentina</i>	Sarpagandha	Pranjal nursery
7	<i>Apodytes nimmoniana</i>	Narkya	Velhe nursery
8	<i>Hemidesmus indicus</i>	Amnatmool	Pranjal nursery
9	<i>Leea indica</i>	Karkani ,dinda	Pranjal nursery
10	<i>Uraria picta</i>	Pitvan, Prsniparni, Ranganja	Vivek Vrum Nursery
11	<i>Gymnosporia routhiana</i>	Lokhandi, Makar Khana, Lechi	Vivek Vrum Nursery
12	<i>Holerrhena antidysenterica</i>	Kutaj	Pranjal nursery

## List Of nurseries:

Sr.No.	Nursery Name	Contact Number
1	Pranjal Nursery	9420482546
2	Vivek Broom	9822828102
3	Ninad Nursery	8390257511
4	Phophale Sunrise	9822766986

# Annexure no.2

## Creation of an Arboretum

### In- Situ Conservation of Medicinal Plants and Bamboo Cultivation at Salungan, Bhor

#### 1. Title of the Concept Proposal:

Creation of An Arboretum: In Situ Conservation of Medicinal Plants and bamboo cultivation at Salungan, Bhor.

#### 2. Principal Investigators

- **PI:** Ms. Sangeeta A. Kulkarni

Address: Jnana Prabodhini Nigdi Kendra, sector 25, Nigdi, Pradhikaran, Pune 411 044.  
Telephone: (020) 27657508

- **PI:** Dr. Medha Paranjape

Address: Late M.G. alias Rajabhau Achawal Trust, Nayan-Tara, 16/8, Sunita Co Op. Society, Erandawane, Pune 41104.  
Telephone: (020) 25441308

- **Co PI:** Mr. Sagar Tupe

Address: Jnana Prabodhini Nigdi Kendra, sector 25, Nigdi, Pradhikaran, Pune 411 044.  
Telephone: (020) 27657508

- **Co PI:** Ms. Amruta Bokil

Address: Jnana Prabodhini Nigdi Kendra, sector 25, Nigdi, Pradhikaran, Pune 411 044.  
Telephone: (020) 27657508

#### 3. Objectives :

1. Mapping of Resources available at the site and in the vicinity.
2. Development and execution of a plan for conservation of the medicinal and forest plants and bamboo cultivation.
3. Development of an Arboretum at Salungan.
4. Development of a training Facility at Salungan, Bhor for conducting Skill Development and Entrepreneurship Development programs in cultivation, Sustainable harvesting and processing of medicinal herbs, plants and bamboo.
5. To create income generating opportunities based on local resources for the local people.
6. To conduct village level awareness programs regarding income Generating potentials of the medicinal herbs, plants and bamboo in 15 villages of Bhor.
7. To conduct General Skill Training programs for Self-help groups, farmers, youth and School students.
8. To conduct Advanced Skill Training programs for Self-help groups, farmers, youth.
9. To conduct Entrepreneurship development programs for Self-help groups, farmers, And youth.

#### **4. Networking Approach in Technology based Work:**

The project activities planned are multi locational and also multi-dimensional. This necessitates involvement of more than one institute. Guidance and technological support will be taken from the specialized institutes and industries.

##### **Lead Institutes:**

**Technical Support:** Jnana Prabodhini, Nigdi: Department of Biotechnology.

**Financial Support:** Late M.G. alias Rajabhau Achawal Trust.

Academic and Research Institutes will be involved as per the requirement of the programs. Following are the probable partners:

1. College of Ayurveda and Research Centre, Nigdi, Pune.
2. Ramakrishna More College, Akurdi.
3. Savitribai Phule University of Pune.
4. Regional Research institute in Ayurveda, Kothrud.

#### **5. Salient Features of the Field Level Intervention:**

##### **1. Community Participation:**

Local and scientific communities, in and around Pune will be actively involved in a systematic manner. People's participation is essential in such kind of activities. This is a multifaceted activity. Hence requires a multidisciplinary approach. Taking in to consideration this multifarious nature, under graduate and post graduate students from Botany, Biodiversity, Agriculture, Environmental Science, Biotechnology, Ayurveda and Architecture will be actively involved in a systematic manner.

##### **2. Conservation and Preservation:**

This is an in situ conservation and preservation program for the native herbs, shrubs and trees. Along with native plants, we also plan to conserve few endangered species Thus; it will be a conservation and biodiversity management program.

##### **3. Green and Sustainable Development:**

The arboretum will soon get transformed into an aesthetically pleasant serene place of spiritual retreat. Such "Green Heaven" will provide an ambiance for the people who want to be in touch with nature for their emotional and spiritual well-being. The other important dimension of this arboretum will be generation of local employment. It will create and provide employment generation opportunities for the local people through various activities and intervention programs.

#### **6. Methodology**

The project area selected covers in all 25 villages. The intervention program will be executed in three phases.

**1. Phase I: Development of Arboretum and Facility center.**

**2. Phase II: Awareness and Training at community level.**

**3. Phase III: Skill and Entrepreneurship development.**

## 1. Phase I: Development of Arboretum.

Work Plans	Details	Start month	End month
1	Resource Mapping	1	36
2	In- Situ Conservation	1	48
3	Development of Arboretum	13	54

### Work Plan 1. Resource Mapping

Activities	Details	Start month	End month
1	Surveys by Project staff	1	36
2	Surveys with Experts	3	36
3	Surveys by Students	7	56
4	Identification and analysis	2	36
5	Preparation of Resource Maps and literature	4	48
6	Documentation (Audio, visual )	1	60

### Work Plan 2. In- Situ Conservation

Activities	Details	Start month	End month
1	Water resource management and development	5	24
2	Soil Restoration and remediation	4	48
3	Site and location studies for ecological restoration	3	24
4	Selection of Plants for conservation	4	24
5	Conservation Activities	4	60
6	Plantation and Preservation of medicinal plants	4	60
7	Site Management Activities	4	60
8	Documentation	4	60

### Work Plan 3. Development of Arboretum

Activities	Details	Start month	End month
1	Development of Structural Plan for Arboretum	4	18
2	Bamboo Plantation	4	18
3	Forest and native species plantation	4	24
4	Development of infrastructures and pathways	13	48
5	Management of Plantations	4	60

## 2. Phase II: Awareness and Training at Community level.

Work Plans	Details	Start month	End month
4	Development of training modules and literature	7	40
5	Development of Training Facility	13	36
6	Organization of Training Programs at community level In- Situ Conservation	4	56
7	Post-harvest Processing of Medicinal Plants	1	56
8	Post-harvest Processing of Bamboo	13	56

### Work Plan 4. Development of training modules and literature

Activities	Details	Start month	End month
1	Modules and literature for site visit	4	56
2	Modules for college students	4	24
3	Modules for school students	8	24
4	Modules for farmers	2	24
5	Modules for Self-help groups	8	24

### Work Plan 5. Development of Training Facility

Activities	Details	Start month	End month
1	Planning for the facility	4	18
2	Development of facility infra-structure	18	40
3	Displays and exhibition, etc.	18	36
4	Models and prototypes	18	36
5	Maintenance	18	60

### Work Plan 6. Organization of Training Programs at community level In- Situ Conservation

Activities	Details	Start month	End month
1	Village level networking	2	56
2	Programs for college students	6	56
3	Programs for school students	10	56
4	Programs for farmers	3	56
5	Programs for Self-help groups	13	56
6	Evaluation and documentation	2	60

### Work Plan 7. Post-harvest Processing of Medicinal Plants

Activities	Details	Start month	End month
1	Study with experts	3	48
2	Product and process development	3	36
3	Infra-structure development	13	36
4	Demonstrations	21	60
5	Activity at Center	24	60

### Work Plan 8. Post-harvest processing of Bamboo

Activities	Details	Start month	End month
1	Study with experts	18	48
2	Product and process development	24	48
3	Infra-structure development	24	36
4	Demonstrations	28	60
5	Activity at Center	28	60

### 3. Phase III: Skill and Entrepreneurship development.

Work Plans	Details	Start month	End month
9	Development of training Modules for skill development	8	56
10	Development of Prototypes for promotion	8	56
11	Skill development Programs	25	56
12	Entrepreneurship Development Programs	18	56

### Work Plan 9. Development of training Modules for Skill development

Activities	Details	Start month	End month
1	Modules for medicinal Plants	8	36
2	Modules for bamboo	18	36
3	Co ordinations with bamboo industries or units	8	60
4	Co ordinations with Herbal and pharma industries	8	60

### Work Plan 10. Development of Prototypes for promotion

Activities	Details	Start month	End month
1	Survey for Medicinal plants and bamboo	8	48
2	Design for Medicinal plants and bamboo	10	48
3	Development for Medicinal plants and bamboo	18	40
4	Industry coordination for Medicinal plants and bamboo	10	60



### Work Plan 11. Skill development Programs

Activities	Details	Start month	End month
1	Programs for college students	24	56
2	Programs for school students	24	48
3	Programs for farmers	24	48
4	Programs for Self-help groups	13	48
5	Evaluation and documentation	12	56

### Work Plan 12. Entrepreneurship Development Programs

Activities	Details	Start month	End month
1	Module Development	18	36
2	Programs for college students	49	56
3	Programs for farmers	24	56
4	Programs for Self-help groups	18	56
5	Evaluation and documentation	13	56

### 6. Expected Outcomes:

**Parameters to be used for evaluation of the impact:** Progress of the intervention activities will be monitored and measured by using following parameters:

1. No of Surveys conducted by staff, with experts and with students
2. No of Plants identified for conservation
3. No of plantations for bamboo
4. No of plantations for medicinal plants
5. No. of plantations of native plants
6. Infra-structure development at location
7. Conservation and management of resources at arboretum.
8. Village level community awareness programs in 15 villages.
9. Conservation and management practices followed and adopted by local people.
10. Cultivation and conservation of medicinal plants by local people.
11. Cultivation of bamboo by local people.
12. No of General Skill training programs for Self-help groups, farmers, youth and School students
13. No. of Advanced Skill training programs for Self-help groups, farmers, youth
14. No. of Entrepreneurship development programs for Self-help groups, farmers, And youth
15. No. of Post-harvest Processing activities for medicinal herbs.
16. No. of Post-harvest Processing activities for bamboo.
17. Entrepreneurship for selected rural women.
18. Mentoring sessions for rural women, youth and farmers.

# Annexure 3

## Write up for shortlisted plant

### 1. *Woodfordia fruticosa*

**Synonym:** *Lythrum fruticosum* L.

*Woodfordia floribunda* Salisb.

**Family:** Lythraceae

**Vernacular name:**

Sanskrit: Agnivala, Dhataki

Hindi: Dawi, Dhai, Dhaula

English: Fire flame bush

Malayalam: Thathiri

Tamil: Velakki

Kannada Bela, Tamrapushpi

Telugu: Dhataki, Jagi

Marathi: Dhyati

**Description:**

A much branched woody shrub up to 3.6m tall with fluted stems and long, spreading branches ; bark smooth, reddish brown ;leaves simple,opposite,subopposite or in whorls of 3,short petiole or sessile. Flowers numerous, borne in dense, 2-16 flowered axillary clusters. Fruit an oblong, dehiscent capsule 6-10mm long and 2.5-4.5 mm wide, containing numerous, minute, smooth obovate seeds.

**Flowering and fruiting:** January – April

**Distribution:**

Widely distributed in the Old World tropics and subtropics from East Africa, Madagascar and Arabia to Indonesia, China and Japan. In India, it is found throughout most of northern and central part as far south in Karnataka and Andrapradesh, to an elevation of 1500m in the Himalayas.

Kerala: Southern Part and Kozhikode

**Medicinal Uses:**

The dried flowers considered stimulant and astringent, used in Ayurveda to treat thirst, tooth ache, bleeding, wounds anorexia, diarrhea, dysentery, leucorrhea, amenorrhea and herpes.

**Traditional Use:**

A decoction of the leaves and twinges is taken internally to treat boils and body swellings. The powdered roots are taken orally to relieve coughs.

**Phytochemistry:**

Flowers are rich in tannins, particularly hydrolysable tannins. Cyanidin -3, 5 -diglucoside, ocacosanol,  $\beta$ -sitosterol and chrysofenol-8-O-  $\beta$ -D glycopyranoside have also been isolated from flowers. Leaves contain ellagic acid, polystachoside, myricetin-3-galactoside and pelargonidin-3; 5-diglucoside. Plant also contains woodfordins A, B, C, D, E and F. Propagation: It can be propagated both by seeds as well as stem cuttings.

## **2. Hemidesmus Indicus:**

**Synonym:** Periploca indica L.

**Family:** Asclepiadaceae

Vernacular Names:

Sanskrit: Ananta, Gopasuta, Sarivahite

Hindi: Anantamul

English: Indian Sarasa Parilla

Malayalam: Nannri, Nannar, naruneendi

Tamil: Ven Nannar

Kannada: Namada Veru, Bili Namadaberu, Anantmool, Sogadeberu

Telugu: Sugandhi Pala, Tella Sugadhi

Marathi: Anantmool

### **Description:**

A Slender, twining or prostrate perennial shrub with cylindrical stems, thickened at the nodes, and aromatic roots. Leaves simple opposite variable from elliptic-oblong to linear-lanceolate, variegated with white above, silvery white and pubescent beneath. Flowers greenish purple crowded in sub sessile cymes in the opposite leaf axils. Fruits slender follicles, cylindrical, 10cm long tapering to a point at the apex. Seeds flattened black ovate-oblong.

Flowering and fruiting: June-March

### **Distribution:**

Found throughout India from upper Gangetic plains eastwards to Assam, throughout Central, Western and Southern India up to elevation of 600m.

Kerala: Throughout

Medicinal uses:

It is used as a blood purifier, antisyphilitic, antileucorrhoeic, galactogenic, antidiarrhoeal, febrifuge alternative. Roots used against gonorrhoea, lecoderma, bleeding piles, jaundice and dysentery.

Traditional use:

The powdered root mixed with the stem bark of *Syzygium cumini* is given to nursing mothers to increase lactation. A hot infusion of the root bark with milk and sugar is given to children to relieve chronic cough and cough.

Phytochemistry:

The chemical constituents present are alkaloids, steroids, terpenoids, flavonoids, saponins, phenolic compounds, tannins, lignins, inulins, cardiac glycosides, proteins and carbohydrates. The root contains coumarino-lignoids, hemidesmine, hemidesmin-1 and 2. The stem contains pregnane glycosides, hemidine, hemidesmine, emidine and indicine, a triterpene lactone,  $\alpha$ -lupanone, besides lupeol acetate, sitosterol and hexadecanoic acid and several hydroxyl-methoxy benzaldehydes.

**Propagation:** It can be propagated by seeds as well as vegetative means. Seeds are soaked in water for 24 hours and are sown in raised beds at the onset of monsoon for better yield. Germination takes about 14 days. Vegetative propagation is done through root cuttings or stem cuttings. Sprouting occurs in about 15-20 days.

### 3 .Piper longum L.

**Synonym:** Chavica roxburghii Mig.

**Family:** Piperaceae

**Vernacular names:**

Sanskrit: kana, Magadhi, Magadha

Hindi: Pipar

English: Long pepper

Malayalam: Pippali, Thippali

Tamil: Arisi, tippali, Thippili

Kannada: Hippali

Telugu: Pippalu

Marathi: Pimpali

**Description:**

A slender, aromatic climber with perennial woody roots; stems jointed, creeping, and young shoots downy. Leaves single, alternate, and ovate. Flowers green turning yellow, cylindrical spikes. Fruits ovoid, yellowish orange turning dark red to blackish.

Flowering and fruiting: July –March

**Distribution:**Native to tropical and subtropical India, Nepal, Bangladesh, Myanmar, Sri Lanka and Malay Peninsula.Kerala: Throughout, often cultivated

**Medicinal uses:** In Ayurveda, the roots and fruits are used to treat dysentery and leucoderma, as a cholagogue for treating bile duct and gall bladder obstruction and analgesic relieving muscular pains and inflammations.

**Traditional use:** A decoction of the dried immature fruit and root or the powdered fruits mixed with honey, is used to treat chronic bronchitis, cough and cold.

**Phytochemistry:** Major chemical constituents are piperine, piperlongumine, piperlonguminine and methyl 3, 4, 5 trimethoxycinnamate. The essential oil of the fruit contains three major components of which are caryophyllene, pentadecane and bisabolone. Others include thujene, terpinolene, zingiberene, p-cymene-methoxy acetophenone and dihydrocarveol.

**Propagation:** It can be propagated using vegetative means. Semi hard stem cuttings with at least 3 nodes, 10 to 12 cm long are planted in shaded nursery beds with uppermost bud exposed. spacing of 12-15cm should be provided between each pair of cuttings. The cuttings root in 10-15days.

State	Threat state	Trade
Chhattisgarh	VU	High
Kerala	NT	High
Odisha	EN	High
Tamil nadu	EN	High

#### 4. *Holarrhena pubescens*

**Synonym:** *Echites pubescens*

*Holarrhena antidysenterica*

Family: Apocynaceae

#### **Vernacular Names:**

Sanskrit: Indrayava, Kalinga, Kutaj, Pandura

Hindi: Dudhi, Indrajab, Kurchi

English: Conessi tree, Tellicherry tree

Malayalam: Kadalapala, Kaipakutakappalavitta, Kudakappala

Tamil: Indrabam, Kashappu-vetpalarishi, Veppalei

Kannada: Beppale, Kodisige gida, korchie

Telugu: Indravrakshamu, kodaga, Pala, Palakodsa

Marathi: Rankuda

**Description:** A deciduous shrub or small tree up to 12 m tall with rough, pale brown or greenish bark that peels off in irregular flakes. Leaves opposite, sub sessile, elliptic or ovate-oblong. Flowers white, fragrant, borne in profusion in terminal corymbose cymes. Fruits parallel, cylindrical, 15-45 cm long. Seeds 25-30 per follicle, light brown, narrowly linear –oblong.

**Flowering and fruiting:** Throughout

**Distribution:** Native to sub tropical Asia from India to Myanmar, Indo –China and Malaysia. It occurs almost throughout tropical India to an altitude of 1000 m.

Kerala: Throughout

**Medicinal uses:** In Ayurveda, This species is widely accepted source of the drug Kutajah, the root bark and seeds being used to treat chronic dysentery and diarrhea. They are also an important ingredient in Ayurvedic prescription for flatulence, jaundice, piles and worms. The stem bark possesses astringent, antidysenterica, anthelmintic, stomachic, febrifugal and tonic properties. It is also used for treating amoebic dysentery and diarrhea.

**Traditional Use:** The powdered seed mixed with the honey are used to treat chronic chest complaints, asthma and to relieve colic pain. A decoction of the stem bark is give orally to treat coughs and cold a hot decoction of the bark is used as a gargle to relive tooth ache.

**Phytochemistry:** Bark is rich in steroidal alkaloids, which include conessine, norconssine, conessinine, conimine, conessidine, kurchine, holarrhenine, holafrine, holarrhetine, conkurchine and kurchicine. Bark also contains gum, resin, tannin, triterpene alcohol, lupeol,  $\beta$  sit sterol and

agkycoalkaloid. Leaves contain alkaloids such as kurchiphylline, kurchiphyllamine, kurchaline, holadysine, holatosines and aminoglycoesteroids, HOLANTOSINES A, B, C and D and holarosine A; amino deoxyglycoesteroids, holarosine B, E, F and Flavonoids.

**Propagation:** It can be propagated through seeds. Weeding and watering stimulates growth in subsequent years. Fresh seeds have a high percentage of germination.

## 5. Rauvolfia serpentina

**Synonym:** Ophioxylon serpentinum L.

**Family:** Apocynaceae

**Vernacular names:**

Sanskrit: Nakuli, candrika, Sarpagandha

Hindi: Chandrabhaga, Chhota-chand

English: Rauvolfia, serpentina

Malayalam: Amalpori, Chuvannavilpuri

Tamil: Chivanamelpodi, Convannamiloori

Kannada: Chandrike, Patalagandhi, Sutranavi

Telegu: Dumparasna, Palalagani

English: Sarpagandha

**Description:**

An erect, evergreen sub shrub, 0.2-0.6mtall, stem usually unbranched, with irregularly longitudinally fissured, pale brown, croky bark. Leaves in whorls of 3or 4,rarely opposite ,ellipticlanceolate or obovate.Flowers white or violet –tinged,brone in may –flowered irregular coryymbocymes.Fruit obliquely ovoid,purplish-black when ripe:seeds ovoid,slightly rugose.

Flowering and Fruiting: Throughout

**Distribution:** An Indo-Malaysian species native to India, Sub Himalayan, Pakistan, Bangladesh, Srilanka, Myanmar, Thailand, Malaysia and Java.Kerala: Throughout

**Medicinal Uses:** In Ayurveda, the roots are given orally as an antidote to snake venom. The juice of the leaves has been used as a remedy for opacity of the cornea. A drug prepared from the dried fruit, black pepper and ginger is used to regularize menstruation. A decoction of the root is believed to stimulate uterine contractions.

**Phytochemistry:** Major alkaloid constituents of roots are reserpine, rescinnamine and deserpidine. Five crystalline alkaloids isolated are ajmaline, ajmalicine, serpentine, serpentinine and yohimbine.

**Propagation:**

It can be propagated both by seeds as well as vegetative means.Freash heavy seeds selected after seed floatation test are placed under moist piece of cloth for 24 hr to soften their hard covering. A spacing of 5-7.5 cm between seeds are maintained. Beds are irrigated soon after sowing and kept moist till germination takes place. Germination takes about 3 weeks.Vegetatively, stem cuttings (15-20cm) or root cuttings (3-5cm) are used. Clayey to clay –loam soil is most suitable for good growth.

<b>Rauvolfia serpentina</b>		
<b>State</b>	<b>Threat status</b>	<b>Trade</b>
Andhra pradesh	CR	High
Arunachal pradesh	CR	High
Assam	VU	High
Chhattisgarh	CR	High
Himachal pradesh	CR	High
Jammu Kashmir	VU	High
Karnataka	EN	High
Kerala	EN	High
Madhya pradesh	VU	High
Maharashtra	CR	High
Meghalaya	VU	High
Nagaland	DD	Not traded
Odisha	EN	High
Tamil nadu	EN	High
Tripura	VU	High
Uttarakhand	VU	High
West Bengal	EN	Normal

## 6. *Celastrus paniculatus*

**Synonym:** *Celastrus dependens*

**Family:** Celastraceae

Vernacular Names:

Sanskrit: Jyotishmati, Tejaswini, kamahi

Hindi: Mal kangani

English: Staff tree, intellect tree

Malayalam: Palulavam

Tamil: kagodagi

Kannad: Beeja

Telegu: Malkanguni

Marathi: Maalkangani

### **Description:**

Large deciduous climber or staggler over trees, characterized by the numerous short leafy shoots of the current year, raising each from a cup of swelling marking the bud scale. Covered with shiny gray skin stubbed with numerous pale lenticels and ending during panicles of small yellowish flower. Stem are upto 2 to 3 cm, diameter and 10 m high. Twigs fairly smooth, reddish brown, densely covered with small elongated whitish lenticles. Bark of the old stem is pale brown, rough with shallow cracks; Leaves simple alternate, oblong elliptic nearly circular or obovate, usually cuspidate, finely

Crenate (the teeth 1.50 cm apart about) from near the base to the apex, in length about 10.5 cm breadth 7.5 cm with five or six main pairs of nerves arching from the midrib. Flowers Polygamous, pale yellow, green in terminal drooping panicles. Pedicles 1.5 cm with minute bract and bracteole

### **Distribution:**

Sub Himalayan tract from the Jhelum eastwards upto 2000 m. throughout the hilly parts of Madhya Bharat, Gujarat, Tamilnadu, Ceylon, Burma, Malay, Peninsula and Archipelago. Mostly found in hedged sand along river and nala Banks.

### **Medicinal Uses:**

In Ayurveda, Seeds oil is used as analgesic. It increases mind power, Digests the mal and excretes them out, Micturitive *Celastrus* oil (indoses of 10-15 drops) supplemented with benzoic, cloves, nutmeg and mace helps in combating beriberi, a disease of the peripheral nervous system associated with vitamin B-1 (thiamine) deficiency. The oil being a powerful stimulant is also used as an ointment for relieving rheumatic pains inflicted by malaria.

### **Phytochemistry:**

Leaves contain Saponin. Root bark contains  $\beta$ -sitosterol, Celastrol, Pristimerin, Zeylasterone, Zeylasteral; Terpenes. Seed or seed oil contain Acetic and benzoic acids in addition to other fatty acids; crystalline substance tetraacanol and sterol; Alkaloids Celastrine and Paniculatus

### **Propagation:**

Jyotishmati can be propagated through seed. It can be grown in any type of soil, but it will require well drained soil. Soil should be prepared with repeated ploughed and mixing farmyard manual

and after this furrow should be made at the distance of two feet.

Time of sowing: 15th June or after 1st rain.



**Method of sowing:** Two seeds should be dropped at the distance of two feet on prepared furrow.

**Seed rate:** 4 Kg. per acre (1.61 Kg. / Hector)

**Seed treatment:** Seeds should be soaked in any growth regulators which improve the germination.

**Irrigation:** First will be given after sowing. Second will be given at 15 days interval. (Then there is no

need to apply, if it rains)

**Intercultural operation:** Intercultural operation should be done with a view to remove weeds.

**Method of preparation of seed:** Seeds should be picked when they will turn into red color and dry. They should be dried under sunlight for 7-10 days.

**Yield :** 500 kg. per acre per year.

**Expected expenditure:** 3000-4000 Rs.

**Net income:** 8500 Rs.

State	Threat state	Trade
Chhattisgarh	VU	
Kerala	VU	
Madhya pradesh	VU	
Odisha	VU	
Rajasthan	VU	
Andhra pradesh	NT	
Karnataka	NT	
Tamil nadu	NT	
West Bengal	EN	

## Photographs of Medicinal Plants



Woodfordia fruticosa



Hemidesmus indicus



Piper longum



Holarrhena pubescens



Rauvolfia serpentinaCelastrus paniculatus



*Smilax zeylanica*  
*Embellica ribes*



*Leea indica*



*Uraria picta*



*Apodytes nimmoniana*  
*Gymnosporia routhiana*



## 7. *Smilax zeylanica*

**Synonyms:** *Smilax ceylanica*, *Smilax collina*

**Family:** Liliaceae

### **Vernacular Names:**

Tamil: arakkappalai, arakkappilappi

Kannada: kaadu hambu, kaadu hambu thaavare

Malayalam: chiruchakayagaoolli,

Sanskrit: vanamadhusnahi

Hindi: jangli aushbah

Telugu: konda dantena

Marathi: Ghet-vel, gholyel

**Description:** Robust woody climber, up to 6 m long, dioeciously, extremely variable. Branches terete to angular, zigzag to straight, sparingly prickly to unarmed. Leaves alternate, ovate, oblong, or lanceolate or orbicular, 5-24 cm × 1-13 cm, thinly to thickly coriaceous, with 3-5 main veins; petiole up to 3 cm long, wings of petiolar sheaths rather weakly developed, tendrils up to 20 cm long. Inflorescences of both sexes consisting of 1-5 umbels; common axis up to 5 cm long, peduncle up to 3.5 cm long, rays 1.5-2 cm long; umbels 10-40-flowered; staminate perianth 3-5.5 mm long, pistillate one 3-4.5 mm. Fruit a globose berry, 6-9 mm in diameter, dirty yellow to shiny black. Seeds 2-3 per berry, planoconvex or globose, brown.

**Distribution:** The plant is widespread in India, and native in other parts of the Indian Subcontinent as well as in Myanmar, Malaysia, Java and Solomon Islands. Recorded in the tropical and subtropical hills from Himalayan region in the north to Kerala in south. Common in the hills tracts of Karnataka, Kerala and Tamil Nadu between an altitude range of 500-1800 m. (ravikumar) This species is globally distributed in Indo-Malesia. Within India, it is found from the Himalayan region in the north to Peninsular India.

**Medicinal use:** Medicinally, the roots are used as a medicinal plant in India, and as an adulterant of the famous roots of *Smilax china* L. (chinaroot, gadung china) in the Moluccas, active against venereal diseases and skin problems

**Traditional uses:** Boiled young roots are edible, possibly only used in times of famine. The stems are very tough and used for baskets and wickerwork. Young stem tips are used as a vegetable. Root powder with ghee is taken to increase the sexual ability of both sexes. Paste prepared by ground fresh root is applied on painful rheumatic joints

**Phytochemistry:** Alkaloids, tannins, triterpenoids, sterols, avionics and saponins, Diosgenin from plant

State	Threat status	Trade
Karnataka	NT	Normal
Kerala	VU	Normal

## 8. Embelica Ribes:

**Synonyms:** *Embelia paniculata*, *Antidesma ribes*

Family: Myrsinaceae

Tamil: vitankam, vivilangam, vollai

Telugu: vellal

Sanskrit: amodha, amogha, vidanga

Marathi: ambti, baavdinga, karkannie, karkunnie

Malayalam: Vizhal

Kannada: amogha, hulimeese

Hindi: Vidanga

English name - False black pepper, White flowered Embelia, Embelia fruit

### **Description:**

Vidanga is a climber with Branchlets slender, white, without warts. Leaves are up to 7 x 3 cm, elliptic, pointed at both ends; nerves many, parallel, faint; leaf-stalk 1 cm long. Flowers are borne in panicles 15 x 15 cm, hairless, branches long, slender racemose; flower-stalks 1.5 cm long. Flowers are white, many; sepals small triangular, woolly; petals 2 mm long, ovate, pointed, densely woolly. Berry is 2.5 mm

Across, spherical.

**Distribution:** Indo-Malesia and South China The plant is found in moist and shady places upto an altitude of 1500 meter. *Embelia ribes* found in the hilly areas of India like lower and central Himalayas down to Konkan, Deccan, and Western Ghats and south India. It is also distributed in China, Bhutan, Nepal and Pakistan. In India *Embelia* is mostly distributed in Assam, Maharashtra, Andhra Pradesh, Arunachal Pradesh, Tamil Nadu and Kerala.

**Medicinal Uses:** In Ayurveda, Vidanga improves the functioning of the digestive system and alleviates flatulence, gaseous belching and constipation. Vidanga is especially useful in expelling the tape worm out of the digestive system. Besides this Vidanga is also useful in Vata disorders like facial paralysis, epilepsy and insanity

**Traditional uses:** The decoction of dried fruits is used for fever and for chest and skin disease. Paste is applied for skin infection. The drug also exhibits significant anti-fertility, antipyretic and antibacterial activity an infusion of the roots is given in the treatment of cough and diarrhea.

Fruits show antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*.

**Phytochemistry:** Embelin, which is one of the active principles of the drug, is reported to possess a property of coloring silk and woolen fabrics. Seeds of *Embelia ribes* contain embelin 2.5–3.1%; quercitol 1.0%; fatty ingredients 5.3% and alkaloid schistembine, a resinoid, tannins, homoembelin, christembine, vilangine and minute quantity of volatile oils.

**Propagation:** *E. ribes* is propagated through seeds .

**Planting in the Field Land Preparation and Fertilizer Application:** Crop is raised through direct sowing of seeds in the field during June-July. The field is well ploughed followed by harrowing to bring the soils to a fine tilth and free from weeds. The application of organic manure (FYM) at the rate of 5-10 t/ha is recommended.

**Transplanting and Optimum Spacing:** Seeds are sown directly in the field at optimum spacing of 1.0 X 1.0 meter.

**Inter cultural Operations:** The inter culture operations like weeding, protective irrigation, support or staking are to be done periodically as and when required.

**Disease and Pest Control:** No major disease and pest is noted. However, in case of severe infestation bio-control measures are to be adopted.

**Crop Maturity and Harvesting:** The crop matures after 5-6 months of its sowing and the fruiting starts in October-November, when these are plucked and stored after shade drying.

**Yield:** The crop yield is 190-200 kg seeds per hectare.

## 9. *Apodytes nimmoniana*

**Synonyms:** *Nothopodytes nimmoniana*, *Mappia foetida*

Family: Icacinaceae

Tamil: Pillipiccu

Marathi: Narkya

Malayalam: Peenari

Kannada: Durannathada mara

English name – Field holly, stinking tree

### **Description:**

A moderate sized or small tree attaining height upto 4-10 meter, with a low spreading crown. Branchlets prominently lenticellate, corky with leaf scars. Leaves simple, alternate, and ovate to obovate, crowded at the end of branches. Flowers bisexual in terminal corymbose cymes, whitish green, foul smelling. Drupe oblong or ellipsoid, smooth, purplish black when ripe, seed solitary.

### **Distribution:**

Common in Mixed deciduous forests and Semi-evergreen forests distributed throughout west Bengal, Assam, Meghalaya, Western Ghats of Karnataka, Tamil Nadu, and Kerala. It is more frequent in the Sahyadris of Maharashtra region spreading over Amboli, Radhanagri, Mulshi, Koyna, Mahabaleshwar, Matheran, Bhimashankar, Satara (Kaas). It prefers forest edges as micro-habitat. Predominantly it is Under storey tree.

**Flowering and fruiting:** September-October. Flowers dioecious, small dull Whitish green in terminal, Panicles and spikes. The species can be easily recognised by its strong foetid odour during blooming.

Seed collection: Fruits (drupes) obliquely ovoid more than 1 cm in girth and 1.5-2.5 cm length with attached nut/seed. Fruits and seeds are collected between December and January.

Seeds 460-880 / kg.

Orange colored receptacle of seeds turns black after drying.

Medicinal uses: It is used to treat cancer.

### **Phytochemistry:**

It is found to contain 16.0% of 3-keto-octadec-cis-15-enoic acid previously hitherto unknown in the Olacaceae plant family. It also contains other normal fatty acids such as palmitic acid (12.3%), stearic acid (4.2%), oleic acid (16.2%), linoleic acid (11.6%) and linolenic acid (39.7%) *Mappia foetida*, foetidine 1 and 2, having anticancer and antiviral properties. These alkaloids, soluble in water, are present in all the parts of the plant, and are the precursors of camptothecin and of 9-methoxycamptothecin, which are alkaloids known to have pharmacodynamic properties but also to be

insoluble in water. The particular water solubility of the novel compounds make them particularly suitable for the treatment of the patients by the parenteral route, avoiding the use of toxic excipients or of unsuitable chemical derivatizations.

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#### **Nursery techniques /propagation:**

1. The species flowers during June-September and fruiting takes place during August-January. The seeds are collected during October-November and are shade dried for about a week and later soaked in cow dung slurry for 24 hours. These treated seeds are sown in well prepared mother beds. Germination duration is 30 days in case of treated seeds and the control seeds take up to 60 days to germinate. The germination is 50 percent for treated seeds and 30 for untreated seeds. Before sowing seeds are drenched with 0.1% bavistin.
2. Vegetative Propagation: The hard wood, semi hard and soft wood cuttings show 20, 40 and 60 percent sprouting respectively in 20 days. Air layering can also be done. These stem cuttings shall be prepared at the time of leaf sprouting during Feb. - March. Growth hormone 200 ppm IBA also improves root germination.
3. Green house: Cuttings kept in hot humid poly chamber with temp range 28 -33 °c and 95 % RH. Sand of coir pith used 1:1 as rooting media with 2000 ppm IBA application. Seedlings attaining height of 8-10 cm are pricked out in polybags of 6 x9 "size filled with 2:1:1 Soil: Sand: FYM including poultry manure. Seedlings are maintained in poly bags till six months or till they attain height of 25-30 cm by regular watering. After 2 months growth 1 gm DAP applied as top dressing without direct contact to root zone. To impart protection against cucurbit beetles 0.2 % Rogar insecticide is sprayed along with antifungal bavistin spray.

#### **Silviculture / Planting techniques:**

Planting of saplings with close spacing 1.5 m X 1.5 m in suitable habitats. Pit size 45 cm X 45 cm x 45 cm is recommended.

#### **10. *Leea Indica***

**Synonyms:** *Leea acuminata*

**Family:** Vitaceae  
Tamil: Nalava, Ottannalam  
Telugu: Amkador  
Sanskrit: Chatri  
Marathi: Karkani  
Malayalam: Nakku  
Kannada: Gadhapatri  
Hindi: Kukur jihwa  
English name - Bandicoot Berry

**Description:**

**Habit** Large shrubs or small trees, up to 5 m tall.

**Trunk & Bark** Stems several to single, often with stilt roots.

**Branches and Branchlets** Young Branchlets angled, glabrescent.

**Leaves** compound, bipinnate to tripinnate, alternate, spiral; rachis 10-20 cm, long; petiolules 0.5-2.5 cm; stipules purple, sheathing, obovate-oblong, glabrous; leaflets 6-21 x 3.5-7.5 cm, ovate to lanceolate, apex acuminate to caudate, base acute to rounded, margin serrate to dentate, glabrous, chartaceous, drying brown; midrib raised above; secondary nerves 7-12 pairs; tertiary nerves reticulate-percurrent.

**Inflorescence / Flower** Inflorescence corymbose cymes; calyx green, petals cream.

**Fruit and Seed** Berry, depressed, globose, ca. 0.7 cm across, purple black; seeds 4-6.

**Distribution:**

It is found in India to Indo-China, the Malay Peninsula, Java, Sumatra, and Borneo.

**Medicinal uses:**

A decoction of the root is given in colic, is cooling and relieves thirst. In Goa, the root is much used in diarrheal and chronic dysentery. The roasted leaves are applied to the head in vertigo. The juice of the young leaves is a digestive.

**Traditional uses:**

Traditionally, it is used to treat itchy skin, fever, diarrhea, and body aches.

**Phytochemistry:** Phytochemical groups such as alkaloids, flavonoids, terpenoids, glycosides, saponins, and steroids and compounds, namely, quercetin, gallic acid, lupeol,  $\beta$ -sitosterol, ursolic acid, mollic acid arabinoside, and mollic acid xyloside have been identified in various parts of the plant.



## 11. *Uraria Picta*

**Synonyms:** *Hedysarum pictum*

Family: *Fabaceae* (Pea family)

Tamil: Sittirappaladai

Telugu: Kolkuponna

Sanskrit: Andhriparni, Chitraparni, Sinhapuchchi

Marathi: Pitvan, Prisiniparni, Ranganja

Malayalam: Muvila

Hindi: Dabra, Pitvan, Shankaraja

English name: Dabra

### **Description:**

Dabra is an erect perennial, under shrub, 1-6 ft tall, branches velvety. Lower leaves are 1-3-foliolate, upper 5-9-foliolate. Leaflets of the lower leaf 2-8 cm long, 2-3 cm broad, ovate; of upper leaves, 7-25 cm long, 5-25 mm broad, ovate-lanceolate, pointed, often variegated, stalk 3.5-6.5 cm long. Inflorescence is 10-70 cm long, carried on a 0-5 cm long stalk. Bracts are 1.4-2.5 cm long, long pointed, completely covering the bud, deciduous. Flower stalks are 6-9 mm long. Sepals are 4-5 mm long. Flowers are purple, pink or bluish, 8-9 mm long. Fruit is 5-9 mm long, with 3-6 segments, each 2-3 mm broad, smooth, polished, and folded on one another.

**Flowering:** June-September.

### **Distribution:**

It is widely distributed throughout India, Bangladesh, Sri Lanka, Tropical Africa, Malay Islands, Philippines, Australia, Africa and almost all parts of Asia. It is grown in dry grasslands and open forests in the sub-Himalayan tract from Kashmir to west Bengal and Assam.

Grassy slopes at elevations from 400 - 1,500 meters

### **Medicinal uses:**

1. Healing properties of this herb are quite effective in the healing of fractured bones. It also helps to reduce pain in affected areas. Use of this herb is quite good in the treatment of gonorrhoea. This herb helps to manage the symptoms like pain in penis, vagina, painful urination, abdominal pain, pelvic pain, pus like discharge and bleeding which are associated with gonorrhoea.
2. Roots of this herb possess the aphrodisiac properties. It helps to increase the libido and sexual desire. Hence use of this herb is quite good to maintain the good sexual health, stamina and energy in the body.
3. This is known to be an effective herb in the treatment of diarrhoea. It helps to manage the symptoms like frequent, loose, watery stools, abdominal cramps, abdominal pain, fever, blood in the stool and bloating.
4. Expectorant properties of the herb are quite effective in the treatment of the respiratory complications like cough, common cold, asthma and bronchitis. It helps to clear the mucous from the lungs and nasal airways. This herb possesses the antiseptic properties thus helps to treat the various viral, bacterial and fungal infections.
5. Use of this herb is good to cure the malarial fever. Cardiovascular properties of this herb support the good heart health. These help to maintain the good blood flow in the body by dilation of blood vessels. This is also quite effective to maintain the good HDL levels in the body and lowers the levels of LDL. Moreover, this herb keeps the healthy blood pressure levels in the body.

6. This herb also acts as an arrhythmic agent. It helps to manage the problems of abnormal rhythms of the heart like atrial fibrillation, atrial flutter, ventricular tachycardia, and ventricular fibrillation.

7. This herb is also packed with anti-cancerous properties. It helps to stop the growth of cancer cells and enhances the growth of healthy cells.

8. This herb possesses the anticholinergic properties. Hence use of this herb is quite good to manage the problems like depression, anxiety, sleeping problems. Analgesic properties of this herb help to reduce

Climate and Soil:

- The plant can grow well in tropical and subtropical areas.
- Loam to clay-loam soil is suitable for its cultivation.
- It can tolerate a soil pH up to 8.5.
- Propagation material The crop can be raised successfully by seeds, which can be collected in

December–January.

- **Nursery technique**
- **Raising Propugules**
- The crop can be raised by sowing seeds in nursery in April–June, as direct sowing in field results in very poor crop stand and yield.
- The seed may be broadcast in well-prepared nursery beds of appropriate size (10 m × 1 m).
- The beds should be watered lightly and regularly.
- The seeds germinate easily, and the germination is completed within 10 days.
- **Propugules rate and pretreatment**
- About 4–5 kg seeds are required for raising stock for planting in 1 hectare of land.

**Yield and cost of cultivation**

- The yield of dry roots is approximately 3–4 quintals/hectare, while the dry weight of herbs is about 4–5 quintals/hectare. Overnight soaking of seeds in water before sowing improves germination.

## **12. *Gymnosporia routhiana***

**Synonyms:** *Maytenus routhiana*

Family: Celastraceae

Marathi: Lokhandi, Makar khana, Lechi

English name: Roth's Spike Thorn

### **Description:**

Roth's Spike Thorn is an armed or unarmed erect shrub. Leaves 7.5-22 x 4-12 cm alternate, subcoriaceous, ovate-oblong or obovate serrate, apex obtuse or obtusely short-acuminate, cuneate at base; nerves obscure; petiole 5-15 mm long. Flowers 2-3 mm across, greenish-white, in fascicles of short cymes at leafless nodes; Fruiting pedicels 12-15 mm long. Calyx lobes 5, minute, free. Petals ca. 2 mm long, free. Stamens 5, inserted outside the disc, alternating with the petals; filaments slender; anthers 2-celled. Capsule 1.5 x 1.5 cm, obovate, trigonous, 3-valved, paler reddish-brown; seed 1-2 in each cell, ca. 1 cm long, ovoid, compressed, reddish with aril embracing the base. Flowering: June-August.

**Distribution:** A large, thorny, evergreen shrub which grows wild in Western Ghats. Native to India.

**Medicinal plants:** *Gymnosporia routhiana* is used in Indian folk medicine as an antiulcerogenic agent.

*Gymnosporia routhiana* (Walp) Lawson, commonly known as Henkal, is a large armed shrub, growing in the western peninsular region of India. Its leaves are used in Indian folk medicine for treatment of a number of ailments including cancer, ulcer, and rheumatism. It is also used as an anti-inflammatory, antioxidant, antiseptic, and antidiarrhoeal drug.

### **Phytochemistry:**

Its leaves are reported to contain n-octacosanol,  $\beta$  amyrin

**Propagation:** Through seeds

## Annesure 4



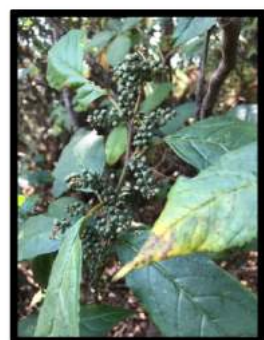
Catunaregum spinosa\_gela(1)



Catunaregum spinosa\_gela(2)



Callicapra tomentosa



Masea indica



Pogostemon



Actinodaphne



Zizyphus rugosa Meyna laxiflora



Ixora brachiata

## Annexure 5

We have submitted printed copy of Coutour mapping in the office .

