

Government of the people's Republic of Bangladesh

ANNUAL RESEARCH PROGRAMME: 2017 – 2018



**Bangladesh Forest Research Institute**  
Chittagong  
2018

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## Research Programme: 2017-18

### FOREST MANAGEMENT WING

Sl.No.	Name of the Division/Section	Total Number of Studies		
		On-going	New	Total
01	Forest Botany Division	2	2	4
02	Forest Economics Division	2	-	2
03	Forest Inventory Division	3	-	3
04	Forest Protection Division	1	1	2
05	Mangrove Silviculture Division	5	-	5
06	Minor Forest Products Division	2	2	4
07	Plantation Trial Unit Division	4	-	4
08	Seed Orchard Division	3	2	5
09	Silviculture Genetics Division	5	-	5
10	Silviculture Research Division	6	2	8
11	Soil Science Division	1	-	1
12	Wildlife Section	3	-	3
Sub-Total:		37	9	46
FOREST PRODUCTS WING				
13	Forest Chemistry Division	2	-	2
14	Pulp and Paper Division	2	1	3
15	Seasoning and Timber Physics Division	2	-	2
16	Veneer and Composite Wood Products Division	3	1	4
17	Wood Preservation Division	2	1	3
18	Wood Working and Timber Engineering Division	1	1	2
Sub-Total:		12	4	17
Total:		49	13	62

# Research Programme: 2017–18

## Management wing

### Forest Botany Division

1. **Study** : New
- 1.1 **Programme Area** : Biodiversity and Conservation.
- 1.2 **Title of the Study** : Floristic composition of Ratargul Swamp forest in Sylhet region
- 1.3 **Justification (For new study):** Ratargul swamp forest is a freshwater swamp forest located in Gowainghat upazila under Sylhet district. It is the only swamp forest located in Bangladesh and one of the few freshwater swamp forests in the world (Gopal, 1999). The forest goes under 20-30 feet water in the rainy season. Rest of the year the water level is about 10 feet deep. It is located 45 km away from Sylhet city on the bank of the river Goyain (Banglapedia, 2012). The total area of Ratargul swamp forest about 204 ha. Approximately 118.50 ha was declared as a reserve forest under the Assam Forest Act in 1993. (Choudhury *et al.*, 2004). It has unique floral and faunal composition than other forested areas of Bangladesh.

This forest provides various products and ecosystem services, which plays a key role in the livelihood of the local population. Also ecologically this forest provides significant habitat for flora and fauna. The ecosystem is a typical freshwater wetland forest rich with 73 species of flora and 230 species of fauna from Ratargul (Choudhury *et al.* 2004). Species diversity is very rich in this swamp forest. Ratargul swamp Forest has been rapid degradation due to high population pressure, fuel wood collection, expansion of agriculture, illegal logging, grazing, habitat human infrastructure, tourism activities, collection of medicinal plants and other forest non-wood products, pesticides and other activities destruction of swamp forest (Islam *et al.* 2016). This forest has a significant ecological importance. But it has been limited information on the vegetation structure of the Ratargul swamp forest. BFRI is a national forest research institute but it has no lot of information about swamp forest and botanical specimen collection of Ratargul Swamp forest. Therefore, the study has taken to get information about floristic composition of Ratargul Swamp forest and to collect wetland botanical specimen. This information will be helpful for the sustainable management and conservation of wetland resources of the swamp forest.
- 1.4 **Objective(s)** :
  - 1.4.1. To assess the phyto-sociological analysis of Ratargul swamp forest.
  - 1.4.2. To prepare checklist the nature of vegetation dynamics in Ratargul swamp forest.
  - 1.4.3. To regenerate awareness among the local people on the protection and conservation for the healthy nature.
- 1.5 **Expected output** :
  - a. Biodiversity status will be developed in Ratargul swamp forest for future wetland plant resource conservation and management.
  - b. Awareness of local people about values about of the study area.
  - c, BFRI Herbarium will be enriched with reference collection of botanical specimens of the swamp forest.
- 1.6 **Study period** :
  - 1.6.1 Starting year : 2017-2018
  - 1.6.2 Completion year : 2019-2020
- 1.7 **Personnel(s)** :
  - 1.7.1 Study leader : Md. Jahangir Alam, D.O
  - 1.7.2 Associates : Asim Kumar Paul, S.R.O; A.H. M. Jahangir Alam, R.O; Syedul Alam, RA-1

**1.8 Activities for the year:**

- a. Literatures review and secondary data collection (Information documented).
- b. Listing of the existing plant species through transect walk method.
- c. Data collection and analysis by quadrat sampling method.
- d. Botanical specimens voucher collection and note in their morphological character.
- e. Processing and Identification of the collected botanical specimens.
- f. Compilation of reports.

**1.8.1 Activities calendar :**

Activities (as per 1.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a												
b												
c												
d												
e.												
f.												

**1.9 Previous progress, if any : New**

1.9.1 Achievement (s), if any: New study

**1.10 Financial statement :**

1.10.1 Total cost of the study : Tk. 10,00,000.00

1.10.2 Cumulative cost : Tk.

1.10.3 Cost of the year : Tk. 2,50,000.00

1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : Forest Departments, Academic Institutes, NGOs, and Communities.

**2. Study : New**

2.1 **Programme Area** : Biodiversity and Conservation.

2.2 **Title of the Study** Assisted Natural Regeneration (ANR) for biodiversity conservation of Sita Pahar Nutun Para and Bagan Para in Bandarban hill district

**2.3 Justification (For new study):** Assisted Natural Regeneration (ANR) is known as a cost-effective method to restore forest landscapes compare to conventional reforestation methods. ANR is considered one of the most viable methods to restore degraded tropical forestlands and convert them into more productive forests (Carandang *et al.* 2007; Shono *et al.* 2007). The aim of ANR is to accelerate the route of natural successional processes by reducing or removing barriers to natural forest regeneration such as competition to available resources by weed species; recurring disturbances like grazing, fire and wood harvesting; and marginal soil condition (Shono *et al.* 2007). According to Sajise (2003), ANR is most suited for areas where protection functions of forests is critical such as areas which are ecologically vulnerable, areas where conservation of biological diversity and soil and water are highly needed, among others. Unlike to the conventional restoration methods that involve planting of nursery grown seedlings, ANR is said to offer significant cost advantages due to reduced costs associated with seedling propagation and transplanting (Shono *et al.* 2007). ANR based on principles of secondary succession and supplemented with traditional knowledge and involvement of the local community people.

The study will be carried out at Sita Pahar Nutun Para and Bagan Para in Bandarban hill district. Sita Pahar Nutun Para is newly established on 2008 and it is 40 kilometers away from Bandarban town. The para is situated on the side of Chimbuk-Thanchi road near by the Peak-69. The Murang community came from Sualock under Bandarban hill district and lives 130 peoples with 22 families. On the other hand Bagan para is just 25 kilometer away from Bandarban sadar and nearby chimbuk hill. Both para have rich in floral diversity. But the forest decline day by day due to

development of good road communication, lack of awareness of biodiversity, forest encroachment and shifting cultivation. Community reserve forest meets the demand of bamboo, timber, medicinal plants, fuel wood and other minor forest product of many indigenous people (Chakma, 2005). Therefore, the protection and preservation of community reserve forest become crucial for livelihood, environmental, medicinal, cultural and religious needs of indigenous communities. The indigenous culture, lifestyle and livelihood are mostly related to forest and forest resources. Unfortunately, over the past several decades, unsustainable use of these resources has led to the loss of biodiversity. As a result, forest resource oriented indigenous communities faced with several crises for their subsistence requirements. Philippines, Thailand and different Asian country apply the ANR methods for biodiversity conservation. The technologies are simple and easy to implement. The cost of reforestation through ANR is less than traditional plantation methods. Therefore the study has taken to initiatives for biodiversity conservation through ANR methods involving by the local community people.

**2.4 Objective(s) :**

- 2.4.1 To increase awareness among the community people of the potential of ANR methods for biodiversity conservation.
- 2.4.2 To establish demonstration plot for conservation of indigenous tree species by using ANR methods.
- 2.4.3 To know about difference between the application of NR and ANR methods for biodiversity conservation.

**2.5 Expected output:**

- a. Awareness of local people about ANR methods for biodiversity conservation.
- b. Biodiversity of hill ecosystem will be conserved as a biodiversity hotspot.
- c. Motivation of community people for restoration of community reserve will be helpful for their perennial water source and better livelihoods.
- d. Understand the regeneration dynamics of community forest which will be helpful for future natural resource management.

**2.6 Study period :**

- 2.6.1 Starting year : 2017-2018
- 2.6.2 Completion year : 2019-2020

**2.7 Personnel(s) :**

- 2.7.1 Study leader : Md. Jahangir Alam D.O.
- 2.7.2 Associates : Asim Kumar Paul S. R.O.; A.H. M. Jahangir Alam, R.O.; Syedul Alam, RA-1.

**2.8 Activities for the year :**

- a. Literature review and secondary data collection (Information documented).
- b. Awareness meeting conduct with the community people through the focus group discussions.
- c. Conducting PRA to find out their ideas for biodiversity conservation.
- d. Laying out sample plots in different sites (Upper, middle and lower hill portion)
- e. Data collection from the sample plots.
- f. Reporting (The draft report)

**2.8.1 Activities calendar :**

Activities (as per 2.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												

- 2.9 **Previous progress, if any :**  
 2.9.1 Achievement(s), if any :  
 2.10 **Financial statement :**  
 2.10.1 Total cost of the study : Tk. 7,50,000.00  
 2.10.2 Cumulative cost : Tk.  
 2.10.3 Cost of the year : Tk. 2,50,000.00  
 2.10.4 Source of fund : GOB  
 2.11 **Beneficiaries :** Forest Departments, Academic Institutes, NGOs, and Communities.

3. **Study :** On-going  
 3.1 **Programme Area :** Biodiversity and Conservation  
 3.2 **Title of the Study :** Documentation of the Angiospermic Flora of Hazarikhill Wildlife Sanctuary in Chittagong, Bangladesh  
 3.3 **Justification(For new study) : NA**  
 3.4 **Objective(s) :**  
 3.4.1 To prepare a checklist of forest trees, woody shrubs and climbers of Hazarikhill Wildlife Sanctuary.  
 3.4.2 To describe taxonomic, phonological and ecological characters, synonyms, vernacular name for the compilation for the Forest Flora of Bangladesh.  
 3.5 **Expected output:**  
 a. Angiospermic flora and their taxonomically account of Wildlife Sanctuary will be documented which will be helpful in future conservation.  
 b. BFRI Herbarium will be enriched with reference collection of botanical specimens **of the** study area.  
 3.6 **Study period :**  
 3.6.1 Starting year : 2015-2016  
 3.6.2 Completion year : 2017-2018  
 3.7 **Personnel(s) :**  
 3.7.1 Study leader : Md. Jahangir Alam, D.O.  
 3.7.2 Associates : Asim Kumar Paul, S.R.O.; Syedul Alam, RA-1  
 3.8 **Activities for the year:**  
 a. Transect walk and quadrat prepared for data collection.  
 b. Listing of the existing plant species in the WS.  
 c. Botanical specimens voucher collection and note in their morphological character.  
 d. Processing and identification of the collected botanical specimen.  
 e. Up to date taxonomic report on collected botanical samples.

**3.8.1 Activities calendar :**

Activities(as per 3.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												

- 3.9 **Previous progress, if any :** Four field trips were conducted in the WS for data collection. Total 19 sample plots of 10 m x 10 m size were lay out representing various slopes (Upper, medium, lower hill portion and along the jhiri) for data collection and vegetation analysis. Total 115 plant species were listing from the WS. Among the listed species there were 48 trees, 31 shrubs, 22 herbs and 14 climbers species. Ban Tagor (*Tabernaemontana cripisa*), Gutguttya (*Protium serratum*), Kamdev

(*Calophyllum inophyllum*), Bon jalpai (*Elaeocarpus rogasus*), Paduk (*Pterocarpus indicus*), *Cryptocarya amygdalina*, Pitraj (*Dysoxylum binectariferum*), Tali (*Palaquium polyanthum*), Buddha Narkeli (*Pterygota alata*), Bans pata (*Podocarpus neriifolius*) are found rare species in the WS. Identified samples were mounted and preserved in the herbarium.

3.9.1 **Achievement(s), if any: NA**

- 3.10 **Financial statement** :
- 3.10.1 Total cost of the study : Tk. 6,00,000.00
- 3.10.2 Cumulative cost : Tk. 3,99,210.00
- 3.10.3 Cost of the year : Tk. 1,50,000.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : Forest Departments, Plant taxonomists, Biodiversity researcher, Academic Institutes, NGOs, and Farmers.

4. **Study** : On-going

4.1 **Programme Area** : Biodiversity and Conservation

4.2 **Title of the Study** : Regeneration status and floristic composition of Kaptai National Park

4.3 **Justification (For new study):** Kaptai National Park (KNP) is situated in the Rangamati Hill District, which falls between the Karnaphuly and Kaptai Mountain Ranges. The park is adjacent to Kaptai Bazar in the north-eastern corner of the Kaptai Upazila. It is about 57 kilometer from Chittagong town. Kaptai National park is being managed under CHT South Forest Division. It was established in 1999 and its area is 5,464.78 hectares (13,498.0 Acres). Prior to declaration of the national park it was Sitapahar Reserve. It comprises with two Ranges namely Kaptai Range and Karnaphuly Range. It is historically important because of first time Teak (*Tectona grandis*) plantation in Bangladesh was started from this area. Its forest type is mixed evergreen forest. There are a huge collection of plants in Kaptai National Park. It is provide various opportunities of education, research, tourism and associates employment. But there is no systematic study of regeneration status and plant species diversity of the National Park. Therefore, the study has taken to get regeneration status and plant species diversity of the national park.

4.4 **Objective(s)** :

- 4.4.1 To prepare a checklist of forest trees, woody shrubs and climbers of Kaptai National Park.
- 4.4.2 To observe the regeneration status of tree species in different habitats in Kaptai National Park.

4.5 **Expected output:**

- a. Plant species diversity of Kaptai Nation Park will be documented which will be helpful in future conservation.
- b. Data base of regeneration status will be developed.
- c. BFRI Herbarium will be enriched with reference collection of botanical specimens of the study area.

4.6 **Study period** :

- 4.6.1 Starting year : 2016-2017
- 4.6.2 Completion year : 2018-2019

4.7 **Personnel(s)** :

- 4.7.1 Study leader : Asim Kumar Paul, S.R.O.
- 4.7.2 Associates : Md. Jahangir Alam, D.O.; A.H.M. Jahangir Alam, R.O.; Syedul Alam, R.A-1.

4.8 **Activities for the year:**

- a. Transect walk and listing of the existing plant species in the National Park.
- b. Data collection on tree seedlings regeneration.
- c. Botanical specimens voucher collection and note in their morphological character.
- d. Processing and identification of the collected botanical specimen.
- e. Compilation of reports.

4.8.1 Activities calendar :

Activities(as per 4.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												

4.9 **Previous progress, if any** : Four field trips were conducted to Kaptai National Park for data collection. Total 31 sample plots of 10 m x 10 m size were lay out representing various slopes (Upper, medium, lower hill portion and along the jhiri) for data collection and vegetation analysis. Telsur (*Hopea odorata*) are the highest number of regenerating seedlings was found in the sample plots followed by Assar (*Microcos paniculata*) and Puti jam (*syzygium cumini*). Dhup (*Canarium resiniferum*) and Bandorhola (*Duabanga grandifolia*) are found rare species in the sample plots of KNP. Total 43 plant species were collected from the KNP. Identified samples were mounted and preserved in the herbarium.

4.9.1 **Achievement(s), if any** : N/A

4.10 **Financial statement** :

4.10.1 Total cost of the study : Tk. 6,00,000.00

4.10.2 Cumulative cost : Tk. 1,50,000.00

4.10.3 Cost of the year : Tk. 2,30,280.00

4.10.4 Source of fund : GOB

4.11 **Beneficiaries** : Forest Departments, Plant taxonomists, Biodiversity researcher, Academic Institutes, NGOs, and Farmers.

## FOREST ECONOMICS DIVISION

1 **Study** : On going

1.1 **Programme Area** : Forest Inventory and Economics

1.2 **Title of the Study** : Impact of participatory forestry on financial and livelihood of local people in northern region of Bangladesh.

1.3 **Justification (For new study)** : NA

1.4 **Objectives:** :

1.4.1 To find out production system through intercropping of seasonal and/or annual crop in the forest floor of strip plantation in northern region of Bangladesh.

1.4.2 To assess income generation of local people.

1.4.3 To make financial analysis of selected year of strip plantation.

1.4.4 To estimate the sequestrated carbon in the selected years of plantations.

1.5 **Expected output:** Generation of employment & income, production system, input-output ratio of local people and the economic profitability of participatory forestry in northern region of Bangladesh.

1.6 **Study period** : 2016-17 to 2018-19

1.6.1 Starting year : 2016-17

1.6.2 Completion year : 2018-19

1.7 **Personnel (s)** :

1.7.1 Study leader : M.A Taher Hossain; RO

1.7.2 Associates : M.A.H. Shah Jalal; DO, Md. Melon; FI; Forzana Yasmin; RA-1

**1.8 Activities for the year:**

- a) Selection of the participated people with tree plantation in three locations (Range) from each of Dinajpur and Pabna social forest divisions.
- b) Arrangement of group discussion with the participated local people.
- c) Collection of data on various economic and social aspects of the selected participants through designed schedule.
- d) Selection of the plantations raised in earlier period of five different years for the collection of required data.
- e) Compilation and analysis of data.

**1.8.1 Activities calendar :**

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												

**1.9 Previous progress:** Information on the strip plantation raised during 2000-01 to 2004-05 under the Social Forest Division (SFD) of Rajshahi was collected. Two Upazila (Damairhat and Bagatipara) of Rajshahi SFD were selected as study areas. The raised plantations in two Upazila were 77 and 101 seedling kilometer respectively within the selected year of plantations. Required sample plot data were collected and analysed. A number of 24 tree species were recorded in the study areas. An estimated amount near about 6 crore taka would be the standing income for the local poor participants from the selected plantations year in study areas. Moreover, 13.7 thousand metric ton of Organic carbon (O-C) are sequestered and that are equivalent to 50 thousand metric ton of CO<sub>2</sub> gas mitigation in reducing compromise of climate change by the strip plantations established from 2000-01 to 2004-05 in two upazillas (Bagatipara & Damairhat) under Rajshahi SFD

**1.9.1 Achievement: NA**

- 1.10 Financial statement :**
- 1.10.1 Total cost of the study : Tk 4,20,000.00
  - 1.10.2 Cumulative cost : Tk. 72,000.00
  - 1.10.3 Cost of the year : Tk. 1,60,000.00
  - 1.10.4 Source of fund : GOB
  - 3.11 **Beneficiaries** : FD, Private Planters, NGOs etc.

**2 Study** : On going

**2.1 Programme Area** : Forest Inventory and Economics

**2.2 Title of the Study** : Impact of Co-management on forest resources and livelihood of forest dependent people in chunati wildlife sanctuary (CWS), Chittagong

**2.3 Justification (For new study)** : NA

**2.4 Objectives** :

2.4.1 To assess the forest resources of the sanctuary.

2.4.1 To assess the socio-economic condition of the forest dependent people.

**2.5 Expected output** : Situation of the forest resource and status of forest dependent people will be known.

- 2.6 **Study period** : 2016-17 to 2017-18  
 2.6.1 Starting year : 2016-17  
 2.6.2 Completion year : 2017-18  
 2.7 **Personnel (s)** :  
 2.7.1 Study leader : Md. Abul Hasnat Shah Jalal, DO  
 2.7.2 Associates : Dr. Rafiqul Haider DO, MFP, M.A Taher Hossain; RO.; Md. Melon; FI,

2.8 **Activities for the year:**

- a) Arrangement of group discussion with local people.  
 b) Collection of demographic profile of local people through questionnaire.  
 c) Collection of data on socio-economic aspect from the selected people through designed schedule.  
 d) Forest resources assessment through Quadrant/transect method  
 e) Compilation, data analysis and report writing.

2.8.1 **Activities calendar** :

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a.													
b.													
c.													
d.													
e.													

2.9 **Previous progress** : Data collected from Chunati , Aziznagar and Harbang Beat under Chunati forest range of Chunati Wildlife Sanctuary (CWS), Chittagong, on forest tree resources and Socio-economic aspect of forest dependent people.

2.9.1 **Achievement** NA.

2.10 **Financial statement**

2.10.1 Total cost of the study Tk 4,50,000.00

2.10.3 Cumulative cost Tk. 1,38,000.00

2.10.2 Cost of the year Tk 2,00,000.00

2.10.4 Source of fund GOB

2.11 **Beneficiaries** FD, Private Planters, NGOs etc.

## FOREST INVENTORY DIVISION

1 **Study** : On-going

1.1 **Programme Area** : Forest Inventory, Growth and Yield.

1.2 **Title of the study** : Growth and yield assessment of akashmoni (*Acacia auriculiformis*) and mahogany (*Swietenia macrophylla*) through establishment of permanent sample plots (PSPs) (2<sup>nd</sup> Phase)

1.3 **Justification (for new study)** : NA

1.4 **Objectives (s)** :

1.4.1 To generate information on growth and yield of these species grown in plantations forest of Bangladesh.

1.4.2 Setting physical rotation of these species.

1.5 **Expected output:**

- a. Site indices curves for these species grown in the plantation forests will be available.  
 b. Growth and yield of these species at different plantation sites will be available.  
 c. Physical rotation of these species will be determined.

- 1.6 **Study period** :
- 1.6.1 Starting year : 2015-2016
- 1.6.2 Completion year : 2019-2020
- 1.7 **Personnel (s)** :
- 1.7.1 Study Leader : Mohammed Shahid Ullah, DO
- 1.7.2 Associate (s) : Mofizul Islam Khan, FI; Abul Kalam Azad, FI; and S. M. Zahirul Islam, RO.

1.8 **Activities for the year:**

- a. Re-measurement of akashmoni trees from existing 24 PSPs established in the plantations of Chittagong and Cox's Bazar Forest Division.
- b. Establishment of 3 new PSPs for akashmoni in place of 3 destroyed PSPs at Ramu and data collection.
- c. Re-measurement of mahogany trees from existing 43 PSPs established in the plantation of Faridpur and Rajbari Forest Division.
- d. Summarization of collected data.

1.8.1 **Activities calendar** :

Activities (as per 1.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												

- 1.9 **Previous Progress, if any:** Established 43 PSPs for mahogany trees of different ages at Faridpur and Rajbari, 27 PSPs for akashmoni trees of different ages at Cox's Bazar and Chittagong forest areas. Data on DBH and height growth of trees in the plots have been collecting since 2011. Collected data were summarized. Summarized data will be used to determine the site indices curves, growth and yield for these species.

1.9.1 **Achievement(s)** :

- a. Based on temporary sample plots (TSPs), prepared growth and yield tables for akashmoni planted in the hills, embankments and road-side.
- b. Based on temporary sample plots (TSPs) prepared growth and yield tables for mahogany planted in the embankments, road-side, wood-lot and crop land.

1.10 **Financial statement** :

- 1.10.1 Total cost of the study : Tk 5,00,000.00
- 1.10.2 Cumulative cost : Tk. 1,00,00.00
- 1.10.3 Cost of the year : Tk: 74,225.00
- 1.10.4 Source of fund : GOB

- 1.11 **Beneficiaries:** Forest Department (FD), Policy Maker, Researchers, Forestry Professionals, BFIDC, Timber traders, Universities and NGOs.

2 **Study** : On-going

2.1 **Programme Area** : Forest Inventory, Growth and Yield.

2.2 **Title of the study** : Growth and yield assessment of mangrove species through establishment of permanent sample plots (PSPs) in coastal plantation of Bangladesh (1<sup>st</sup> Phase)

2.3 **Justification (For new study)** : NA

2.4 **Objectives (s)**

- 2.4.1 To generate information on growth and yield of mangrove species planted as under plantation.
- 2.4.2 To estimate diameter/girth increment rates of these species.
- 2.4.3 Setting physical rotation of these species.

**2.5 Expected output:**

- a. Survival rates, diameter/girth and height increment rates of the mangrove species planted as under planting will be known.
- b. Site indices curves for different mangrove species grown as under planting will be available.
- c. Physical rotation of mangrove species will be determined.

**2.6 Study period :**

2.6.1 Starting year : 2015-2016

2.6.2 Completion year : 2019-2020

**2.7 Personnel (s) :**

2.7.1 Study Leader : Mohammed Shahid Ullah, DO

2.7.2 Associate (s) : Mofizul Islam Khan, FI; Abul Kalam Azad, FI and S. M. Zahirul Islam, RO.

**2.8 Activities for the year:**

- a. Re-measurement of gewa and passur trees from existing 33 PSPs established in the plantations of Patuakhali and Bhola Coastal Afforestation Division.
- b. Summarization of collected data.

**2.8.1 Activities calendar:**

Activities (as per 2.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												

2.9 **Previous Progress, if any:** Data on DBH and height of the trees were collected from 20 PSPs at Char Kukri-Mukri, Bhola and 33 PSPs at Rangabali, Patuakhali for three mangrove species namely sundri, gewa and passur and summarized.

2.9.1 **Achievement(s) :** NA

**2.10 Financial statement :**

2.10.1 Total cost of the study : Tk. 4,30,000.00

2.10.2 Cumulative cost : Tk. 1,80,000.00

2.10.3 Cost of the year : Tk: 1,14,453.00

2.10.4 Source of fund : GOB

2.11 **Beneficiaries:** Forest Department (FD), Policy Maker, Researchers, Forestry Professionals, BFIDC, Timber traders, Universities and NGOs.

**3 Study :** On-going

3.1 **Programme Area :** Forest Inventory, Growth and Yield.

3.2 **Title of the study :** Preparation of volume tables of *Acacia* hybrid, Hijol (*Barringtonia acutangula*), Karoj (*Pongamia pinnata*) and Jarul (*Lagerstroemia speciosa*).

3.3 **Justification (For new study):** NA

3.4 **Objectives (s) :**

3.4.1 To prepare volume tables of *Acacia* hybrid, hijol (*Barringtonia acutangula*), karoj (*Pongamia pinnata*) and jarul (*Lagerstroemia speciosa*).

3.5 **Expected output:** Volume table of *Acacia* hybrid, hijol, karoj and jarul will be available.

**3.6 Study period**

3.6.1 Starting year : 2016-2017

3.6.2 Completion year : 2018-2019

- 3.7 **Personnel (s)** :
- 3.7.1 Study Leader : Mohammad. Shahid Ullah, DO.
- 3.7.2 Associate (s) : S. M. Zahirul Islam, RO; Mofizul Islam Khan, FI and Abul Kalam Azad, RA (Grade-1)

3.8 **Activities for the year:**

- a. Literature review.
- b. Reconnaissance survey and site selection for collection of data for hybrid acacia.
- c. Collection of data on height and diameter at one meter interval from 300 trees hybrid acacia and 300 trees of hijol, karoj & jarul (100 trees of each species) from plantations of *Acacia sps.* at Chittagong, Cox's bazar, Mymensing and from existing hijol, karoj & jarul plantations/natural forest of Sylhet division.
- d. Summarization of collected data.

3.8.1 **Activities calendar:**

Activities (as per 1.8)	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a.													
b.													
c.													
d.													

3.9 **Previous Progress, if any:** Reviewed literature. Prepared detailed work plan. Data on height and diameter at one meter interval were collected from 900 trees of three species (jarul, hijol and karoj (300 trees of each species) selected at Lawachara, Tahirpur and Karimganj of Sylhet and Sunamganj district.

3.9.1 Achievement(s) : NA

3.10 **Financial statement** :

3.10.1 Total cost of the study : Tk. 4,50,000.00

3.10.2 Cumulative cost : Tk. 2,00,000.00

3.10.3 Cost of the year : Tk. 2,00,000.00

3.10.4 Source of fund : GOB

3.11 **Beneficiaries:** Forest Department (FD), Policy Maker, Researchers, Forestry Professionals', BFIDC, Timber traders, Universities and NGOs.

## FOREST PROTECTION DIVISION

1. **Study** : On-going
- 1.1 **Programme Area** : Forest Pests and Diseases
- 1.2 **Title of the Study** : Major pests and diseases of *Hevea* Rubber and their management
- 1.3 **Justification (for new study):** Rubber is one of the most important cash crops, with multipurpose uses. It yields latex which is commercially the most important source of natural rubber (NR). The British planters first introduced it in Bangladesh in the early twentieth century. But commercial plantation was started in 1961 by the government in Chittagong and Sylhet hilly regions. Later on, plantations were expanded in Chittagong Hill Tracts and Madhupur by the government and public enterprises. The British and some other private companies also planted rubber in the fellow lands of tea estates. At present about 25,000 hectare of land is under rubber plantation in Bangladesh, and annual production is about 7,500 tons against 20,000 tons country's total demand of natural rubber (NR). Considering high productivity, storage, transportation and marketing facilities, the government encouraged its plantation with financial support; land allotment and foreign technical

assistance. Public and private enterprises established plantations in different hilly regions and commercial exploitation started successfully within seventh years of plantation. Pest and diseases have had a major impact on rubber production in Bangladesh. Recently, a number of insect and pathogenic problem have been reported from different Rubber cultivated areas in Bangladesh. Pests include plant parasites such as *Loranthus* spp., nematodes such as *Helicotylenchus cavenessi*, *H. dihystra*, *H. erythrinae* and *Meloidogyne incognita* acrit. Insect pests include scale insects (*Aspidiotus cyanophylli* and *Parasaissetia nigra*) and white ants. Rubber cultivation is under a constant threat of attack by native as well as exotic pathogenic fungal diseases. Leaves, stems, and roots of *Hevea* are susceptible to fungal pathogens. Leaf diseases are caused by *Oidium heveae*, *Colletotrichum* spp., *Phytophthora* spp., *Corynespora cassiicola*, and *Microcyclus ulei*. The above pathogens cause abnormal leaf fall or leaf spot of young as well as mature leaves of *Hevea*. Among stem infections, pink disease, caused by *Corticium salmonicolor*, is the most important, capable of infecting young as well as mature trees. Dry rot caused by *Ustilina deusta*, patch canker caused by *Phytophthora palmivora*, and black stripe caused by *P. palmivora*, *P. meadii*, or *P. botryose*, are other important diseases affecting the stem. White root rot caused by *Rigidiporus lignosus*, brown rot caused by *Phellinus noxius*, and red rot caused by *Ganoderma philippii* are notable diseases of roots. Among the above diseases, South American leaf blights (SALB), caused by *Microcyclus ulei*, is the most devastating. This disease caused several serious epidemics, almost leading to cessation of planting of *Hevea* in Brazil. For the last few years rubber plantations has increased due to the advancement of government (FDC) and private planters in the country. Forest department has also taken large scale plantations programme for the last 3-4 decads. It is known that rubber tree is highly susceptible of a number of pests and diseases. Initially, there are some primary works on pathogenic problem by the Forest Protection Division (FPD) of BFRI. Recently, a number of complaints are coming from different private planters and government organization on pest and disease of rubber. So, intensive studies on pest and diseases are very important need. The study will help to find out the suitable pest and diseases management technique in order to increase productivity of rubber.

#### 1.4 **Objective(s)** :

- 1.4.1 To survey the incidence and asses the present status of pest and disease infestation in rubber nurseries and plantation from different areas of Bangladesh.
- 1.4.2 To study nature and extent of damage by insect-pest and pathogens.
- 1.4.3 Isolation and identification of major pest and pathogens and proving Pathogenicity.
- 1.4.4 Morphological and cultural studies of major pathogens.
- 1.4.5 To study the biology and ecology of the causal agent(s).
- 1.4.6 To develop suitable management techniques for controlling pest and disease.

#### 1.5 **Expected output** : Plant protection operations will be ensured for healthy growth and economic production of *Hevea*.

#### 1.6 **Study period**

- 1.6.1 Starting year 2015-2016
- 1.6.2 Completion year 2019-2020

#### 1.7 **Personnel(s)**

- 1.7.1 Study leader M. R. Islam, D.O.
- 1.7.2 Associates Dr, M. A. Rahman, S.R.O.; M. Junayed, R.O.; M. Z. Rahman, R.A. (Gr-1);, K.A. Zaman F.I.; S Nasreen F.I.

#### 1.8 **Activities for the year** :

- a) Survey the incidence and assess the present status of pest and disease infestation in rubber trees from different areas of Bangladesh.
- b) Study nature and extent of damage by pest and pathogens.
- c) Isolation and identification of major pest and pathogens and proving pathogenicity.
- d) Morphological and cultural studies of major pathogens.

Work plan as per activities with budget (2017-18):

Activities	Time schedule (months)											
	J	A	S	O	N	D	J	F	M	A	M	J
a. To survey for the incidence and assess the present status of pest and disease infestation in rubber trees from different areas of Bangladesh.												
b. To study nature and extent of damage by pest and pathogens.												
c. Isolation and identification of major pest and pathogens and proving pathogenicity.												
d) Morphological and cultural studies of major pathogens.												

1.9. **Previous progress**, if any (year):

- i) *Corynespora* leaf fall disease caused by *Corynespora cassiicola* and leaf spot disease caused by *Colletotrichum gloeosporioides* were isolated and identified.
- iii) Termite (*Odontotermes* spp., *Microtermes* spp., *Microcerotermes* spp.), Hemipteran bug, grass hopper, Beetle and caterpillar were identified.
- iv) Fourteen different fungicides viz., Indol M-45, Knowing, Ridomil gold, Oxyvit 50 WP, Cupravit 50 WP, Aimcozim, Champion, Sunvit, Diathane, Thiovit 80 WG, LM 45, Sulphosearch, Rovral and ABRA were tested for their efficacy against mycelia growth and spore germination inhibition of *C. gloeosporioides* at 3 different concentrations i.e. 50, 100 and 150 mg/ L under laboratory condition. Among these fungicides maximum inhibition on mycelial growth and conidial germination was observed in Knowing (Carbendazim).
- v) Five *Trichoderma* isolates, *T. virens* (Miller) IMI-392430, *T. pseudokoningii* IMI-392431, *T. harzianum* (Rifai) IMI-392432, *T. harzianum* (Rifai) IMI-392433, and *T. harzianum* (Rifai) IMI- 392434, were tested for their efficacy against mycelia growth and spore germination inhibition of *C. gloeosporioides* under *in vitro* condition. *Trichoderma harzianum* IMI-392434 was the best for inhibition of the mycelia growth and conidial germination inhibition of *C. gloeosporioides*. This strain can be used as potential biological control agent to control leaf spot disease of Rubber.

1.9.1 Achievement(s), if any : N.A.

1.10 **Financial statement** :

1.10.1 Total Cost : Tk, 20,00,000.00

1.10.2 Cumulative cost : Tk.

1.10.3 Cost of the year : Tk. 3,76,719.00

1.10.4 Source of Fund : GOB

1.11 **Beneficiaries** : FIDC, Private planters, FD, NGO's, Farmers, Educational institutions and other tree planting agencies.

2. **Study** : New

2.1 **Programme Area** : Forest pest and Diseases

2.2 **Sub-title of the study** : Insect Pests of Ratuargul Swamp Forest in Bangladesh and its management

2.3 **Justification** : Ratuargul swamp forest is the only fresh water swamp forest in Bangladesh. This forest is Amazan of Bangladesh. It is also daughter of nature. It is located in Goghatain area of

Sylhet. This forest is flooded by the water coming from hills of India only in the monsoon period and makes the swamp. Other time it remains dry. Water level never remains in the same level on this forest. It depends on the quantity of rainfalls. Water level could be 15-20 feet in the on the time of heavy rainfall. Total area of the forest is 3325.61 acres, among which 504 acres of forest was declared wildlife sanctuary in 1973. In Sylhet range-2 under Sylhet Forest Department, there is a wetland which area is about 30 thousand 3 hundred and 25 acres. In that wetland, Ratargul forest is in 5 hundred and 4 acres. At the time of rainy season the whole wetland goes under water and in winter it almost dry up.

Ratargul is a natural forest. There are 73 species has found in the forest till now. The notable plants of this forest are Hijal, Koroch, Borun, Kadam, Arjun, Jalibet, Mutta etc. Main trees of this forest are zigzag style Koroch and Hizal tree. About 25 water friendly species. Major portion of supply of Mutta which is the main raw material of Shital pati, heritage of Sylhet, comes from this forest. About 80 % of the forest area is covered with umbrella of the tree. Root of these trees are in two level. One is the ground and another in the midlevel which is used while the forest is flooded in the monsoon time. Banyan tree is very common in that forest.

This forest is very important for us. These plants are infected many pest in the different season. There are about 30 species of insect pests recorded to cause damage to pongamia raised usually as avenue planting & strip plantations on marginal lands. They include gall insect, leaf miners, foliage feeders, shoot bores, sap suckers, flower feeders and fruit seed borers. Of these, gall inducers and leaf miners rank predominant position because of their destructive potential and ubiquitous occurrence. However, it has also been shown that galls increase the photosynthetic capacity of the plant by increasing the surface area of leaves.

Recently, a number of complaints are coming from government organization (D.F.O), Forest Department of Sylhet on pest of plantation. Forest Department and Government have mass plantation those areas. So, intensive studies on pest are very important need. The study will help to find out the suitable pest management technique in order to mitigate the climate change.

- 2.4 **Methodology:** Pest problems in nurseries and plantations will be surveyed on randomly. Collection and identification of unknown key pests will be made from various locations and in different seasons of the year. Nature and extent of damage by the pests will be recorded. Biology and ecology of the major pests will be studied in the lab condition. Management trials will be set up against the causal organism through insecticides and bio-control agents under laboratory and field conditions.

2.4.1 **Objectives :**

- 2.4.1.1 To assess the present status of pest at Raturgul swamp forest.  
 2.4.1.2 To conduct Some PRA (Participatory Rural Advisory) meeting with the people during the study.  
 2.4.1.3 To study nature and extent of damage by insect pest.  
 2.4.1.4 To Identify major pest providing pathogenicity.  
 2.4.1.5 To develop suitable management techniques for controlling pest.

- 2.5 **Expected Output :** Sustainable development plantation will be ensure and mitigate the natural destroy. The wood Production will be increased.

2.6 **Study period :**

- 2.6.1 Starting year : 2017-2018  
 2.6.2 Completion year : 2019-2020

2.7 **Personnel (s) :**

- 2.7.1 Study leader : M. R. Islam, D.O.  
 2.7.2 Associates : Dr, M. A. Rahman, S.R.O.; M. Junayed, R.O.; M. Z. Rahman, R.A.; K.Asad-uz-Jaman F.I. (Gr-1); S. Nasreen F.I

2.8 **Activities of the year :**

- 2.8.1 Survey the incidence and asses the present status of pest infestation from different areas.  
 2.8.2 Conduct Some PRA meeting with the people during the study

2.8.3 Study nature and extent of damage by pest.

2.8.4 Isolation and identification of major pests.

Work plan as per activities with budget (2017-18):

2.8.1 Activities calendar :

Activities	J	A	S	O	N	D	J	F	M	A	M	J
a. Survey the incidence and asses the present status of pest infestation from different areas.				■	■	■	■		■	■	■	
b. Conduct Some PRA meeting with the people during the study					■	■		■	■	■		
C. Study nature and extent of damage by pest.				■	■	■	■	■	■	■		
d. Isolation and identification of major pests.				■	■	■	■	■	■	■	■	■

2.9 **Previous progress**, if any (year): N.A.

2.9.1 Achievement(s), if any : N.A

2.10 **Financial statement** :

2.10.1 Total Cost : Tk, 15,00,000.00

2.10.2 Cumulative cost : Tk.

2.10.3 Cost of the year : Tk. 5,27,306.00

2.10.4 Source of Fund : GOB

2.11 **Beneficiaries** : Forest Department, NGO, Local people and Nursery Owner

## Mangrove Silviculture Division

1. **Study** : On going

1.1 **Programme Area** : Breeding and Tree Improvement

1.2 **Title of the Study** : Vegetation dynamics and regeneration pattern in relation to salinity and siltation of the Sundarban

1.3 **Justification:** The Sundarbans, like other mangrove ecosystems, is dynamic and complex. Changes in this ecosystem are occurring frequently. To ascertain these changes, regular collection of relevant data from the forests on a long-term basis is a prerequisite. Continuous forest inventory through Permanent Sample Plots (PSPs) are useful to record changes in the various parameters associated with the stand density, species composition, structure and species shifts. The Sundarban forest is dependent on natural regeneration in order to be managed under a sustainable yield basis. The main problem of the forest is inadequate natural regeneration. So, the present study may help to correlate past and present regeneration and vegetation status of the forest and these can be useful tools for improving the management system of the Sundarban.

1.4 **Objective(s)** :

1.4.1 To determine the species composition

1.4.2 To determine the natural regeneration status of major mangrove species.

1.4.3 To understand the vegetation dynamics in the Sundarban over time.

1.4.4 To assess the impact of salinity and siltation on the change of vegetation.

1.5 **Expected output** : Species composition, vegetation dynamics and regeneration status of major mangrove species in the Sundarbans can be determined.

1.6 **Study period** : 2016-2021

1.6.1 Starting year : 2016-2017 (2<sup>nd</sup> Phase)

1.6.2 Completion year : 2020-2021

- 1.7 **Personnel(s)** :
- 1.7.1 Study leader : Dr. M. M. Rahman, DO
- 1.7.2 Associate : Dr. A. S. M. Helal Siddiqui, SRO

1.8 **Activities for the year** :

- a) Maintenance (Demarcation of plots, replacement of signboards, number-plates, jungle cutting etc.) of 30 PSPs in different salinity zones throughout the Sundarban.
- b) Collection of data on regeneration, salinity and siltation data from the PSPs.
- c) Compilation and analysis of data.

1.8.1 **Activities calendar** :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												

1.9 **Previous progress:** Data on regeneration of major mangrove species were recorded from 33 PSPs. Average seedlings recruitment in the year 2016 was found 27,333/ha/year. Among them, *Heritiera fomes* constituted 30%, *Excoecaria agallocha* 24%, *Ceriops decandra* 12%, *Bruguiera sexangula* 11%, *Avicennia officinalis* 9%, *Aegiceras corniculatum* 7%, *Xylocarpus mekongensis* 4%, *Amoora cuculata* 1% and rest other species 2%. Height and DBH class of Sundri and Gewa were analysed. Highest number of sundri trees (51%) was found under DBH class >5<=10cm and only 3.5% Sundri trees was found above 30cm DBH. Highest number of gewa trees (74%) was found under DBH class >5<=10cm and only 1.5% gewa trees was found above 20cm DBH. Highest number of sundri trees (41%) was found under height class >5<=10m and only 2.3% sundri trees was found above 15m height. Highest number of gewa trees (47%) was found under height class >5<=10m and only 14% gewa trees was found above 10m height.

1.9.1 **Achievements** : Thirty Permanent Sample Plots (PSPs) were established in different salinity zones throughout the Sundarban

1.10 **Financial statement** :

- 1.10.1 Total cost of the study : Tk. 20,00,000.00
- 1.10.2 Cumulative cost : Tk. 3,00,000.00
- 1.10.3 Cost of the year : Tk. 4,00,000.00
- 1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : Forest Department, NGOs, Students, Teachers and Researchers.

2. **Study** : On going

2.1 **Programme Area** : Plantation Technique and Forest Management

2.2 **Title of the Study** : Growth performance of mangrove and non-mangrove experimental plantations in the Sundarban

2.3 **Justification** : There are poorly stocked less productive areas in the Sundarban. The Mangrove Silviculture Division studied the growth performance of mangrove and non-mangrove species in poorly stocked less productive areas of the Sundarbans since 1988. Those are all preliminary results of planted mangrove and non-mangrove species. So, monitoring or continuous investigation up to several years are to be needed to find out the actual performance of mangrove species with a view to study the survival, establishment and growth of these mangrove species.

2.4 **Objective(s)** :

2.4.1 To determine the growth performance of mangrove and non-mangrove experimental plantations in the Sundarban

2.5 **Expected output:** Determination of growth and yield of the planted mangrove species over poorly stocked areas and non-mangrove species on the raised lands of the Sundarban and to increase the productivity of the mangrove forest.

2.6 **Study period** : 2016-2020

2.6.1 Starting year : 2016-2017 (2<sup>nd</sup> Phase)

2.6.2 Completion year : 2019-2020

2.7 **Personnel(s)** :

3.7.1 Study leader : Dr. M. M. Rahman, DO

2.7.2 Associate : Dr. A. S. M. Helal Siddiqui, SRO

2.8 **Activities for the year** :

a. Maintenance of 8 ha mangrove and 3.5 ha non-mangrove experimental plantations.

b. Collection of growth data (Survivability, height, dbh, bole height, etc.) from the experimental plantations.

c. Compilation and analysis of data.

2.8.1 **Activities calendar** :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												

2.9 **Previous progress** : A total of 3.5 ha mangrove and 3.5 ha non-mangrove species plantations were maintained. Growth data of one non-mangrove (Jarul- *Legerstroemia speciosa*) and eight mangrove species (Sundri- *Heritiera fomes*, gewa- *Excoecaria agallocha*, goran- *Ceriops decandr*, kirpa-*Lumnitzera racemosa*, passur (*Xylocarpus mekongensis*), kankra (*Bruguiera gymnorrhiza*), amur (*Amoora cucullata*), khalshi (*Aegiceras corniculatum*) were recorded and analyzed. Growth performance of Jarul is very promising in the raised land of the Sundarban. Average survival percentage of jarul was 83 and average height was 6.9m & average DBH 12.2cm at the age of 15 years at Khatakhali in the less saline zone of the Sundarban. The average of survival of sundri, gewa and kirpa were 21%, 70% and 63% as well as average height of those species were 1.8m, 5.0m and 5.5m respectively at the age of 14 years at Burigoalini in the strong saline zone. The average of survival of jhana and gewa were 26% and 86% as well as average height of those species were 5.6m and 3.2m respectively at the age of 11 years at Khashitana in the strong saline zone of the Sundarban. The average of survival of gewa and goran were 61% and 55% as well as average height of those species were 2.1m and 1.6m respectively at the age of 10 years at Andermanik in the strong saline zone of the Sundarban.

2.9.1 **Achievement(s)** : Plantations of 5 ha mangrove and 3.5 ha non-mangrove species were established in the Sundarban.

2.10 **Financial statement** :

2.10.1 Total cost of the study : Tk. 14,00,000.00

2.10.2 Cumulative cost : Tk. 2,00,000.00

2.10.3 Cost of the year : Tk. 3,69,000.00

2.10.4 Source of fund : GOB

2.11 **Beneficiaries:** Forest Department, NGOs, Students, Teachers, Researchers and Local farmers.

3. **Study** : On going
- 3.1 **Programme Area** : Breeding and Tree Improvement
- 3.2 **Title of the Study** : Selection and development of the top dying tolerant sundary (*Heritiera fomes*) trees in the Sundarban.
- 3.3 **Justification:** A lot of sundari (*Heritiera fomes*) trees have been dying due to a disorder known as top dying. The genetic characterization of a species and the degree of polymorphism is basic to any understanding of variation within mangrove ecosystems. It seems that it is difficult to partition environmental and heritable components. Forest tree breeding involves the selection of superior germplasm and the large scale reproduction of elite trees. In case of mangroves, morphological and physiological markers can be used to identify superior trees. Elite trees can then be produced using micropropagation, vegetative propagation or seed propagation. Studies on top dying of sundari were conducted but actual cause for the disorder has not yet been ascertained. So, a study for improvement of the species is necessary.
- 3.4 **Objective(s)** :
- 3.4.1 To develop a pure line of top dying tolerant sundri trees.
- 3.5 **Expected output** : Selection and development of top dying resistant sundri trees in the Sundarban.
- 3.6 **Study period** : 2016-2019
- 3.6.1 Starting year : 2016-2017 (2<sup>nd</sup> Phase)
- 3.6.2 Completion year : 2018-2019
- 3.7 **Personnel(s)** :
- 3.7.1 Study leader : Dr. M. M. Rahman, DO
- 3.7.2 Associate : Dr. A. S. M. Helal Siddiqui, SRO
- 3.8 **Activities for the year** :
- Planting of previously raised seedlings of selected sundari trees at three locations of the Sundarban.
  - Maintenance of previously raised experimental plantations. Collection of survival and growth data from the experimental plantations twice a year.
  - Collection of data on soil pH, water salinity, light intensity, inundation and siltation in the selected sites.
  - Collection of seeds from the selected trees.
  - Raising seedlings at Munshiganj, Bogi and Dhangmari Research Stations for next year plantations.
  - Observation on germination of the seeds, survival and growth performance of the seedlings in the nursery.
  - Data compilation.

3.8.1 **Activities calendar** :

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a.													
b.													
c.													
d.													
e.													
f.													
g.													

- 3.9 **Previous progress:** Forty numbers (10 nos. in each location) of healthy (disease free) sundari trees have been selected for development of pure line in the Sundarban. Forty numbers (10 nos. in each location) of healthy (disease free) sundari trees have been selected for development of pure line in

the Sundarban. The water salinity of Bholarpar (compt. No. 24), Bojbaja (compt. No. 37), Kalabogi (compt. No. 33) and Kalabogi Khal (compt. No. 32) were recorded 1ppt, 24ppt, 17ppt and 22ppt respectively in May, 2014. The soil pH of Bholarpar (compt. No. 24), Bojbaja (compt. No. 37), Kalabogi (compt. No. 33) and Kalabogi Khal (compt. No. 32) were 4.5, 5.6, 6.1 and 6.4 respectively. Inundation was regular in all the experimental sites. Siltation / erosion gauge have been placed in each location. Flowering and fruiting behaviors of the selected trees have been observed and recorded. Germination of the seeds, survival and growth performance of the seedlings in the nursery have been recorded. Growth performance of sundari at different locations in different years of the Sundarban was recorded.

3.9.1 **Achievement(s)** : Forty numbers (10 nos. in each location) of healthy (disease free) sundari trees have been selected for development of pure line in the Sundarban.

- 3.10 **Financial statement** :
- 3.10.1 Total cost of the study : Tk. 15,00,000.00
- 3.10.2 Cumulative cost : Tk. 7,00,000.00
- 3.10.3 Cost of the year : Tk. 4,00,000.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : Forest Department, NGOs, and Researchers.

4. **Study** : On going
- 4.1 **Programme Area** : Biodiversity and conservation
- 4.2 **Title of the Study** : Centralization and conservation of mangrove vegetation in three salinity zones of the Sundarban

4.3 **Justification:** The conservation, management and use of mangrove germplasm maintained in gene banks poses a number of challenges to the researchers dedicated to the investigation of plant genetic resources. Common problems include, for example, the development of strategies for sampling representative individuals in natural populations, the improvement of tools and technology for long-term conservation. The characterization of the accessions maintained in the collection and the examination of the genetic relationship between them is important for the sustainable conservation and increased use of mangrove genetic resources. Germplasm characterization of plant accessions deposited in gene banks has been limited and is probably a major cause for the limited use of accessions in tree improvement programs. The most important challenges in the near future are certainly the identification of useful variation (real or potential) in germplasm and its use in guiding conservation decisions. Knowing the presence of useful genes and alleles would help in making decisions on the multiplication of accessions and the maintenance of seed/propagule stocks when responding to an expected higher demand for materials. Such information may also help in making decisions on heterogeneous accessions where only some genotypes may possess useful alleles. The gene bank curator may have to decide on maintaining the original material as is and separating a sub-population carrying the desirable alleles as well as giving it new accession numbers and management protocols. This will facilitate germplasm use and add value to the collections. The effective use of mangrove genetic resources stored in gene banks for tree improvement program will be increased. The integration of genomic technology and the characterization of germplasm banks will play an important role in the sustainable conservation and increased use of mangrove genetic resources. Mangrove germplasm is the foundation of all mangrove ecological restoration activities. Based on the existing literatures and our own experiences, and by using different methods, the mangrove germplasm will be developed in the Sundarban, which could provide guidance for the integrated management of mangrove ecosystems. As a part of mangrove conservation, establishment of a mangrove museum is very much essential for preservation and demonstration of the flora and faunal specimens of the Sundarban to the students, researchers and general people of the country which will create awareness and will help protect and preserve the Sundarban ecosystem. The museum will act as a hub for conservation training for adults, and educating children about the value of mangroves.

- 4.4 **Objective(s)** :
- 4.4.1 To conserve mangrove species in their natural habitat.
- 4.4.2 To centralize threatened mangrove species.
- 4.4.3 To demonstrate flora and fauna in natural habitat in the Sundarban.
- 4.4.4 To enrich and develop of a mangrove museum
- 4.5 **Expected output** : Conservation and protection of mangrove plant gene resources for studying taxonomy, phenology, ecology, silviculture, genetic diversity etc. Increased yield by capturing higher genetic gain, control of pests and diseases of forest tree species, forest resource management, biodiversity conservation and sustainable production. Establishment of a mangrove museum housing representative flora and fauna of the Sundarban.
- 4.6 **Study period** : 2016-2020
- 4.6.1 Starting year : 2016-2017(2<sup>nd</sup> Phase)
- 4.6.2 Completion year : 2019-2020
- 4.7 **Personnel(s)** :
- 4.7.1 Study leader : Dr. M. M. Rahman, DO
- 4.7.2 Associate : Dr. A. S. M. Helal Siddiqui, SRO
- 4.8 **Activities for the year** :
- a) Collection of survival and growth data from the experimental plantations twice a year. Collection of data on soil pH, water salinity, light intensity, inundation and siltation in the selected sites.
- b) Maintenance of previously raised experimental plantations of kirpa (1.8 ha), passur (0.9 ha), jhana (0.6 ha), khalshi (1.8 ha), amur (1.8 ha) bakul kankra(1.8 ha), amdhekur (0.9ha), dhundul (1.8 ha) and marichabaen(0.9 ha).
- c) Gap filling and maintenance of previously raised dhundul (0.9 ha).
- d) Preparation of demarcation line by clearing jungle and painting of trees.
- e) Collection and preservation of fleshy fruits, plant parts and available faunal specimens from the Sundarbans and Forest Department.
- f) Maintenance of previously collected flora and faunal specimens in the museum.
- g) Data compilation and reporting.
- 4.8.1 **Activities calendar** :

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a.													
b.													
c.													
d.													
e.													
f.													

4.9 **Previous progress:** Three conservation plots covering an area of sixty hectares were established at Dhangmari (Com. No. 31), Bogi (Com. No. 24) and Munshiganj (Com. No. 46) in three salinity zones of the Sundarban. Initially it was recorded that there are thirty seven species at Bogi in the less saline zone, thirty one species at Dhangmari in the moderate saline zone and twenty two species at Munshiganj in the strong saline zone of the conservation plots. Dhundul (1.5 ha), kirpa (1.8 ha), passur (0.9 ha), jhana (0.6 ha) and khalshi (0.9 ha) species were centralized in three conservation plots in different saline zones. Growth and survival of those planted species in the conservation plots in different years have been analyzed. 1,800 Seedlings of amur (*Amoora cuculata*) and 1,800 seedlings of shingra (*Cynometra ramiflora*) were raised in three research stations for centralization in the arboretum. The following Bee foraging plants were recorded in the conservation plots: Khalshi, kirpa, golpata, goran, gewa, sundari, baen, keora, choyla, kankra, passur, amur, hargoja and hantal. Museum room was renovated and furnished with iron racks, multipurpose almirah, display boards and xylarium. Fifteen herbarium specimens of

mangrove species were prepared. Fleshy fruits and plant parts of major mangrove species' specimens and twenty five fish specimens were collected from the Sundarbans and preserved in the museum. Sixteen wood samples of mangrove tree species were prepared and preserved in the museum. Previously collected flora and faunal specimens from the Sundarban were maintained in the museum.

4.9.1 **Achievements:** Three conservation plots (Twenty hectares at each saline zone) were established at Dhangmari (Com. No. 31), Bogi (Com. No. 24) and Munshiganj (Com. No. 46) in the Sundarban. Five mangrove species were centralized in the three conservation plots of the Sundarban. A museum has been established at the Divisional Head Quarter of Mangrove Silviculture Division, Khulna in 2002 having 55 flora and 50 faunal specimens and twelve wood samples of mangrove tree species.

4.10 **Financial statement** :

4.10.1 Total cost of the study : Tk. 35,00,000.00

4.10.2 Cumulative cost : Tk. 5,00,000.00

4.10.3 Cost of the year : Tk. 5,00,000.00

4.10.4 Source of fund : GOB

4.11 **Beneficiaries** : Forest Department, NGOs, Researchers, Students and local people.

5. **Study** : On going

5.1 **Programme Area** : Biodiversity and conservation

5.2 **Title of the Study** : Improvement and Popularization of Plantation Techniques for Threatened Mangrove Species in the Sundarban

5.3 **Justification** : More than one in six mangrove species worldwide are in danger of extinction due to coastal development and other factors, including climate change, logging and agriculture, according to the first-ever global assessment on the conservation status of mangroves for the IUCN Red List of Threatened Species. The loss of mangroves will have devastating economic and environmental consequences. They also have the ability to store large amounts of carbon from the atmosphere. These ecosystems are not only a vital component in efforts to fight climate change, but they also protect some of the world's most vulnerable people from extreme weather and provide them with a source of food and income.

A threatened species is any plant or animal species that is risk of extinction. Different categories are allocated to threatened species depending on the degree of risk. These categories are based on a number of criteria including, trends in population size, health and distribution. A species may become threatened/ endangered and eventually extinct when death rate exceeds birth for a prolonged duration. The reasons may be natural and anthropogenic. Anthropogenic activities are now-a-days prominent and causing extinction of many plant species of ecological and economic significance. Many species are facing tremendous pressure and are on the verge of extinction in the Sundarban. In the present peace of research work, we suppose to study the conservation requirement of three mangrove species of the Sundarban viz. *Rhizophora mucronata*, *Kandelia candel*, and *Xylocarpus granatum*. Natural populations of these species have been depleted due to over-harvesting of mature trees and climate change effects. The populations of these species are also very poor in nature which culminates with poor natural regeneration. Therefore, *ex-situ* conservation in plantations of these species will be suggested for effective conservation of the species.

5.4 **Objective(s)** :

5.4.1 To develop standard nursery and plantation techniques for endangered mangrove species.

5.4.2 To determine better silvicultural techniques for each endangered mangrove species

5.4.3 To establish and conserve the plantations of endangered species for seed source.

- 5.5 **Expected output** : Knowledge on the nursery raising technique, proper methods for plantations and suitable site for threatened mangrove species in the Sundarban. Increased the productivity of forests through use of appropriate nursery and plantation techniques of these species, protect and preserve the forest ecosystem, biodiversity conservation and sustainable production.
- 5.6 **Study period** : 2016-2020
- 5.6.1 Starting year : 2016-2017
- 5.6.2 Completion year : 2019-2020
- 5.7 **Personnel(s)**
- 5.7.1 Study leader : Dr. M. M. Rahman, DO
- 5.7.2 Associate : Dr. A. S. M. Helal Siddiqui, SRO
- 5.8 **Activities for the year** :
- Collection of seeds/propagules of jhana, bhatkathi and dhundul from the Sundarban.
  - Raising 10,200 seedlings of jhana, bhatkathi and dhundul in polybags.
  - Raising experimental plantations of jhana, bhatkathi and dhundul in 3 salinity zones at 1m x 1m, 1.5m x 1.5m and 2.0m x 2.0m spacings in Randomised Complete Block Design.
  - Collection of survival and growth data from the experimental plantations at six months interval.
  - Data compilation and reporting.

#### 5.8.1 Activities calendar

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a)													
b)													
c)													
d)													
e)													

- 5.9 **Previous progress** : A total of 10,200 seedlings of jhana, bhatkathi and dhundul were raised in polybags for this year experimental plantation in three salinity zones of the Sundarban. An area of 1.2ha experimental plantations of dhundul in 3 salinity zones at 1m x 1m, 1.5m x 1.5m and 2.0m x 2.0m spacing in Randomised Complete Block Design were raised.
- 5.9.1 Achievements : NA
- 5.10 **Financial statement** :
- 5.10.1 Total cost of the study : Tk. 20,00,000.00
- 5.10.2 Cumulative cost : Tk. 3,00,000.00
- 5.10.3 Cost of the year : Tk. 3,00,000.00
- 5.10.4 Source of fund : GOB
- 5.11 **Beneficiaries** : Forest Department, NGOs, Researchers, Students and local people.

## MINOR FOREST PRODUCTS DIVISION

1. **Study** : On-going
- 1.1 **Programme Area** : Bamboo and Non-timber Economic Crops.
- 1.2 **Title of the Study** : Growth performance of common rattans in Bangladesh and its popularization
- 1.3 **Justification (For new study)** :
- 1.4 **Objective(s)** :
- 1.4.1 To determine the growth performance of common rattan species
- 1.4.2 To determine the optimum harvesting cycle and appropriate management system for maintaining sustainable production of different rattan species

1.4.3 To distribute quality planting materials of different rattan species to the interested government/non-government organization and private planters

1.4.4 To create awareness among the common people about rattan species

**1.5 Expected output:**

- Appropriate plantation technique will be available for rising of different rattan species
- Suitable management technique will be available
- Rattan resources will be increase

**1.6 Study period :**

1.6.1 Starting year : 2015-2016

1.6.2 Completion year : 2017-2018

**1.7 Personnel :**

1.7.1 Study Leader : a) Md. Sah Alam, RO

1.7.2 Associate : b) Dr.Rafiqul Haider, DO and Mohammed Mukhlesur Rahman, FI

**1.8 Activities for the year :**

- a) Survey for selecting the study sites and the study will be conducted through systematic sampling
- b) Data on number of shoot per clump, length/height and diameter of the main shoot
- c) Seed collection of different rattan species from different locations.
- d) Raising 10,000 seedlings of different rattan species (jali, kerak and golla) for establishment of conservation plots and remaining seedlings for distribution on payment basis.
- e) Organize two (02) awareness programs in a suitable location.
- f) Raising trial plantations of 0.5 hectare at BFRI Headquarter and Hinguli Research Station.
- g) Data compilation and report writing.

**1.8.1 Activities calendar :**

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a)													
b)													
c)													
d)													
e)													
f)													
g)													

1.9 **Previous progress if any :** Data on number of shoot per clump, length and diameter of the main shoot were collected.

**1.9.1 Achievement (s) (if any) :**

**1.10 Financial statement :**

1.10.1 Total cost of the study : Tk. 4,50,000.00

1.10.2 Cumulative cost : TK. 2,96,000.00

1.10.3 Cost of the years : Tk. 1,49,950.00

1.10.4 Source of fund : GOB

1.11 **Beneficiaries :** FD, NGOs, Private Planters, Farmers, Educational Institute, Rattan industries and BSCIC.

2. **Study** : New
- 2.1 **Programme Area** : Bamboo and Non-timber Economic Crops
- 2.2 **Title of the Study** : Nursery techniques of three medicinal plants: kusum (*Schleichera oleosa*), mahua (*Madhuca indica*) and box-badam (*Sterculia foetida*).
- 2.3 **Justification (For new study)** : From the time immemorial plants with therapeutic properties play an important role in disease treatment (Khan et al. 2005). Proper exploration of medicinal plants in the country and their stock assessment were not thoroughly carried out. Gani (1998) reported 450 to 500 plants growing in Bangladesh have therapeutic value. Yusuf et al. 2009 reported 747 plants have therapeutic value which is used in Ayurvedic, Unani and other system of medical treatments. In Bangladesh the people who living in the remote areas particularly in hilly areas rely on herbal medicines (Ara et al. 1997). Owing to its potentiality demand of raw materials for production of herbal medicines increased in Bangladesh. About six thousand metric tons of medicinal plants are required annually by the relevant industries for producing traditional medicines (Motaleb et al. 2011). In absence of organized cultivation and lack of proper propagation techniques for medicinal plant species, local manufacturers imported huge amount of pharmaceutical raw materials including medicinal plants and their semi processed products to feed their industries (Ghani 2003). Bangladesh Forest Research Institute (BFRI) initiated the research on different aspects of medicinal plants and generates considerable information since its inception. In continuation of these following five important medicinal plants are included for standardizing nursery and plantation techniques in the study.
- 2.4 **Objective(s)** :
- 2.4.1 To develop nursery techniques for production of planting materials.
- 2.4.2 To develop plantation and management techniques for sustain yield.
- 2.4.3 To popularize cultivation and use of those medicinal plants.
- 2.5 **Expected output** : Appropriate nursery, plantation and management techniques of selected five medicinal plants will be known.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2017-2018
- 2.6.2 Completion year : 2018-2019
- 2.7 **Personnel** :
- 2.7.1 Study Leader : Dr.Rafiqul Haider, DO
- 2.7.2 Associate : Md Sah Alam, RO and Mohammed Mukhlesur Rahman, FI
- 2.8 **Activities for the year** :
- a) Collection of seed / propagating materials and raising 4,000 seedlings for five selected medicinal plants
- b) Recording information on germination percentage, germination period and seedlings growth in the nursery.
- c) Maintenance of seedlings in the nursery.
- d) Establishment of 0.5 hectare experimental plantations with selected medicinal plants in Hinguli Research Station.
- e) Collection of survival and growth data from raised plots of BFRI Headquarter and Hinguli Research Station.
- f) Data compilation and report writing.

### 2.8.1 Activities calendar :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a)			■	■	■				■	■		
b)								■	■	■		
c)			■	■	■	■	■	■	■	■	■	■
d)											■	■
e)	■	■	■	■	■	■	■	■	■	■	■	■
f)										■	■	■

2.9 **Previous progress if any** : New study

2.9.1 **Achievement(s)(if any)** :

2.10 **Financial statement** :

2.10.1 Total cost of the study : Tk 6,000,00.00

2.10.2 Cumulative cost : Tk-

2.10.3 Cost of the years : Tk 4,19,469.00

2.10.4 **Source of fund** : GOB

2.11 **Beneficiaries** : FD, NGOs, Private planters, Farmers, Educational Institute and Herbal drug processing industries.

3 **Study** : On going

3.1 **Programme Area** : Bamboo and Non-timber Economic Crops.

3.2 **Title of the Study** : Germplasm conservation and management practices of different medicinal plants (2<sup>nd</sup> phase)

3.3 **Justification (For new study)** :

3.4 **Objective(s)** :

3.4.1 To authenticate the correct identification of medicinal plants

3.4.2 To conserve medicinal plants for scientific study and demonstration

3.4.3 To develop a gene pool of medicinal plants species for propagation purposes

3.4.4 To popularize cultivation and use of medicinal plants

3.4.5 To determine management techniques for maximum yield of medicinal plants

3.5 **Expected output** : Genetic sources for quality planting materials will be enriched. Management techniques for maximum yield of medicinal plants will be developed.

3.6 **Study period** :

3.6.1 **Starting year** : 2015- 2016

3.6.2 **Completion year** : 2019- 2020

3.7 **Personnel** :

3.7.1 Project Leader : Md. Sah Alam RO

3.7.2 Associates : Dr.Rafiqul Haider, DO and Mohammed Mukhlesur Rahman, FI

3.8 **Activities for the year** :

a) Collection of propagating materials for 12 (annual and perennial) medicinal plants from Bogra, Natore, Rangamati, Bandarban and Khagrachari districts and Sylhet regions

b) Raising 4,000 seedlings of different medicinal plants for establishing conservation plots and left over seedling for distribution.

c) Maintenance of seedlings in the nursery.

d) Bed development through earth feeling and improvement of permanent drainage system.

e) Re-establishment of conservation plots for 90 annual medicinal plants and establishment of conservation plots with 05 perennial medicinal plants at BFRI Headquarter.

- f) Establishment of 0.5 hectare experimental plantations with selected medicinal plants in Hinguli Research Station.
- g) Maintenance of existing and new conservation plots at BFRI campus and Hinguli Research Station.

### 3.8.1 Activities calendar :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a)												
b)												
c)												
d)												
e)												
f)												
g)												

3.09 **Previous progress if any** : Four perennial (ashfal, daruchini, alu-bokhara, jaifal) and 05 annual (bakful, dauntimul, bontulsi, bish-kachu, alkushi,) medicinal plant species were collected from different locations and conserved them at BFRI HQs nursery

3.9.1 **Achievement (if any)** : Conserve 109 perennial (aloevera, sadachita, kalochita, iswarmul, pipul, sarpagandha, choijal, anantamul, salpani, panbilash, ulotkombal, buikumra, karpur, hazari mossalla, jayanti, naglingom, ayapana, tespata, mehedi, khoir, chandan, kuchila, kurchi, dhup, ritha, uriam etc.) and 81 annual (brammi, mohabingharaj, kalokeshi, alkushi, aswagandha, ekangi, misridana, turukchandal, ulatchandal, dantimul, bakful punarnava, tulshi, beladona, dhutura, shankhamul, muktajhuri bhuiamla etc.) medicinal plants at MFP nursery and BFRI campus as a permanent source of propagating materials.

### 3.10 Financial statement :

- 3.10.1 Total cost of the study : Tk. 9, 50,000.00
- 3.10.2 Cumulative cost : Tk. 4, 30,000.00
- 3.10.3 Cost of the year : Tk. 2, 99,850.00
- 3.10.4 Source of fund : GOB

3.11 **Beneficiaries** : FD, NGOs, Private planters, Farmers, Educational Institute and Herbal drug processing industries.

4. **Study** : New

4.1 **Programme Area** : Bamboo and Non-timber Economic Crops

4.2 **Title of the Study** : Screening of host /nurse plants for raising chandan (*Santalum album*.) plantation

4.3 **Justification (For new study)** : Sandalwood (*Santalum album*) commercially and culturally important species belongs to the family Santalaceae. The main reasons for the economic and cultural value of sandalwood are the oil contained in the sandalwood timber, mainly heartwood. *Santalum album* known as Indian sandalwood is renowned for its oil, which is highly rated for its sweet, fragrant, persistent aroma and the fixative property which is highly demanded in perfume industry (Subasinghe 2013). From perfumery to joss sticks, there are several hundred products that use sandalwood oil and also used in soap industry (Rai 1990). The powder of wood commonly used on skin as beautifier. The oil found in heartwood and root is used in medicines for cooling diaphoretic diuretic and expectorant properties (Ara et al 1997). Paste of heartwood is applied to burns, fever and headache. The wood is also used in snake bite and oil yield, from seeds is used in skin troubles (Singh et al. 1965).

There are around 18 sandalwood species in the world belongs to the genus *Santalum*. All the sandalwood species are identified as obligate wood hemi-parasites which mean they absorb certain nutrients like phosphorous, sulphate and nitrates from the host trees via root connections called haustoria (Subasinghe 2013). *Santalum album* the Indian sandalwood is native to Indonesia and India. In Bangladesh it is found in gardens or home gardens sporadically. But there is a growing demand of sandalwood in soap and perfume industry. Considering the demand Export Promotion Bureau (EPB) of Bangladesh indent to commercial cultivation of sandalwood in Bangladesh through a tripartite meeting among Bangladesh Forest Research Institute (BFRI), Forest Department (FD) and EPB. For any successful plantation program it needs appropriate nursery and plantation technique. BFRI worked on nursery raising technique of sandalwood. As sandalwood is hemi-parasite so it is pre-requisite to identify or select suitable host plants for plantation raising. In view of this the study is under taken.

4.4 **Objective(s)** :

4.4.1 To select suitable host plants for raising chandan plantation.

4.4.2 To develop plantation and management techniques for sustain yield.

4.5 **Expected output** : Suitable host and appropriate plantation and management techniques of chandan plants will be known.

4.6 **Study period** :

4.6.1 Starting year : 2017-2018

4.6.2 Completion year : 2021-2022

4.7 **Personnel** :

4.7.1 Study Leader : Dr. Rafiqul Haider, DO

4.7.2 Associate : Md. Sah Alam, RO and Mohammed Mukhlesur Rahman, FI

4.8 **Activities for the year** :

- a) Raising of 1000 seedlings for five host plants
- b) Collection of seed / propagating materials and raising 500 seedlings of chandan.
- c) Recording information on germination percentage, germination period and seedlings growth in the nursery.
- d) Maintenance of seedlings in the nursery.
- e) Establishment of 0.2 hectare experimental plantations with host plants
- f) Data collection from raised plots on survival, and growth
- g) Report writing.

4.8.1 **Activities calendar** :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a)			■	■	■				■	■		
b)				■	■			■				
c)												
d)	■	■	■	■	■	■	■	■	■	■	■	■
e)											■	■
f)										■	■	■
g)										■	■	■

4.9 **Previous progress if any** : New study

4.9.1 **Achievement(s)(if any)** :

4.10 **Financial statement** :

4.10.1 Total cost of the study : Tk. 15,00,000.00

4.10.2 Cumulative cost : Tk.-

4.10.3 Cost of the years : Tk. 2,23,350.00

4.10.4 Source of fund :

4.11 **Beneficiaries**: FD, NGOs, Private planters, Farmers, Educational Institute and Herbal drug processing industries.

## PLANTATION TRIAL UNIT DIVISION

1. **Study** : On-going
- 1.1 **Programme Area** : Plantation technique and forest management
- 1.2 **Title of the study** : Monitoring and maintenance of existing trial plantations in the coastal areas of Bangladesh
- 1.3 **Justification (for new study)** :
- 1.4 **Objective(s)** :
- 1.4.1 To assess the growth performance and phenology of different mangrove and non-mangrove species at different char lands.
- 1.4.2 To develop future seed sources for sustainable coastal forests management.
- 1.5 **Expected output** : Growth performance and phenological behavior of mangrove and non-mangrove species will be determined over time. Older trial plots will be maintained and conserved of future seed sources for sustainable management of coastal forests.
- 1.6 **Study period** :
- 1.6.1 Starting year : 2013-2014
- 1.6.2 Completion year : 2017-2018
- 1.7 **Personnel (s)** :
- 1.7.1 **Study leader** : S. A. Islam, DO
- 1.7.2 **Associates** : M.M. Alam, RO; M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah FI; M. S. Rana, FI.
- 1.8 **Activities for the year** :
  - a) Conservation and maintenance of 35.0 ha older trials of mangrove (30.0 ha) and non-mangrove (5.0 ha) species by weeding, cleaning, climber cutting, fence repairing etc. in different islands of Rangabali, Char Kukri-Mukri, Char Osman and Sitakundu Research Stations.
  - b) Maintenance of 10.0 ha trials of mangrove and non-mangrove species for 2<sup>nd</sup> time at Rangabali and Char Kukri-Mukri Research Stations.
  - c) Collection of flowering and fruiting data of keora, baen, gewa, sundri, passur, kankra, khalshi and golpata.
  - d) Collection of growth data from the experimental plantations once a year.
  - e) Compilation and analysis of data.
- 1.8.1 **Activities calendar** :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												

- 1.9 **Previous progress, if any:** A total of 30.0 ha existing trials of mangrove, non-mangrove and palm species were maintained by weeding, cleaning, climber cutting and fence repairing. Growth and survival data from experimental plots of mangrove and non-mangrove were recorded at Rangabali, Sitakundu and Char Kukri-Mukri Research Stations. Trees of keora, baen, gewa, sundri, passur, khalshi were selected for phonological study. Flowering and fruiting characteristics were recorded throughout the year.
- 1.9.1 **Achievement(s), if any:** One scientific paper has been published in the Bangladesh Research Publications Journal.

- 1.10 **Financial statement** :
- 1.10.1 Total cost of the study : Tk 20,00,000.00
- 1.10.2 Cumulative cost : Tk 13,35,000.00
- 1.10.3 Cost of the year : Tk 5,00,000.00
- 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries** : Forest Department and adjacent coastal dwellers.
2. **Study** : On-going
- 2.1 **Programme Area** : Plantation technique and forest management
- 2.2 **Title of the study** : Selection of salt tolerant fruit and medicinal tree species in the coastal areas of Bangladesh.
- 2.3 **Justification (for new study) :**
- 2.4 **Objective(s)** :
- 2.4.1 To select suitable salt tolerant fruit and medicinal tree species in the coastal areas of Bangladesh.
- 2.4.2 To observe the growth performance of different fruit and medicinal tree species in different sites.
- 2.4.3 To assess the production of fruits in different fruit tree species.
- 2.5 **Expected output** : Site-suitable fruit and medicinal tree species will be selected for the coastal areas of Bangladesh.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2013-2014
- 2.6.2 Completion year : 2017-2018
- 2.7 **Personnel (s)** :
- 2.7.1 Study leader : S. A. Islam, DO
- 2.7.2 Associates : M. M. Alam, RO; M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI; M. S. Rana, FI
- 2.8 **Activities for the year :**
- a) Organizing two awareness meetings with rural people for cultivating fruit and medicinal tree species in the coastal homesteads at Rangabali and Char Osman Research Stations.
- b) Selection of 150 farmer's homesteads (30 from each research station) for planting fruit trees in their homesteads at Rangabali, Char Kukri-Mukri, Char Osman, Sitakundu and Head Quarter Research Stations.
- c) Raising/purchasing of 9000 seedlings of some major fruit tree species such as coconut (narikel), mango (am), jackfruit (kanthal), black berry (kalojam), guava (peyara), tamarind (tentul), ber (kul), pummelo (jambura), hog plant (amra), litchi (letchu), elephant apple (chalta), indian olive (jalpai), velvety apple (bilati gab) and aonla (amloki).
- d) Raising 18,000 seedlings of medicinal tree species such as neem, arjun, simul, bohera, goraneem, khoer, katbadam, kadam, sonalu, pitraj, satian and horitoki.
- e) Raising 4.0 ha experimental plantations of medicinal tree species at 4 Research Stations.
- f) Distribution and planting of seedlings of fruit tree species in the selected homesteads.
- g) Maintenance of previously raised 15.0 ha plantations of medicinal plants at 4 Research Stations.
- h) Collection of survival and growth data from the experimental plots of medicinal plants and fruit species.
- i) Analysis of data and preparation of a scientific paper.

## 2.8.1 Activities calendar :

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a.													
b.													
c.													
d.													
e.													
f.													
g.													
h.													
i.													

2.9 **Previous progress, if any** : A total of 150 farmers were selected for planting fruit tree species in their homesteads. Totals of 6000 seedlings of coconut, mango, jackfruit, black berry, guava, tamarind, ber, pummelo, hog plant, litchi, elephant apple, indian olive, velvety apple and amlaki were distributed and planted in the coastal homesteads. Four hectares plantations of medicinal tree species have been raised at 4 research stations. Previously raised 11.0 ha plantations of medicinal tree species were maintained. Growth data have been recorded from experimental plots.

2.9.1 Achievement(s), if any : One scientific paper has been published in the Journal of Bioscience and Agriculture Research. Totals of 15.0 ha plantations of different medicinal tree species have been raised at 4 research stations.

2.10 **Financial statement** :

2.10.1 Total cost of the study : Tk. 20,00,000.00

2.10.2 Cumulative cost : Tk. 15,43,000.00

2.10.3 Cost of the year : Tk. 5,75,920.00

2.10.4 Source of fund : GOB

2.11 **Beneficiaries** : Forest Department, coastal farmers, planers and NGOs.

3. **Study** : On-going

3.1 **Programme Area** : Plantation technique and forest management

3.2 **Title of the study** : Growth performance of bamboo and rattan in the coastal raised lands of Bangladesh

3.3 **Justification (for new study)** :

3.4 **Objective(s)** :

3.4.1 To investigate the possibility for introduction of bamboo and rattan inside the older keora plantations.

3.4.2 To select suitable bamboo and rattan species in the coastal areas.

3.4.3 To increase the productivity of bamboo and rattan in the coastal areas.

3.5 **Expected output** : Production of bamboo and rattan in the coastal areas will be increased.

3.6 **Study period** :

3.6.1 Starting year : 2016-2017

3.6.2 Completion year : 2020-2021

3.7 **Personnel (s)** :

3.7.1 Study leader : S. A. Islam, DO

3.7.2 Associates : M.M. Alam, RO; M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI; M.S. Rana, FI

3.8 **Activities for the year** :

a) Collection of seeds of rattan (*Calamustenuis/ Calamusviminalis*) for raising 12000 seedlings.

- b) Collection of bamboo (*Bambusabalcooa* and *B. vulgaris*) branches for raising 6000 seedlings from branch cuttings.
- c) Raising 12000 seedlings of rattan and 6000 seedlings of bamboo at Rangabali, Char Kukri-Mukri, Char Osman and Sitakundu Research Stations.
- d) Raising 8 ha experimental plantations of bamboo and rattan inside keora forests.
- e) Fencing with barbed wire around the plots at 4 research stations.
- f) Collection of data from nursery and plantations.

3.8.1 **Activities calendar** :

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a.													
b.													
c.													
d.													
e.													
f.													

**3.9 Previous progress, if any :** A total of 1200 seedlings of bamboo (*Bambusa vulgaris* and *B. balcooa*) and 1500 seedlings of rattan (*Calamustenuis*) were raised in the nursery. Totals of 2.0 ha experimental plots of bamboo and rattan have been raised at Rangabali and Char Kukri-Mukri Research Stations.

3.9.1 Achievement(s), if any : Two ha experimental plots of bamboo and rattan have been raised at Rangabali and Char Kukri-Mukri Research Stations.

3.10 **Financial statement** :

- 3.10.1 Total cost of the study : Tk. 20,00,000.00
- 3.10.2 Cumulative cost : Tk. 2,22,000.00
- 3.10.3 Cost of the year : Tk. 5,24,080.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : FD, NGO and rural farmers.

4. **Study** : On-going

4.1 **Programme Area** : Plantation technique and forest management

4.2 **Title of the study** : Plantation techniques of some understoried mangrove associates inside keora plantations in the coastal belt of Bangladesh

4.3 **Justification (for new study) :**

4.4 **Objective(s)** :

4.4.1 To develop better techniques for raising nursery and plantations of some important understoried mangrove species inside keora plantations

4.4.2 To select suitable mangrove species for coastal areas of Bangladesh.

4.5 **Expected output :**

4.6 **Study period** :

4.6.1 Starting year : 2016-2017

4.6.2 Completion year : 2020 –2021

4.7 **Personnel (s)** :

4.7.1 Study leader : M.M. Alam, RO

4.7.2 Associates : S. A. Islam DO, M. A. Habib, FI M. G. Rasul FI, M.A.Q. Miah FI, M.S. Rana FI

4.8 **Activities for the year :**

- a) Collection of seeds of *Amooracucullata* (amur), *Excoecariaindica* (batla), *Ficussp.* (jir bot), *Hibiscus tiliaceous* (bola), *Tamarixindica* (nonajhao), *Thespesiapopulnea* (sonboloi), *Calophylluminophyllum* (punial), *Cynometraramiflora* (shingra), *Rhizophoramucronata* (jhana) and panikapilafor raising 20,000 seedlings.
- b) Raising 20,000seedlings of these species at Rangabali, Char Kukri-Mukri, Char Osman and Sitakundu Research Stations.
- c) Raising 4.0 ha experimental plantations inside keora forests.
- d) Collection of data from nursery and plantations.

4.8.1 **Activities calendar :**

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a.													
b.													
c.													
d.													

4.9 **Previous progress, if any :**Seeds of amur, batla, jir bot, bola, nonajhao, sonboloi, punial, shingra and panikapilawere collected for raising seedlings. A total of 15,000 seedlings of these species were raised in the nursery. Totals of 2.0 ha experimental plots of understoried mangrove species have been raised at Rangabali and Char Kukri-Mukri Research Stations.

4.9.1 Achievement(s), if any : Two ha experimental plots of understoried mangrove species have been raised at Rangabali and Char Kukri-Mukri Research Stations.

4.10 **Financial statement :**

- 4.10.1 Total cost of the study : Tk. 20,00,000.00
- 4.10.2 Cumulative cost : Tk. 2,00,000.00
- 4.10.3 Cost of the year : Tk. 4,00,000.00
- 4.10.4 Source of fund : GOB
- 4.11 Beneficiaries : FD, NGO and rural farmers.

## Seed Orchard Division

- 1 **Study** : On-going
- 1.1 **Programme area** : Breeding and Tree improvement
- 1.2 **Title of the study** : Expansion and management of seed orchards
- 1.3 **Justification(For new study):** NA
- 1.4 **Objective(s)** :
- 1.4.1 To establish and manage superior quality seed sources from selected clones or progenies.
- 1.4.2 To preserve better genetic stocks under *exsitu* condition from the natural stands and plantations for future breeding and tree improvement programme.
- 1.4.3 To develop suitable techniques for mass production of clonal planting materials.
- 1.4.4 To screen best clones/progenies.
- 1.4.5 To supply quality seeds to FD, NGOs, DNMSs and planters.
- 1.5 **Expected output** : Permanent source of quality seeds and improved planting materials will be available for the planters.
- 1.6 **Study period** :
- 1.6.1 Starting year : 2014-2015
- 1.6.2 Completion Year : 2018-2019

- 1.7 **Personnel (s)** :
- 1.7.1 Study leader : Dr.Hasina Mariam, DO.
- 1.7.2 Associates : Mohammad Arifur Rahaman, SRO.; Md. Mezan-Ul-Hoque, RO.; A.K.M Azad, RO.; S.M. Kamal Uddin, RO.

1.8 **Activities for the year:**

- a. Collection of 200 kg seeds from clonal & seedling seed orchards : 132 kg. teak seeds and 50 kg. gamar seeds from Kaptai; 10 kg. telsur seeds from Ichamati ; 2 kg akasmoni and 5 kg. acacia hybrid seeds from Haynko; 1 kg. eucalyptus seeds from Salna Seed Orchard Centre (SOC) for seedling raising and supply.
- b. Raising and maintenance of 20,000 seedlings (polybag size 5" X 7") for the establishment of 10.0 ha seedling seed orchard (SSO) (viz. teligarjan 4,000, baityagarjan 3,000, dholigarjan 3,000, dhakijam 3,000, telsur 2,000, goda 1,000, gutguttya 2,000, boilam 2,000) at Kaptai, Hyanko, Ichamati, Dulahazara and Salna SOCs.
- c. Preparation of 3500 ramets (teak 2,500, dhakijam 250 teligarjan 250 and agar 500) for the establishment of clonal seed orchard at Dulahazara,Hyanko, Ichamati, Kaptai and Salna SOCs.
- d. Establishment of 10ha seedling seed orchard of agar, dholigarjan, teligarjan, baityagarjan, dhakijam, telsur, neem, goda, gutguttya, civit, and boilam at Kaptai, Hyanko, Ichamati, Dulahazara and Salna SOCs.
- e. Establishment of 5 ha (teak, dhakijam, and teligarjan ) clonal seed orchard at Kaptai, Hyanko, Ichamati, Salna and Dulahazara SOCs.
- f. Maintenance of existing 39.75 ha CSO and SSO at Ichamati,Salna,Hyanko, Kaptai and Dulahazara SOCs.
- g) Maintenance by gap filling in previously raised 2.5ha (SSO 1.25 ha and CSO 1.25 ha) orchard at Dulahazara, Ichamati,Kaptai,Hyanko and Salna SOCs.
- h) Collection of left wood from different seed orchard centre .
- i) Data collection at Salna,Hyanko,Ichamati,Kaptai,Dulahazara and Barshijora SOCs.

1.8.1 **Activities calendar**

Activities(as per 2.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												
g												
h												
i												

1.9 **Previous progress, if any** : From different seed orchards and PTs 361 kg. seeds of 26 forest tree species were collected and distributed. 29000 seedlings of teligarjan, baityagarjan, dholigarjan, dhakijam and telsur were raised to establish seedling seed orchard and 10000 rootstocks of teak, dhakijam and teligarjan were raised to establish clonal seed orchard. 3.75ha. seedling seed orchard of civit, dholigarjan, teli garjan, boitya-garjan, kadam, sidha jarul dhakijam and 10.25 ha of clonal seed orchard of teak were raised. Cultural operations viz. weeding, mulching, making fire line and gap filling etc. was carried out in 91ha orchards of five Seed Orchard Centers.

1.9.1 Achievements, if any: 33.25 ha. clonal seed orchard of teak, gamar and mahogany and 26.25 ha. seedling seed orchard of garjan, dholigarjan, dhakijam, chapalish, eucalyptus (*Eucalyptus camaldulensis*, *E. tereticornis*, *E. europylla*), akashmoni and gamar were established at Hyankoo, Dulahazara, Ichamati, Salna and Kaptai SOCs, and seeds are being collected from teak and gamar seed orchard at Kaptai.

1.10 **Financial statement**

1.10.1 Total cost of the study Tk. 40,00,000.00

1.10.2 Cumulative cost : Tk. 26,10,229.00

1.10.3 Cost of the Year : Tk 8,20,000.00

1.10.4 Source of the fund GOB

1.11 **Beneficiaries** : Forest Department (FD), NGOs and other Tree Planting Agencies and Private Land Owners.

2. **Study** : On-going

2.1 Programme area : Breeding and Tree improvement

2.2 **Title of the study** : Centralization of high yielding clones of rubber (*Hevea brasiliensis*) and establishment of orchard

2.3 Justification (For new study) : **NA**

2.4 **Objective(s)** :

2.4.1 To increase the productivity of latex by selecting better yielding rubber plant/ clone.

2.4.2 Centralization of high yielding clones in hedge orchard.

2.5 **Expected output:** Latex production of rubber plant will increase.

2.6 **Study Period** :

2.6.1 Starting Year : 2013-2014

2.6.2 Completion year : 2017-2018

2.7 **Personnel(s)** :

2.7.1 Study leader : S.M. Kamal Uddin, RO

2.7.2 Associates : Dr.Hasina Mariam, DO.; Mohammad Arifur Rahaman, SRO.; Md. Mezan-Ul-Hoque, RO.; A.K.M Azad, RO.

2.8 **Activities for the year:**

a. Information/data collection on growth performance of rubber trees.

b. Maintenances of previously raised 5.75 ha trial plantation at Hyanko SOC

c. Fertilizing in the rubber trials (3 times) at Hyanko SOC.

d. Fencing of plantation area.

e. Development of nursery facilities at Salna Ichamoti and Hayankoo, Seed orchard Centre.

2.8.1 Activities calendar :

Activities (as per 4.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												

2.9. **Previous progress, if any** : 3000 rootstocks were raised to produce ramet. 1500 ramets were prepared and 2.0ha of rubber plantation were raised at Datmara Rubber estate. 5.75ha rubber plantations were maintained by weeding and applying fertilizer .

2.9.1 **Achievements, if any:** Established clonal trial plots of 32 clones in Hyanko SOC at Datmara rubber estate, Fatickchari, Chittagong.

- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 21,00,000.00
- 2.10.2 Cumulative cost : Tk. 13,38,871.00
- 2.10.3 Cost of the year : Tk. 2,17,000.00
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : BFIDC, Other Government and Private Entrepreneurs.

3 **Study** : On-going

3.1 **Programme area** : Production of quality planting materials

3.2 **Title of the study** : Assessment of seed production capacity of dhakijam, gamar and jarul species

3.3 **Justification(For new study)** : NA

3.4 **Objective(s)** :

3.4.1 To determine the capacity of seed production of an individual tree.

3.4.2 To find out the peak period of seed collection of a species.

3.5 **Expected output:** Information about the seed production capacity of an individual tree of selected (three) forest tree species will be available which will be helpful for seedling raising and successful tree plantation.

3.6 **Study period** :

3.6.1 Starting year : 2016-2017

3.6.2 Completion year : 2018-2019

3.7 **Personnel(s)** :

3.7.1 Project leader : Md. Mezan- Ul-Hoque, RO

3.7.2 Associates : Dr.Hasina Mariam, DO.; Mohammad Arifur Rahaman, SRO.; A.K.M Azad, RO.; S.M Kamal Uddin, RO.

3.8 **Activities for the year:**

a. Seed collection from 210 No selected seed trees of dhakijam (64), gamar (40) and jarul (106) species from Chakaria, Cox's Bazar; Fatikchari and Rangunia, Chittagong; Gazipur Sadar, Gazipur.

b. Germination test of collected seeds.

3.8.1 **Activities calendar** :

Activities (as per 3.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												

3.9 **Previous progress, if any:** NA

3.9.1 **Achievements, if any** : NA

3.10 **Financial statement** :

3.10.1 Total cost of the study : Tk. 11,00,000.00

3.10.2 Cumulative cost : Tk. 3,00,000.00

3.10.3 Cost of the year : Tk. 2,20,000.00

3.10.4 Source of the fund : GOB

3.11 **Beneficiaries** : Forest Department (FD), NGOs , Nursery Malik Sameety and other seedling raising agencies.

- 4 **Study** : New
- 4.1 **Programme area** : Breeding and Tree improvement
- 4.2 **Title of the study** : Popularizing Quality planting Materials of five important forest tree species (acacia hybrid, agar, neem, segun and gamar).
- 4.3 **Justification(For new study)** : Quality planting materials (QPM) like seeds, scions and cuttings are prerequisite for the success of plantation. Generally phenotypic variations exist among individual trees of a species both in qualitative and quantitative characters, So, for quick genetic gain plus trees (PTs) are selected from existing base population for providing the breeding population of the tree improvement programme. Selected plus trees are provide an interim seed sources for production of quality planting materials. QPM can increase significantly the present level of forest production, the ultimate return to the user both by increasing the yield per unit area and improving the quality of wood.Many country uses quality planting materials to increase the annual growth rates of planted species. To mitigate the gap between demand and production the use of QPM is very important for man made forest where more timber can be produced from same area of similar land. Peoples are not aware of QPM and generally they collect their required planting materials from old plantations, natural forests, and scattered road side trees even from the village grooves without giving any importance to the genetic quality. Therefore the quality of seeds may not be guaranteed. As a result collection of immature poor quality seeds can not be overruled. In most of the cases the seedlings from these seeds are not of good quality for ensuring higher growth and yield.Previous years 10,000 kg seeds were collected and 2,00,000 no seedlings of different forest tree species were raised from the QPM of different plus trees. However awareness on quality planting materials (QPM) is at minimum level amongst the tree planters and nursery owners. It is also true that production of quality planting materials is not sufficient in relation to demand.Thus, production of QPM using seeds from plus trees or seed orchards and other improved sources will make access to QPM to the tree planters. Therefore, the study has been undertaken for Popularizing Quality planting Materials of five important forest tree species ( acacia hybrid, agar, neem, segun and gamar).
- 4.4 **Objective(s)** :
- 4.4.1 To produce and supply of quality planting materials to the planters.
- 4.4.2 To develop awareness about the importance and benefits of using seeds and seedlings
- 4.5 **Expected output:** Farmers and planters will be awared about quality planting materials of forest tree species and productivity of the plantation will be increased.
- 4.6 **Study Period** :
- 4.6.1 Starting year : 2017-2018
- 4.6.2 Completion Year : 2019-2020
- 4.7 **Personnel(s)** :
- 4.7.1 Project leader : Mohammad Arifur Rahaman, SRO.
- 4.7.2 Associates : Dr. Hasina Mariam, DO.; Md. Mezan-Ul-Hoque, RO.; A.K.M Azad, RO.; S.M. Kamal Uddin, RO
- 4.8 **Activities for the year:**
- a. Collection of 250 kg seeds from plus trees : Barshijura, Dulahazara, Hyanko, Ichamati, Kaptai, Salna, Kaptai, Ukhia Seed Orchard Centers and Head Quarter for plantation at different seed orchard centers and distribution to Forest Department (FD), District Nursery Malik Samitee (DNMS) and other tree planters.
  - b. Raising of 33,000 seedlings of acacia hybrid, agar, neem, segun and gamar considering the demands of earlier years at Dulahazara, Hyanko, Ichamati,Kaptai, Ukhia ,Salna,HQ nursery.
  - c. Raising of 5,000 rootstocks at Dulahazara, Hyanko, Ichamati, Kaptai, Salna,
  - d. Production of 6000 rooted cutting of hybrid acacia (5500) and agar (500) at HQ nursery.

- e. Nursery maintenance of Barshijura, Dulahazara, Hyanko, Ichamati, Kaptai, Salna, Ukhia Seed Orchard Centers and Head Quarter Nursery .
- f. Distribution of seedlings among the farmers, planters and other users.
- g. Data collection on survival % and growth performance of raised seedlings at nursery stage.

4.8.1 Activities calendar :

Activities(as per 4.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												
g.												

4.9 Achievements, if any : NA

4.10 **Financial statement** :

- 4.10.1 Total cost : Tk. 16,00,000.00
- 4.10.2 Cumulative cost : Tk. 0.00
- 4.10.3 Cost of the Year : Tk. 4,00,000.00
- 4.10.4 Source of the fund : GOB

4.11 **Beneficiaries** : Forest Department (FD), NGOs and other Tr Planting Agencies and Private Land Owners.

5 **Study** : New

5.1 Programme area : Production of quality planting materials

5.2 **Title of the study** : Seed storage behaviour of chapalish, gutguttya, neem, horitaki and bohera species

5.3 **Justification(For new study)** : Forest productivity and quality of plantation greatly depend on genetic quality as well as physiological quality of seeds. Physiological quality of collected seeds determines the germination capacity, vigor & health and storage capacity of the planting materials produced. There is a scanty literature regarding the storage condition which influence on seed viability to store recalcitrant seed due to lack of available information. It is extensively desired to carry out seed storage behaviour of important recalcitrant forest tree species to increase viability for proper utilization of seeds to raise large-scale plantations. In previous years storage behaviour of agar, civit, telsur, baittya-garjan, dhali-garjan, teli-garjan and boilam seeds were determined. They were treated in six conditions, viz.- sand, chalk-powder, refrigerator, saw-dust, and ash compared with controlled seeds. Among them in refrigerator condition agar, telsur and baittya-garjan prolonged their seed viability 30% up to 30days, 50% up to 12days, and 33.33% up to 15 days respectively. But civit showed better performance in sand storage conditions (33.33% up to 52days), dholi-garjan showed best performance both in sand and saw-dust storage conditions (33.33% up to 15 days), teli-garjan showed best performance in chalk powder storage condition (60% up to 33 days) and boilam seed showed better performance in sand storage condition (53.33% up to 30 days). Therefore, it is possible to prolong viability of the seeds of these species through different suitable storage conditions. This study has been undertaken to carry out research about the suitable storage conditions of five another forest tree species viz. chapalish, gutguttya, neem, horitaki and bohera as per increasing demand of seeds and seedlings.

5.4 **Objective(s)** :

- 5.4.1 To determine a suitable storage condition/medium of forest tree seeds.
- 5.4.2 To strengthen the BFRI seed testing laboratory.

5.5 **Expected output** : Suitable storage conditions for prolonging the viability of recalcitrant seeds will be determined

5.6 **Study period** :

5.6.1 Starting year : 2017 - 2018

5.6.2 Completion Year : 2019 - 2020

5.7 **Personnel (s)** :

5.7.1 Study leader : Md. Mezan - UI - Haque, RO

5.7.2 **Associates:** : Dr.Hasina Mariam, DO.; Md. Arifur Rahaman, SRO.; A.K.M Azad, RO.; : S.M. Kamal Uddin, RO

5.8 **Activities for the year:**

a. Collection of chapalish (*Artocarpus chama*) and gutguttia(*Protium serratum*) seeds.

b. Storage and viability testing of chapalish and gutguttia seeds at different durations.

c. Data collection on storage behavior

5.8.1 Activities calendar :

Activities (as per 5.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												

5.9 **Previous progress, if any** : NA

5.9.1 Achievements, if any : NA

5.10 **Financial statement** :

5.10.1 Total cost : Tk. 4,00,000.00

5.10.2 Cumulative cost : Tk. 0.00

5.10.3 Cost of the Year : Tk. 1,00,000.00

5.10.4 Source of the fund : GOB

5.11 **Beneficiaries** : Forest Department (FD), NGOs, DNMSs and private nursery owners.

## Silviculture Genetics Division

1 **Study** : On-going

1.1 **Programme Area** : Bamboo and Non-Timber Economic Crops

1.2 **Title of the Study** : Mass propagation of bamboos (*Dendrocalamus giganteus*, *D. longispathus*, *D. brandisii*, *Bambusa balcooa*, *B. vulgaris*, *B. bambos*, *B. cacharensis*, *B. ventricosa*, *B. jaintiana*, and *Thyrsospachys oliveri*) through branch cuttings and seedlings proliferation (3<sup>rd</sup> Phase).

1.3 **Justification (For new study)** : NA

1.4 **Objective(s)** :

1.4.1 To make available bamboo propagules for wider distribution and dissemination with developed technology.

1.4.2 To develop linkage with different stakeholders and as well as conserve bamboo resources.

1.5 **Expected output** : This will increase bamboo propagating materials for cultivation and as well as production of bamboo.

- 1.6 **Study period** :
- 1.6.1 Starting year : 2014-2015
- 1.6.2 Completion year : 2019-2020
- 1.7 **Personnel (s)** :
- 1.7.1 Study Leader : Dr. Md. Mahbubur Rahman, DO
- 1.7.2 Associates : Nusrat Sultana, SRO.; Dr. Waheeda Parvin, Curator; Saiful Alam Md. Tareq, FI.

1.8 **Activities for the year :**

- a. Collection of planting materials of selected species from Sylhet, Mymensingh, Jessore, Cox's Bazar, Chittagong Hill Tracts and different areas of Chittagong.
- b. Production of twelve thousand (12,000) bamboo propagules (six thousand through branch cuttings and six thousand through seed and seedling proliferation).
- c. Data collection on survival rate of cuttings.
- d. Preparation of report.

1.8.1 **Activities calendar :**

Activities (as per 1.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												

1.9 **Previous progress, if any :** About two lakh (2,00,000) rooted cuttings and seedlings of ten bamboo species were raised and distributed among the different stakeholders in the previous years.

1.9.1 **Achievements (s), if any :** People's awareness increased for bamboo production through planting branch cuttings and bamboo resources has increased.

1.10 **Financial statement :**

- 1.10.1 Total cost of the study : Tk. 10,00,000.00
- 1.10.2 Cumulative cost : Tk. 5,37,770.00
- 1.10.3 Cost of the year : Tk. 2,40,000.00
- 1.10.4 Source of fund : GOB.

1.11 **Beneficiaries** : BFRI, FD, NGOs, Farmers, Universities

2 **Study** : On-going

2.1 **Programme Area** : Bio-diversity and Conservation

2.2 **Title of the Study** : Conservation of threatened plant species through domestication (3<sup>rd</sup> Phase)

2.3 **Justification (For new study) :** NA

2.4 **Objective(s)** :

- 2.4.1 To conserve and centralize the gene resources of threatened forest plant species.
- 2.4.2 To domesticate the threatened species for conservation.
- 2.4.3 To raise demonstration and resource plots for conservation purpose.

2.5 **Expected output** : Establishment of conservation plots of different threatened species as gene resources conservation.

2.6 **Study period** :

- 2.6.1 Starting year : 2014-2015
- 2.6.2 Completion year : 2019-2020

- 2.7 **Personnel (s)** :
- 2.7.1 Study Leader : Dr. Md. Mahbubur Rahman, DO
- 2.7.2 Associates : Nusrat Sultana, SRO.; Dr. Waheeda Parvin, Curator; Saiful Alam Md. Tareq, FI.

2.8 **Activities for the year** :

- a. Exploration to Sylhet, Dhaka, Cox's Bazar, Chittagong Hill Tracts and different areas of Chittagong. For what ?
- b. Collection of seeds and seedlings of nine threatened species viz. padak (*Pterocarpus indicus*), bashpata (*Podocarpus neriifolius*), titpai (*Millettia plguensis*), nima (*Knema bengalensis*), asok (*Saraca asoca*), karanja (*Pongamia pinnata*), batna (*Castanopsis indica*), udal, (*Sterculia villosa*), and raktan (*Lophopetalum fimbriatum*).
- c. Raising of five thousands seedlings of selected species and maintenance of seedlings in the nursery.
- d. Maintaining 4.0 acre plantation of 22 threatened species at IFESCU, Chittagong University campus and Radar unit of Bangladesh Air Force, Cox's Bazar. Why not in BFRI Research Station.
- e. Raising 2.0 acre new plantation.

2.8.1 Activities calendar :

Activities (as per 2.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												

2.9 **Previous progress, if any** : About seventy thousand (70,000) seedlings of 30 threatened species were raised in nursery. Raised 4.0 acres conservation plots of 22 species at IFESCU campus of Chittagong University and Radar unit of Bangladesh Air Force, Cox's Bazar.

2.9.1 Achievements (s), if any : Conserved and centralized plot has been established at IFESCU campus, Chittagong University and Radar unit of Bangladesh Air Force, Cox's Bazar. Twenty two (22) threatened plant species has been planted for gene resources conservation.

- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 6,50,000.00
- 2.10.2 Cumulative cost : Tk. 2,09,720.00
- 2.10.3 Cost of the year : Tk. 1,20,000.00
- 2.10.4 Source of fund : GOB.
- 2.11 **Beneficiaries** : BFRI, FD, NGOs, Farmers, Universities.

3. **Study** : On-going
- 3.1 **Programme Area** : Breeding and Tree Improvement
- 3.2 **Title of the Study** : Development of tissue culture techniques for five bamboo species viz., farua (*Bambusa polymorpha*), bhudum (*Dendrocalamus giganteus*), china bamboo (*D. latiflorus*), ora (*D. longispathus*) pencha (*D. hamiltonii*) and wappi (*Thyrsostachys sp.*) (2<sup>nd</sup> Phase)

3.3 **Justification (For new study)** : NA

- 3.4 **Objective(s)** :
- 3.4.1 To develop micro-propagation techniques for the species.
- 3.4.2 To produce a homogenous plant population.
- 3.4.3 To conserve *in vitro* plants.
- 3.5 **Expected output** : Production of large number of quality planting stocks through tissue culture technique.
- 3.6 **Study period** :
- 3.6.1 Starting year : 2014-2015
- 3.6.2 Completion year : 2019-2020
- 3.7 **Personnel (s)** :
- 3.7.1 Study Leader : Dr. Waheeda Parvin, Curator
- 3.7.2 Associates : Dr. Md. Mahbubur Rahman, DO; Nusrat Sultana, SRO.; Saiful Alam Md. Tareq, FI.
- 3.8 **Activities for the year** :
- a. Collection of explants from Teknaf, Khagrachari and Sylhet.
- b. Establishment of culture, production of multiple shoots and maintenance.
- c. Root induction of the induced shoots.
- d. Transfer of the rooted plantlets into soil for hardening.
- e. Two thousand (2,000) bamboo seedlings through tissue culture will be produced.
- f. Raising 1.0 acre bamboo demonstration plot with tissue culture plantlets.
- 3.8.1 **Activities calendar** :

Activities (as per 3.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												

- 3.9 **Previous progress, if any** : Culture established of bhudum, ora, brandisii, china, wappi and borak bamboo. Multiple shoots production of wappi and china bamboo were optimized. Rooted plantlets of bhudum and ora bamboo were produced.
- 3.9.1 **Achievements (s), if any** : Established bamboo demonstration plots through tissue culture plantlets in IFESCU, RU, JU, BSRI campuses and farmer's field in Paithong of Bandarban hill district.
- 3.10 **Financial statement**
- 3.10.1 Total cost of the study : Tk. 15,00,000.00
- 3.10.2 Cumulative cost : Tk. 5,40,060.00
- 3.10.3 Cost of the year : Tk. 2,60,000.00
- 3.10.4 Source of fund : GOB.
- 3.11 **Beneficiaries** : BFRI, FD, NGOs, Farmers, Universities.

4. **Study** : On-going
- 4.1 **Programme Area** : Breeding and Tree Improvement
- 4.2 **Title of the Study** : Development of tissue culture techniques for boilam (*Anisoptera scaphula*), tamal (*Diospyros montana*), agar (*Aquilaria malaccensis*), Diabetes plant (*Gynura procumbens*) and lotkon (*Baccaurea sapida*) (2<sup>nd</sup> Phase)
- 4.3 **Justification (For new study)** : NA
- 4.4 **Objective(s)** :
- 4.4.1 To develop micro-propagation techniques for the species.
- 4.4.2 To produce a homogenous plant population.
- 4.4.3 To conserve *in vitro* plants.
- 4.5 **Expected output** : Production of large number of quality planting stocks through tissue culture technique.
- 4.6 **Study period** :
- 4.6.1 Starting year : 2014-2015
- 4.6.2 Completion year : 2019-2020
- 4.7 **Personnel (s)** :
- 4.7.1 Study Leader : Nusrat Sultana, SRO.
- 4.7.2 Associates : Dr. Md. Mahbubur Rahman, DO; Dr. Waheeda Parvin, Curator; Saiful Alam Md. Tareq, FI.
- 4.8 **Activities for the year** :
- a. Collection of explants from Srimongal (Moulavibazar), Sylhet, Cox's Bazar and different areas of Chittagong.
- b. Culture establishment, multiple shoots and rooted plantlets production.
- c. Transfer of the plantlets into soil for hardening.
- d. Maintenance of the plantlets in nursery.
- e. One thousand tissue culture seedlings will be produced.
- 4.8.1 **Activities calendar** :

Activities (as per 4.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												

- 4.9 **Previous progress, if any** : Tissue culture plantlets of amloki, haldu and hybrid acacia were produced.
- 4.9.1 **Achievements (s), if any** : Tissue culture protocol of haldu and amloki were developed.
- 4.10 **Financial statement** :
- 4.10.1 Total cost of the study : Tk. 6,00,000.00
- 4.10.2 Cumulative cost : Tk. 3,11,990.00
- 4.10.3 Cost of the year : Tk. 1,00,000.00
- 4.10.4 Source of fund : GOB.
- 4.11 **Beneficiaries** : BFRI, FD, NGOs, Farmers, Universities.

5. **Study** : On-going
- 5.1 **Programme Area** : Breeding and Tree Improvement
- 5.2 **Title of the Study** : Development of improved protocols for *in vitro* plant regeneration of selected rubber (*Hevea brasiliensis*) clones.
- 5.3 **Justification (For new study)** : NA
- 5.4 **Objective(s)** :
- 5.4.1 To establish embryogenic callus culture and plant regeneration protocol via somatic embryogenesis from potential explants of *H. brasiliensis*.
- 5.4.2 To evaluate the *in vitro* micro-propagation capacity of somatic embryo derived plants
- 5.4.3 To produce a homogenous plant population of selected rubber clone
- 5.5 **Expected output** : Production of large number of quality planting stocks through tissue culture technique of selected rubber clones
- 5.6 **Study period** :
- 5.6.1 Starting year : 2016-2017
- 5.6.2 Completion year : 2019-2020
- 5.7 **Personnel (s)** :
- 5.7.1 Study Leader : Dr. Md. Mahbubur Rahman, DO
- 5.7.2 Associates : Nusrat Sultana, SRO.; Dr. Waheeda Parvin, Curator; Saiful Alam Md. Tareq, FI.
- 5.8 **Activities for the year** :
- a. Selection of high yield latex producing mother trees in Madhupur and Srimongal rubber garden of BFIDC.
- b. Explant collection and culture establishment.
- c. Primary callus induction from different explants (cotyledon, inner integument, zygotic embryo, leaf and root) of selected clone.
- d. Establishment of embryogenic callus culture and plant regeneration.
- e. Direct plant regeneration from shoot tip culture of selected rubber clone.
- 5.8.1 **Activities calendar** :

Activities (as per 4.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												

- 5.9 **Previous progress, if any** : Madhupur and Srimongal rubber garden of BFIDC were visited for superior mother tree selection. Seven high yielding mother tree of rubber were selected and marked for explant collection.

- 5.9.1 **Achievements (s), if any** : Callus tissue developed from cotyledon explant of selected rubber clone.

- 5.10 **Financial statement** :
- 5.10.1 Total cost of the study : Tk. 16,00,000.00
- 5.10.2 Cumulative cost : Tk. 3,75,000.00
- 5.10.3 Cost of the year : Tk. 3,00,000.00
- 5.10.4 Source of fund : GOB.
- 5.11 **Beneficiaries** : BFRI, FD, NGOs, Farmers, Universities.

## Silviculture Research Division

- 1 **Study** : On-going
- 1.1 **Programme Area** : Plantation techniques and forest management.
- 1.2 **Title of the Study** : Growth performance of different forest tree species in research plots (2<sup>nd</sup> Phase)
- 1.3 **Justification (For new study)** : N/A
- 1.4 **Objective (s)** :
- 1.4.1 To assess the growth performance of different tree species in four dendroecological regions of the country.
- 1.4.2 To determine the silvics of different forest tree species.
- 1.4.3 To develop future quality seed sources.
- 1.5 **Expected output:** Site suitable species and provenances for plantation development will be selected for different site quality index in different dendroecological regions of Bangladesh. Silvicultural techniques (spacing, weeding, fertilization, pruning, thinning and coppicing) for plantation management will be developed for maximizing yield of the plantation.
- 1.6 **Study period** :
- 1.6.1 Starting year : 2015-2016
- 1.6.2 Completion year : 2019-2020
- 1.7 **Personnel (s)** :
- 1.7.1 Study leader : Nasrat Begum, DFO
- 1.7.2 Associates : Abdullah-Al-Masud Mazumdar, RO.; Md. Rabiul Islam, FI.
- 1.8 **Activities for the year** :
- a. Maintenance of 105 ha experimental plantations (oil palm, agar, sal, ex-situ conservation plots, species elimination and site suitability trial, provenance trial, mixed species trial plantations, bamboo plantations, etc) raised up to 2015 at Keochia, Lawachara, Charaljani and Charkai SR stations.
- b. Collection of data on survival, height, diameter at breast height, total biomass, coppicing, ability etc.
- c. Data analysis and reporting.
- 1.8.1 **Activities calendar** :

Activities (as per 1.8)	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a.													
b.													
c.													

- 1.9 **Previous progress, if any:** Up to Dec. **2016**, around 160 ha experimental plantations (oil palm, agar, sal, muli bamboo, ex-situ conservation plots, species elimination trials; provenance trials, coppicing trials, spacing trials, mixed planting trials, under planting trials, planting technique, arboretum of 46 species, etc.) were raised at four Silviculture Research Stations. Those plantations were maintained by weeding, cleaning, climber cutting, pruning, etc. Biomass of three eucalyptus species viz. *Eucalyptus camaldulensis*, *E. tereticornis* and *E. brassiana* (3<sup>rd</sup> rotation) was assessed at Charkai SR Station. Phenological data of 240 indigenous and exotic tree species were compiled.
- 1.9.1 **Achievement(s), if any:** Phenological characters of 240 indigenous and exotic species were determined. Site specific species/provenances were selected for large scale plantation (15 fast-growing species, 21 medium rotation species, 17 long rotation species, 4 provenance of *A. auriculiformis*, 6 provenance of *A. mangium*, 3 provenance of *P. caribaea*, 3 provenance of *P. oocarpa*, 4 provenance of *Glericidia sepium*, 3, 2, 2, 2 provenance of *E. camaldulensis*, *E. brassiana*, *E. teriticornis*, *E. urophylla* respectively). Plantations of 70 indigenous, and exotic tree species were established.

- 1.10 **Financial statement** :
- 1.10.1 Total cost of the study : Tk. 20,00,000.00
- 1.10.2 Cumulative cost : Tk 5,52,000.00
- 1.10.3 Cost of the year : Tk 3,97,000.00
- 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.

- 2 **Study** : On-going
- 2.1 **Programme Area** : Production of quality planting materials.
- 2.2 **Title of the Study** : Large scale production of quality seedlings of important forest tree species (2<sup>nd</sup> Phase)
- 2.3 **Justification (For new study)** : N/A
- 2.4 **Objective (s)** :
- 2.4.1 To standardize the nursery techniques of different forest tree species.
- 2.4.2 To provide quality seedlings to planters for successful plantation establishment.
- 2.4.3 To develop linkages with planters for awareness development about quality seedling.
- 2.5 **Expected output** :
- a. Awareness development about quality seeds and seedlings.
- b. Increased yield of timber and fuel wood.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2015-2016
- 2.6.2 Completion year : 2019-2020
- 2.7 **Personnel (s)** :
- 2.7.1 Study leader : Nasrat Begum, DFO
- 2.7.2 Associates : Abdullah-Al-Masud Mazumdar, RO.; Md. Rabiul Islam , FI.
- 2.8 **Activities for the year** :
- a. Collection/purchase of seeds of popular/threatened forest tree species from seed orchards, plantations and natural forests and raising of 40,000 seedlings at HQs research station
- b. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
- c. Seedling raising technique of Hijal, Kerong , barun, goda, boilam and gutgutia.
- d. Collection of data on seedlings growth, collar diameter, root-shoot ratio of different species.
- e. Report writing.

2.8.1 **Activities calendar** :

Activities (as per 2.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												

- 2.9 **Previous progress, if any:** Raised and distributed more than 11.60 lakh quality seedlings of about more than 59 forest tree species raised viz- acacia hybrid (*Acacia auriculiformis* X *A. mangium*), banderhola (*Duabanga grandiflora* (Roxb. ex DC.) Wall.), civit (*Swintonia floribunda* Griff.), teli-garjan (*Dipterocarpus turbinatus* Gaertn.),

gamar (*Gmelina arborea* Roxb.), sal (*Shorea robusta* Gaertn.f.), shegun (*Tectona grandis* L.), lohakat (*Xylia kerrii* Craib & Huta), chickrassi (*Chukrassia velutina* W & A), eucalyptus (*Eucalyptus camaldulensis* Dehnn.), raintree (*Albizia saman* (Jacq.)Merr.), mahogany (*Swietenia mahogoni* (L.) N.J.Jacquin), sonalu (*Cassia fistula* L.), kala-koroi (*Albizia lebbeck* (L.) Benth), raj-koroi (*A. richardiana* King & Prain), sil-koroi (*A. procera* (Roxb.) Benth), chakua-koroi (*Albizia chinensis*), motor-koroi (*Albizia lucida*), arjun (*Terminalia arjuna* (Roxb.) Wt. & Arn.), pitraj (*Aphanamixis polystachya*), bohera (*Terminalia bellirica* (Gaertn.) Roxb.), haritaki (*Terminalia chebula* (Gaertn.) Retz.), menda (*Litsea monopetala* (Roxb.) Pers.),haldu (*Adina cordifolia*), katbadam (*Terminalia catappa* L.), palas (*Butea monosperma* (Lam.) Taub.), khayer (*Acacia catechu*), tamal (*Diospyros montana* Roxb.), krishnachura (*Delonix regia* (Bojer) Rafin), kalo-jam (*Syzygium cumini*), kanchan (*Bauhinia racemosa* Lamk.), jarul (*Lagerstroemia speciosa* (L.) Pers.), parul (*Stereospermum suaveolens* A. DC.), dhakijam (*Syzygium grande*), chapalish (*Artocarpus chama*), telsur (*Hopea odorata*), champa (*Michelia champaca*), cryptocarya (*Cryptocarpa amygdalina*), baobab (*Andansonia digitata*), kerung (*Pongamia pinnata* L.), boilam (*Anisoptera scaphula*), toon (*Toona ciliata*), chalmugra (*Gynocordia odorata*), goda/awal (*Vitex peduncularis*), raktan (*Lophopetalum fimbriatum*), udal (*Firmiana colorata*), sidha-jarul (*Lagerstroemia parviflora*), hargaza (*dillenia pentagina*), dholi-garjan (*Dipterocarpus alatus*), kanaidinga (*Oroxylum indicum*), agar (*Aquilaria malaccensis*), gandhi-gazari (*Miliusa velutina*), pakhiara (*Thespesia populnea*), mailam (*Bouea oppositifolia*), pine (*Pinus caribaea*), dharmara (*Stereospermum personatum*), punnyal (*Calophyllum inophyllum*), Arshal (*Vitex glabrata*), Bot (*Ficus bengalensis*), Simul (*Bombax ceiba*), box badam/ Jangli badam (*Sterculia foetida*) bhui kadam (*Hymanodictyon excelsum*), Rata (*Ficus lyrata*), gutgutia (*Portium serratum*), Dudh kuruch(*Wrightia arborea*), Jog dumur (*Ficus racemosa*), etc.

2.9.1 **Achievement(s), if any** : Developed appropriate nursery technique for 30 indigenous and exotic forest tree species.

- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 10, 00,000.00
- 2.10.2 Cumulative cost : Tk 2, 34,000.00
- 2.10.3 Cost of the year : Tk. 3, 39,000.00
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.

- 3 **Study** : On-going
- 3.1 **Programme Area** : Biodiversity and Conservation
- 3.2 **Title of the Study** : Conservation of indigenous/native forest tree species in different dendroecological regions of Bangladesh
- 3.3 **Justification (For New Study)** : NA
- 3.4 **Objective (s)** :
- 3.4.1 Germplasm conservation of indigenous forest tree species in different dendroecological regions of Bangladesh.
- 3.4.2 To observe their suitability in particular sites.
- 3.5 **Expected output** : 120-150 indigenous forest tree species will be conserved over an area of fifty hectare at four Silviculture Research Stations.
- 3.6 **Study period** :
- 3.6.1 Starting year : 2013-2014
- 3.6.2 Completion year : 2017-2018

- 3.7 **Personnel (s)** :
- 3.7.1 Study leader : Nasrat Begum, DFO.
- 3.7.2 Associates : Abdullah-Al-Masud Mazumder, RO; Md. Rabiul Islam, FI.
- 3.8 **Activities for the year** :
- a. Collection of seeds and raising 30,000 seedlings of different indigenous forest tree species at Charkai, and Keochia Research Stations.
- b. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
- c. Maintenance and protection of 45.0 ha last year's experimental plantations through weeding, vacancy filling, cleaning, climber cutting, engage of watcher, etc.
- d. Raising of 10.0 hectares plantations at Charkai, and Keochia SR stations.
- f. Collection of data on survival and height growth of the seedlings in the plantations.
- g. Report writing.
- 3.8.1 **Activities calendar** :

Activities (as per 3.8)	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
A													
B													
C													
D													
F													
G													

- 3.9 **Previous progress, if any:** Raised 45 ha plantations with 104 indigenous forest tree species at Charkai, Charaljani, Lawachara and Keochia SR Stations.
- 3.9.1 **Achievement(s), if any** : Raised 35 ha plantations having 80 indigenous forest tree species.
- 3.10 **Financial statement** :
- 3.10.1 Total cost of the study : Tk. 30,00,000.00
- 3.10.2 Cumulative cost : TK. 22,28,500.00
- 3.10.3 Cost of the year : Tk. 7,30,000.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.
- 4 **Study** : On going
- 4.1 **Programme Area** : Plantation Techniques and Forest Management
- 4.2 **Title of the Study** : Suitability of *Khaya anthotheca* (lambu) plantation in Bangladesh
- 4.3 **Justification (For new study) : NA**
- 4.4 **Objective (s)** :
- 4.4.1 To develop/standardize nursery technique of lambu.
- 4.4.2 To develop suitable plantation technique of lambu.
- 4.4.3 To find out survival, growth and site suitability of lambu.
- 4.4.4 To observe the disease infestation, environmental effect, etc. if any in the plantation.
- 4.5 **Expected output** : Feasibility of large scale plantation of lambu in Bangladesh.
- 4.6 **Study period** :
- 4.6.1 Starting year : 2013-2014
- 4.6.2 Completion year : 2017-2018

- 4.7 **Personnel (s)** :
- 4.7.1 Study leader : Nasrat Begum, DFO.
- 4.7.2 Associates : Abdullah-Al-Masud Mazumdar, RO.; Md. Rabiul Islam, FI.

4.8 **Activities for the year** :

- a. Collection of seeds and raising 3000 seedlings at Charkai, and Keochia Research Stations.
- b. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement etc.
- c. Maintenance of 7.5 ha. last year's experimental plantations at four Silviculture Research Stations.
- d. Raising of 1.0 hectares plantations at Charkai, and Keochia SR stations.
- e. Collection of data on survival, height, diameter at breast height, length of clean bole, straightness of stem, total biomass, coppicing ability etc.
- f. Report writing.

4.8.1 **Activities calendar** :

Activities (as per 4.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												

4.9 Previous progress, if any : Raised 7.5 ha trial plantation at four (Charkai, Charaljani, Lawachara and Keochia) Silviculture Research Stations.

4.9.1 **Achievement(s), if any** : N/A

4.10 **Financial statement** :

- 4.10.1 Total cost of the study : Tk .6,50,000.00
- 4.10.2 Cumulative cost : Tk. 4,28,000.00
- 4.10.3 Cost of the year : Tk. 75,500.00
- 4.10.4 Source of fund : GOB

4.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.

5 **Study** : On-going

5.1 **Programme Area** : Plantation Techniques and Forest Management

5.2 **Title of the Study** : Restoration of degraded sal forest through mix planting with sal (*Shorea robusta*) and other site suitable species

5.3 **Justification (For new study)** :N/A

5.4 **Objective (s)** :

- 5.4.1 To develop suitable mixed plantation model for the enrichment of degraded sal forest.
- 5.4.2 To monitor the changes of biodiversity of sal forest overtime after establishing the plantation.

5.5 **Expected output:** Techniques for restoration of degraded sal forest will be developed.

5.6 **Study period** :

- 5.6.1 Starting year : 2015-2016
- 5.6.2 Completion year : 2019-2020

- 5.7 **Personnel (s)** :
- 5.7.1 Study leader : Abdullah-Al-Masud Mazumdar, RO.
- 5.7.2 Associates : Nasrat Begum, DFO.; Md. Rabiul Islam, FI.
- 5.8 **Activities for the year** :
- Collection of seeds and raising 3000 seedlings of sal, simul, udal and dakhijam at Charkai research station.
  - Collection of seed and raising 1500 seedlings of jali bet and 1500 babla for live-fence around the boundary of planted forest land at Charkai research station.
  - Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
  - Collection of data on seed germination, survival, height and collar dia. of the seedlings in the nursery.
  - Maintenance of last year's 1.5 hectare fencing plantation and 1.0 hectare Sal mix plantation .
  - Planting 3000 seedlings of jali bet and babla along with the margin/boundary of forest land and raising 1.0 ha plantation of sal, kalo koroi, amloki and chapalish at Charkai and Charaljani research stations.
  - Collection of data on survival, height, diameter etc.
  - Report writing.

5.8.1 **Activities calendar** :

Activities (as per 5.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.	■	■	■							■	■	■
b.									■	■	■	
c.					■	■					■	■
d.	■	■	■						■	■	■	
e.					■	■					■	■
f.											■	■
g.					■	■					■	■
h.					■	■					■	■

5.9 Previous progress, if any: Raised 0.5 ha live fencing/boundary of experimental plantation with jali bet and babla at Charkai research station.

5.9.1 Achievement(s), if any : NA

5.10 **Financial statement** :

5.10.1 Total cost of the study : Tk. 5,00,000.00

5.10.2 Cumulative cost : TK. 1,31,000.00

5.10.3 Cost of the year : Tk 1,79,480.00

5.10.4 Source of fund : GOB

5.11 **Beneficiaries** : FD, Educational institutions and Forestry related agencies.

6 **Study** : On-going

6.1 **Programme Area** : Biodiversity and Conservation

6.2 **Title of the Study** : Effect of betel leaf cultivation by the Khashia community on the vegetation and soil of Lawachara Forest

6.3 **Justification (For new study):** N/A

6.4 **Objective (s)** :

6.4.1 To find out the lopping intensity of support trees in relation to betel leaf production.

6.4.2 To find out the growth performance of support trees.

6.4.3 To determine the amount soil loss from the forest floor.

6.5 **Expected output :**

- a. Appropriate lopping technique of support trees for betel leaf cultivation will be developed.
- b. Growth performance of support trees will be assessed.

6.6 **Study period :**

- 6.6.1 Starting year : 2015-2016
- 6.6.2 Completion year : 2017-2018

6.7 **Personnel (s) :**

- 6.7.1 Study leader : Abdullah-Al-Masud Mazumdar, RO.
- 6.7.2 Associates : Nasrat Begum, DFO. ; Md. Rabiul Islam, FI.

6.8 **Activities for the year :**

- a. Maintenance of plot (weeding, mulching, irrigation, pruning etc.)
- b. Determination of soil loss by siltation gauge.
- c. Data collection.

6.8.1 **Activities calendar :**

Activities (as per 6.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												

6.9 Previous progress, if any : Arranged views exchange meeting with the Khasia community. Completed site selection and field layout. Established demonstration plots.

6.10 Achievement(s), if any : N/A

6.11 **Financial statement :**

- 6.11.1 Total cost of the study : Tk. 6,00,000.00
- 6.11.2 Cumulative cost : Tk. 1,62,000.00
- 6.11.3 Cost of the year : Tk. 38,000.00
- 6.11.4 Source of fund : GOB

6.12 **Beneficiaries :** FD, NGOs, The Khasia people and other communities, Educational Institutions and other tree planting agencies.

7 **Study :** New

7.1 **Programme Area :** Plantation Techniques and Forest Management

7.2 **Title of the Study :** Development of plantation technique of Jigni (*Trema orientalis*) for pulp wood production.

7.3 **Justification (For new study) : NA**

7.4 **Objective (s) :**

- 7.4.1 To standardize nursery technique of *T. orientalis*
- 7.4.2 To standardize suitable plantation technique of *T. orientalis* for pulp production.

7.5 **Expected output:** Large scale plantation in Bangladesh. Provide raw materials for pulp and paper industries, poles and fuel woods.

7.6 **Study period :**

- 7.6.1 Starting year : 2016-2017
- 7.6.2 Completion year : 2020 - 2021

7.7 **Personnel (s) :**

- 7.7.1 Study leader : Abdullah-Al-Masud Mazumdar, RO.
- 7.7.2 Associates : Nasrat Begum, DFO.; Md. Rabiul Islam, FI.

## 7.8 Activities for the year :

- Collection of seeds of Jigni and gamar.
- Raising 12000 seedling of Jigni and Gamar at Head Quatar nursery and four Silviculture Research Stations.
- Collection of data on germination, survival and height growth of the seedlings.
- Raising 3 .0 ha plantations of Jigni and Gamar at spacing 0.5m x 0.5m, 1.0m x 1.0m, 1.0m x1.5m and 2.0m x 2.0m at Keochia, lawachara, Charaljani and Charkai research stations.
- Collection of data on survival, height growth, biomass and coppicing ability of the saplings.
- Report writing.

### 7.8.1 Activities calendar :

Activities (as per 7.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												

7.9 Previous progress, if any : 1.5 plantation raised at Keochia, Charaljani and Charkai research stations.

7.9.1 Achievement(s), if any : N/A

7.10 Financial statement :

7.10.1 Total cost of the study : Tk. 8,50, 000.00

7.10.2 Cumulative cost : Tk. 2,50,000.00

7.10.3 Cost of the year : Tk. 1,29,000.00

7.10.4 Source of fund : GOB

7.11 Beneficiaries : FD, Pulp and paper industries, NGOs, Farmers, Educational institutions and other tree planting agencies.

8 Study : New

8.1 Programme Area : Plantation Techniques and Forest Management

8.2 Title of the Study : জনস্বাস্থ্যের উপর আকাশমনি (*Acacia auriculiformis*) বৃক্ষের পুষ্পরেণুর প্রভাব নিরূপণ

8.3 Justification (For new study) : আকাশমনি (*Acacia auriculiformis*) হলো *Mimosaceae* গোত্রের একটি বৃক্ষ প্রজাতি যা দ্রুত বর্ধনশীল ও চিরসবুজ। আমাদের দেশে প্রজাতিটি আকাশমনি বা একাশি বৃক্ষ নামে বহুল পরিচিত। বৃক্ষটির আদি নিবাস পাপুয়া নিউগিনি ও অস্ট্রেলিয়া হলেও সিলেট অঞ্চলের চা বাগান গুলোতে ছায়া-বৃক্ষ হিসেবে এ প্রজাতির কিছু বৃক্ষ সর্বপ্রথম লাগানো হয়। চা বাগান হতেই পরবর্তীতে দেশের বিভিন্ন অঞ্চলে এ প্রজাতির বিস্তারণ ঘটে। আকাশমনিকে দ্রুত বর্ধনশীল বৃক্ষ প্রজাতি হিসেবে চিহ্নিত করে এর চারা উত্তোলন, ব্যবস্থাপনা ও কাঠের গুণাগুণ নির্ণয়ের নিমিত্তে আশির দশকে বাংলাদেশ বন গবেষণা ইনস্টিটিউট এটি নিয়ে গবেষণা করে (Hossain *et al.* 1997)। আকাশমনি বিভিন্ন ধরনের মাটিতে, বিশেষ করে খুবই অনুর্বর ও অবক্ষয় প্রাপ্ত ভূমিতেও ভাল জন্মায়। প্রজাতিটি শেকড়ের মাধ্যমে মাটিতে নাইট্রোজেনের আধিক্য ঘটিয়ে মাটিকে উর্বর করে তোলে। মাটির অম্লত্ব ও ক্ষারত্ব (pH 3.5–10.5) সহ্য করার ক্ষমতা অন্য প্রজাতির তুলনায় অনেক বেশি বিধায় অন্যান্য দেশীয় প্রজাতির তুলনায় এর বেঁচে থাকার হার অধিক। বাংলাদেশ সহ পৃথিবীর অন্যান্য দেশ যেমন: ইন্দোনেশিয়া, মালয়েশিয়া, ভিয়েতনাম, ভারতের পশ্চিম বাংলা এবং আকাশমনির আদি-স্থান পাপুয়া নিউগিনি ও উষ্ণম-লীয় অঞ্চলে এর ব্যাপক চাষ হচ্ছে (Das, S. 1986)।

আকাশমনি কাঠের গুণগত মান ও রং সেগুনের কাছাকাছি হওয়ায় আসবাবপত্র তৈরিতে সেগুন কাঠের বিকল্প হিসেবে বাংলাদেশে এটি বহুল ভাবে ব্যবহার হচ্ছে। আশির দশক হতে চট্টগ্রাম বন বিভাগের গাছ-পালা শূন্য অনুর্বর ন্যাড়া পাহাড়ি এলাকা এবং সমাজিক বনায়নে প্রজাতিটি ব্যাপকভাবে রোপন হচ্ছে। তাছাড়া, এর অভিযোজন ক্ষমতা তুলনামূলকভাবে বেশি এবং গবাধি পশু খায় না বিধায় বর্তমানে এটি পতিত জমি, ধ্বংস প্রাপ্ত বন ও বসত বাড়িতে অধিকহারে রোপণ করা হচ্ছে। আকাশমনি রোপণের দুই থেকে তিন বছরের মধ্যে ফুল ফুটে শুরু করে। প্রজাতিটি কোন কোন ক্ষেত্রে বছরে দুইবার ফুল ধারণ করলেও সবচেয়ে বেশী পরিমাণে ফুল ফুটে আগস্ট-সেপ্টেম্বর মাসে। পুষ্পমঞ্জুরী কন্ট্রাক্টিভর এবং হলুদ রংয়ের ফুলগুলো ছোট ও মিষ্টি গন্ধযুক্ত। ফুল ফুটার সময় প্রচুর পরিমাণে পুষ্পরেণুর সৃষ্টি হয় যা বাতাসে ছড়িয়ে পড়ে। বসত বাড়ির আশেপাশে অধিকহারে রোপনের ফলে, মানবদেহের উপর আকাশমনির পরাগরেণুর ক্ষতিকর প্রভাব নিয়ে বিভিন্ন প্রিন্ট ও ইলেকট্রনিক মিডিয়াতে আলোচনা-সমালোচনার প্রেক্ষিতে গত ১৮ ই জানুয়ারী, ২০১৭ খ্রি. তারিখ মন্ত্রিপরিষদ সভায় বিষয়টি আলোচিত হয়। উক্ত সভায়, মানবদেহের উপর আকাশমনির পরাগরেণুর প্রভাব সম্পর্কে জরুরী ভিত্তিতে মতামত ও তথ্য প্রদানের জন্য পরিবেশ ও বন মন্ত্রণালয়, বন বিভাগ, পরিবেশ অধিদপ্তর, বাংলাদেশ বন গবেষণা ইনস্টিটিউট ও চট্টগ্রাম বিশ্ববিদ্যালয়ের ইনস্টিটিউট অব ফরেস্ট্রি এন্ড এনভায়রনমেন্টাল সায়েন্সেস (ইফেসকু) সমন্বয়ে প্রকৃত তথ্য প্রদানের নিমিত্তে একটি কমিটিকে দায়িত্ব প্রদান করা হয় (সংযুক্তি-১)। কমিটি ঢাকা বন বিভাগ সদর দপ্তর (বন ভবন) ও চট্টগ্রামের আকাশমনি অধ্যুষিত এলাকা পরিদর্শন শেষে বিএফআরআই এর অর্থায়নে চট্টগ্রাম বিশ্ববিদ্যালয় ও পরিবেশ অধিদপ্তরের সহায়তায় উক্ত গবেষণা প্রকল্পটি (Study) নেয়ার সুপারিশ করে। এছাড়াও, পরিবেশ ও বনমন্ত্রণালয় কর্তৃক জনস্বাস্থ্যের উপর আকাশমনি বৃক্ষের পরাগরেণুর ক্ষতিকর প্রভাব বিষয়ে বিএফআরআই এর কাছে মতামত জানতে চাওয়া হয়। আকাশমনি প্রজাতির উপর বাংলাদেশ বন গবেষণা ইনস্টিটিউটের বিভিন্ন বিষয়ে গবেষণা থাকলেও (সংযুক্তি-২) জনস্বাস্থ্যের উপর আকাশমনির পরাগরেণুর প্রভাব বিষয়ে গবেষণালব্ধ হালনাগাদ তথ্য ও উপাত্ত না থাকায় তা পর্যবেক্ষণের নিমিত্তে আলোচ্য স্টাডিটি গ্রহণ করা হয়েছে।

#### 8.4 Objective (s) :

- 8.4.1 আকাশমনি গাছ অধ্যুষিত এলাকায় বসবাসকারী মানুষের (বাগানের ২০০-৩০০ মি. দূরত্বে বসবাসকারী) অ্যালার্জি সৃষ্টিতে পরাগরেণুর ভূমিকা সম্পর্কে ব্যক্তিগত সাক্ষাৎ/দলগত অংশগ্রহণে তথ্য সংগ্রহ।
- 8.4.2 আকাশমনি গাছ বিষয়ে বিভিন্নস্তরের মানুষের (বাগানের মালিক, শিক্ষক ও স্থানীয় সচেতন মহল) মতামত গ্রহণ।
- 8.4.3 আকাশমনি গাছের ফুল, পরাগরেণু স্থানান্তর, ঘনত্ব নির্ণয়।
- 8.4.5 পরাগরেণুর ভৌত ও রাসায়নিক বিশ্লেষণ।

8.5 **Expected output:** এ গবেষণার মাধ্যমে জনস্বাস্থ্যের উপর আকাশমনি বৃক্ষের পরাগরেণুর ক্ষতিকর প্রভাব আছে কিনা সেই বিষয়ে সঠিক তথ্য ও উপাত্ত পাওয়া যাবে। যার দ্বারা এতদসংক্রান্ত বিষয়ে পরবর্তী সিদ্ধান্ত গ্রহণে সহায়ক।

#### 8.6 Study period :

- 8.6.1 Starting year : জুলাই- অক্টোবর/২০১৭ খ্রি.
- 8.6.2 Completion year : জুলাই- অক্টোবর/২০১৭ খ্রি.

#### 8.7 Personnel (s) :

- 8.7.1 Study leader : জনাব নসরত বেগম, বিভাগীয় বন কর্মকর্তা (দা.প্রা.)
- 8.7.2 Associates : ড. মোহাম্মদ কামাল হোসাইন, অধ্যাপক, ইফেসকু, চট্টগ্রাম বিশ্ববিদ্যালয়; ড. মোহাম্মদ জাকির হোসাইন, বিভাগীয় কর্মকর্তা (দা.প্রা.), বন রসায়ন বিভাগ, বিএফআরআই; জনাব মোহাম্মদ আরিফুর রহমান, সিনিয়র রিসার্চ অফিসার, বীজ বাগান বিভাগ, বিএফআরআই; জনাব আবদুল্লাহ-আল-মাসুদ মজুমদার, রিসার্চ অফিসার, সিলভিকালচার রিসার্চ বিভাগ, বিএফআরআই; জনাব পাভেল রহমান, ইফেসকু, চট্টগ্রাম বিশ্ববিদ্যালয়।

#### 8.8 Activities for the year :

- a. প্রাসঙ্গিক গবেষণাপত্র রিভিউ ও ইন্টারনেট থেকে প্রয়োজনীয় তথ্য-উপাত্ত সংগ্রহ করা।
- b. জরিপ কাজ সম্পাদনের জন্য প্রশ্নমালা প্রস্তুতকরণ।
- c. বন বিভাগ থেকে মাঠ পর্যায়ে আকাশমনি বনায়নের তথ্য সংগ্রহ করা।
- d. চট্টগ্রাম বিশ্ববিদ্যালয় ক্যাম্পাসে, মধ্যাকর্ষণ স্পাইড/গ্রেগরি স্যাম্পলার যন্ত্রের সাহায্যে আকাশমনির পরাগরেণু বিস্তৃতি নির্ণয় করা।
- e. আকাশমনির গাছ সমৃদ্ধ ৯ টি এলাকা চিহ্নিতকরণ এবং উক্ত এলাকায় প্রশ্নমালার আলোকে তথ্য সংগ্রহ, পিআরএ ও সাক্ষাৎকার গ্রহণ।
- f. প্রতিবেদন প্রস্তুতকরণ

**8.8.1 Activities calendar :**

Activities (as per 7.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.		■	■	■	■	■				■	■	
b.			■	■	■	■				■	■	
c.				■	■	■				■	■	
d.											■	■
e.						■					■	■
f.												■

8.9 **Previous progress, if any** : N/A

8.9.1 **Achievement(s), if any** : N/A

8.10 **Financial statement** :

8.10.1 Total cost of the study : Tk. 2,20,000.00

8.10.2 Cumulative cost : Tk. 2,20,520.00

8.10.3 Cost of the year : Tk. 2,20,520.00

8.10.4 Source of fund : GOB

8.11 **Beneficiaries** : FD, NGOs, Educational institutions and other tree planting agencies.

## SOIL SCIENCE DIVISION

1.0 **Study** : On-going

1.1 **Programme Area** : Soil conservation and watershed management

1.2 **Title of the Study** : Effect of acacia and eucalyptus tree species on soil properties in three Agro Ecological Zones (AEZs) of Bangladesh

1.3 **Justification** : Not applicable

1.4 **Objectives** :

1.4.1 To observe the change of soil properties occurred due to the acacia and eucalyptus tree plantations

1.4.2 To find out the relationship between the tree growth of acacia and eucalyptus tree species and soil properties

1.5 **Expected output:** Impact of acacia and eucalyptus tree species on soil properties

1.6 **Study period** :

1.6.1 Starting year : 2016-17

1.6.2 Completion year : 2018-19

1.7 **Personnels** :

1.7.1 Study leader : Md. Motiar Rahman, SRO

1.7.2 Associates : Syeeda Rayhana Merry, DO

1.8 **Activities for the year:**

a) Site selection

b) Excavation of soil profile for identification of different soil horizon in each site from different plantations including acacia and eucalyptus tree species

c) Collection of soil core samples from each horizon in each site for determination of bulk density, moisture content and soil texture

d) Collection of composite soil samples from each horizon in each site for determination of soil macro (total N and available P, K, S, Ca & Mg) and micro (available Fe, Zn, Cu, B, Mn) nutrient elements

e) Collection of tree growth parameter including age, height and girth at breast height

(GBH)/ diameter at breast height (DBH) from each site in different plantations

f) Soil sample processing and analysis

g) Data analysis and report writing

#### 1.8.1 Activities calendar

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												
g.												

1.9 **Previous progress (if any):** Soil samples (both core and composite samples) were collected from Kotbari, Comilla (AEZ-19) and Ranirhat, Rangunia, Chittagong (AEZ-29). Collection of soil samples from Madhupur, Tangail (AEZ-28) and Dantmara, Fatikchari, Chittagong (AEZ-29) is under progress.

1.9.1 Achievement : Not applicable

1.10 **Financial statement** :

1.10.1 Total cost of the study : Tk. 15,00000.00

1.10.2 Cumulative cost : Tk. 6,38,200.00

1.10.3 Cost of the year : Tk. 4,30,834.00

1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : Forest department, researchers and academicians

## Wildlife Section

1 **Study** : On-going (Extension)

1.1 **Programme Area** : Biodiversity and conservation

1.2 **Title of the Study** : Mammalian species diversity in Hazarikhil wildlife sanctuary of Bangladesh

1.3 **Justification** : N/A

1.4 **Objectives** :

1.4.1 To find out mammalian species diversity of Hazarikhil WS.

1.4.2 To estimate the population density of these mammalian species.

1.4.3 To identify major threats to the mammalian species in this WS.

1.4.4 Wildlife specimen collection & Preservation.

1.5 **Expected Output** : Informations will help to Develop a management plan for sustainable conservation for mammalian species .

1.6 **Study Period** :

1.6.1 Starting Year : 2015-2016

1.6.2 Completion year : 2017-2018

1.7 **Personnel** :

1.7.1 Study leader : Md.Anisur Rahman, SRO

1.7.2 Associates : S. M Rabiul Alam, SRO.; M. K. Islam, RA -1; S.M. Mainuddin, FI

- 1.8 **Activities for the year:**  
 a) Field visit for establishing trails.  
 b) Baseline survey for Mammalian species.  
 c) Report writing and printing.

1.8.1 Activities calendar :

Activities (as per 1.8)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a												
b												
c												

- 1.9 **Previous progress** : Seven mammalian species has been recorded  
 1.9.1 Achievement(s) : N/A
- 1.10 **Financial statement:** :  
 1.10.1 Total cost of the study : Tk. 5,50,220.00  
 1.10.2 Cumulative cost : Tk. 3,40,220.00  
 1.10.3 Cost of the year : Tk. 2,00,000.00  
 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries** : Researchers, students and teachers of different educational institutions and Forest Department / NGOs
- 2 **Study** : On-going
- 2.1 **Programme Area** : Biodiversity and conservation
- 2.2 **Title of the Study** : Survey of Nocturnal Mammals in Bangabandhu Sheikh Mujib Safari Park, Cox's Bazar using Camera Trap.
- 2.3 **Justification** : N/A
- 2.4 **Objective** :  
 2.4.1 To evaluate the status of nocturnal mammals.  
 2.4.2 To find out the active area for targeted species.  
 2.4.3 Wildlife specimen collection & Preservation.
- 2.5 **Expected Output** : Formulation of conservation measures to conserve nocturnal mammals of Dulahazra Safari Park.
- 2.6 **Study Period** :  
 2.6.1 Starting Year : 2016-2017  
 2.6.2 Completion year : 2017-2018
- 2.7 **Personnel:**  
 2.7.1 Study leader : S.M. Rabiul Alam, SRO  
 2.7.2 Associates : M.A. Rahman, SRO.; M. K. Islam, RA -1; S.M. Mainuddin, FI
- 2.8 **Activities for the year:**  
 a. Selection of targeted area.  
 b. Identification of suitable area for camera trapping.  
 c. Installation of camera trap.  
 d. Status survey for nocturnal mammals.  
 e) Data analysis & report preparation.

2.8.1 Activities calendar :

Activities (as per 2.8)	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a													
b													
c													
d													
e													

- 2.9 Previous progress : N/A  
 2.9.1 Achievement(s) : N/A  
 2.10 Financial statement:  
 2.10.1 Total cost of the study : Tk. 3,90,000.00  
 2.10.2 Cumulative cost : Tk. 1,71,630.00  
 2.10.3 Cost of the year : Tk. 2,00,000.00  
 2.10.4 Source of fund : GOB  
 2.11 Beneficiaries : Researchers, students and teachers of different educational institutions and Forest Department / NGOs

- 3 **Study** : On-going  
 3.1 **Programme Area** : Biodiversity and conservation  
 3.2 **Title of the Study** : Population Status and Conservation of Nocturnal Mammals and Birds in BFRI Campus  
 3.3 **Justification** : N/A  
 3.4 **Objective**  
 3.4.1 Determine the population status of birds and nocturnal mammals.  
 3.4.2 Take conservation measures to conserve targeted species.  
 3.4.3 Wildlife specimen collection & Preservation.  
 3.5 **Expected Output:** Ensure suitable habitat for targeted species.  
 3.6 **Study Period** :  
 3.6.1 Starting Year : 2016-2017  
 3.6.2 Completion year : 2020-2021  
 3.7 **Personnel** :  
 3.7.1 Study leader : S.M. Rabiul Alam, SRO  
 3.7.2 Associates : M.A. Rahman, RO.; M. K. Islam, RA -1.; S.M. Mainuddin, FI  
 3.8 **Activities for the year :**  
 a) Selection of targeted area & identification of suitable area for camera trapping.  
 b) Installation of camera trap & status survey for nocturnal mammals.  
 c) Establishment of Sampling Transects for bird survey.  
 d) Regular bird survey for density estimation.  
 e) Characterization of birds according to their food habit.  
 f) Identification of threats and conservation issues.  
 g) Habitat improvement of birds and nocturnal mammals.  
 h) Data analysis & report preparation.

3.8.1 **Activities calendar** :

Activities (as per 3.8)	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a													
b													
c													
d													
e													
f													
g													
h													

- 3.9 **Previous progress** : N/A
- 3.9.1 Achievement(s) : N/A
- 3.10 **Financial statement** :
- 3.10.1 Total cost of the study : Tk. 7,00,000.00
- 3.10.2 Cumulative cost : Tk. 2,31,225.00
- 3.10.3 Cost of the year : Tk. 1,95,150.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : Researchers, students and teachers of different educational institutions and Forest Department / NGOs

# Forest Products Wings

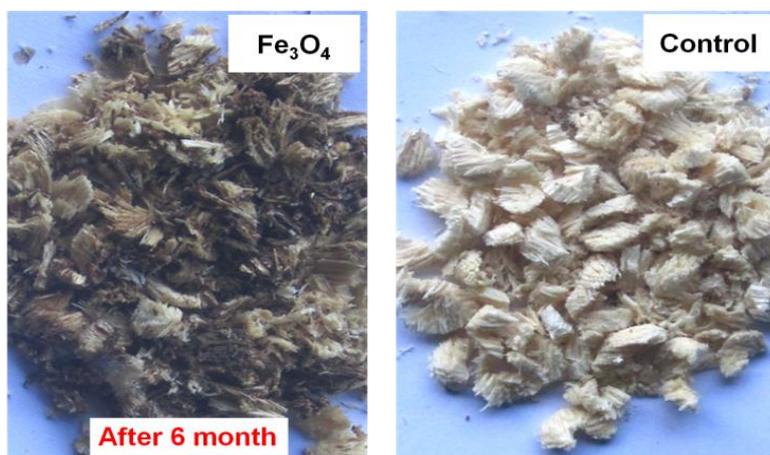
## Forest Chemistry Division

- 1 **Study** : On-going
- 1.1 **Programme Area** : Post Harvest Utilization, Chemical Processing
- 1.2 **Title of the Study** : Artificial Inoculation of agar wood (*Aquilaria malaccensis* Lam.) by Chemical Inducing Agent(s).
- 1.3 **Justification (For new study):** NA
- 1.4 **Objective(s)**
- 1.4.1 To explore an efficient and suitable chemical inducing agent(s) for the artificial inoculation of agarwood tree.
- 1.4.2 To develop and optimize the inoculation technique for the best formation of agar resins.
- 1.4.3 To investigate the origin or process of agar resin deposition.
- 1.5 **Expected output:** Explore an artificial chemical inducement technique for the best formation of agar resin within short period and effect of age and location factor for better agar resin formation.
- 1.6 **Study period** :
- 1.6.1 Starting year : 2014-2015
- 1.6.2 Completion year : 2018-2019
- 1.7 **Personnel(s)** :
- 1.7.1 Study leader : M. Jakir Hossain, SRO
- 1.7.2 Associates : M. S. Rahman, RO; S. C. Nath, RA (Gr.-1); M. Saidur Rahman, SO (BCSIR Laboratories, Chittagong)
- 1.8 Activities for the year :
- a) Preparation of iron oxide nanoparticles (IONPs) for inducement.
- b) *In vitro* application of IONPs by transfusion sets.
- c) Trial experiments with CA Kits and compare results with IONPs.
- d) Quantification and analysis of formed agar resin.
- 1.8.1 **Activity calendar** :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a												
b												
c												
d												

- 1.9 **Previous progress, if any:** Due to the nature of its low formation, artificial inoculation of agarwood by mechanical or chemical inocula is an established method to enhance the formation of agar resin. Five types of IONPs with different size, reducing agents and stabilizing agents were prepared following reported protocols. By varying concentration and application method, a total number of twenty five experiments were carried out in Holudia Agar Wood Garden, Bandarban; Korerhat Agar Wood Garden, Mirsarai, Chittagong and BCSIR Laboratories Chittagong Campus. The experimented trees were visited time to time and data were collected. It was observed that IONPs were effective to deposit agar resin around the zone of application. In case of 500 mL of 1.0 mM concentrated IONPs hydrosol with respect to iron, it was found that nearly 276 square inch area of normal white agarwood became darken. Those darken woods had the similar characteristic fragrance of agar or agar oil and confirmed by smoke formation. Additionally, it was observed that the purity of the IONPs is very important for agar

formation. The presence of chloride with iron is detrimental for the tree. The below picture represent the generated agar by IONPs application at Holudia Agar Wood Garden. The black color indicates the resin rich wood, which was unaffected by microbial attack after storing at normal room temperature and open air condition, whereas, the white wood was contaminated with fungus within 3 days in the same condition. This antifungal activity was developed due to the presence of deposited agar resin, agar resin or oil is well known for its antifungal activity.



**Fig.1.** The black discoloration indicates the deposition of agar resin due to IONPs at Holudia Agar Wood Garden, Bandarban.

1.9.1 **Achievement** : Application of IONPs inocula accelerates agar resin formation.

1.10 **Financial statement** :

1.10.1 Total cost of the study : Tk. 10,00,000

1.10.2 Cumulative cost : Tk. 6,80,200

1.10.3 Cost of the year : Tk. 2,74,200

1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : FD, Agar producers and traders, community people.

2. **Study** : On-going

2.1 **Programme Area** : Post harvesting utilization- Chemical processing

2.2 **Title of the Study** : Popularization of agar deposition and oil extraction techniques of agar plant.

2.3 **Justification** : NA

2.4 **Objective(s)** :

2.4.1 To disseminate artificial agarwood inoculation techniques for better resin deposition.

2.4.2 To promote efficient extraction process of agar oil from wood.

2.5 **Expected output** : People will be informed about artificial agar inoculation techniques and efficient oil extraction. Export of agar product will be increased.

2.6 **Study period** :

2.6.1 Starting year : 2016-2017

2.6.2 Completion year : 2018-2019

2.7 **Personnel(s)** :

2.7.1 Study Leader : M. S. Rahman, (RO)

2.7.2 Associates : M. Jakir Hossain, SRO; M.Jillur Rahman.(RA Gr-1); S. C. Nath (RA Gr.-1)

**2.8 Activities for the year:**

- a. Site selection; total five sites.
- b. Preparation of training materials: poster, leaflet, power point presentation, etc.
- c. Arrangement of trainings / workshops collaborating with all stakeholders: Forest Department, cultivators, NGOs and local administrations.

**2.8 Activities for the year :**

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a												
b												
c												

**2.9 Previous Progress** : NA

**2.9.1 Achievement(s), if any** : NA

**2.10 Financial statement** :

2.10.1 Total cost of the study : Tk. 8,00,000

2.10.2 Cumulative cost : Tk. 2,00,000

2.10.3 Cost of the year : Tk. 2,70,000

2.10.4 Source of fund : GOB

**2.11 Beneficiaries** : Forest Department, New agar producers and traders.

## PULP AND PAPER DIVISION

**1 Study** : New

**1.1 Programme Area** : Post Harvest Utilization – Chemical Processing

**1.2 Title of the study** : Influence of age on chemical pulping of gamar (*Gmelina arborea*) and akashmoni (*Acacia auriculiformis*).

**1.3 Justification (For new study) : Not applicable**

**1.4 Objective (s):** :

1.4.1 To determine the optimum harvesting time of the species with respect to yield and quality pulp

**1.5. Expected output** : Rational utilization of species would be ensured

**1.6. Study period** :

1.6.1. Starting year : 2015-16

1.6.2. Completion year : 2018-19

**1.7 Personnel(s)** :

1.7.1 Study Leader : Daisy Biswas, DO

1.7.2 Associates : Nazma Khatun, RO.; Md. Misbahuddin, FI; and Urboshi Roy, FI.

**1.8 Activities for the year**

a) Processing of chips of akashmoni and determination of chemical constituents

b) Preparation of kraft and soda pulp from akashmoni by varying alkali dose, sulphidity and pulping time.

c) Determination of kappa number and yield

d) Preparation of hand sheets of pulp made from gamar.

e) Evaluation of physical strength properties of hand sheets.

1.8.1 Activities calendar :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												

1.9 **Previous progress, if any:** Gamar tree of 4, 6, 8, 10 and 12 years were collected. These were debarked and chipped separately using a laboratory chipper. The chips of stem and branches were screened to remove oversized and pin chips. Finally, the screened chips were hand sorted to remove all pieces of knots, barks and decayed wood. The accepted chips were about 20 mm in length, 10 mm in width and 3 mm in thickness. The chips were then air dried and stored in sealed polythene bag for pulping.

Kraft pulps were prepared with the untreated chips at 25% sulphidity by maintaining 2000 H-Factor. The alkali doses were varied from 14 to 18% at 2% increments. The black liquor of pulps were analysed for residual alkali. Yield and kappa number were determined

1.9.1 Achievements, if any: Nil

1.10 **Financial statement** :

1.10.1 Total cost of the study : Tk. 5,00,000.00

1.10.2 Cumulative cost : Tk. 2,50,000.00

1.10.3 Cost of the year : Tk. 2,05,805.00

1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : Pulp and Paper Industry and local people.

2 **Study** : On-going

2.1 **Programme Area** : Post Harvest Utilization – Chemical Processing

2.2 **Title of the study** : Production of nano composite from fibers of *Acacia* hybrid and simul (*Bombax ceiba*) tree species of Bangladesh.

2.3 **Justification (For new study)** : Not applicable

2.4 **Objective (s)** :

2.4.1 To develop modern technique for extraction of nanocellulose from wood pulp.

2.4.2 To produce ethanol and environment friendly packaging materials.

2.5 **Expected output** : Better utilization of pulping raw materials as environment friendly value added product.

2.6 **Study period** :

2.6.1 Starting year : 2013-14

2.6.2 Completion year : 2017-18

2.7 **Personnel(s)** :

2.7.1 Study Leader : Md. Misbahuddin, FI.

2.7.2 Associates : Daisy Biswas, DO; Md. Didarul Alam Chowdhury, Lecturer, Department of Applied & Environment Chemistry, University of Chittagong; Mohammed Jakir Hossain, SRO; Nazma Khatun, RO and Urboshi Roy, FI.

2.8 **Activities for the year**

a) Processing of *Acacia* hybrid and simul pulp

b) Preparation and characterization of nanocellulose from pulp/wood

2.8.1 Activities calendar :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												

2.9 **Previous progress, if any:** The freshly cut *Acacia* hybrid tree was collected from Banshkhali, Chittagong with bark on. The chips were then air dried. Then the chips were treated in water and Na<sub>2</sub>CO<sub>3</sub>. The chemical constituents of untreated and treated chips were determined.

Six kraft pulps were prepared with the untreated chips at 25% sulphidity by maintaining 2000 H-Factor. The alkali doses were varied from 14 to 18% at 2% increments. Six soda pulps were prepared with and without anthraquinone by varying alkali doses of 14, 16 and 18%. The black liquor of pulps were analysed for residual alkali.

- 2.9.1 Achievements, if any : Nil
- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 25,00,000.00
- 2.10.2 Cumulative cost : Tk. 6,00,000.00
- 2.10.3 Cost of the year : Tk. 1,50,000.00
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : Pulp, Paper and Pharmaceutical Industry.

3 **Study** : On-going

3.1 **Programme Area** : Post Harvest Utilization – Chemical Processing

3.2 **Title of the study** : Suitability of *Acacia* hybrid and rubber tree (*Hevea brasiliensis*) for making hardboard.

3.3 **Justification (For new study)** : Not applicable

3.4 **Objective (s)**

3.4.1 To investigate the suitability of *Acacia* hybrid and rubber tree (*Hevea brasiliensis*) for making hardboard

3.5 **Expected output** : Rational utilization of species would be ensured

3.6 **Study period** :

3.6.1 Starting year : 2014-15

3.6.2 Completion year : 2017-18

3.7 **Personnel(s)** :

3.7.1 Study Leader : Nazma Khatun, RO.

3.7.2 Associates : Md. Misbahuddin, FI; Urboshi Roy, FI. and Daisy Biswas, DO

3.8 **Activities for the year**

a) Treating chips of rubber branch with steam and chemicals

b) Making hardboard at different freeness level.

c) Evaluation of strength properties of hardboard.

3.8.1 Activities calendar :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												

- 3.9 **Previous progress, if any:** The freshly cut *Acacia* hybrid logs and stem of rubber wood were debarked and chipped. These were screened to remove oversized and pin chips. In addition, the knots, barks and decayed wood chips were removed. The accepted chips were about 20 mm in length, 10 mm in width and 3 mm in thickness. The chips were cooked in steam for 30, 60 and 90 minutes in laboratory model stainless steel rotary digesters. The pressure at the time of experiment was 100 and 150 psi. The steamed cooked chips were then defiberised in a single rotating disk attrition mill at different plate clearances. Three pulps of different freenesses were made from each cook. Then S-1-S hardboards were made and tested.
- 3.9.1 Achievements, if any : Nil
- 3.10 **Financial statement** :
- 3.10.1 Total cost of the study : Tk. 3,00,000.00
- 3.10.2 Cumulative cost : Tk. 3,00,000.00
- 3.10.3 Cost of the year : Tk. 1,21,470.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : Hardboard Industry and local people.

## Seasoning and Timber Physics Division

1. **Study** : On-going
- 1.1 **Programme area** : Post harvesting utilization-physical processing
- 1.2 **Title of the study** : Effect of heat treatment on physical and mechanical properties of ghora neem (*Melia azedarach*), jam (*Syzygium cumini*), rain tree (*Samanea saman*), jarul (*Lagerstroemia speciosa*) and akashmoni (*Acacia auriculiformis*) wood
- 1.3 **Justification** :
- 1.4 **Objective (s)** :
- 1.4.1 To investigate the effect of heat treatment on physical and mechanical properties of wood
- 1.4.2 To assess the suitability of wood for making furniture and construction materials
- 1.5 **Expected output** : Quality improvement of wood with heat treatment for appropriate use.
- 1.6 **Study period** :
- 1.6.1 Starting year : 2016-2017
- 1.6.2 Completion year : 2018-2019
- 1.7 **Personnel (s)** :
- 1.7.1 Study leader : M. Rowson Ali, SRO
- 1.7.2 Associates : U. K. Rokeya, RO and Dr. Daisy Biswas, DO
- 1.8 **Activities for the year (with quantifiable indicator):**
- a) Selection of six standing trees of jam (*Syzygium cumini*) and collection of 60 cft. round wood from Southern part of Bangladesh.
- b) Preparation of 360 samples of jam wood for testing physical and mechanical properties.
- c) Determination of the physical and mechanical properties of ghora neem (previously collected) and jam woods following ASTM (American Society for Testing Materials) standards.
- d) Data analysis and report writing.
- 1.8.1 **Activities calendar** :

Activities of the year	Time schedule (months)												
	J	A	S	O	N	D	J	F	M	A	M	J	
a.													
b.													
c.													
d.													

- 1.9 **Previous progress, if any** : NA  
 1.9.1 Achievement (s), if any : NA  
 1.10 **Financial statement** :  
 1.10.1 Total cost of the study : Tk. 10, 50,000.00  
 1.10.2 Cumulative cost : Tk. 3, 09, 950.00  
 1.10.3 Cost of the year : Tk. 3, 88,800.00  
 1.10.4 Source of fund : GOB  
 1.11 **Beneficiaries** : FD, BFIDC, Wood based Industries, Universities and BFRI.

2. **Study** : On-going  
 2.1 **Programme area** : Post harvesting utilization-physical processing  
 2.2 **Title of the study** : Investigation of physical and mechanical properties of haldu (*Haldina cordifolia*) and jhau (*Casuarina equisetifolia*) wood  
 2.3 **Justification** :  
 2.4 **Objective (s)** :  
 2.4.1 To assess the suitability of haldu and jhau wood for making furniture and construction materials.  
 2.5 **Expected output:** Determination of physical and mechanical properties of haldu and jhau tree wood for appropriate use.  
 2.6 **Study period** :  
 2.6.1 Starting year : 2016-2017  
 2.6.2 Completion year : 2017-2018  
 2.7 **Personnel (s)** :  
 2.7.1 Study leader : U. K. Rokeya, RO  
 2.7.2 Associates : M. Rowson Ali, SRO and Dr. Daisy Biswas, DO  
 2.8 Activities for the year (with quantifiable indicator):  
 a) Selection of three standing trees of haldu and three standing trees of jhau and collection of 30 cft. round wood from Chittagong Hill Tracts.  
 b) Preparation of 270 samples for testing physical and mechanical properties in air dry condition.  
 c) Determination of the physical and mechanical properties of haldu and jhau woods in air dry condition following ASTM (American Society for Testing Materials) standards.  
 d) Data analysis and report writing.  
 2.8.1 **Activities calendar** :

Activities of the year	Time schedule (months)											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												

- 2.9 **Previous progress, if any:** NA  
 2.9.1 Achievement (s), if any : NA  
 2.10 **Financial statement** :  
 2.10.1 Total cost of the study : Tk. 3, 10,000.00  
 2.10.2 Cumulative cost : Tk. 1, 17,660.00  
 2.10.3 Cost of the year : Tk. 1, 18,300.00  
 2.10.4 Source of fund : GOB  
 2.11 **Beneficiaries:** FD, BFIDC, Wood based Industries, Universities and BFRI.

## Veneer and Composite Wood Products Division

- 1.0 **Study** : On going
- 1.1 **Programme Area** : Post Harvest Utilization Chemical Processing
- 1.2 **Title of the Study** : Development of doors and partition using bamboo composite products.
- 1.3 **Justification:** The forest of Bangladesh is declining day by day with the growth of population. The declining of timber demands import of wood which create negative effect on the national economy. Furthermore, declining of forest causes adverse effect on climate change. Bamboo is the appropriate substitute of wood which is versatile and highly renewable material. Bamboo is fast growing and can harvest within 3 years. It is comparatively cheap and has a tremendous growth potential in rural areas. Every household maintains small bamboo yard for various uses. Bamboo is used in housing, furniture making, packing, transport and various purposes. It is important raw material in the handicraft and small cottage industry sector. Bamboo in panel form is well suited to wood substitute and therefore development of cost effective technologies to produce bamboo composite products is an important area of research. Recently Bangladesh Forest Research Institute developed attractive bamboo tiles and bamboo composite furniture using thick wall bamboo. Bamboo composite products can be used for making doors and partition. Manufacture of doors and partition using bamboo composites instead of wood will decrease the pressure on wood and will create income generating opportunities for bamboo growers and producers.
- 1.4 **Objectives** :
- 1.4.1 To assess the potential of bamboo composites for making doors and partition.
- 1.4.2 To assess economic feasibility of doors and partition made of bamboo composites.
- 1.4.3 To disseminate the information to the end-users.
- 1.5 **Expected output:** Manufacture of doors and partition using bamboo composites will help to decrease the pressure on valuable timber and will create income-generating opportunities for bamboo growers and employment at the unit and improve the livelihood of the rural people in Bangladesh.
- 1.6 **Study period** : 2014-2015, 2019-2020
- 1.6.1 Starting year : 2017-2018(2<sup>nd</sup> phase)
- 1.6.2 Completion year : 2019-2020
- 1.7 **Personnel(s)** :
- 1.7.1 Study Leader : M. M. Rahaman, RO
- 1.7.2 Associates : Dr. K. Akhter, DO, S. Hossain, RO, M. R. Islam, FI.
- 1.8 **Activities for the year:**
- Visit to Bamboo plantation area.
  - Procurement of chemicals and other materials.
  - Selection of design of doors and partition.
  - Collection of bamboo culms (*Bambusa vulgaris/Bambusabalcooa*)
  - Preparation and processing of bamboo mats, bamboo strips.
  - Manufacturing of bamboo composites.
  - Manufacturing of one door and one partition using bamboo composite panel & bamboo mat veneer board.
  - Visit to Bamboo product shop & industries.
  - Calculation of manufacturing cost.

### 1.8.1 Activities calendar :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
ef.												
ghi												

1.9 **Previous progress, if any** : Borak (*Bambusa balcooa*) bamboos were collected from Anowara Banskhali, Chittagong. Strips of bamboo were prepared, dried and treated with borax-boric acid solution. Bamboo mats were prepared using mitinga (*Bambusa tulda*) which were also treated with borax-boric acid solution. Bamboo composite products such as bamboo panel board were made using treated strips in hot press. Planner's shavings are found during strips preparation. Bamboo chips were prepared in hammer mill machine. Bamboo particleboard made by using bamboo chips and planner shaving. Bamboo mat over laying particle board were made using bamboo planner's shavings. Borax-boric acid (2%) was added with UF glue. One door was prepared using bamboo panel board and two doors were prepared using bamboo panel board and bamboo mat overlaid particleboards. Three partitions were prepared using bamboo panel board and bamboo mat overlaid particleboards. The bamboo composite products were kept in VCWP Division for service test.

1.9.1 Achievement(s), if any : **NA.**

1.10 **Financial statement** :

1.10.1 Total cost of the study : Tk. 5,00,000

1.10.2 Cumulative cost : Tk. 3,90,000

1.10.3 Cost of the year : Tk. 1,50,000

1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : Door & windows industries, Bamboo/wood plywood and particleboard industries, farmers/bamboo growers, general people, village women, NGOs.

2.0 **Study** : New

2.1 **Programme area** : Post Harvest Utilization -Physical Processing

2.2 **Title of the study** : Suitability of manufacturing medium density fiberboard (MDF) from hybrid *acacia* wood.

2.3 **Justification:** Medium density fiberboard (MDF) is an engineered wood product. It is made by breaking down hardwood or softwood residuals into wood and woody fibers, combining it with a resin binder and forming panels by applying high temperature and pressure. MDF is generally denser than plywood. It can be used as a building material similar in application to plywood. It is stronger and much denser than particle board. MDF is also usable for furniture such as cabinets, because of its strong surface. The utilization of medium density fiberboard as a replacement of larger solid structure lumber is increasing day by day. As a result medium density fiberboard (MDF) markets are growing rapidly for housing and household materials like doors, furniture and construction materials. It is noted that research have been carried out form manufacturing (MDF) medium density fiberboard using rubber wood in VCWP Division of BFRI. Bending strength (MOR), Internal bond strength (IB), Thickness swelling and water Absorption of those boards were investigated.

Hybrid *acacia* is used by furniture and plywood industries. It is occurring scattered and planted in Bangladesh. Generally this timber is used for making furniture, door-windows and other purposes. The stem and branches of hybrid *acacia* trees are used as fuel wood or unused. This stem and

branches can be also used for making MDF. The aim of the study is to determine the suitability of manufacturing medium density fiberboard (MDF) from hybrid *acacia* wood which will reduce pressure on wood and other composite products.

ii) Methodology: Hybrid *acacia* chips are converted into fibers for fabricating the MDF panels. MDF will be made in hot press using UF glue at 150 C applying pressure 35 kg/cm<sup>2</sup> for 6 min, 10.5kg/cm<sup>2</sup> for 4 min 3.5 kg/cm<sup>2</sup> min. Strength properties will be determined according to IS:2380.

2.4.0 **Objective(s)** :

2.4.1 To determine the suitability of medium density fiberboard made from hybrid *acacia* wood.

2.5 **Expected output:** Maximum utilization of hybrid *acacia* wood for manufacturing medium density fiberboard (MDF).

2.6 **Study period** : 2017-2018, 2019-2020

2.6.1 Starting year : 2017-2018

2.6.2 Completion year : 2019-2020

2.7.0 **Personnel(s)** :

2.7.1 Study Leader : M. M. Rahaman, RO

2.7.2 Associates : Dr. K. Akhter, DO; S. Hossain, RO ; M. R. Islam F I.; M. Uddin F I.

2.8.0 **Activities for the year:**

a) Procurement of chemicals and other materials.

b) Collection of hybrid *acacia* wood Logs.

c) Cross cut of Logs to bolts of suitable length and preserve in log pond.

d) Peeling of the bolts into 1.5 mm thick

e) Cutting of veneer in clipper machine up to suitable size.

f) Drying of veneer in suitable moisture (8%)

g) Visit particleboard industries.

2.8.1 **Activities calendar** (July 2017- June 2018):

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a												
b												
c												
d												
ef												
g												

2.9.0 **Previous progress:** NA

2.9.1 **Achievement(s)** :

2.10 **Financial statement** :

2.10.1 Total cost of the study : Tk 4,00,000.00

2.10.2 Cumulative cost : Tk.

2.10.3 Cost of the year : Tk. 1,20,000.00

2.10.4 Source of fund : GOB

2.11 **Beneficiaries:** Wood merchants, plywood and particleboard industries/ BFIDC & NGOs.

3. **Study** : On going
- 3.1 **Programme Area** : Training and technology transfer
- 3.2 **Title of the Study** : Design Improvement of bamboo composite furniture and popularization of technology.
- 3.3 **Justification:** The forests of Bangladesh have been declining day by day with the growth of population. As a result, the gap between the demand and supply of wood is increasing. Furthermore declining forests cause adverse effect on climate change. Denuded land due to shifting cultivation, illicit felling, accelerated soil erosion and uncontrolled fire hazard can be deforested by environmentally, ecologically and economically viable fast growing species. Bamboo is appropriate fast growing species and can be used after 3 years. It is comparatively cheap and has a tremendous growth potential in rural areas. Some characteristics of bamboo such as rapid growth, lightness, flexibility, colour and attractive texture made it very useful to people. In rural area of Bangladesh, every household maintains small bamboo yard and get benefit by using and trading for various uses. Bamboo is used in housing, furniture making, packing, transport and various purposes. Limitation like short service life has been overcome by treatment technology developed by Bangladesh Forest Research Institute (BFRI). Composite technology made the bamboo in panel form which is well suited to wood substitute. BFRI developed attractive bamboo tiles and bamboo composite furniture using thick wall bamboo. Use of bamboo composites instead of wood will decrease the pressure on wood and will create income generating opportunities for bamboo growers and producers. Bamboo panel products have demand in international market. Furthermore fast growing bamboo plantation will mitigate climate change risk. Extension of the bamboo composite technology will help people to develop entrepreneurship for bamboo composite products which will provide employment generation and foreign currency. These activities are undertaken to disseminate and popularize the Bamboo composite technology to the end-users.
- 3.40 **Objectives** :
- 3.4.1 To improve the design of bamboo composite furniture.
- 3.4.2 To disseminate the information to the end-users.
- 3.4.3 To provide technical support to the business initiators for development of entrepreneurship.
- 3.5 **Expected Output:** Manufacture and use of bamboo composites will decrease the pressure on valuable timber. It will create income-generating opportunities for bamboo growers and employee at the unit. It will improve the livelihood of the rural people. Bamboo plantation will decrease climate change risk.
- 3.6 **Study period** : 2015-16, 2019-20
- 3.6.1 Starting year : 2015-2016
- 3.6.2 Completion year : 2019-2020
- 3.7.0 **Personnels** :
- 3.7.1 Study Leader : S. Hossain, RO
- 3.7.2 Associates : Dr. K. Akhter, DO , M.M. Rahaman, RO; & M. R. Islam, F I.
- 3.8 **Activities for the year :**
- a) Procurement of chemicals and other materials.
  - b) Selection of design of furniture.
  - c) Procurement of bamboo culms (*Bambusa vulgaris/Bambusa balcooa*).
  - d) Preparation and processing of bamboo mats, bamboo strips.
  - e) Manufacturing of bamboo composites panel.
  - f) Manufacturing of bamboo furniture using bamboo composites
  - g) Arrangement of motivational activities in plywood and particleboard industries.
  - h) Arrangement of training programme.

### 3.8.1 Activities calendar :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												
g-h												

3.9.0 **Previous progress:** Borak (*Bambusabalcooa*) bamboos were collected from Anawara, Banskhali Chittagong. Strips were prepared and treated with borax-boric acid solution. Bamboo mats were prepared using Mitinga (*Bambusa tulda*) which were also treated with borax-boric acid solution. Bamboo composite products such as bamboo panel board and bamboo mat over laying particle board were made using borak (*Bambusa balcooa*) bamboo. Bamboo particleboard was made by using bamboo chips and planner shaving. Borax-boric acid (2%) was added with UF glue. Bamboo panel and bamboo mat overlaid particle boards were prepared in making one bending chair, two new designed armed chairs and one tea table. This composites furniture are kept in VCWP Division. Star particle board industries in Dhaka were visited. End-users were encouraged and advised to visit BFRI and seek for the technology in the related field. Training programme were organized in Khagrachori (carpenter, furniture businessmen, mat weaver and handicraftsmen etc) held on 02-01-2016 and Naogoan(carpenter, furniture businessmen, mat weaver and handicraftsmen etc) held on 16-05-2016. On 11-10-2016, we visited different furniture shops, crafts & novelty item shops in Comilla. Training program was arranged in Mandibug, Sylhet held on 27-11-2016, Rangamati held on 25-12-2016, Dhaka held on 28-02-017 and Kaptai held on 24-02-2017.

3.9.1 Achievement : NA.

3.10 **Financial statement** :

3.10.1 Total cost of the study : Tk. 7,50,000.00

3.10.2 Cumulative cost : Tk. 3,25,000.00

3.10.3 Cost of the year : Tk. 2,13,000.00

3.10.4 Source of fund : GOB

3.11 **Beneficiaries** : Bamboo growers, Bamboo/wood plywood and particleboard industries, bamboo growers, general people, village women, NGOs

4.0 **Study** : On going

4.1 **Programme Area** : Post harvesting utilization-physical processing

4.2 **Title of the Study** : Suitability of uprooted tea plants (*Camellia sinensis*) for particleboard and pulp production.

4.3 **Justification:** The utilization of plywood and particleboard as a replacement of larger solid structure lumber is increasing day by day. As a result, the plywood and particleboard markets are growing rapidly for making housing and household materials like doors, windows and furniture etc. The consumption of paper, board and newsprint has been growing at a robust rate of 20% annually in the last five years. This will increase extremely in the near future. Tea plant is occurring planted hill area in Bangladesh. There are total 163 tea gardens are exists in Bangladesh and these are at different places. Since it is not possible to collect better tea leaf from an old plant, every year there are huge amounts of old plants need to be removed from the tea garden which is commonly used as fuel wood. The wastage plant of tea may be an alternative new

source of raw material for Particleboard and pulp industries to increase its economic value and reduce pressure on other species. However there is no information on the use of these resources as raw material for making pulp and particleboard. It is expected that if found suitable these resources would supplement as particleboard and pulping raw material alone or blended with other ligno-celulosic material. Therefore the study is undertaken to find out the suitability of making particleboard and pulp using wastage tea plant. Therefore immediate action is necessary to find out new source of raw material for pulp and paper mill for attaining self-sufficiency in paper production.

4.4 **Objective(s)** :

- 4.4.1 To determine the suitability of tea plant for particleboard making.
- 4.4.2 To determine the optimum cooking variables for making chemical pulp with respect to yield and quality pulp.
- 4.4.3 To improve the strength of pulp and particleboard by blending with hardwood / bamboo.

4.5 **Expected output:** Maximum utilization of tea plant by making particleboard and pulp.

4.6 **Study period** : 2016-17 to 2018-19

4.6.1 Starting year : 2016-2017

4.6.2 Completion year : 2018-2019

4.7 **Personnel(s)** :

4.7.1 Study Leader : S. Hossain, RO.

4.7.2 Associates : Dr. K. Akhter, DO, M. M. Rahaman, RO, M.R. Islam, F.I; N. Khatun, RO; M. M. Uddin; FI, U. Roy, FI.

4.8 **Activities for the year:**

- a) Procurement of chemicals and other materials.
- b) Screening of chips.
- c) Manufacturing of particleboard in laboratory by hot press machine.
- d) Particleboard conditioned in conditioning chamber.
- e) Visit plywood & particleboard industry.
- f) Determination of chemical constituents of uprooted tea plants.
- g) Preparation of kraft pulp by varying cooking chemicals.
- h) Determination of kappa number and yield.
- i) Preparation of hand sheets and evaluation of physical strength properties.

4.8 **Activities calendar** :

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a													
b													
c													
d													
e													
f.													
g.													
h.													
i.													

4.9 **Previous Progress, :** Wastage and uprooted tea plants were collected Neptune tea garden at Naraonhat in Rawjan, Chittagong. Plants were cut into the clipper machine and were dried up to suitable moisture (10-12%) content. Chips were prepared in hammer mill machine and were dried up to suitable moisture content (4-5%) in batch oven.

- 4.10 **Financial statement** :
- 4.10.1 Total cost of the study : Tk. 5, 00,000.00
- 4.10.2 Cumulative cost : Tk. 1,75,000.00 (VCP: 1,00,000.00+ P&P: 75,000.00)
- 4.10.3 Cost of the year : Tk. 1,75,000.00 (VCP: 1,10,000.00+ P&P: 65,000.00)
- 4.10.4 Source of fund : GOB
- 4.11 **Beneficiaries:** Wood merchants, Pulp and paper, particleboard industries/ BFIDC & NGOs.

## Wood Preservation Division

- 1 **Study** : On going
- 1.1 **Programme Area** : Post Harvest Utilization- Chemical Processing.
- 1.2 **Title of the Study** : Treatability and natural durability of bhudum (*Dendrocalamus giganteus*) bamboo species.
- 1.3 **Justification** : Bamboo are commonly used by the villagers in the construction of thatched and semi-pacca houses. They are also used for betel leaf farming, fishing, etc. in our country. They are usually not treated with any preservative against wood deteriorating agencies before they are put into use. As a result, the untreated bamboo poles, splits deteriorate quickly and therefore need to be replaced frequently within short time. But properly treated bamboo lasts 08-10 years or more in outdoor condition. Treatability and natural durability of some thick wall bamboo viz. borak, baijja etc. have been determined and technology on those information are being transferred to the end users. Further research works on the treatability and durability of the available bamboo species in the country is needed. This study has been undertaken to determine the treatability and durability of some available bamboo. This study will determine durability and treatability grade and would enhance the service life of bamboo. It will help to categorize each species on the basis of method and conserve the forest resource as well as national economy.
- 1.4 **Objective(s)** :
- 1.4.1 To develop treating schedule for preservative treatment.
- 1.4.2 To determine outdoor service life of bamboo species treated with CCB preservative.
- 1.4.3 To disseminate the information to the end-users.
- 1.5 **Expected output** : The study will be helpful for the bamboo users, Betel leaf farms, general public and cottage industries as well as for related to bamboo products.
- 1.6 **Study Period** :
- 1.6.1 Starting year : 2013- 2014
- 1.6.2 Completion year : 2017 – 2018
- 1.7 **Personnel (S)** :
- 1.7.1 Study leader : Mozammel Hoque Chowdhury, RO.
- 1.7.2 Associates : Dr. Khurshid Akhter, CRO.; Mohammad Anisur Rahman, SRO and Abdus Salam, RO.
- 1.8 **Activities for the year** :
- a) Procurement of CCB (Copper-Chrome-Boron) preservative, chemicals, treatment materials instrument, bhudum (*Dendrocalamus giganteus*) bamboo.
- b) Processing of bamboo and preparation of samples for diffusion method.
- c) Treatment of samples by diffusion method.
- d) Installation of treated samples in stake yards at BFRI campus & Barisal PTU campus for service test.

- e) Collection of data from previously installed bhudum (*Dendrocalamus giganteus*) bamboo samples at BFRI & Barisal stake yard which were treated with preservative.
- f) Analysis of data and determination of treatability group.
- g) Reporting.

**1.8.1 Activities calendar :**

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												
g.												

1.9 **Previous progress, if any (year) :** Bamboo samples were treated by sap-displacement, soaking, double- diffusion and stepping method with water-borne preservative. Penetration and retention were measured. The treated samples were installed in the BFRI and Barisal stake yard for service test. Data was collected from previously installed bamboo samples periodically; afterward data was analyzed for reporting.

1.9.1 Achievements (s), if any : NA

1.10 **Financial statement :**

1.10.1 Total cost of the study : Tk. 6,00,000.00

1.10.2 Cumulative cost : Tk. 3,00,000.00

1.10.3 Cost of the year : Tk. 1,30,000.00

1.10.4 Source of fund : GOB

1.11 **Beneficiaries :** Betel leaf farms, Bangladesh Forest Industries Development Corporation (BFIDC) and general public.

2. Study : On going

2.1 Programme Area : Post Harvest Utilization –Chemical Processing

2.2 Title of the Study : Popularization of preservation treatment technology through training and entrepreneurship development.

2.3 **Justification:** Betel leaf & vegetable farm are made primarily from bamboo, bamboo sticks, jute stick, paddy straw, sungrass and similar materials, which are very susceptible to biodegrading agents, and needs to be replaced after 10-12 months. Extension of the preservative treatment technology developed at BFRI for enhancing service life of low cost housing materials like bamboo and other lignocellulosic materials. This technology will help people to save their hardly earned income and reduce their maintenance cost. These activities are undertaken to disseminate and popularize the treatment technology to the end-users

2.4 **Objectives(s) of the Study :**

2.4.1 To motivate people through training, group discussions, personal contacts etc.

2.4.2 To provide technical support to the business initiators for development of entrepreneurship preservative treatment.

2.5 **Expected output ( quantify) :** Use of preservative treatment technology by betel leaf & vegetable farmers, common people and development of local entrepreneurship

- 2.6 **Study period** :
- 2.6.1 Starting year : 2014 – 2015
- 2.6.2 Completion year : 2019 – 2020
- 2.7 **Personnels** :
- 2.7.1 Study Leader : Abdus Salam, Research Officer.
- 2.7.2 Associates : Dr. Khurshid Akhter, Divisional Officer; Mohammad Anisur Rahman, Senior Research Officer and Mozammel Hoque Chy, Research Officer.

2.8 **Activities for the year :**

- a. Procurement of raw materials, chemicals and other inputs.
- b. Treatment of demonstration materials for repairing of Bamboo model house at BFRI Campus.
- c. Arrangement of training and motivational activities in Maulvibazar, Gaibandha, Bhola, Rajbari.
- d. Monitoring of service life of previously established experiments in betel leaf & vegetable farms in Barisal and Gaibandha.
- e. Reporting.

2.8.1 Activities of the calendar year :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												

2.9 **Previous progress, if any** : Wood, bamboo and sungrass were treated by CCB (Coper-Crom-Boron) solution for repairing bamboo model house at Bangladesh Forest Research Institute Campus and Safari park, Dulahajra, Cox’s Bazar which were made in 2006 by BFRI, Ctg. Eight training program were organized to motivate people and awareness development on increasing the service life of wood, bamboo, sungrass etc. by preservative treatment technology at Hatibanda, Lalmonirhate; Naowga; Bagmara, Rajshahi Laxmipur, Ramgati, shobarnchar, Nowakhali, Magora and Dhinajpur.

2.9.1 Achievement(s), if any: NA.

- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : 6,00,000.00
- 2.10.2 Cumulative cost : 2,00,000.00
- 2.10.3 Cost of the year : 1,42,300.00
- 2.10.4 Source of fund : GOB

2.11 **Beneficiaries** : NGOs and general public, particularly the users of wood, bamboo, sun grass and other materials

3 **Study** : New

3.1 **Programme Area** : Post Harvest Utilization- Chemical Processing.

3.2 **Title of the Study** : Effect of preservative treatment on physical and mechanical properties of wood.

3.3 **Justification:** Mango wood ( *Mengifera indica* ), Rubber wood ( *Hevea brasiliensis* ) and Mahagoni ( *Swietenia macrophylla* ) are three common tree species in the natural and plantation forests of Bangladesh. Timber tree species provide round wood, sawn timber,

poles, post, fuel wood etc. which are essential materials for furniture making, building construction, fishing, cooking and for agricultural implements (Aitrell,1007). These are also used for different purpose in our country. These are usually not treated with any preservative against wood deteriorating agencies before they are put into use. As a result, the untreated wood poles, planks, splits etc. are deteriorate quickly and therefore need to be replaced frequently within short time. But properly treated wood may service 10-12 years or more in outdoor condition. As a information regarding wood properties is required for best utilization of four potential species. This study is devoted to determine the principal physical and mechanical properties of wood before and after preservative treatment. This study is also devoted to determine the treatability and natural durability of Mango wood ( *Mengifera indica* ), Rubber wood ( *H. brasiliensis*) wood and Mahagoni ( *Swietenia macrophylla*) species of Bangladesh. It will help to categorize each species on the basis of method and conserve the forest resource as well as national economy.

**3.4 Objective(s) :**

3.4.1 To find out the impacts of preservative treatment on physical and mechanical properties of three wood species.

3.4.2 To determine the treatability and natural durability of three tree species of Bangladesh.

**3.5 Expected output :** The study will be helpful for the best utilization of wood, wood users, general public, furniture industries as well as for related to wood products.

**3.6 Study Period :**

3.6.1 Starting year : 2017- 2018

3.6.2 Completion year : 2019 – 2020

**3.7 Personnel (S) :**

3.7.1 Study leader : Abdus Salam, RO.

3.7.2 Associates : Dr. Khurshid Akhter, DO.; Mohammad Anisur Rahman, SRO and Mozammel Hoque Chowdhury, RO.

**3.8 Activities for the year :**

- a) Literature review, Procurement of CCB (Copper-Chrome-Boron) preservative, chemicals, treatment materials instrument, four species of wood.
- b) Processing of wood and preparation of samples for treatment by different method and duration.
- c) Determination of physical and mechanical properties of wood samples (Mahagoni) before and after treatment.
- d) Installation of treated samples in stake yards at BFRI campus & Barisal PTU campus for outdoor service test.
- e) Collection of data from installed wood samples at BFRI & Barisal stake yard every three months which were treated with preservative.
- f) Analysis of data and determination of treatability group.
- g) Reporting.

**3.8.1 Activities calendar :**

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												
g.												

- 3.9 **Previous progress, if any (year) :** NA
- 3.9.1 Achievements (s), if any : NA
- 3.10 Financial statement :
- 3.10.1 Total cost of the study : Tk. 6,00,000.00
- 3.10.2 Cumulative cost : Tk. 1,57,700.00
- 3.10.3 Cost of the year : Tk. -
- 3.10.4 Source of fund : GOB
- 3.11 Beneficiaries : Bangladesh Forest Industries Development Corporation (BFIDC), furniture industries, wood users, general public as well as for related to wood products.

## Wood Working and Timber Engineering Division

1. **Study** : On-going
- 1.1 **Programme Area** : Post harvest utilization-Physical Processing.
- 1.2 **Title of the Study** : Survey and improvement of sawing technique of different wood species for maximum yield.
- 1.3 **Justification** : The importance of sawmilling sector cannot be ignored as the use of wood products is increasing and subsequently wood based industries are expanding rapidly in Bangladesh. The conversion of log into sawn-timber requires many steps arriving at sawmill. Problems that arise from conventional sawing practices include low yields and inferior quality timber which increases losses of timber resources. The aim of this study is therefore to use the application of different improved sawing techniques instead of conventional sawing method to produce maximum yields. The overall economic benefits will be gained through the yield maximization of timber in the sawing unit throughout the country.
- 1.4 **Objectives**
- 1.4.1 To determine the cause of timber loss during sawing.
- 1.4.2 To maximize the yields of timber by applying improved sawing techniques.
- 1.5 **Expected output** : Minimizing sawing wastage and making as large quality sawn yield.
- 1.6 **Study period** :
- 1.6.1 Starting year : 2014-15
- 1.6.2 Completion year : 2017-18
- 1.7 **Personnel's** :
- 1.7.1 Study Leader : M Ramiz Uddin, DO
- 1.7.2 Associates : M Zahirul Alam, RO; M N A Mridha, RO & M Ashaduzzaman Sarker, RO.
- 1.8 **Activities for the year :**
- a) Data collected from Chittagong, Dhaka, Rajshahi , Khulna and Kaptai will be analyze.
- 1.8.1 Activities calendar

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a													

- 1.9 **Previous progress:** 50 cft. mahogany (*Swietenia macrophylla*) wood was procured. Sawmill at two locations, namely- Dhaka and Khulna was visited. Data on present sawing status from sawmill at above locations was collected. Different sawing techniques and collection of data on those techniques for medium density group wood were applied.
- 1.9.1 Achievement: By using quality saw blade and proper maintenance of saw blade can produce quality sawn products and also minimized sawing wastage.

- 1.10 **Financial Statement** :
- 1.10.1 Total cost of the study : Tk. 5,00,000.00
- 1.10.2 Cumulative cost : Tk. 3,05,000.00
- 1.10.3 Cost of the year : Tk. 4,000.00
- 1.10.4 Source of Fund : GOB
- 1.11 **Beneficiaries:** Sawmill owners, timber traders, timber users, BFIDC and FD.

2.0 **Study** : New

2.1 **Programme Area** : Post harvest utilization-Physical Processing.

2.2 **Title of the Study** : Characterization and potential uses of mahogany (*Swietenia macrophylla*) wood for furniture and construction materials.

2.3 **Justification:** Mahogany (*Swietenia macrophylla*) is widely distributed in Bangladesh. It can reach a height of 35 m, with a diameter of 130 cm or more, bole is cylindrical and straight, free from branches to about 15 to 20 metre. The heartwood is reddish or pinkish brown when freshly cut, turning into a deep rich red brown color after exposure. The present study has been taken to find out the working and finishing properties of mahogany wood. The study also includes manufacture of some standard furniture. Performance of furniture and construction materials in service condition will provide final recommendation.

2.4 **Objective**

2.4.1 To assess the suitability of mahogany wood for furniture and other utilization purposes.

2.5 **Expected output** : Better utilization of wood and conservation of forest resources.

2.6 **Study period** :

2.6.1 Starting year : 2017-18

2.6.2 Completion year : 2018-19

2.7 **Personnel's** :

2.7.1 Study Leader : : M Ramiz Uddin, DO

1.7.2 Associates : M Zahirul Alam, RO; M N A Mridha, RO;

2.8 **Activities for the year :**

a) Seasoning of wood to 15% moisture content.

b) Determination of working and finishing properties.

c) Manufacture of six chair, four half secretariat table, four single seated sofa, two tea table, two centre table and two bed and put under service test.

d) Cost comparison of the furniture.

2.8.1 **Activities calendar** :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a												
b												
c												
d												

2.9 Previous progress : NA

2.9.1 Achievement : NA

2.10 **Financial Statement** :

2.10.1 Total cost of the study : Tk. 5,50,000.00

2.10.2 Cumulative cost : Tk.

2.10.3 Cost of the year : Tk. 1,96,000.00

2.10.4 Source of Fund : GOB

2.11 **Beneficiaries** : Common people, timber traders, wood based industries, FD, FIDC and NGOs.