

## RESEARCH PROGRAMME: 2014 – 2015



Government of the people's Republic of Bangladesh  
**Bangladesh Forest Research Institute**  
Chittagong

## Contents of the Research Programme: 2014 – 15

### FOREST MANAGEMENT WING

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## Summary of the Research Programme: 2014 – 15

Sl.No.	Name of the Division/Section	Total Number of Studies		
		Ongoing	New	Total
<b>FOREST MANAGEMENT WING</b>				
1	Silviculture Research Division	7	-	7
2	Silviculture Genetics Division	4	-	4
3	Seed Orchard Division	6	-	6
4	Forest Botany Division	3	-	3
5	Forest Inventory Division	2	-	2
6	Forest Economics Division	2	-	2
7	Soil Science Division	3	-	3
8	Minor Forest Products Division	3	2	5
9	Mangrove Silviculture Division	6	-	6
10	Forest Protection Division	3	-	3
11	Plantation Trial Unit Division	6	-	6
12	Wildlife Section	2	1	3
<b>Sub-Total:</b>		47	3	50
<b>FOREST PRODUCTS WING</b>				
13	Forest Chemistry Division	2	2	4
14	Seasoning and Timber Physics Division	3	-	3
15	Pulp and Paper Division	3	1	4
16	Veneer and Composite Wood Product Division	2	2	4
17	Wood Working and Timber Engineering Division	1	1	2
18	Wood Preservation Division	2	3	5
<b>Sub-Total:</b>		13	9	22
<b>Total :</b>		60	12	72

## List of new studies: 2014-15

Sl.No.	Title of the Study	Division
<b>Forest Management Wing</b>		
1	Nursery and plantation techniques of five selected medicinal plants: iswarmul ( <i>Aristolochia indica</i> ), kurchi ( <i>Holarrhena pubescence</i> ), gajpipul ( <i>Scindapsus officinalis</i> ) antamul ( <i>Tylophora indica</i> ) and chandan ( <i>Santalum album</i> )	MFP
2	Studies on ethnomedicinal plants used by the <i>Khasia</i> community of Moulvibazar district	MFP
3	Status of Wildlife in Baraiyadhala National Park, Chittagong	WLS
<b>Forest Products Wing</b>		
4	Development of doors and partition using bamboo composite products. (New)	VCWP
5	Studies on the manufacture of medium density fiberboard (MDF) from Rubber wood ( <i>Heveabraziliensis</i> ). (New)	VCWP
6	Extension of preservation treatment technology to the end-users. (New)	WPD
7	Assessment of durability of different bamboo species under different duration of water treatment. (New)	WPD
8	Performance of <i>Neem</i> ( <i>Azadirachta indica</i> A.Juss) leaves and <i>Mehagani</i> ( <i>Azalia</i> Sm) seeds extract as an eco-friendly wood preservative	WPD
9	Artificial Inoculation of Agarwood ( <i>Aquilariamalaccensis</i> Lam.) by Chemical Inducing Agent(s).	FCD
10	Phytochemical analysis and antioxidant potential of medicinal plants. (New)	FCD
11	Suitabiity of <i>Acacia</i> hybrid for making hardboard	P&P
12	Improvement of sawing technique of different wood species for maximum yield	WW&TED

# FOREST MANAGEMENT WING

## SILVICULTURE RESEARCH DIVISION

1. **Study** : Ongoing
- 1.1 Programme Area : Plantation Techniques and Forest Management
- 1.2 Title of the Study : Development of planting technique of Sal (*Shorea robusta*).
- 1.3 Justification(For new study): NA
- 1.4 **Objective (s)** :
  - 1.4.1: To develop suitable planting technique of sal.
  - 1.4.2: To enrich the degraded sal forest through aided regeneration.
  - 1.4.3: To monitor the change of biodiversity of sal forest overtime after establishing the plantation.
- 1.5 **Expected output** : Techniques for restoration of degraded sal forest will be developed.
- 1.6 Study period :
  - 1.6.1 Starting year : 2010-2011
  - 1.6.2 Completion year : 2014-2015
- 1.7 **Personnel (s)** :
  - 1.7.1 Study leader : Nasrat Begum, SRO
  - 1.7.2 Associates : Mohammed Shahid Ullah, DFO; A.A. Masud Majumdar, RO; Md. Rabiul Islam, FI.
- 1.8 **Activities for the year** :
  - a. Collection of seeds and raising 2000 seedlings at Charkai Research Stations.
  - b. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
  - c. Maintenance of 5.0 ha last years' experimental plantations through weeding, vacancy filling, cleaning, climber cutting, etc.
  - d. Collection of survival and height growth data at six months interval.
  - e. Raising of 1.0 ha experimental plantations at Charkai SR Stations by seedlings, stumps and direct seed sowing in thalli.
  - f. Analysis of data and reporting.
- 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.												

- 1.9 **Previous progress:** Five hectares experimental plantations were established at Charaljani (1.5 ha) and Charkai (3.5 ha) SR Stations through planting seedlings, stumps and sowing seeds in thalli.
  - 1.9.1 **Achievements** : NA
  - 1.10 **Financial statement** :
    - 1.10.1 Total cost of the study : Tk. 5,00,000.00
    - 1.10.2 Cumulative cost : Tk. 2,69,000.00
    - 1.10.3 Cost of the year : Tk. 68,000.00
    - 1.10.4 Source of fund : GOB
  - 1.11 **Beneficiaries** : FD, Educational institutions and Forestry related agencies.

2. **Study** : Ongoing
- 2.1 Programme Area : Plantation Techniques and Forest Management.
- 2.2 Title of the Study : Study on the development of Oil Palm (*Elaeis guineensis*) cultivation in Bangladesh.
- 2.3 Justification (For new study) : NA
- 2.4 **Objective (s)** :
- 2.4.1 To determine present status of oil palm plantation in Bangladesh.
- 2.4.2 To standardize nursery raising technique and management.
- 2.4.3 To standardize plantation (spacing) and management technique of oil palm
- 2.4.4 To study the reproductive biology of oil palm in plantations of Bangladesh.
- 2.4.5 To introduce and test the high yielding variety (HYV) of oil palm.
- 2.5 **Expected output** :
- a. Nursery and plantation technique will be standardized.
- b. Suitable variety of oil palm will be selected for large scale plantation in Bangladesh.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2010-2011
- 2.6.2 Completion year : 2014-2015
- 2.7 **Personnel (s)** :
- 2.7.1 Study leader : Mohammed Shahid Ullah, DFO.
- 2.7.2 Associates : Nasrat Begum, SRO.; A. A. Masud Majumdar, RO;  
Md. Rabiul Islam, FI.
- 2.8 **Activities for the year** :
- a. Collection/purchase of seeds and raising 500 seedlings at Charkai SR Stations.
- b. Collection of data on germination period, germination percentage, survival, growth, disease infestation, etc. of the seedlings.
- c. Maintenance of seedlings in the nursery.
- d. Maintenance of 13.5 ha last years' experimental plantations through weeding, gap-filling, cleaning, climber cutting, etc.
- e. Watering the seedlings in the last years' plantations during dry season (Feb – May).
- f. Raising of 1.5 ha new plantation with three spacing (viz. 5.0m x 5.0m, 6.0m x 6.0m, and 7.0m x 7.0m) at Charkai Research Stations
- g. Construction of 1 Nos. brick wall signboard.
- h. Collection and analysis of data on survival, growth, number of fronds, etc. and report writing.
- 2.8.1 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.			■	■	■	■	■	■	■	■	■	■	■

- 2.9 Previous progress: Raised 13.5 ha experimental plantations at Charaljani, Keochia, Charkai and Hinguli Research Stations. Aalysed the soil samples of the plantation sites.
- 2.9.1 Achievement(s), if any : NA

- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 15,00,000.00
- 2.10.2 Cumulative cost : Tk. 7,43,800.00
- 2.10.3 Cost of the year : Tk. 1,44,000.00
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.

3. **Study** : Ongoing
- 3.1 Programme Area : Plantation techniques and forest management.
- 3.2 Title of the Study : Growth performance of different forest tree species in research plots.
- 3.3 Justification(For new study) : NA
- 3.4 **Objective (s)** :
- 3.4.1 To assess the growth performance of different tree species in four agroecological regions of the country.
- 3.4.2 To determine the silvics of different forest tree species.
- 3.4.3 To develop future quality seed sources.
- 3.5 **Expected output:** Site suitable species and provenances for plantation development will be selected for different site quality index in different agroecological regions of Bangladesh. Silvicultural techniques (spacing, weeding, fertilization, pruning, thinning and coppicing) for plantation management will be developed for maximizing yield of the plantation.
- 3.6 **Study period** :
- 3.6.1 Starting year : 2012-2013(4<sup>th</sup> Phase)
- 3.6.2 Completion year : 2014-2015
- 3.7 **Personnel (s)** :
- 3.7.1 Study leader : Mohammed Shahid Ullah, DFO, SRD.
- 3.7.2 Associates : Nasrat Begum, SRO; A. A. Masud Majumdar, RO.; Md. Rabiul Islam, FI

- 3.8 **Activities for the year** :
- a. Maintenance of 80.0 ha experimental plantations (ex-situ conservation plots, species elimination and site suitability trial, provenance trial, mixed species trial plantations, bamboo plantations, etc) raised up to 2014 at Keochia, Lawachara, Charaljani and Charkai SR stations.
- b. Collection of data on survival, height, diameter at breast height, length of clean bole, straightness of stem, total biomass, coppicing ability etc.
- c. Data analysis and reporting.

3.8.1 **Activities calendar** :

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

- 3.9 **Previous progress:** Up to 2013, 135 ha experimental plantations ( ex-situ conservation plots, species elimination trials; provenance trials, coppicing trials, spacing trials, mixed planting trials, underplanting 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.

3.9.1 **Achievement(s)** : 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.

3.10 **Financial statement** :

3.10.1 Total cost of the study : Tk. 40,00,000.00

3.10.2 Cumulative cost : Tk. 37,20,000.00

3.10.3 Cost of the year : Tk. 3,00,000.00

3.10.4 Source of fund : GOB

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

4. **Study** : Ongoing

4.1 Programme Area : Production of quality planting materials.

4.2 Title of the Study : Large scale production of quality seedlings of important forest tree species.

4.3 Justification (For new study) : NA

4.4 **Objective (s)** :

4.4.1 To determine age, height and root-shoot ratio of seedlings for dispatch from nursery to plantation.

4.4.2 To provide quality seedlings to planters for successful plantation establishment.

4.4.3 To develop linkages with planters for awareness development about quality seedling.

4.5 **Expected output** :

a. Awareness development about quality seeds and seedlings.

b. Increased yield of timber and fuel wood.

4.6 **Study period** :

4.6.1 Starting year : 2011-2012(2<sup>nd</sup> Phase)

4.6.2 Completion year : 2014-2015

4.7 **Personnel (s)** :

4.7.1 Study leader : Nasrat Begum, SRO

4.7.2 Associates : Mohammed Shaid Ullah, DFO; A. A. Masud Majumdar, RO.  
Md. Rabiul Islam, FI

4.8 **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 30,000 seedlings at HQs and four research stations

b. Development of nursery facilities at HQs.

c. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.

d. Collection of data on seedlings growth, collar diameter, root-shoot ratio of different species and report writing.

4.8.1 **Activities calendar** :

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



4.9 **Previous progress** : Raised and distributed more than 11 lakh quality seedlings of different indigenous and exotic forest tree species, viz- acacia hybrid (*Acacia auriculiformis* X *A. mangium*), shegun (*Tectona grandis*), banderhola (*Duabanga grandiflora*), civit (*Swintonia floribunda*), teli-garjan (*Dipterocarpus turbinatus*), gamar (*Gmelina arborea*), sal (*Shorea robusta*), lohakat (*Xylia kerrii*), chickrassi (*Chukrassia velutina*), eucalyptus (*Eucalyptus camaldulensis*), raintree (*Samanea saman*), mahogany (*Swietenia mahogoni*), sonalu (*Cassia fistula*), kala-koroi (*Albizia lebbek*), raj-koroi (*A. richardiana*), sil-koroi (*A. procera*), chakua-koroi (*Albizia chinensis*), motor-koroi (*Albizia lucida*), arjun (*Terminalia arjuna*), pitraj (*Aphanamixis polystachya*), bohera (*Terminalia bellirica* (Gaertn.) Roxb.), haritaki (*Terminalia chebula* (Gaertn.) Retz.), menda (*Litsea monopetala* (Roxb.) Pers.), haldu (*Adina cordifolia*), katbadam (*Terminalia catappa*), palas (*Butea monosperma*), khayer (*Acacia catechu*), tamal (*Diospyros montana*), krishnachura (*Delonix regia*), kalo-jam (*Syzygium cumini*), kanchan (*Bauhinia racemosa* Lamk.), jarul (*Lagerstroemia speciosa*), parul (*Stereospermum suaveolens*), dhakijam (*Syzygium grandis*), chapalish (*Artocarpus chama*), telsur (*Hopea odorata*), champa (*Michelia champaca*), cryptocarya (*Cryptocarpa amygdalina*), baobab (*Andansonia digitata*), kerung (*Pongamia pinnata*), 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 agallocha*), 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*), Box badam/ Jangli badam (*Sterculia foetida*)etc.

4.9.1 **Achievement(s)**: Developed appropriate nursery technique for 30 indigenous and exotic forest tree species

4.10 **Financial statement** :

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

4.10.2 Cumulative cost : Tk. 10,82,500.00

4.10.3 Cost of the year : Tk. 1,40,000.00

4.10.4 Source of fund : GOB

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

5. **Study** : Ongoing

5.1 Programme Area : Plantation Techniques and Forest Management..

5.2 Title of the Study : Spacing trial of agar plantation (*Aquilaria malaccensis*).

5.3 Justification (For new study) : NA

5.4 **Objective (s)** :

5.4.1 To determine the optimum spacing for agar plantation.

5.4.2 To assess biomass production and effect of spacing on agar formation.

5.5 **Expected output** :

a. Optimum spacing for agar plantation will be determined.

b. Biomass production and effect of spacing on agar formation will be determined.

5.6 **Study period** :

5.6.1 Starting year : 2014-2015(2<sup>nd</sup> Phase)

5.6.2 Completion year : 2016-2017

- 5.7 **Personnel (s)** :
- 5.7.1 Study leader : Mohammed Shahid Ullah, DFO, SRD.
- 5.7.2 Associates : Nasrat Begum, SRO; A. A. Masud Majumdar, RO.  
Md. Rabiul Islam , FI

5.8 **Activities for the year** :

- a. Collection of agar seeds and raising 2000 seedlings at Charkai.
- b. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
- c. Improvement of nursery facilities at Charkai SR Station.
- d. Maintenance of 10.44 ha last year's experimental plantations through weeding, gap-filling, cleaning, climber cutting, pruning, etc.
- e. Raising of 1.16 ha new agar plantation at four spacing (viz. 1.50m x 1.50m, 2.00m x 2.00m, 2.50m x 2.50m and 3.00m x 3.00m) at Charkai SR Stations.
- f. Collection of data on survival and height growth of the seedlings in the plantations at six month interval.
- g. Analysis of data 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.											■	■
f.						■						■
g.						■						■

5.9 **Previous progress:** Raised 10.4 ha experimental plantations at Keochia, Charaljani and Charkai SRS.

5.9.1 Achievement: : NA

5.10 **Financial statement** :

5.10.1 Total cost of the study : Tk.5,40,000.00

5.10.2 Cumulative cost : Tk 4,31,000.00

5.10.3 Cost of the year : Tk. 99,000.00

5.10.4 Source of fund : GOB

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

6. **Study** : Ongoing

6.1 Programme Area : Biodiversity and Conservation.

6.2 Title of the Study : Conservation of indigenous forest tree species in different agro-ecological regions of Bangladesh.

6.3 Justification (For new study): NA

6.4 **Objective (s)** :

6.4.1 Germplasm conservation of indigenous forest tree species in different agroecological regions of Bangladesh.

6.4.2 To observe their suitability in particular sites.

6.4.3 Selection of climate change resilience forest tree species.

- 6.5 **Expected output** : 100-120 indigenous forest tree species will be conserved over an area of thirty hectares at four Silviculture Research Stations
- 6.6 **Study period** :
- 6.6.1 Starting year : 2013-2014
- 6.6.2 Completion year : 2017-2018
- 6.7 **Personnel (s)** :
- 6.7.1 Study leader : Mohammed Shaid Ullah, DFO.
- 6.7.2 Associates : Nasrat Begum, SRO.; A. A. Masud Majumdar, RO  
Md. Rabiul Islam, FI.
- 6.8 **Activities for the year** :
- a. Collection of seeds and raising 20,000 seedlings of different indigenous forest tree species at Charkai, Charaljani, Lawachara and Keochia Research Stations.
- b. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
- c. Development of nursery facilities at Keochia research Stations' nursery.
- d. Raising of 25.0 hectares plantations at Charkai, Charaljani, Lawachara and Keochia SR stations
- 6.8.1 Activities calendar :

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

- 6.9 **Previous progress** : Raised 75,000 seedlings of more than 70 indigenous forest tree species to raise 25 ha experimental plantations at Keochia, Lawachara, Charaljani and Charkai SRS Station.
- 6.9.1 Achievement : NA
- 6.10 **Financial statement** :
- 6.10.1 Total cost of the study : Tk. 21,50,000.00
- 6.10.2 Cumulative cost : Tk. 3,89,500.00
- 6.10.3 Cost of the year : Tk. 5,60,000.00
- 6.10.4 Source of fund : GOB
- 6.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.

7. **Study** : Ongoing
- 7.1 Programme Area : Plantation Techniques and Forest Management.
- 7.2 Title of the Study : Suitability of *Khaya anthotheca* (lambu) plantation in Bangladesh.
- 7.3 Justification (For new study): NA
- 7.4 **Objective (s)** :
- 7.4.1 To develop/standardize nursery technique of lambu
- 7.4.2 To develop suitable plantation technique of lambu.
- 7.4.3 To find out survival, growth and site suitability of lambu
- 7.4.4 To observe the disease infestation, environmental effect, etc. if any in the plantation.
- 7.5 **Expected output** : Feasibility of large scale plantation of lambu in Bangladesh.
- 7.6 **Study period** :
- 7.6.1 Starting year : 2013-2014

- 7.6.2 Completion year : 2017-2018  
 7.7 **Personnel (s)** :  
 7.7.1 Study leader : Mohammed Shaid Ullah, DFO.  
 7.7.2 Associates : Nasrat Begum, SRO.; A. A. Masud Majumdar, RO  
 Md. Rabiul Islam, FI

7.8 **Activities for the year :**

- a. Collection of baseline information.
- b. Collection/purchase of seeds and raising 6000 seedlings
- c. Development nursery facilities of Charaljani Research Station.
- d. Maintenance of 2.0 ha experimental plantations.
- e. Raising trial plantation over an area of 2 ha (0.5 ha in each station) at four Silviculture Research Stations.

7.8.1 **Activities calendar :**

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

7.9 **Previous progress:** : Raised 2.0 ha experimental plantation at Keochia, Lawachara, Charaljani and Charkai SRS Station

- 7.9.1 Achievement(s) : NA  
 7.10 **Financial statement** :  
 7.10.1 Total cost of the study : Tk. 6,50,000.00  
 7.10.2 Cumulative cost : Tk. 95,000.00  
 7.10.3 Cost of the year : Tk. 89,000.00  
 7.10.4 Source of fund : GOB  
 7.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.

## SILVICULTURE GENETICS DIVISION

1. **Study** : Ongoing
- 1.1 Programme Area : Bamboo and Non-Timber Economic Crops
- 1.2 **Title of the Study** : Mass propagation of bamboos (*Dendrocalamus giganteus*, *D. longispathus*, *B. balcooa*, *B. vulgaris*, *B. bambos*, *B. cacharensis*, *B. multiplex*, and *D. brandisii*) through branch cuttings and seedlings proliferation
- 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.
- 1.5 **Expected output** : Increased bamboo cultivation and production.
- 1.6 **Study period** :  
 1.6.1 Starting year : 2014-2015(3<sup>rd</sup> Phase)  
 1.6.2 Completion year : 2018-2019
- 1.7 **Personnel (s)**  
 1.7.1 Study Leader : Dr. Sharmila Das, DO.

1.7.2 Associates Nusrat Sultana, SRO; Saiful Alam Md. Tareq, FI

1.8 **Activities for the year :**

- a) Collection of planting materials of selected species from Sylhet, Mymensing, Chittagong Hill Tracts and different areas of Chittagong.
- b) Production of seven thousand bamboo propagules (Six thousand through branch cuttings and one thousand through seed and seedling proliferation).
- c) Data collection on survival rate of cuttings.
- d) Preparation of report.

1.8.1 Activities calendar :

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

1.9 **Previous progress:** About one lakh and sixty two thousand rooted cuttings and seedlings of seven bamboo species were raised and distributed to the planters.

1.9.1 **Achievements :** People's awareness increased for bamboo production through planting branch cuttings.

1.10 **Financial statement :**

1.10.1 Total cost of the study : Tk. 12,50,000.00

1.10.2 Cumulative cost : Tk 11,07,590.00

1.10.3 Cost of the year : Tk. 1,06,620.00

1.10.4 Source of fund : GOB.

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

2. **Study :** Ongoing

2.1 Programme Area : Bio-diversity and Conservation

2.2 Title of the Study : Conservation of threatened plant species through domestication

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<sup>nd</sup> Phase)

2.6.2 Completion year : 2018-2019

2.7 **Personnel (s) :**

2.7.1 Study Leader : Dr. Sharmila Das, DO.

2.7.2 Associates : Nusrat Sultana, SRO; Saiful Alam Md. Tareq, FI

2.8 **Activities for the year :**

- a) Exploration to Sylhet, Dhaka, Chittagong Hill Tracts and different areas of Chittagong.
- b) Collection of seeds and seedlings of five threatened species viz. udal (*Sterculia villosa*), pitali (*Trewia nudiflora*), batna (*Castanopsis indica*), gutguttya (*Protium serratum*) and raktan (*Lophopetalum fimbriatum*).

- c) Raising of five thousands seedlings of selected species and maintenance of seedlings in the nursery.
- d) Maintaining two acre plantation of 22 threatened species in IFESCU campus.

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:** About sixty thousand seedlings of 25 threatened species were raised in nursery. Raised two acres conservation plots of 22 species at IFESCU campus

2.9.1 **Achievements** : Raised two acres conservation plots of 22 species at IFESCU campus as gene resource conservation plot.

2.10 **Financial statement :**

2.10.1 Total cost of the study Tk. 6,50,000.00

2.10.2 Cumulative cost Tk. 5,59,150.00

2.10.3 Cost of the year Tk. 54,400.00

2.10.4 Source of fund GOB.

2.11 **Beneficiaries** BFRI, FD, NGOs, Farmers, Universities.

3. **Study** : Ongoing

3.1 Programme Area : Breeding and Tree Improvement

3.2 **Title of the Study** : Development of tissue culture techniques for different bamboo species viz., farua (*Bambusa polymorpha*), budum (*Dendrocalamus giganteus*), china bamboo (*D. latiflorus*), wappi (*Thyrsostachys sp.*) and pencha (*D. hamiltonii*)

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 (2<sup>nd</sup> Phase)

3.6.2 Completion year : 2018-2019

3.7 **Personnel (s)** :

3.7.1 Study Leader : Dr. Md. Mahbubur Rahman, SRO

3.7.2 Associates : 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 rooted plantlets.

c) Root induction and maintenance of the plantlets.

d) Transfer of the plantlets into soil for hardening.

e) One thousand tissue culture bamboo seedlings will be produced.

3.8.1 Activities calendar:

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

- 3.9 **Previous progress:** Culture establishment of farua, membra, budum, ora, brandisii and dolu have been done. Multiple shoots of wappi and rooted plantlets of brandisii have been produced.
- 3.9.1 **Achievements:** Established bamboo demonstration plots through tissue culture plantlets in IFESCU, RU, JU, BSRI campuses and farmer's field in Phaithong of Bandarban hill district.
- 3.10 **Financial statement :**
- 3.10.1 Total cost of the study : Tk. 21,50,000.00
- 3.10.2 Cumulative cost : Tk. 19,44,025.00
- 3.10.3 Cost of the year : Tk. 86,780.00
- 3.10.4 Source of fund : GOB.
- 3.11 **Beneficiaries** : BFRI, FD, NGOs, Farmers, Universities.
4. **Study** : Ongoing
- 4.1 Programme Area : Breeding and Tree Improvement
- 4.2 **Title of the Study:** Development of tissue culture techniques for 1) Timber trees: boilam (*Anisoptera scaphula*), tamal (*Diospyros montana*). 2) Medicinal plant: amloki (*Phyllanthus emblica*) and 3) Fruit tree: lotkon (*Baccaurea sapida*)
- 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 (2<sup>nd</sup> Phase)
- 4.6.2 Completion year : 2018-2019
- 4.7 **Personnel (s)**
- 4.7.1 Study Leader : Nusrat Sultana, SRO
- 4.7.2 Associates : Dr. Md. Mahbubur Rahman, SRO, Saiful Alam Md. Tareq, FI.
- 4.8 **Activities for the year :**
- a) Collection of explants from Sreemangal (Moulavibazar), Sylhet, Ukhia and different areas of Chiittagong.
- b) Establishment of culture, production of multiple shoots and rooted plantlets.
- c) Root induction and maintenance of the plantlets.
- d) Transfer of the plantlets into soil for hardening.
- e) One thousand tissue culture seedlings will be produced.
- 4.8.1 **Activities calendar** :

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

4.9 **Previous progress:** Tissue culture plantlets of haldu have been established. Multiple shoots of amloki, tamal and culture establishment of boilam and lotkon have been done.

4.9.1 **Achievements** : Tissue culture plantlets of haldu have been produced

4.10 **Financial statement** :

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

4.10.2 Cumulative cost : Tk. 4,81,675.00

4.10.3 Cost of the year : Tk. 1,02,200.00

4.10.4 Source of fund : GOB.

4.11 **Beneficiaries** : BFRI, FD, NGOs, Farmers, Universities.

## SEED ORCHARD DIVISION

1. **Study** : On-going

1.1 Programme area : Breeding and Tree improvement

1.2 Title of the study : Selection of plus trees of important agroforestry and forest tree species

1.3 Justification(For new study) : NA

1.4 **Objectives** :

1.4.1 To establish sources of superior quality seeds from selected clones or progenies.

1.4.2 To obtain best possible gains from the breeding programmes by testing progenies/clones of the selected plus trees (PTs).

1.4.3 To popularize superior quality seeds produced in seed orchards and providing among the planters.

1.5 **Expected output** : An interim source of superior quality seeds and breeding materials will be available for the planters.

1.6 **Study Period** :

1.6.1 Starting year : 2013-2014(4<sup>th</sup> Phase)

1.6.2 Completion Year : 2015-16

1.7 **Personnels** :

1.7.1 Study leader : Nani Gopal Bhowmick, SRO

1.7.2 Associates: Hasina Mariam, DO; Sukla Rani Bashak, SRO; Md. Arifur Rahaman, RO; Md. Mezan-Ul-Hoque, RO; A.K.M Azad, RO; Md. Kamal Uddin, RO; Md. Moklesur Rahaman, FI

1.8 **Activities for the year:**

a. Conducting survey in previously demarcated plus trees (PT) for present status of different locations at Barshijura, Dulahazara, Ukhia, Hyanko, Ichamati, Kaptai, Salna Seed Orchard Centers and Head Quarter.

b. Remarkings previously selected 230 plus trees (PT) at Barshijura (45), Dulahazara (20), Ukhia (30), Hyanko (30), Ichamati (30), Kaptai (40), Salna (30) Seed Orchard Centers and Head Quarter (5). **Annexure-1.**



- c. Collection of 100 kg seeds from plus trees for plantation at 7 Seed Orchard Centers (SOCs) and distribution to Forest Department (FD) District Nursery Malik Samitee (DNMS) and other tree planters. **Annexure-2.**
- d. Remarkd plus trees will be documented .

1.8.1 Activities Calendar :

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

1.9 **Previous progress :** A total of 2129 plus trees of 59 different forest tree species namely- acacia hybrid (*Acacia auriculiformis X A. mangium*), akashmoni (*Acacia auriculiformis*), agar (*Aquilaria agallocha*), amloki (*Phyllanthus emblica*), arjun (*Terminalia arjuna*), baittya-garjan (*Dipterocarpus costatus*), banspata (*Podocarpus nerifolius*), bazna (*Zanthoxylum rhetsa*), bel (*Aegle marmelos*), bohera (*Terminalia bellirica*), boilam (*Anisoptera scaphula*), civit (*Swintonia floribunda*), champa (*Michelia champaca*), chapalish (*Artocarpus chama*), chatian (*Alstonia scholaris*), chickrassi ( *Chukrasia velutina*), dholi-garjan (*Dipterocarpus alatus*), dharmara (*Stereospermum personatum*), dhaki-jam (*Syzygium grandis*), eucalyptus (*Eucalyptus camaldulensis*), gamar (*Gmelina arborea*), ghora-nim/bokain ( *Melia sempervirens*), goda/awal (*Vitex peduncularis*), gutguttya (*Protium serratum*), jhau (*Casuarina sp.*), horitaki (*Terminalia chebula*), kadam (*Anthocephalus chinensis*), kainjal (*Bischofia javanica*), kalo-jam (*Syzygium cumini*), kala-koroi (*Albizia lebbek*), kanak (*Schima wallichii*), kanthal (*Artocarpus heterophyllus*), jalpai (*Elaeocarpus floribundus*), jarul (*Lagerstroemia speciosa*), lohakat (*Xylia kerrii*), mahogany (*Swietenia mahagoni*), moluccana (*Paraserianthes falcataria*), mangium (*Acacia mangium*), minjiri (*Cassia siamea*), nageswar (*Mesua nagassarium*), neem (*Azadirachta indica*), pitali (*Trewia nudiflora*), pitraj (*Aphanamixis polystachya*), raintree (*Samanea saman*), raj-koroi /chambol (*Albizia richardiana*), raktan (*Lophopetalum fimbriatum*), rubber (*Hevea brasiliensis*), sal (*Shorea robusta*), shegun (*Tectona grandis*), shil-batna (*Castanopsis indica*), simul (*Bombax ceiba*), sidha-jarul (*Lagerstroemia parviflora*), sil-Koroi (*Albizia procera*), sissoo (*Dalbergia sissoo*), sonalu (*Cassia fistula*), teli-garjan (*Dipterocarpus turbinatus*), telsur ( *Hopea odorata*), toon (*Toona ciliata*) and uriam (*Mangifera sylvatica*) were selected and seeds are being collected.

9536 kg seeds of 33 different forest tree species acacia hybrid (*Acacia auriculiformis X A. mangium*), agar (*Aquilaria agallocha*), akasmoni (*Acacia auriculiformis*), arjun (*Terminalia arjuna*), baittya-garjan (*Dipterocarpus costatus*), bohera (*Terminalia bellirica*), boilam (*Anisoptera scaphula*), champa (*Michelia champaca*), chickrassi (*Chukrasia velutina*), civit (*Swintonia floribunda*), dhaki-jam (*Syzygium grandis*), dharmara (*Stereospermum personatum*), dholi-garjan (*Dipterocarpus alatus*), gamar (*Gmelina arborea*), goda (*Vitex peduncularis*), gutguttya (*Protium serratum*), haritaki (*Terminalia chebula*), jat batna (*Castanopsis lancifolia*), jhau (*Casuarina equisetifolia*), kadam (*Anthocephalus chinensis*), kanak (*Schima wallichii*), lohakat (*Xylia kerrii*), mahogany (*Swietenia mahagoni*), mangium (*Acacia mangium*), raintree (*Samanea saman*), neem (*Azadirachta indica*), raktan (*Lophopetalum fimbriatum*), shegun (*Tectona grandis*), sil-koroi (*Albizia procera*), sidha-jarul (*Lagerstroemia parviflora*), teli-garjan (*Dipterocarpus turbinatus*), toon (*Toona ciliata*) and uriam (*Mangifera sylvatica*) distributed /sold to different tree planting agencies.

1.9.1 **Achievements :** A total of 2129 plus trees of 59 different forest tree species of more than forty species were selected and 9536 kg seeds were collected and

distributed. Better quality seed sources were created having broader genetic base.

- 1.10 **Financial statement** :
- 1.10.1 Total cost of the study : Tk. 9,40,000.00
- 1.10.2 Cumulative Cost : Tk. 8,82,037.00
- 1.10.3 Cost of the year : Tk. 32,000.00
- 1.10.4 Source of 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 : Establishment and management of seed orchards
- 2.3 Justification(For new study) : NA
- 2.4 **Objective(s)** :
- 2.4.1 To establish and manage superior quality seed sources from selected clones or progenies.
- 2.4.2 To preserve better genetic stocks under ex situ condition from the natural stands and plantations for future breeding and tree improvement programme.
- 2.4.3 To develop suitable techniques for mass production of clonal planting materials.
- 2.4.4 To screen best clones/progenies
- 2.4.5 To supply quality seeds to FD, NGOs, DNMSs and planters.
- 2.5 **Expected output** : Permanent source of quality seeds and improved planting materials will be available for the planters.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2014-2015 (4<sup>th</sup> Phase)
- 2.6.2 Completion Year : 2018-2019
- 2.7 **Personnel** :
- 2.7.1 Study leader : Hasina Mariam, DO
- 2.7.2 **Associates** : Sukla Rani Bashak, SRO; Nani Gopal Bhowmick, SRO; Md. Arifur Rahaman, RO; Md. Mezan-Ul-Hoque, RO; A.K.M Azad, RO; Md. Kamal Uddin, RO; Md. Moklesur Rahaman, FI
- 2.8 **Activities for the year:**
- a. Collection of 50 kg. teak seeds and 20 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 for seedling raising and supply.
- b. Raising and maintenance of 17,500 seedlings (polybag size-5" X 7") for establishment of 5.0 ha seedling seed orchard on this year and next year (viz.-teli-garjan, boitya-garjan, dholi-garjan, dhaki-jam and telsur) at Kaptai, Hyanko, Ichamati, Dulahazara and Salna SOCs. and raising 5,000 root stock (polybag size-12"X9") of dhakijam (1500), garjan (15000) and teak (2000) for establish 5.0 ha clonal seed orchard at Kaptai, Hyanko, Ichamati, Dulahazara and Salna SOCs.
- c. Preparation of 1500 teak ramets and 1500 gamar ramets for clonal seed orchard establishment at Kaptai, Hyanko, Ichamati and Dulahazara SOCs.
- d. Establishment of 2.5 ha seedling seed orchard of civit (0.5 ha), dholi-garjan (0.5 ha), teli-garjan (0.5ha), baoitya-garjan (0.5ha) and mixed species (0.5ha : viz.-kadam, sidha-jarul, dhaki-jam etc.) at Kaptai, Hyanko, Ichamati, Dulahazara, Barshijora and Salna SOCs.
- e. Establishment of 2.5ha (teak-1.5ha and gamar-1.0ha) clonal seed orchard at Kaptai, Hyanko, Ichamati, Salna and Dulahazara SOCs.

f. Maintenance (orchard) : - existing CSO 20.5 ha (2014yr: 14.25x3times, 2013yr:9.5 haX2times ) at Ichamati, Salna, Hyanko, Kaptai and Dulahazara SOCs.

**nursery** : - maintenance of nursery and previous year's seedling at HQ nursery and seven seed orchard centres.

g. Maintenance by gap filling in previously raised one year old 18.75 ha (SSO 4.25, CSO 14.50) orchard at Dulahazara, Ichamati, Kaptai, Hyanko and Salna SOCs.

h. Data collection at Barshijora, Salna, Hyanko, Ichamati, Kaptai and Dulahazara SOCs.

i. Expenditure for collecting left over illicitly cutted wood logs from orchards.

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.													
i.													
j.													

2.9 **Previous progress** : From different seed orchards 4700 kg. seeds of teak, gamar, pine, telsur and eucalyptus were collected and distributed. 1,03,000 rootstocks were raised to establish clonal seed orchard of teak, mahogany, gamar, garjan, eucalyptus, akasmoni, dhakijam etc. 71.0 ha. seedling seed orchard of garjan, doligarjan (*Dipterocarpus pilosus*), dhakijam, chapalish, eucalyptus sp, akashmoni and gamar and 45.5 ha clonal seed orchard of teak, gamar, and mahogany were raised. Cultural operations viz. fertilizer application, weeding, mulching etc. was carried out in 105 ha orchards and experimental plantations. Nurseries at head quarters and 7 seed orchard centres were maintained.

2.9.1 **Achievements** : At Hyankoo, Dulahazara, Ichamati, Salna and Kaptai SOCs 32.0 ha. clonal seed orchard of teak, gamar and mahogany and 25.0 ha. seedling seed orchard of garjan, dholigarjan dhakijam, chapalish, eucalyptus (*Eucalyptus camaldulensis*, *E. tereticornis*, *E. europphylla*), akashmoni and gamar were established and seeds are being collected from teak and gamar seed orchard at Kaptai

2.10 **Financial statement** :

Total cost of the study : Tk. 2,10,00,000.00

Cumulative cost : Tk. 1,01,30,685.00

Cost of the Year : Tk. 6,69,500.00

Source of the fund : GOB

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

3. **Study** : Ongoing

3.1 Programme area : Breeding and Tree improvement

3.2 Title of the study : Superior stands/ woodlots selection and conversion into Seed Production Area (SPA).

3.3 Justification (For new study) : NA

3.4 **Objectives(s)** :

3.4.1 To develop an interim source of seeds

3.4.2 To ensure supply of better quality seeds

3.5 **Expected output** : An interim source of superior quality seeds will be developed

- 3.6 **Study Period** :
- 3.6.1 Starting year : 2013-2014 (4<sup>th</sup> Phase)
- 3.6.2 Completion year : 2015-16
- 3.7 **Personnels** :
- 3.7.1 Study leader : Sukla Rani Bashak, SRO
- 3.7.2 **Associates:** Hasina Mariam, DO; Nani Gopal Bhowmick, SRO; Md. Arifur Rahaman, RO; Md. Mezan-Ul-Hoque, RO; A.K.M Azad, RO; Md. Kamal Uddin, RO; Md. Moklesur Rahaman, FI
- 3.8 **Activities for the year:**
- a. Survey on present status of Seed Production Area (SPA) at Ichamati and Kaptai Seed Orchard Centers.
- b. Survey record will be documented.
- 3.8.1 Activities calendar :

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

- 3.9 **Previous progress** : Two hectare SPA of akashmoni were established and seed collection and production are going on. About 262 kg seeds of akashmoni were collected from established SPA and distributed to DNMSs, FD, and private planters. Inferior stock was removed from one hectare earlier raised plantation of akashmoni at Kaptai and one hectare at Ichamati seed orchard centre. Seven thousand seedling of Akasmoni were raised and 0.75ha SSO we established.
- 3.9.1 **Achievements** : Two hectare SPA of akashmoni were established and seed collection and production are going on.
- 3.10 **Financial statement** :
- 3.10.1 Total cost of the study : Tk. 3,90,000.00
- 3.10.2 Cumulative cost : Tk. 3,88, 290.00
- 3.10.3 Cost of the Year : Tk. 1000.00
- 3.10.4 Source of the fund : GOB
- 3.11 **Beneficiaries** : Forest Department (FD), NGOs and other Tree Planting Agencies and private land owners.

4. **Study** : On-going
- 4.1 Programme area : Production of quality planting materials
- 4.2 Title of the study : Popularizing quality seeds and planting materials
- 4.3 Justification (For new study) : NA
- 4.4 **Objective(s)** :
- 4.4.1 To develop awareness about the importance and benefits of using quality seeds and seedlings.
- 4.4.2 To create quality seeds and seedlings.
- 4.5 **Expected output:** Farmers and planters will aware about quality forest tree seeds and planting materials. Productivity/yield of the plantation will increase.
- 4.6 **Study Period** :
- 4.6.1 Staring Year : 2013-2014 (4<sup>th</sup> Phase)
- 4.6.2 Completion year : 2015-16
- 4.7 **Personnels** :
- 4.7.1 Study leader : Md. Arifur Rahaman, RO
- 4.7.2 **Associates:** Hasina Mariam, DO; Sukla Rani Bashak, SRO; Nani Gopal Bhowmick, SRO; Md. Mezan-Ul-Hoque, RO; A.K.M Azad, RO; Md. Kamal Uddin, RO; Md. Moklesur Rahaman, FI
- 4.8 **Activities for the year:**

- a. Raising of 10,000 seedlings of mahogany, hybrid acacia, akashmoni, kadam, telsur, champa, chickrassi, haritaki, amloki, bohera, neem, raintree etc. considering the demands of earlier years at HQ nursery.
- b. Production of 3000 rooted cutting of hybrid acacia at HQ nursery.
- c. Distribution of seedlings among the farmers, planters and other users.
- d. Study on sowing position and data collection on survival % and growth performance of raised seedlings at nursery stage

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** : During previous years 2,09,000 quality seedlings of 26 species were distributed and nursery facilities improved

4.9.1 **Achievements:** Awareness has developed about use of quality seed and seedlings. Production of forest plantation and homestead plantation has increased where quality seeds and seedlings used by farmers.

4.10 **Financial statement** :

4.10.1 Total cost of the study : Tk. 17,80,000.00

4.10.2 Cumulative cost : Tk. 16,65,745.00

4.10.3 Cost of the year : Tk. 39,000.00

4.10.4 Source of fund : GOB

4.11 **Beneficiaries** : Forest Department (FD), NGOs and other Tree Planting Agencies and private land owners.

5. **Study** : Ongoing

5.1 Title of the study : Testing of seeds before distribution and standardization of seed storage behaviour

5.2 Programme area : Production of quality planting materials

5.3 Justification(For new study) : NA

5.4 **Objectives** :

5.4.1 To develop a unified system of seed collection, storage, export, import, testing and distribution of forest tree seeds.

5.4.2 To ensure the supply of quality seeds to the planters

5.4.3 To strengthen the BFRI seed testing laboratory.

5.5 **Expected output** : Seed with better physiological and physical quality will ensure better productivity of the plantation

5.6 **Study period** :

5.6.1 Starting year : 2012-2013(5<sup>th</sup> Phase)

5.6.2 Completion year : 2016-17

5.7 **Personnel** :

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

5.7.2 **Associates:** Hasina Mariam, DO; Sukla Rani Bashak, SRO; Nani Gopal Bhowmick, SRO; Md. Arifur Rahaman, RO; A.K.M Azad, RO; Md. Kamal Uddin, RO; Md. Moklesur Rahaman, FI

5.8 **Activities for the year:**

a. Study on storage behavior of chapalish and telsur seeds.

b. Germination, purity and viability tests of the collected seeds from seed orchard

centre's before distribution

5.8.1 Activities calendar :

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

5.9 **Previous progress** : Storage behavior of **civit, agar amd** routine testing of the collected seeds were done prior to distribution of seeds.

5.9.1 **Achievements:** Unified systems of seed distribution for akasmoni were developed. Seed storage and testing facilities were developed.

5.10 **Financial statement** :

5.10.1 Total cost of the study : Tk. 3,50,000.00

5.10.2 Cumulative cost : Tk. 2,20,632.00

5.10.3 Cost of the year : Tk. 45,000.00

5.10.4 Source of the fund : GOB

5.11 **Beneficiaries** : Forest Department (FD), NGOs and other Tree Planting Agencies and private land owners.

6. **Study** : Ongoing

6.1 Programme area : Breeding and Tree improvement

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

6.3 Justification(For new study) :NA

6.4 **Objectives** :

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

6.4.2 Centralization of high yielding clones in hedge orchard

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

6.6 **Study Period** :

6.6.1 Starting year : 2014-2015(3<sup>rd</sup> Phase)

6.6.2 Completion Year : 2018-2019

6.7 **Personnel** :

6.7.1 Project leader : Md. Kamal Uddin, RO

6.7.2 **Associates:** Hasina Mariam, DO; Sukla Rani Bashak, SRO; Nani Gopal Bhowmick, SRO; Md. Arifur Rahaman, RO; Md. Mezan-UI-Hoque, RO; A.K.M Azad, RO; Md. Moklesur Rahaman, FI

6.8 **Activities for the year:**

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

b. Seed collection and raising of 4000 (Hayanko-2000 & Ukhia-2000)seedlings (polybag size-12" X 9").

c. Establishment of 1.0ha rubber orchard (CSO-0.5ha & SSO-0.5ha) at Hyanko SOC.

d. Maintenances of previously raised 3.75 ha trial plantation (3 times) at Hyanko SOC.

e. Preparation of 1000 rubber ramets at Hyanko SOC.

f. Fertilizing in the rubber clonal trial (3 times) at Hyanko SOC.

g. Appointing watcher for duties of raising new plantation.

h. Fencing of new plantation area.

i. Development of nursery facilities at seven seed orchard centres.

j. Data will be collected.

6.8.1 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.													
j.													

6.9 **Previous progress:** One hundred twenty trees were selected at Datmara Rubber estate, 20000 root stocks were raised to produce ramets by using selected clones. From 32 trees selected on the basis of latex yield were used in raising 2.5 ha clonal trial at Datmara rubber estate.

6.9.1 **Achievements** : A clonal trial of 32 clones was established by Hyanko SOC at Datmara rubber estate, Fatickchari, Chittagong.

**6.10 Financial statement :**

6.10.1 Total cost : Tk. 28,50,000.00

6.10.2 Cumulative cost : Tk. 7,76,740.00

6.10.3 Cost of the Year : Tk. 4,13,500.00

6.10.4 Source of the fund : GOB

**6.11 Beneficiaries** : BFIDC, Other Government and Private Entrepreneurs.

### FOREST BOTANY DIVISION

1. **Study** : Ongoing

1.1 Programme Area : Biodiversity and Conservation.

1.2 Title of the Study : Floristic composition and restoration of village common forest of Kapru Para, Bandarban Hill District.

1.3 Justification (For new study) : NA

1.4 **Objective(s)** :

1.4.1 To assess the qualitative and quantitative floristic composition of common village forest of Kapru Para.

1.4.2 To motivate the local people for restoration of the village common forest.

1.5 **Expected output:**

a. Plant diversity and status of the reserve will be documented and this will be helpful in future conservation and management plan.

b. Awareness of local people about values of local biodiversity and their conservation will be developed for better ecosystem services.

c. Motivation for community people for restoration for their perennial water source and better livelihoods.

1.6 **Study period** :

1.6.1 Starting year : 20013- 14

1.6.2 Completion year : 2015-16

1.7 **Personnel(s)** :

1.7.1 Study leader : Mohammed Mohiuddin, D.O

1.7.2 **Associates:** Syedul Alam RA-1; A.H. M. Jahangir Alam, R.O.

1.8 **Activities for the year:**

a. Group discussion with local people and karbaries.

b. Preparation of sample plots and data collection on the existing vegetation.

c. Collection of botanical samples and processing of the samples.

d. Identification of plant species and data analysis.

e. Motivation meeting with the local people for conservation of wild indigenous tree seedlings and enrichment planting with supplied indigenous species.

f. Motivate the local peoples towards enrichment plantation for restoration.

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												

1.9 **Previous progress:** Report building with the local people has been developed. Total 57 sample plots were lay out in different slopes (Upper hill portion, medium hill portion, lower hill portion and along the jhiri) of the reserve. One hundred twenty one botanical samples were collected from the sample plots and processed for preservation in the herbarium.

1.9.1 **Achievement(s)** : -

1.10 **Financial statement** :

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

1.10.2 Cumulative cost : Tk 1,50,000.00

1.10.3 Cost of the year : Tk.1,84,850.00

1.10.4 Source of fund : GOB

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

2. **Study** : Ongoing

2.1 Programme Area : Biodiversity and Conservation

2.2 Title of the Study :Studies on ethno-botanical plants used by the Chakma communities of Rangamati and Khagrachari Hill District

2.3 Justification (For new study) : NA

2.4 **Objective(s)** :

2.4.1 To collect the ethno-botanical plants and their information used by the Chakma tribe of Rangamati Hill District.

2.4.2 To find out conservation strategy and to develop data base for ethno medicinal plants.

2.5 **Expected output:**

a. Ethno-medicinal plants used by the Chakma tribe will be documented.

b. BFRI herbarium will be enriched with ethno-botanical samples.

2.6 **Study period** :

2.6.1 Starting year : 2013- 14

2.6.2 Completion year : 2015-16

2.7 **Personnel(s)** :

2.7.1 Study leader : Mohammed Mohiuddin, D.O

2.7.2 Associates : Asim Kumar Paul, R.O; Syedul Alam RA-1

2.8 Activities for the year:

a. Group discussion with herbal healers.

b. Collection of information on parts uses disease name, medicine preparation and habitat of plant growing.

c. Collection of ethno-botanical samples, processing and identification of the collected samples.

d. Collection of information on conservation strategy

e. Data processing 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													
f													

2.9 **Previous progress:** Four discussions meeting were conducted with the herbal healer and local people to know about present situation of medicinal plants of the area. Samples of 115 ethno-medicinal plants were collected from the surrounding forests areas. Uses of the species, parts used, and mode of preparation were documented with the help of herbal healers. Collected plants samples were processed and preserved in the herbarium.

2.9.1 **Achievement(s)** : Awareness has created among the religious leaders and local people for biodiversity conservation in the Bihar.

2.10 **Financial statement** :

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

2.10.2 Cumulative cost : Tk. 100,000.00

2.10.3 Cost of the year : Tk 1,42,650.00

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 : Post Harvest Utilization- Physical Processing.

3.2 Title of the Study : Anatomical properties of lambu (*Khaya anthotheca*) tree grown in Bangladesh

3.3 Justification (For new study) : NA

3.4 **Objective(s)** :

3.4.1 To determine the detail gross and minute anatomical features of the species grown in Bangladesh.

3.4.2 To develop a database on anatomical properties of this species for determining better utilization.

3.5 **Expected output:**

- Data base on anatomical properties of lambu (*Khaya anthotheca*) woods will be developed.
- BFRI xylarium will be enriched with wood collections and permanent slides.

3.6 **Study period** :

3.6.1 Starting year : 2012- 13

3.6.2 Completion year : 2014-15

3.7 **Personnel(s)** :

3.7.1 Study leader : Asim Kumar Paul, R.O.

3.7.2 Associates : A.H.M.Jahangir Alam, R.O.

3.8 **Activities for the year:**

- Microtome sections cutting and preparation of permanent slides.
- Study of gross anatomical properties and minute anatomical properties from permanent slides.
- Writing of scientific reports.

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:** Wood sample were collected from Jessore. Gross anatomical

features namely colour, texture, grain, parenchyma and ray type have been studied and recorded.

- 3.9.1 **Achievement(s)** : -
- 3.10 **Financial statement:** :
- 3.10.1 Total cost of the study : Tk. 1,30,000.00
- 3.10.2 Cumulative cost : Tk. 45,600.00
- 3.10.3 Cost of the year : Tk. 22,500.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : FD, BFIDC, Academic Institutes, NGOs and Wood Traders, Farmers.

## FOREST INVENTORY DIVISION

- 1. **Study** : Ongoing
- 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).
- 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 the species grown in the plantation forests will be available.
  - b. Growth and yield of the 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 : 2010-11
- 1.6.2 Completion year : 2010 – 2015
- 1.7 **Personnel (s)** :
- 1.7.1 Study Leader : S. M. Zahirul Islam, RO
- 1.7.2 Associates : Md. Abul Hasnat Shah Jalal, DO; Mofizul Islam Khan, FI
- 1.8 **Activities for the year:**
  - a) Re-measurement 27 established PSPs for Akashmoni in existing plantation at Chitagong and Cox,s Bazar Forest Division.
  - b) Re-measurement 44 established PSPs of mahogany in existing plantation at Faridpur and Rajbari Forest Division.
  - c) Summarization of collected 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** : Fifty four PSPs for mahogany at Faridpur and Rajbari , 27 PSPs for akashmoni/hybrid acacia were established in Cox’s Bazar and Chittagong forest areas. Collected data were summarized and used to estimate the site indices curves, growth and

yield for the species.

A bulletin on Mathematical Models and Tables on Growth, Yield, Volume and Biomass for Important Trees in Bangladesh have been prepared and accepted for publication.

- 1.9.1 **Achievement(s)** : -  
 a) Prepared growth and yield tables for akashmoni and mahogany in the plantations and village groves based on temporary sample plots.  
 b) Prepared growth and yield tables for mahogany planted on the crops land.
- 1.10 **Financial statement** :  
 1.10.1 Total cost of the study : Tk 5,00,000.00  
 1.10.2 Cumulative cost : Tk. 1,84,980.00  
 1.10.3 Cost of the year : Tk: 47,500.00  
 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries:** Forest Department, development policy maker, researchers, forestry teachers, students, trainees and trainers, BFIDC, timber traders, universities and NGOs
2. **Study** : Ongoing
- 2.1 Programme Area : Forest Inventory, Growth and Yield.
- 2.2 Title of the study : Growth and yield assessment of keora (*Sonneratia apetala*) and baen (*Avicennia officinalis.*) in the coastal plantations of Bangladesh.
- 2.3 Justification (For new study):
- 2.4 **Objectives (s)** :  
 2.4.1 To generate information on growth and yield of the keora and baen in the coastal plantations of Bangladesh  
 2.4.2 Setting physical rotation of the species.
- 2.5 **Expected output** :  
 a. Site indices curves will be prepared for keora and baen grown in the coastal plantations of Bangladesh.  
 b. Growth and yield of the keora and baen at different sites.
- 2.6 **Study period** :  
 2.6.1 Starting year : 2012-2013(5<sup>th</sup> Phase)  
 2.6.2 Completion year : 2014 - 2015
- 2.7 **Personnel (s)**  
 2.7.1 Study Leader : Md. Abul Hasnat Shah Jalal, DO  
 2.7.2 Associates : S. M. Zahirul Islam, RO  
 2.7.3 : Mofizul Islam Khan, FI
- 2.8 **Activities for the year:**  
 a) Yearly re-measurement of the trees in the established 30 PSPs at Chittagong and Cox's Bazar coastal areas.  
 b) Summarization of collected data.
- 2.8.1 Activities calendar :

Activities (as per 2.9)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												

- 2.9 **Previous Progress** : A total of 30 permanent sample plots of keora and baen were laid out at Salimpur, Sitakundu, Chittagong and Moheshkhali, Cox's Bazar. Collected data were summarized. Site index curves, growth and yield models of

- keora were determined using collected data.
- 2.9.1 Achievement(s) : -  
 a) Prepared site indices curves and growth and yield tables for keora.  
 b) Physical rotation of keora was determined.
- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 1,05,000.00
- 2.10.2 Cumulative cost: Tk. 46,190.00
- 2.10.3 Cost of the year : Tk: 27,500.00
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries:** Forest Department, working plans planner, development policy maker, researchers, forestry professionals, students, trainees and trainers, BFIDC, timber traders, universities and NGOs.

## FOREST ECONOMICS DIVISION

- 1 **Study** : Ongoing
- 1.1 Programme Area : Forest Inventory and Economics
- 1.2 Title of the Study : Determination of financial rotation of babla (*Acacia nilotica*) plantations in Bangladesh
- 1.3 Justification (For new study) : NA
- 1.4 **Objective(s)** :
- 1.4.1 : To determine the financial rotation of babla (*Acacia nilotica*) based on it's the existing utilization.
- 1.5 **Expected output:** Optimum rotation of babla (*Acacia nilotica*) will be determined.
- 1.6 **Study period**
- 1.6.1 Starting year : 2011-12
- 1.6.2 Completion year : 2014-15
- 1.7 **Personnel (s)** :
- 1.7.1 Study leader : M.A Taher Hossain; RO.
- 1.7.2 Associates : Hasina Mariam; DO, Md. Melon; FI; Forzana Yasmin; RA-1
- 1.8 Activities for the year :
- a) Contact the DFO office of Faridpur to collect related information on raised babla plantations from respective social forest division.
- b) Collection of field data on height, diameter of trees, establishment cost of plantations and market price of round tree log and fuel wood from the nearest bazaar of babla plantations under social forest division of Faridpur.
- c) Compilation and analysis of collected 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:** Required data on babla species were collected from the mixed and mono plantation of Bagerhat Social Forest Division (SFD) and Noakhali Coastal Afforestation (C/A) Division in 2011-12, Barisal and Bhola SFD in 2012-13 and Patuakhali and Chittagong C/A Division in 2013-14. The analysis of collected data is ongoing. Finally, optimum financial rotation will be fixed up after the financial analysis of collected data from selected Forest Divisions of the study areas.
- 1.9.1 **Achievements** : -

- 1.10 **Financial statement** :
- 1.10.1 Total cost of the study : Tk. 3,10,000.00
- 1.10.2 Cumulative cost : Tk.2,30,464.00
- 1.10.3 Cost of the year : Tk 42,600.00
- 1.10.4 Source of fund : GOB
- 1.11. Beneficiaries : FD, Private Planters. NGOs etc.
2. **Study** : Ongoing.
- 2.1 Programme Area : Forest Inventory and Economics
- 2.2 Title of the study : Impact of the Coastal afforestation of Bangladesh in respect of financial and socioeconomic conditions of local people
- 2.3 Justification (For new study): NA
- 2.4 **Objective(s)** :
- 2.4.1 To find out production system through intercropping of seasonal and/or annual crop in the forest floor of afforestation areas.
- 2.4.2 To assess income generation of local people.
- 2.4.3 To make financial analysis of afforestation in Coastal zone.
- 2.4.4 To estimate the sequestrated carbon in the selected years of plantations of Coastal Afforestation
- 2.5 **Expected output:** Determination of income generation and employment, annual/seasonal production system, input- output ratio of local peoples' income and their economic profitability of afforestation in Coastal zone.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2012-13
- 2.6.2 Completion year : 2015-16
- 2.7 **Personnel (s)** :
- 2.7.1 Study leader : M.A. Taher Hossain; RO
- 2.7.2 Associate : Hasina Mariam; DO, Forjana Yasmin; RA-1; Rukshana Akther & Md. Melon; FI
- 2.8 **Activities for the year** :
- Pertinent Literature will be reviewed.
  - Collection of trail sample data from the selected plantations to determine the required number of plots as sample size through pilot survey under Barisal and Bhola social forest (SF) divisions.
  - Selection of the local participants of strip plantations in three locations (Range) from each of Barisal and Bhola SF division.
  - Arrangement of group discussion with local participants of the social forest divisions.
  - Collection of data on socioeconomic aspect of selected participants through designed schedule.
  - Data collection from the sample plots that would determine the number of plots through pilot survey from the selected plantations raised in earlier period of ten different years under Barisal and Bhola SF division.
  - 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.												
d.												
e.												
f..												

g.																			
----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

- 2.9 **Previous progress:** Survey was conducted on the strip plantations of 1980 seedling km or 792 hectares raised during 1993-94 to 2000-01 in **Noakhali Coastal Afforestation (C-A) Division**. The total tree stocking (no.) and carbon sequestration (tons) determined were about 997 thousand and 170 thousand and this sequestered carbon was equivalent to 623 thousand tons of Green House Gas (CO<sub>2</sub>) mitigation of the atmosphere. The average Net Present Value of Benefit (NPVB), Internal Rate of Return (IRR) and B-C ratio of the same targeted year were 513 thousand taka/ha, 30% and 4.21 respectively as indicators of financial aspect and followed by 620 thousand taka/ha, 46% and 4.90 as indicators of economic aspect for the same plantations year. So, the beneficiaries additional standing income from the targeted strip plantations were estimated in current price about 84 million taka in Noakhali C-A division. Required data on the strip plantations raised during 1995-96 to 2000-01 under **Bagerhat Social Forest Division** were collected. Analysis of collected data is on going and its' results will be submitted later on.
- 2.9.1 **Achievements** : -
- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 6,50,000.00
- 2.10.2 Cumulative cost : Tk. 1,63,960.00
- 2.10.3 Cost of the year : Tk. 1,57,400.00
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : FD, Private Planters. NGOs etc.

## SOIL SCIENCE DIVISION

1. **Study** : Ongoing
- 1.1 Programme Area : Plantation technique and forest management
- 1.2 Title of the Study : Effect of integrated soil fertility management in rubber plantation at Dantmara Rubber Estate, Fatikchari, Chittagong
- 1.3 Justification (For new study) : NA
- 1.4 **Objective(s)** :
- 1.4.1 To utilize litter fall of rubber trees as organic compost
- 1.4.2 To assess the effect of compost on growth and latex production in new and mature rubber plantation
- 1.4.3 To evaluate the role of different nitrogen fixing crops in new rubber plantation
- 1.5 **Expected output** : Increasing soil fertility and latex production of rubber trees
- 1.6 **Study period** :
- 1.6.1 Starting year : 2010-11
- 1.6.2 Completion year : 2014-15
- 1.7 **Personnels** :
- 1.7.1 Study leader : Md. Jahangir Alam, DO
- 1.7.2 Associates : Md. Motiar Rahman, Asst. Soil Scientist; M. Zahirul Alam, Asst. Soil Scientist
- 1.8 **Activities for the year** :
- a) Prepared heap will be maintained for composting of litter falls
- b) Compost sample from heap will be collected for storage and application
- c) Data collection on latex yield for 36 (12x3) times from selected mature rubber plantation

- d) Land will be prepared for cover crops in the experimental plot
- e) Field management by two times weeding and pruning of 2.0 acre established plantation and repairing fence
- f) Seed collection of pueraria, thai lazzabati and arhar
- g) Cover crops (*pueraria-Puereria phaseoloides* and thai lazzabati-*Mimosa invisa*) will be broadcast and shrubby crop (arhar-*Cajanus cajan*) seed sown as intercrop in established 1.0 hectare rubber plantation
- h) 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.											■	■
h.										■	■	■

1.9 **Previous progress:** Data on height and girth of immature rubber plantation were collected and analyzed. Yield of latex from 144 mature rubber trees was recorded for 36 times and analyzed. Compost and fertilizer was applied to the experimental plot. Fencing of cover crop experimental plot was repaired with bamboo materials, net, etc.

1.9.1 **Achievements** : Established one hectare rubber plantation at Dantmara Rubber Estate

**Financial statement** :

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

1.10.2 Cumulative cost : Tk. 3,92,120.00

1.10.3 Cost of the year : Tk. 1,79,300.00

1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : BFIDC, private rubber planters, researchers and academicians

2. **Study** : Ongoing

2.1 Programme Area : Soil conservation and watershed management

2.2 Title of the Study : Assessment of carbon storage trends in the soil-plant system in different forest areas

2.3 Justification(For new study) : NA

2.4 **Objectives** :

2.4.1 To determine carbon storage of different forest tree species and adjacent soil

2.4.2 To assess the correlation between soil and plant system on carbon storage trends

2.5 **Expected output** : Data bank on carbon storage trends from different forest tree species and soil will be prepared.

2.6 **Study period** :

2.6.1 Starting year : 2010-11

2.6.2 Completion year : 2014-15

2.7 **Personnels** :

2.7.1 Study leader : Md. Motiar Rahman, Asst. Soil Scientist

2.7.2 **Associates:** : Md. Jahangir Alam, DO; M. Zahirul Alam, Asst. Soil Scientist

2.8 **Activities for the year :**

- a) Root, stem, twig and leaf samples from 2 forest trees species will be collected at different forest areas for determination of carbon content
- b) Soil profile will be excavated and soil samples will be collected from adjacent selected trees
- c) Soil and plant samples will be analyzed
- d) 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.												

2.9 **Previous progress:** Organic carbon content one forest tree species (Agar) and four bamboo species (Barak, Kali, Pencha and Tolla) were collected and analyzed. Soil samples from adjacent selected tree species were analyzed and recorded.

2.9.1 **Achievements** : Twenty two forest tree (12 mangroves and 10 forests) and fourteen bamboos species were analyzed for data bank.

2.10 **Financial statement** :

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

2.10.2 Cumulative cost : Tk. 2,65,440.00

2.10.3 Cost of the year : Tk. 68,380.00

2.10.4 Source of fund : GOB

2.11 **Beneficiaries** : FD, NGO and academician

3. **Study** : Ongoing

3.1 Programme Area : Soil conservation and watershed management

3.2 Title of the Study : Effect of using preservative treated bamboo materials on soil properties and production of betel leaf in betel leaf cultivation

3.3 Justification(For new study) : NA

3.4 **Objectives** :

3.4.1 To monitor the changes in soil properties for using preservative treated bamboo materials in betel leaf cultivation

3.4.2 To assess the yield and quality of betel leaf in the betel leaf farms

3.5 **Expected output:** Conservation of soil properties and sustainable production of betel leaf.

3.6 **Study period** :

3.6.1 Starting year : 2013-14

3.6.2 Completion year : 2015-16

3.7 **Personnels** :

3.7.1 Study leader : Md. Motiar Rahman, Asst. Soil Scientist

3.7.2 **Associates:** : Md. Jahangir Alam, DO; M. Zahirul Alam, Asst. Soil Scientist

3.8 **Activities for the year:**

- a) Land management (weeding, furrowing etc.) and maintenance (repairing fence,



- shade etc.) will be done of the experimental plots
- b) Soil and betel leaf samples will be collected from the experimental plots for analysis of soil and plant nutrients
- c) Data on production of betel leaf will be collected from the experimental plots
- d) Data analysis and report writing

3.8.1 Activities calendar :

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

3.9 **Previous progress** : Site was selected at Sitakunda, Chittagong. Initial soil sample was collected and analyzed. Experimental plot was set up and rhizomes of betel leaf were planted. Betel leaf and soil (2<sup>nd</sup> time) samples were collected and analyzed.

3.9.1 **Achievements** : Experiment was set up successfully at Sitakunda, Chittagong.

3.10 **Financial statement** :

3.10.1 Total cost of the study : Tk. 4,00,000.00

3.10.2 Cumulative cost : Tk. 1,10,200.00

3.10.3 Cost of the year : Tk. 1,02,800.00

3.10.4 Source of fund : GOB

3.11 **Beneficiaries** : Betel leaf farmers, researchers and academicians

## MINOR FOREST PRODUCTS DIVISION

1. **Study** : Ongoing

1.1 Programme Area : Bamboo and Non-timber Economic Crops.

1.2 Title of the Study : Nursery, plantation and management techniques of ten rattan species of Bangladesh.

1.3 Justification (For new study) : NA

1.4 **Objective(s)** :

a) To develop suitable techniques for production of quality planting materials of ten rattan species, jali (*Calamus tenuis*), kerak (*C. viminalis*), golla (*Daemonorops jenkinsiana*), udum (*Calamus longisetus*), bhudum (*C. latifolius*), noli (*C. travencoricus*), gouri (*C. acanthospathus*), sundi (*C. guruba*), sita (*C. erectus*) and maphuri (*C. gracilis*).

b) To develop appropriate plantation techniques and site suitability of ten rattan species.

c) To determine the optimum harvesting age and sound management system for maintaining sustainable production of different rattan species.

d) To develop a gene pool and conserve rattan species available in Bangladesh for scientific study and demonstrations.

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

1.5 **Expected output:**

- a) Appropriate technique will be available for production of quality planting materials for plantation raising and management of different rattan species will be available.
- b) Conservation and centralization of all available rattan species in Bangladesh will be possible.
- c) Permanent seed source of different rattan species will be created.

1.6 Study period

1.6.1 Starting year : 2013-2014(3<sup>rd</sup> Phase)

1.6.2 Completion year : 2014-2015

1.7 Personnel :

1.7.1 Study Leader : Md. Sah Alam, RO

1.7.2 Associate : Rafiqul Haider, DO; S. R.Merry, SRO & Anita Rany Shutrodhar, RO

1.8 Activities for the year :

- a) Seed collection of different rattan species from three to four locations.
- b) Nursery trial for sita (*Calamus erectus*) rattan species and raising 20,000 seedlings of different rattan species (jali, kerak and golla) for trial plantation, establishment of conservation plots and remaining seedlings for distribution on payment basis.
- c) Maintenance of seedlings in the nursery through weeding, watering, manuring etc.
- d) Raising trial plantations of 1.0 hectare at BFRI Headquarter and Hinguli Research Station.
- e) Maintenance of 4.0 hectare old trial plantation and conservation plots at BFRI Headquarter and Hinguli Research Station.
- f) Data collection 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)			■	■	■		■	■	■		■	■

1.9. **Previous progress** : Studied flowering, fruiting, seed per kilogram counted for ten rattan species; seed germination period and germination percentage, root-shoot ratio of seedlings and seedling-growth in the nursery of four species; jali (*Calamus tenuis*), kerak (*C. viminalis*), golla (*Daemonorops jenkinsiana*) and udum (*C. longisetus*).

Raised experimental plantations and conservation plots over an area of 4.0 ha. Survival percentage, growth of seedlings in the plantation, site suitability of four species, etc. were studied

1.9.1 **Achievements** : Nursery and plantation techniques of jali (*Calamus tenuis*), kerak (*C. viminalis*), golla (*Daemonorops jenkinsiana*) and udum (*Calamus longisetus*) had developed.

1.10 Financial statement :

1.10.1 Total cost of the study : Tk. 8, 00,000.00

- 1.10.2 Cumulative cost : Tk. 5, 83,580.00  
 1.10.3 Cost of the years : Tk. 1, 32,500.00  
 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 and plantation techniques of five selected medicinal plants: iswarmul (*Aristolochia indica*), kurchi (*Holarrhena pubescence*), gajpipul (*Scindapsus officinalis*) antamul (*Tylophora indica*) and chandan (*Santalum album*.)

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 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) :**

- a) To develop nursery techniques for production of planting materials.
- b) To develop plantation and management techniques for sustained yield.
- c) 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 : 2014-2015

2.6.2 Completion year : 2016-2017

2.7 Personnel :

2.7.1 Study Leader : Anita Rany Shutrodhar, RO

2.7.2 Associates : Rafiqul Haider, DO; S.R. Merry, SRO & Md. Sah Alam, RO

2.8 Activities for the year :

- a) Collection of seed / propagating materials and raising 1000 seedlings (200 for each species) of five medicinal plants such as, iswarmul (*Aristolochia indica*), kurchi (*Holarrhena pubescence*), gajpipul (*Scindapsus officinalis*), antamul (*Tylophora indica*) and chandan (*Santalum album*).
- b) Recording information on germination percentage, germination period and seedlings growth in the nursery.
- c) Maintenance of seedlings in the nursery.
- d) Establishment of 0.25 hectare experimental plantations with five 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) Report writing and printing.

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)										■	■	■

- 2.09 Previous progress, if any : NA  
 2.9.1 Achievement (s) (if any) : New study  
 2.10 Financial statement :  
 2.10.1 Total cost of the study : Tk. 3,50,000.00  
 2.10.2 Cumulative cost :  
 2.10.3 Cost of the year : Tk. 80,000.00  
 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.  
 3.3 Justification (For new study) : NA  
 3.4 **Objective(s) :**  
 a) To authenticate correct identification of medicinal plants.  
 b) To conserve medicinal plants for scientific study and demonstration.  
 c) To develop a gene pool of medicinal plants species for propagation purposes.  
 d) To popularize cultivation and use of medicinal plants.  
 e) To determine management techniques for maximum yield of medicinal plants.  
 3.5 **Expected output:** Conserve the valuable medicinal plant resource as gene pool for future programme will be available.  
 3.6 **Study period :**  
 3.6.1 Starting year 2010-2011 (3<sup>rd</sup> Phase)  
 3.6.2 Completion year 2014-2015  
 3.7 Personnel  
 3.7.1 Project Leader Md. Sah Alam, RO  
 3.7.2 Associates Rafiqul Haider, DO; S.R. Merry, SRO & Anita Rany Shutrodhar, RO  
 3.8 Activities for the year  
 a) Collection of propagating materials for 15 annual and 05 perennial medicinal plants from Bogra, Natore, Gaibandha, Madhupur, Bandarban and Khagrachari districts of Bangladesh.  
 b) Nursery bed preparation and development.  
 c) Raising 5,000 seedlings of different medicinal plants for establishing conservation plots and left over seedling for distribution.  
 d) Maintenance of seedlings in the nursery.  
 e) Re-establishment of conservation plots for 87 annual and establishment of conservation plots with 05 perennial medicinal plants at BFRI Headquarter and Hinguli Research Station.  
 f) 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)		■	■	■	■	■	■	■	■	■	■	■

3.09 **Previous progress:** Three perennial (turkinishinda, goniary and antamul) and 09 annual (setpunarnaba, joymala, dauntimul, nidradevi, bontulsi, talmul, alkushi, benamul, ekpurush) medicinal plant species were collected from different locations of Bangladesh and conserved them at BFRI HQs nursery

3.9.1 **Achievement :** Conserve 75 perennial (ghritoakanchan, pipul, sarpagandha, choijal, anantamul, salpani, panbilash, buikumra, karpur, all-spices, jayanti, naglingom, ayapana, tespata, mehedi, khoir, chandan, kuchila, kurchi, dhup, ritha, uriam etc.) and 87 annual (brammi, mohabingharaj, kalokeshi, alkushi, aswagandha, ekangi, misridana, turukchandal, ulatchandal, 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. 6,80,000.00

3.10.2 Cumulative cost: Tk. 5,60,000.00

3.10.3 Cost of the year: Tk. 1,17,500.00

3.10.4 Source of fund: GOB

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

4 **Study** Ongoing

4.1 Programme Area: Bamboo and Non- timber Economic Crops

4.2 Title of the Study : Nursery and plantation technique of dhup (*Canarium resiniferum*)

4.3 Justification (For New study) : NA

4.4 **Objective(s):**

a) To observe the phenological character of dhup.

b) To standardize nursery techniques of dhup.

c) To develop plantation techniques of dhup.

4.5 **Expected output** : Improved nursery and plantation technique of dhup will be available

4.6 **Study period** :

4.6.1 Starting year : 2011-2012

4.6.2 completion year : 2015-2016

4.7 Personnel(s) :

4.7.1 Project Leader : Rafiqul Haider, DO

4.7.2 Associates : S. R. Merry, SRO; Md. Sah Alam, RO & Anita Rany Shutrodhar, RO

4.8 **Activities for the year :**

a) Collection of seeds / propagules from different locations in Bangladesh.

b) Sowing of seeds with different treatments:

(i) Soaking seeds in hot water (100 °C) till the water comes in normal temperature

(ii) Soaking seeds in hot water (100 °C) for 5 minutes +12 hours in cold water

- (iii) Scarification of seed with sand paper (siris paper)
- (iv) Scarification of seed- nicked with a knife
- (v) Soaked in 30% H<sub>2</sub>SO<sub>4</sub> for 20 minutes
- (vi) Soaked in 50% H<sub>2</sub>SO<sub>4</sub> for 20 minutes
- (vii) Gibbrellic acid (500 ppm, 750 ppm and 1000 ppm) for 20 minutes
- c) Observe seed germination percentage, germination period, seedlings growth, etc in the nursery.
- d) Raising 300 seedlings and maintenance at MFP Headquarter nursery for raising experimental plantation at HQs and Hinguli Research Station
- e) Raising seedlings though cutting with two rooting hormone: IAA and IBA (500 ppm, 750 ppm and 1000 ppm).
- f) Site selection and preparation for raising experimental plantations
- g) Field layout (three plots with 2x2 meter spacing), and planting seedlings in the field

4.8.1 Activities calendar:

Activities (as per 1.9)	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a.													
b.													
c.													
d.													
e.													
f.													

4.9 **Previous progress:** Phenology (flowering, fruiting, leaf shedding etc.), germination percentage, germination period of seeds were studied. Twenty seedlings have conserved at BFRI campus.

4.9.1 Achievement (if any) : -

4.10 Financial statement :

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

4.10.2 Cumulative cost :Tk. 1, 81,400.00

4.10.3 Cost of the year :Tk. 70,000.00

4.10.4 Source of fund :GOB

4.11 Beneficiaries :FD, NGOs, Private planters, Farmers, Educational Institutes, Herbal drug producers, etc.

5 **Study** : New

5.1 Programme Area : Biodiversity and Conservation.

5.2 Title of the Study : Studies on ethnomedicinal plants used by the *Khasia* community of Moulvibazar district

5.3 Justification (For new study): The *Khasia* community is the dominant tribe of the greater Sylhet areas, particularly in Moulvibazar district. The community people used a good number of plant species for the treatment of illness as herbal medicine. The plant species and the inherited knowledge of *Khasia* people are becoming eroded with the dominance of modern medicine and habitat destruction. So far there is no ethnobotanical information on the herbal medicine of the *Khasia* tribe in Bangladesh. Considering the fact the study has been undertaken with aiming the following objectives

5.4 **Objective(s)** :

a) To collect the ethnomedicinal plants and their information used by the *Khasia* community of Moulvibazar district.

b) To find out the conservation strategy and to develop database for ethnomedicinal plants.

- 5.5 **Expected output** :
- Ethnomedicinal plants used by the *Khasia* community will be documented.
  - Germplasm conservation of ethnomedicinal plants will be enriched.

5.6 **Study period** :

5.6.1 Starting year :2014-2015

5.6.1 Completion year :2016-2017

5.7 **Personnel** :

5.7.1 Project Leader :Rafiqul Haider, DO

5.7.2 Associates :S. R. Merry, SRO; Md. Sah Alam, RO&  
Anita Rany Shutrodhar, RO

5.8 **Activities for the year** :

- Two to three group discussion with herbal practioners and *Khasia* people
- Collection of ethnomedicinal samples and conservations
- Collection of information on conservation strategy
- Documentation of medicinal uses of plant species
- Report preparation

5.8.1 **Activities calendar**

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

5.09 **Previous progress** : NA

5.09.1 **Achievement** : New Study

5.10 **Financial statement** :

5.10.1 Total cost of the study : Tk. 2,50,000.00

5.10.2 Cumulative cost : Tk. -

5.10.3 Cost of the year : Tk. 70,000.00

5.10.4 Source of fund :GOB

5.11 **Beneficiaries** : Forest Departments, Educational Institutes, Ayurvedic & Unani medicine manufactures.

## MANGROVE SILVICULTURE DIVISION

1. **Study** : Ongoing

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 (For new study):** NA

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 Sundarban will be determined.

1.6 **Study period** :

1.6.1 Starting year : 2012-2013(2<sup>nd</sup> Phase)

- 1.6.2 Completion year : 2015-16  
 1.7 **Personnel(s)** :  
 1.7.1 **Study leader** : Dr.M. M. Rahman, DO  
 1.7.2 Associate : S. M. M. Hasnin, SRO; A. S. M. Helal Siddiqui, RO  
 1.8 **Activities for the year :**

- a) Reestablishment of PSP no. 17 (Comp. no. 41) at Bolriver, Munshigong.  
 b) Maintenance (Demarcation of plots, replacement of damaged signboards, number-plates, jungle cutting etc.) of 30 PSPs in different salinity zones throughout the Sundarban.  
 c) Collection of data on species composition, dia-class, height class, regeneration data, growth data, salinity and siltation data from the PSPs.  
 d) 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.												

1.9 **Previous progress:** Thirty Permanent Sample Plots (PSPs) were maintained. Data on species composition, number of trees of different species, height, DBH, regeneration of the seedlings recruitment of mangrove species were recorded from 30 PSPs. Seedlings recruitment of major mangrove species were recoded from the PSPs. Average seedlings recruitment in the year 2010 was found 33,133/ha/year. Among them, *Heritiera fomes* constituted 43.16%, *Excoecaria agallocha* 31.89%, *Ceriops decandra* 10.76%, *Bruguiera sexangula* 3.52%, *Avicennia officinalis* 1.01%, *Aegiceras corniculatum* 3.92%, *Xylocarpus mekongensis* 0.91%, *Sonneratia apetala* 0.20%, *Amoora cuculata* 2.41%, *Cynometra ramiflora* 1.21%, *Nypa fruticans* 0.10%, *Phoenix paludosa* 0.20%, *Rhizophora mucronata* 0.31%, *Acanthus illicifolius* 0.10% and *Brownlowia tersa* 0.30%. 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. 10,00,000.00  
 1.10.2 Cumulative cost : Tk. 4,30,000.00  
 1.10.3 Cost of the year : Tk. 1,50,000.00  
 1.10.4 Source of fund : GOB

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

2. **Study** : Ongoing

2.1 Programme Area : Biodiversity and Conservation

2.2 Title of the Study : Centralization and conservation of mangrove vegetation in three salinity zones of the Sundarban.

2.3 Justification (For new study): NA



- 2.4 **Objective(s)** :
- 2.4.1 To conserve mangrove species in their natural habitat.
- 2.4.2 To centralize threatened mangrove species.
- 2.4.3 To observe the flora-fauna interaction over time.
- 2.4.4 To demonstrate flora and fauna in natural habitat in the Sundarban.
- 2.5 **Expected output** : a) Conservation of mangrove species. b) Establishment of primary relationship between flora and fauna in the mangroves.

- 2.6 **Study period** :
- 2.6.1 Starting year : 2011-2012 (2<sup>nd</sup> Phase)
- 2.6.2 Completion year : 2015-16

- 2.7 **Personnel(s)** :
- 2.7.1 Study leader : A. S. M. Helal Siddiqui, RO
- 2.7.2 Associates : Dr. M. M. Rahman, DO; S. M. M. Hasnin, SRO

- 2.8 **Activities for the year** :
- a. Raising of 12,600 seedlings of three mangrove species namely Sundari, kankra, goran, passur, Singra, jhana and khalshi for raising experimental plantation.
- b. Maintenance of previously raised experimental plantations of kirpa (1.8 ha), passur (1.2 ha), jhana (0.6 ha), khalshi (2 ha), amur (1.8 ha) bakul kankra(1.8 ha), amdhekur (0.9ha), dhundul (1.8 ha) and marichabaen (0.9 ha).
- c. Collection of survival and growth data from the experimental plantations twice a year.
- d. 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.													
d.													

2.9 **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. Dhundhul (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.

2.9.1 **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.

- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 14,00,000.00
- 2.10.2 Cumulative cost : Tk. 6,50,000.00
- 2.10.3 Cost of the year : Tk. 3,50,000.00

- 2.10.4 Source of fund : GOB
- 2.11 Beneficiaries : Forest Department, NGOs, Students, Teachers, Researchers and Visitors.
3. **Study** : Ongoing
- 3.1 Programme Area : Plantation Technique and Forest Management
- 3.2 Title of the Study : Growth performance of mangrove and non-mangrove experimental plantations in the Sundarban.
- 3.3 Justification (For new study) : NA
- 3.4 **Objective(s)** :
- 3.4.1 To determine the growth performance of mangrove and non-mangrove experimental plantations in the Sundarban
- 3.5 **Expected output:** Growth performance of planted mangrove species on poorly stocked areas and non-mangrove species on the raised lands of the Sundarban will be determined.
- 3.6 **Study period** :
- 3.6.1 Starting year : 2012-2013 (2<sup>nd</sup> Phase)
- 3.6.2 Completion year : 2015-16
- 3.7 **Personnel(s)** :
- 3.7.1 Study leader : A. S. M. Helal Siddiqui, RO
- 3.7.2 Associates : Dr. M. M. Rahman, DO
- 3.7.3 : S. M. M. Hasnin, SRO
- 3.8 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.
- 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:** 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.
- 3.9.1 **Achievements** : Plantations of 5 ha mangrove and 3.5 ha non-mangrove species

were established in the Sundarban.

- 3.10 **Financial statement** :
- 3.10.1 Total cost of the study : Tk. 9,00,000.00
- 3.10.2 Cumulative cost : Tk. 4,70,000.00
- 3.10.3 Cost of the year : Tk. 2,50,000.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : Forest Department, NGOs, Students, Teachers, Researchers and Local farmers.

4. **Study** : Ongoing
- 4.1 Programme Area : Biodiversity and conservation
- 4.2 Title of the Study : Development of a mangrove museum.
- 4.3 Justification (For new study) : NA

- 4.4 **Objective(s)** :
- 4.4.1 To collect and preserve the representative specimens of flora and fauna from the Sundarban.
- 4.4.2 To demonstrate the specimens of flora and fauna to the students, teachers, researchers and visitors.

- 4.5 **Expected output** : Establishment of a mangrove museum housing representative flora and fauna of the Sundarban.

- 4.6 Study period
- 4.6.1 Starting year : 2013-2014 (2<sup>nd</sup> Phase)
- 4.6.2 Completion year : 2015-16

- 4.7 **Personnel(s)** :
- 4.7.1 Study leader : S M. M. Hasnin, SRO
- 4.7.2 Associate : Dr. M. M. Rahman, DO; A. S. M. Helal Siddiqui, RO.

- 4.8 Activities for the year :
- a) Collection and preservation of fleshy fruits, plant parts and available faunal specimens from the Sundarbans and Forest Department.
- b) Maintenance of previously collected flora and faunal specimens in the museum.
- c) Preparation of digital banner for display boards, still pictures, digital pictures and lamination of still pictures.

- 4.8.1 Activities calendar :

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

- 4.9 **Previous progress:** 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:** A museum has been established at the Divisional Head Quarter of Mangrove Silviculture Division, Khulna in 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. 10,00,000.00
- 4.10.2 Cumulative cost : Tk. 4,30,000.00
- 4.10.3 Cost of the year : Tk. 1,30,000.00

- 4.10.4 Source of fund : GOB
- 4.11 **Beneficiaries** : Forest Department, NGOs, Students, Teachers, Researchers and Visitors.
5. **Study** : Ongoing
- 5.1 Programme Area : Breeding and Tree Improvement
- 5.2 Title of the Study : Development of nursery and plantation techniques of Khalshi (*Aegiceras corniculatum*) in the coastal zone of Bangladesh.
- 5.3 Justification (For new study): NA
- 5.4 **Objective(s)** :
- 5.4.1 To develop nursery and plantation techniques of Khalshi.
- 5.5 **Expected output:** Nursery and plantation technique of khalsi will be developed for its conservation as bee plant.
- 5.6 **Study period** :
- 5.6.1 Starting year : 2010-11
- 5.6.2 Completion year : 2014-15
- 5.7 **Personnel(s)** :
- 5.7.1 Study leader : Dr. M. M. Rahman, DO
- 5.7.2 Associates : S. M. M. Hasnin, SRO; A. S. M. Helal Siddiqui, RO
- 5.8 Activities for the year :
- Raising experimental plantations with the previously raised seedlings.
  - Collection of propagules (seeds) from the Sundarban and nursery raising for next year experimental plantations.
  - Collection of data on soil pH, water salinity, light intensity, inundation and siltation in the selected sites.
  - Observation on germination of the seeds, survival and growth performance of the seedlings in the nursery.
  - Maintenance of nursery
  - Data collection and analysis.
- 5.8.1 Activities calendar :

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

- 5.9 **Previous progress:** Propagules (seeds) of Khalshi (*Aegiceras corniculatum*) were collected from the Sundarban and nursery was raised. Data on soil pH, water salinity, light intensity, inundation and siltation in the selected sites were collected. Germination of the seeds, survival and growth performance of the seedlings in the nursery were recorded.
- 5.9.1 **Achievements** : -
- 5.10 **Financial statement** :
- 5.10.1 Total cost of the study : Tk. 12,00,000.00
- 5.10.2 Cumulative cost : Tk. 4,35,000.00
- 5.10.3 Cost of the year : Tk. 2,80,000.00
- 5.10.4 Source of fund : GOB
- 5.11 **Beneficiaries** : Forest Department, NGOs, Teachers, Researchers and Local farmers.

6. **Study** : Ongoing
- 6.1 Programme Area : Breeding and Tree Improvement
- 6.2 Title of the Study : Selection and development of the top dying tolerant sundri (*Heritiera fomes*) trees in the Sundarban.
- 6.3 Justification (For new study) : NA
- 6.4 **Objective(s)** :
- 7.4.1 To develop a pure line of top dying tolerant sundri trees.
- 6.5 **Expected output** : Selection and development of top dying resistant sundri trees in the Sundarban.
- 6.6 **Study period** :
- 6.6.1 Starting year : 2013-2014 (2<sup>nd</sup> Phase)
- 6.6.2 Completion year : 2015-16
- 6.7 **Personnel(s)** :
- 6.7.1 Study leader : Dr. M. M. Rahman, D
- 6.7.2 Associates : S. M. M. Hasnin, SRO; A. S. M. Helal Siddiqui, RO
- 6.8 **Activities for the year** :
- Planting of previously raised seedlings of selected sundari trees at three locations of the Sundarban.
  - Observation of flowering and fruiting behaviors in the selected trees.
  - 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 H/Q, 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.
- 6.8.1 Activities calendar :

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

- 6.9 **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. The average height, bole height and DBH of the selected healthy (disease free) sundari trees were 10.8m, 7.5m and 16.2cm respectively at Bholarpar (compt. No. 24) in the less saline zone. The average height, bole height and DBH of the selected healthy (disease free) sundari trees were 10.6m, 6.3m and 16.6cm respectively at Bojbaja (compt. No. 37) in the moderate saline zone. The average height, bole height and DBH of the selected healthy (disease free) sundari trees were 10.1m, 4.9m and 17.8cm respectively at Kalabogi (compt. No. 33) in the moderate saline zone. The average height, bole height and DBH of the selected healthy (disease free) sundari trees were 15.8m, 8.3m and 22.7cm respectively at Kalabogi Khal (compt. No. 32) in the moderate saline zone. The water salinity of Bholarpar (compt. No. 24), Bojbaja

(compt. No. 37), Kalabogi (compt. No. 33) and Kalabogi Khal (compt. No. 32) were recorded 3ppt, 20ppt, 18ppt and 21ppt respectively in May, 2010. The soil pH of Bholarpar (compt. No. 24), Bojbaja (compt. No. 37), Kalabogi (compt. No. 33) and Kalabogi Khal (compt. No. 32) were 4.2, 5.4, 6.0 and 6.2 respectively. Inundation was regular in all the experimental sites. Siltation / erosion gauge have been placed in each location. Raised seedlings of selected sundari trees at three locations of the Sundarban have been planted. Flowering and fruiting behaviors of the selected trees have been observed and recorded. Nine thousand seedlings have been raised at Bogi and Dhangmari Research Stations for next year plantations. Germination of the seeds, survival and growth performance of the seedlings in the nursery have been recorded.

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

6.10 **Financial statement** :

6.10.1 Total cost of the study : Tk. 12,50,000.00

6.10.2 Cumulative cost : Tk. 6,30,000.00

6.10.3 Cost of the year : Tk. 1,90,000.00

6.10.4 Source of fund : GOB

6.11 **Beneficiaries** : Forest Department, NGOs, and Researchers.

## FOREST PROTECTION DIVISION

1 **Study** : Ongoing

1.1 Programme Area : Forest Pests and Diseases

1.2 Title of the Study : Major pests and diseases of commercially important medicinal plants and their management

1.3 Justification (for new study) : NA

1.4 **Objective(s)** :

2.4.1 To identify pests and pathogens of commercially important medicinal plants

2.4.2 To determine the nature and extent of damage by each pest and pathogen

2.4.3 To know the biology and ecology of key pests and pathogens

2.4.4 To develop/adapt suitable management techniques for key pests/pathogens

1.5 **Expected output** : Increased production of commercially important medicinal plants will be ensured

1.6 **Study period** :

1.6.1 Starting year : 2012-2013(2<sup>nd</sup> Phase)

1.6.2 Completion year : 2014-2015

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) Collection of samples (pest and disease) and recording of nature and extent of damage by each pest and pathogen from commercially important medicinal plants (*Aloe indica*, *Withania somnifera*, *Ocimum sp.*, *Adhatoda vasica*, *Andrographis paniculata*, *Calotropis gigantia*, *Asparagus racemosus* and *Rauwolfia serpentina*) from Gaibandha, Natore, Naogaon, Sirajgonj, Tangail, Sunamganj, Sherpur and Chittagong Hill Tracts districts.

b) Rearing/culture and identification of key pests and pathogens.

c) Management of diseases through plant extracts and biocontrol agents in *in vitro* and *in vivo* condition.

d) Nursery raising and management of medicinal plants at BFRI campus.

1.8.1 Activities calendar :

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

- 1.9 **Previous progress:** Five *Trichoderma* strains viz. *T. virens* IMI-392430, *T. pseudokoningii* IMI-392431, *T. harzianum* IMI-392432, *T. harzianum* IMI-392433, and *T. harzianum* IMI-392434 were used to assess the ability against *F. solani* causing root rot disease of Ashwagandha in *in vitro* condition. The result showed that *Trichoderma* isolates have a good antagonistic effect on *F. solani* mycelial growth and *T. harzianum* IMI-392432 has the most potential to control the root rot disease pathogen.

Neem oil, Urea, Sulphur, Turmeric powder and Omite were applied to red mite of Ashwagandha. Primary result showed that Omite was most effective (98%). Then Turmeric powder (80%), Neem oil (75%) and Sulphur (50%). Urea showed less effectiveness (20%). Neem oil was applied to control the spittle bug of Tulsi. It was very effective (75%) against the pest.

Insects and diseased samples were collected from medicinal plants from FPD and MFPD nursery of BFRI campus. Scale insect, Spittle bug, Aphid of tulsi; Mealy bug & Scale insect of Sarpogandha were collected and recorded.

Powdery mildew & Root rot of tulsi, Leaf spot & Colar rot of kalomegh, and Die-back & Root rot of basok, Root rot of ashwagandha, Collar rot & Leaf spot of Gritakanchon and Sooty mould fungus of Sarpogandha also recorded. Leaf defoliator of basok was recorded in Sunamgonj and leaf spot of gitakanchan was recorded in different areas of Tangail district.

Nature & extent of damage were recorded. Tulsi is infested by scale insect (50%). Powdery mildew (90%) & Root rot (80%) of tulsi, Leaf spot (100%) of kalomegh, Die-back & Root rot (80%) of basok, Root rot (85%) of ashwagandha, & Leaf spot (40%) of Gritakanchon also recorded. Leaf defoliator of basok (60%) in Sunamgonj, Leaf spot of gitakanchon (60%) in Tangail district.

*Fusarium solani* and *F. oxysporum* are identified from root rot of ashwagandha and tulsi respectively.

Regular observation and data collection were done. Weeding, soil management, fertilization (Organic), watering, sample collection and management practices are going on. Ashwagandha, Tulsi, Ghritokanchon, Brahmi, stavia and shotomoly seedling have been planted for natural pest and disease infestation /infection.

- 1.9.1 **Achievements :** Five *Trichoderma* strains were used to control the root rot disease of ashwagandha in *in vitro* condition and the *T. harzianum* IMI-392432 showed the best performance. Neem oil, Urea, Sulphur, Turmeric powder, Omite were applied to control red mite of Ashwagandha. Primary result showed that Omite was most effective against red mite of Ashwaganda (98%).

1.10 **Financial statement :**

- 1.10.1 Total Cost of the study : Tk.10,00000.00  
 1.10.2 Cumulative cost : Tk. 8,97,891.00  
 1.10.3 Cost of the year : Tk 2, 00,000.00  
 1.10.4 Source of Fund : GOB

- 1.11 **Beneficiaries** : Medicinal plant cultivators, FD, NGOs, general public and BFRI.

2. **Study** : Ongoing

- 2.1 Programme Area : Forest Pests and Diseases

- 2.2 Title of the Study : Major pests and diseases of forest seeds and their management

- 2.3 Justification (For new study) : NA
- 2.4 **Objective(s)** :
- 3.3.1 To identify pests and pathogens of forest seeds in the field and storage condition.
- 3.3.2 To determine the nature and extent of damage by each pest and pathogen.
- 3.3.3 To develop suitable management techniques for key pests and pathogens
- 2.5 **Expected output:** Pest and disease-free seeds will be made available that leads to better germination and production of healthy and sound seedlings.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2012-2013 (2<sup>nd</sup> Phase)
- 2.6.2 Completion year : 2014-2015
- 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. (Gr-1); K.A. Zaman F.I.; S. Nasreen F.I.

2.8 **Activities for the year :**

- a) Collection of infested/infected seeds sil koroi (*Albizia lucida*), fulkaroi (*Albizia lebeck*), ipil ipil (*Leucaena leucocephala*), raintree (*Samania saman*), akasmony (*Acacia auriculacformis*), meinzeri, gamer (*Gmelina arborea*), teak (*Tectona grandis*), mahogany (*Switenia macrophylla*), sissou (*Dalbergia sisso*), cikkrasi, (*Chukrasia tabularis*) arjun, (*Terminalia Arjuna*) sonalu (*Cassia fistula*), kankra, (*Bruguiera sexangula*), passur (*Xylocarpus moluccensis*)& sundari (*Heritiera fomes*) from the field and in storage condition of Dhaka, Gazipur, Mymensingh, Cox's bazar and Sundarban (Khulna, Satkhira, Bagerhat,) districts
- b) Recording of nature and extent of damage by each pest and pathogen.
- c) Rearing/culture and identification of key pests and pathogens.
- d) To develop suitable pest /disease management techniques for key pests/diseases

2.8.1 **Activities calendar** :

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

2.9 **Previous progress:** Previously collected seeds (Sada koroi, sil koroi, ipil ipil, Jarul, akasmoni, acacia hybrid, teak, Rain tree) were dried and kept with Neem oil, Biskatali, Aata powder (green) Neem powder, Sevin powder, Diazinon, Malathion for observation. Data collected and recorded. No insect pest infestation was recorded up to June 2014.

Seeds of sil koroi, ipil ipil, raintree, akasmoni, acacia hybrid, teak, jarul were collected and kept in laborarory condition for observation and data collection. Among mangrove seeds, kankra, passur, dhamur and sundari also collected from different areas of Sundarban.

The rate of infestation were recorded 50 % in teak, 6 % in acacia, 10 % in ipil-ipil, 12 % in silkoroi, 7.5 % in jarul From different areas of Cox's bazar.

Average infested by insect were recorded 96% in Garan, 66% in Sundri, 61% in kankra, 43 % in Bayen, 23% in Singra, 15% in Amur, 14% in Gewa and 5% in Passur.

Infected rate by seed born fungi 51.95 % in Garan, 51.24% in Singra, 45 % in Gewa, 46.29 % in Kankra, 30 % in Passur, 24.70 % in Sundari, 24.3 % in Amur and 22.5% Bayen.

A total of nine fungal species belonging to seven different genera of fungi viz. *Botryodiplodia*, *Rhizopus*, *Mucor*, *Fusarium*, *Curvularia*, *Penicillium* and *Aspergillus* were found associated with seeds of Shil koroi (*Albizia lucida*), Rain



tree (*Samanea saman*), Sundri (*Heritiera fomes*), Keora (*Sonneratia apetala*), Singra (*Cynometra ramiflora*), Gewa (*Excoecaria agalloca*), Kanka (*Bruguiera sexangula*) and Bayen (*Avicennia officinalis*).

2.9.1 **Achievements:** Fungi were identified and quantified using the blotter method and agar plate method as recommended by ISTA (International Seed Testing Association).

2.10 **Financial statement :**

2.10.1 Total Cost : Tk.15,00000.00

2.10.2 Cumulative cost : Tk. 7,66,921.00

2.10.3 Cost of the year : Tk. 1,00,000.00

2.10.4 Source of Fund : GOB

2.11 **Beneficiaries** : FD, BFRI, NGOs, nursery owners, private planters and general public

3. **Study** : Ongoing

3.1 Programme Area : Forest Pests and Diseases

3.2 Title of the Study : Pests and diseases of bamboos in Bangladesh and its management.

3.3 Justification (For new study) : NA

3.4 **Objective(s)** :

3.4.1 To survey and asses the present status of pest and disease infestation in bamboos from different areas of the country

3.4.2 To collect & identify major pests and pathogens of bamboos

3.4.3 To study nature and extent of damage by pest and pathogens.

3.4.4 To study the biology & ecology of the causal agent(s)

3.4.5 To develop suitable management techniques for controlling pest and disease.

3.5 **Expected output:** Increased production of bamboo will be ensured and suitable management techniques for controlling the pest and disease will be developed.

3.6 **Study period** :

3.6.1 Starting year : 2013-14

3.6.2 Completion year : 2015-16

3.7 **Personnel(s)** :

3.7.1 Study leader : M. R. Islam, D.O.

3.7.2 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.

3.8 **Activities for the year :**

a) Survey and determination of present status of pest and diseases of Bamboos in Bangladesh

b) To collect and identify common pests and diseases of Bamboos from nurseries and plantations of different areas ( Kustia, Maherpur, Pabna, Rajshahi, Nilphamari, Chapinawabgonj, Sylhet, Chittagonj Hill Tracts and Dhaka) of Bangladesh..

c) To isolate and identify major pests and pathogens of bamboos.

d) Morphological and cultural studies of major pests and pathogens.

e) Management of pests and pathogens through plant extracts, bio-control agents, pesticides and fungicides in *in vitro* and *in vivo* condition.

3.8.1 **Activities calendar** :

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

3.9 **Previous progress:** A Lepidopteran moth was collected from Bamboo branch cutting from Silviculture Genetics Division's Nursery of BFRI and Lama, Bandarban. Leaf roller, aphid, borer and scale insects were found in different areas of Jessore, Khulna and Satkhira districts.

- 3.9.1 **Achievements** : A lepidopteran moth (*Pyrestia bambosivora*) was identified.
- 3.10 **Financial statement** :
- 3.10.1 Total Cost : Tk, 12,00,000.00
- 3.10.2 Cumulative cost : Tk. 2,50,000.00
- 3.10.3 Cost of the year : Tk. 2,50,000.00
- 3.10.4 Source of Fund : GOB
- 3.11 **Beneficiaries** : Common people, FD, NGO's, Farmers, Educational institutions and other tree planting agencies.

### PLANTATION TRIAL UNIT DIVISION

1. **Study** : Ongoing
- 1.1 Programme area : Plantation technique and forest management
- 1.2 Title of the study : Introduction of bamboo, rattan and golpata in the coastal homesteads of Bangladesh (2<sup>nd</sup> Phase).
- 1.3 Justification(For new study) : NA
- 1.4 **Objective(s)** :
- 1.4.1 To investigate the possibility for introduction of bamboo rattan and golpata in coastal homesteads of Bangladesh
- 1.4.2 To select site suitability of bamboo, rattan and golpata in the coastal areas.
- 1.4.3 To increase the productivity of bamboo, rattan and golpata in the coastal areas
- 1.5 **Expected output:** Production of bamboo, rattan and golpata in the coastal areas will be increased.
- 1.6 **Study period** :
- 1.6.1 Starting year : 2011-2010 (2<sup>nd</sup> phase)
- 1.6.2 Completion year : 2015-2016
- 1.7 **Personnel (s)** :
- 1.7.1 Study leader : S. A. Islam, DO
- 1.7.2 Associates : M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI
- 1.8 Activities for the year :
- a) Organizing two awareness meetings with rural people for cultivating bamboo, rattan and golpata in the coastal homesteads at Char Kukri-Mukri (South Aycha) and Head Quarter Research Stations.
- b) Collection of seeds of rattan for raising 5000 seedlings.
- c) Collection of bamboo (*Bambusa balcooa*) branch for raising 5000 seedlings from branch cutting.
- d) Raising 5000 seedlings of rattan and 5000 seedlings of bamboo at Rangabali, Char Kukri-Mukri, Char Osman, Sitakundu and Head Quarter Research Stations.
- e) Supplying of seedlings to the selected coastal farmers at 4 research stations
- f) . Maintenance and supervision of seedlings planted in previous years
- g) Collection 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.			■	■								
f.											■	■
g.						■	■					
h.						■	■				■	■

1.9 **Previous progress:** Three awareness meetings were organized at Rangabali, Char Osman and Sitakundu Research Stations with coastal rural people for raising nursery and plantation techniques of bamboo, rattan and golpata in the coastal homesteads. A total of 6000 seedlings of rattan, 4000 seedlings (branch cutting) of bamboos and 2000 seedlings of golpata were raised in the nursery at 4 Research Stations. Seedlings of bamboo, rattan and golpata were distributed to the selected coastal farmers. Growth and survival data were collected and compiled.

1.9.1 **Achievements:** Till to date, 1060 coastal homesteads have been selected for introducing bamboo, rattan and golpata. A total of 11,314 seedlings of bamboo, 16564 seedlings of rattan and 9160 seedlings of golpata have been distributed to 1060 coastal homesteads.

1.10 **Financial statement :**

1.10.1 Total cost of the study : Taka 15,00,000.00

1.10.2 Cumulative cost : Taka 9,80,000.00

1.10.3 Cost of the year : Taka 2,00,000.00

1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : FD, NGO and rural farmers.

2. **Study** : Ongoing

2.1 Programme Area : Plantation technique and forest management

2.2 Title of the study : Introduction of major bee foraging mangrove plant species in the coastal belts of Bangladesh.

2.3 Justification (for new study) : NA

2.4 **Objective(s)** :

2.4.1 To develop better silvicultural techniques for plantations for each bee foraging mangrove plant species.

2.4.2 To provide the sources of honey plants.

2.5 **Expected output:** Knowledge on the proper methods and suitable sites for plantations for different bee foraging mangrove species in the coastal belts and providing source of honey for introducing apiculture.

2.6 **Study period** :

2.6.1 Starting year : 2010-11

2.6.2 Completion year : 2014-15

2.7 **Personnel (s)** :

2.7.1 Study leader : S. A. Islam, DO

2.7.2 Associates : M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI

2.8 **Activities for the year:**

- Collection of seeds of khalshi (*Aegiceras corniculatum*) gewa (*Excoecaria agallocha*), goran (*Ceriops decandra*), passur (*Xylocarpus mekongensis*), dhundul (*Xylocarpus granatum*), Choyla (*Sonneratia caseolaris*) and baen (*Avicennia officinalis*).
- Raising 14,000 seedlings of these species at Rangabali, Char Kukri-Mukri, Stakundu and Char Osman Research Stations.
- Raising of 4.0 ha experimental mixed plantations at 4 research stations.
- Maintenance of 14.0 ha experimental plantations raised in previous years.
- Collection 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.												
d.												
e.												

2.9 **Previous progress** : A total of 14,000 seedlings of khalshi, gewa, goran, passur dhundul, hantal and baen have been raised in polybags at Rangabali, Char kukri-Mukri, Sitakundu and Char Osman Research Stations. Four hectares experimental mixed plantations of bee foraging plant species were raised at 4 Research Stations. Data on growth and survival were recorded.

2.9.1 **Achievements** : A total of 14.0 ha experimental mixed plantations of bee foraging plant species have been raised.

2.10 **Financial statement** :

2.10.1 Total cost of the study : Taka 10,00,000.00

2.10.2 Cumulative cost : Taka 7,30,000.00

2.10.3 Cost of the year : Taka 2,00,000.00

2.10.4 Source of fund : GOB

2.11 **Beneficiaries** : FD, NGO and rural farmers.

3 **Study** : Ongoing

3.1 Programme Area : Plantation technique and forest management

3.2 Title of the study : Development of model vegetation to protect soil erosion, salt spray and other climatic changes in the coastal belt of Bangladesh

3.3 Justification (For new study) : NA

3.4 **Objective(s)** :

3.4.1 To develop a better model plantation of suitable species against major climatic changes in the coastal belt of Bangladesh.

3.4.2 To select mangrove species that can tolerate cyclonic and salt hazard.

3.4.3 To increase the coastal forest product.

3.5 **Expected output**: Model vegetation in the coastal belt will be developed against all sorts of climatic hazards.

3.6 **Study period** :

3.6.1 Starting year : 2010-11

3.6.2 Completion year : 2014-15

3.7 **Personnel (s)** :

3.7.1 Study leader : S. A. Islam, DO;

3.7.2 Associates : M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI

3.8 **Activities for the year** :

- Collection of seeds of keora, baen and golpata for newly accreted lands; sundari, kankra, passur, gewa, shingra and khalshi for moderately established lands for raising model plantations.
- Raising 24,000 seedlings of these species at Rangabali, Char kukri-Mukri, Sitakundu and Char Osman Research Stations.
- Raising of 5.44 ha experimental model plantations of these species at 4 Research Stations.
- Establishment of 18 siltation gauge in the experimental plantations for measuring siltation/soil erosion.
- Collection of data on different climatic parameters (siltation, inundation, rain fall etc.) from experimental 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.												

- 3.9 **Previous progress:** Seeds of keora, baen and golpata for newly accreted lands; sundari, kankra, passur, gewa and khalshi for moderately established lands; and karanja, payra, jhao and babla were collected for raised lands for raising model plantations. A total of 18 thousands seedlings of these mangrove and non-mangrove species were raised at Rangabali, Char kukri-Mukri, Char Osman and Sitakundu Research Stations. A total of 4.0 ha experimental plantations were raised at 4 Research Stations.
- 3.9.1 **Achievements:** A total of 14.0 ha experimental plantations have been established at Rangabali, Char kukri-Mukri, Char Osman and Sitakundu Research Stations.
- 3.10 **Financial statement :**
- 3.10.1 Total cost of the study : Taka 20,00,000.00
- 3.10.2 Cumulative cost : Taka 7,35,000.00
- 3.10.3 Cost of the year : Taka 2,50,000.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : Forest Department, coastal farmers, planers and NGOs.

4. **Study** : Ongoing
- 4.1 Programme Area : Conservation of Biodiversity
- 4.2 Title of the study : Ecological succession in the man-made coastal forests in relation to age and other related factors
- 4.3 Justification (For new study) : NA
- 4.4 **Objective(s)** :
- 4.4.1 To observe the changes of vegetation and natural regeneration in the coastal man-made forests.
- 4.4.2 To determine the impact of related climatic factors, which are responsible for the ecological succession in the coastal forests.
- 4.4.3 To increase coastal forest resources of the country.
- 4.5 **Expected output:** Knowledge on the changes of vegetation, geomorphology and natural generation in the coastal man-made forests will be developed for the sustainable management of coastal forest.
- 4.6 **Study period** :
- 4.6.1 Starting year : 2012-13
- 4.6.2 Completion year : 2016-17
- 4.7 **Personnel (s)** :
- 4.7.1 Study leader : S. A. Islam, DO
- 4.7.2 Associates : M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI
- 4.8 **Activities for the year :**
- a) Remarking of previously established 108 TSP plots by replacing poles and painting trees.
- b) Procurement of Refract meter for measuring water/soil salinity.
- c) Recording data on siltation, soil erosion, soil/water salinity, inundation frequency and impact of human and animal interferences.
- d) Collection of growth data of the plantations and status of natural regenerations.

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:** A total of 27 Temporary Sample Plots (TSP) were established at Sitakundu Research Station. Data on growth of planted trees, regeneration status were recorded from the TSPs established at 4 research stations.

4.9.1 **Achievements** : A total of 108 Temporary Sample Plots (TSP) were established at Rangabali, Char kukri-Mukri, Char Osman and Sitakundu Research Stations for assessing ecological succession.

4.10 **Financial statement** :

4.10.1 Total cost of the study : Taka 20,00,000.00

4.10.2 Cumulative cost : Taka 3,35,000.00

4.10.3 Cost of the year : Taka 1,25,000.00

4.10.4 Source of fund : GOB

4.11 **Beneficiaries** : Forest Department, Planers and NGOs

5. **Study** : Ongoing

5.1 Programme Area : Plantation technique and forest management.

5.2 Title of the study : Monitoring and maintenance of existing trial plantations in the coastal areas of Bangladesh.

5.3 Justification (For new study) : NA

5.4. **Objective(s)** :

5.4.1 To assess the growth performance and phenology of different mangrove and non-mangrove species at different char lands.

5.4.2 To develop future seed sources for sustainable coastal forest management.

5.5 **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 for future seed sources for sustainable management of coastal forest.

5.6 **Study period** :

5.6.1 Starting year : 2013-2014

5.6.2 Completion year : 2017-2018

5.7 **Personnel (s)** :

5.7.1 Study leader : S. A. Islam, DO.

5.7.2 Associates : M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI

5.8 **Activities for the year** :

- a. Conservation and maintenance of 30.0 ha older trials of mangrove (25.0 ha), non-mangrove (4.0 ha) and palm (1.0 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 15.0 ha older trials of mangrove and non-mangrove species by weeding, cleaning, climber cutting, fence repairing at 2<sup>nd</sup> time in different islands of Rangabali, and Char Kukri-Mukri, Research Stations.
- c. Collection of data on height, DBH, canopy diameter, bole height and phenology etc. from the experimental plantations once a year.
- d. Compilation and analysis of data.

5.8.1. Activities calendar :

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

5.9 **Previous progress** : -

5.9.1 **Achievemens** : -

5.10 **Financial statement** :

5.10.1 Total cost of the study : Taka 15,00,000.00

5.10.2 Cumulative cost : Taka 3,00,000.00

- 5.10.3 Cost of the year : Taka 2,50,000.00  
 5.10.4 Source of fund : GOB  
 5.11 **Beneficiaries** : Forest Department and adjacent coastal dwellers

6. **Study** : Ongoing  
 6.1 Programme Area : Plantation technique and forest management  
 6.2 Title of the study : Selection of salt tolerant fruit and medicinal tree species in the coastal areas of Bangladesh  
 6.3 Justification (For new study) : NA  
 6.4 **Objective(s)** :  
 6.4.1 To select suitable salt tolerant fruit and medicinal tree species in the coastal areas of Bangladesh.  
 6.4.2 To observe the growth performance of different fruit and medicinal tree species in different sites.  
 6.4.3 To assess the production of fruits in different fruit tree species.  
 6.5 **Expected output** : Site-suitable fruit and medicinal tree species will be selected for the coastal areas of Bangladesh  
 6.6 **Study period** :  
 6.6.1 Starting year : 2013-14  
 6.6.2 Completion year : 2017-18  
 6.7 **Personnel (s)** :  
 6.7.1 Study leader : S. A. Islam, DO  
 6.7.2 Associates : M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI  
 6.8 **Activities for the year** :

- a) Selection of 150 farmer's homesteads (25 from each research station) for raising trial plots in their homegarden at Rangabali, Char Kukri-Mukri, Char Osman, Sitakundu, Head Quarter and Kolatoli (Cox's Bazar) Research Stations.
- b) Raising/purchasing of 8400 seedlings of some major fruit tree species such as coconut, mango, jackfruit, black berry, guava, tamarind, ber, pummelo, hog plant, litchi, elephant apple, indian olive, velvety apple and amloki for 150 homesteads.
- c) Raising of 15000 seedlings of medicinal tree species such as neem, arjun, simul, bohera, gora neem, khoer, katbadam, kadam, sonalu and pitraj
- d) Raising of 5.0 ha experimental plantations of medicinal tree species at 5 Research Stations.
- e) Distribution and Planting of seedlings of fruit tree species in the selected homesteads.
- f) Procurement of soil salinity meter.
- g) Collection of survival and growth data from the experimental plots.
- h) Compilation and analysis of data

6.8.1. Activities calendar :

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

- 6.9 **Previous progress** : -  
 6.9.1 **Achievements** : -

- 6.10 **Financial statement** :
- 6.10.1 Total cost of the study : Taka 20,00,000.00
- 6.10.2 Cumulative cost : Taka 2,50,000.00
- 6.10.3 Cost of the year : Taka 3,25,000.00
- 6.10.4 Source of fund : GOB
- 6.11 **Beneficiaries** : Forest Department, coastal farmers, planers and NGOs.

## WILDLIFE SECTION

1. **Study** : Ongoing
- 1.1 Programme Area : Biodiversity and conservation
- 1.2 Title of the Study : Development and maintenance of wildlife museum
- 1.3 Justification(For new study) : NA
- 1.4 **Objective(s)** :
- 1.4.1 To collect wildlife specimens, preservation and routine care.
- 1.4.2 To preserve wildlife specimens for future demonstration and research
- 1.5 **Expected output:** Enrichment of information on the morphological, taxonomical and ecological aspects of the wildlife resources.
- 1.6 **Study period** :
- 1.6.1 Starting Year : 2011-2012 (2<sup>nd</sup> Phase)
- 1.6.2 Completion year : 2015-2016
- 1.7 **Personnel** :
- 1.7.1 Study Leader : M.A.Rahman, R.O
- 1.7.2 Associates : M. K. Islam, RA (Gr-1); S.M. Mainuddin, (FI)
- 1.8 **Activities for the year** :
- a) Collection of wildlife specimens, preservation and routine cure
- b) Preparation of videos, posters, still pictures of collected wildlife specimen
- 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** : A total of 28 (Twenty eight) wildlife specimens were collected and preserved in the wildlife museum.
- 1.9.1 **Achievement** : NA
- 1.10 **Financial statement** :
- 1.10.1 Total cost of the study : Tk. 5, 00, 000.00
- 1.10.2 Cumulative cost : Tk. 3, 57,216.00
- 1.10.3 Cost of the year : Tk. 27,000.00
- 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries** : Researchers, Students and Teachers of different educational Institutions and Forest Department and NGOs

2. **Study** : Ongoing
- 2.1 Programme Area : Biodiversity and conservation
- 2.2 Title of the Study : Present status of Phayre's leaf monkey (*Trachypithecus phayrei*), Pig-tailed macaque (*Macaca nemestrina*) and Capped leaf



- 2.3 Justification (For new study) : monkey (*Trachypithecus pileatus*) in hill forest of Bangladesh : NA
- 2.4 **Objective(s)** :
- 1.4.1 To evaluate the distributions and population of the non human primate species in hill forest of Bangladesh for sustainable conservation
- 2.5 **Expected output** : Formulation of effective conservation measures for the species in hill forest of Bangladesh.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2012-2013
- 1.6.2 Completion year : 2014 – 2015
- 2.7 **Personnels** :
- 2.7.1 Study leader : M.A. Rahman, R.O
- 2.7.2 Associates : M. K. Islam, RA (Gr-1); S.M. Mainuddin, (FI)
- 2.8 **Activities for the year** :
- a) Determination of distribution and assessment of population of three non-human primates species using sampling surveys and total count methods in Rema-Kalenga WS, Lawachara national park (NP), Satchari NP, Khadimnagar NP.
- b) Report writing and printing.
- 2.81 Activity Calendar :

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

- 2.9 **Previous progress** : Survey was made in Fashiakhali WS, Teknaf NP and Himchari NP, Chittagong. Phayre's leaf monkey (*Trachypithecus phayrei*) and Pig-tailed macaque (*Macaca nemestrina*) were not found in any surveyed area. One troops of Capped leaf monkey (*Trachypithecus pileatus*) consist of 6 (six) member in Fashiakhali WS and other troops consist of 6 (six) member of same species in Teknaf NP
- 2.9.1 **Achievements** : NA
- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk.8, 00,000.00
- 2.10.2 Cumulative cost : Tk.1,87,000.00
- 2.10.3 Cost of the year : Tk.1,23, 200.00
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : Researchers, Students and Teachers of different educational Institutions and Forest Department/NGOs
- 3 **Study** : New
- 3.1 Programme Area : Biodiversity and conservation
- 3.2 Title of the Study : Status of Wildlife in Baraiyadhala National Park, Chittagong
- 3.3 **Justification (For new study)** : Now there are 37 Protected areas (PAs) in Bangladesh. But current status wildlife most of these PAs are not available. In order to formulate effective management of PAs updated and trend of wildlife population is needed. Baraiyadhala National Park and it's adjacent areas are rich in different wildlife species but there is no published information. In this National Park, the existing status of wildlife needs to be present to the visitors coming from home and abroad.
- 3.4 **Objective (s)** :
- 3.4.1 Establishment of Sampling transects based on Google earth map of the site and field visit

- 3.4.2 To evaluate the status of wildlife population in Baraiyadhala National Park.
- 3.5 **Expected Output** : Formulation of effective way to monitoring wildlife status and conservation measures for NP.
- 3.6 **Study Period** :
- 3.6.1 Starting Year : 2014-2015
- 3.6.2 Completion year : 2015-2016
- 3.7 **Personnel:** :
- 3.7.1 Study leader : Sheikh Mohammed 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) Reconnaissance and field visit to establish trails.  
b) Baseline survey for wildlife.  
c) Report writing and printing.
- 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											■	■

- 3.9 **Previous progress** : NA
- 3.9.1 **Achievements** : NA
- 3.10 **Financial statement:** :
- 3.10.1 Total cost of the study : Tk. 4,00,000.00
- 3.10.2 Cumulative cost : -
- 3.10.3 Cost of the year : Tk. 1,49,800.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : FD, Researchers, students and teachers of different educational institutions and NGOs.

## DEVELOPMENT PROJECT

- 1 Study** : Ongoing
- 1.1 Programme Area : Plantation technique and forest management
- 1.2 Title of the Study : Community based adaptation to climate change through coastal afforestation in Bangladesh (CBACC-CF)
- 1.3 **Justification (For new study):** NA
- 1.4 Objective (s)** :
- 1.4.1 To reduce vulnerability of coastal communities to the impacts of climate change-induced risks in four upazilas in the coastal districts of Borguna and Patuakhali (Western region), Bhola (Central region), Noakhali (Central region), and Chittagong (Eastern region).
- 1.5 **Expected Output** : Promotion of climate-resilience development in the coastal areas of Bangladesh.
- 1.6 **Study Period** :
- 1.6.1 Starting Year : 2009-2010
- 1.6.2 Completion year : 2014-2015
- 1.7 **Personnel:** :
- 1.7.1 Study leader : S. A. Islam, DO/DPD
- 1.7.2 Associates : M.G. Moula, RO; M.A. Habib, FI, M. G. Rasul, FI & M.A.Q. Miah, FI

**1.8 Activities for the year:**

- a) Collection of seeds of 08 mangrove species.
- b) Raising of 200,000 seedlings of these species in polybags with the participation of contractual farmers at Char kukri- Mukri Research Stations.
- c) Selection and preparation of sites for the establishment of 60 ha model demonstration plantations at Char kukri-Mukri islands.
- d) Raising of 60 ha model demonstration plantations of these species at Char kukri-Mukri islands.
- e) Maintenance of previously raised 100 ha model plantations.
- f) Collection of survival, growth and siltation data from the model demonstration plantations.

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** : A total of 120 thousand seedlings of these species were raised in polybags with the participation of contractual farmers at Char kukri-Mukri and Hatia. Fourty ha model demonstration plantations were established with these species at Char kukri-Mukri and Hatia islands. Previously raised 55 ha model plantations planted in 2009 and 2010 were maintained.

- 3.9.1 **Achievements** : A total of 160 ha model demonstration plantations have been established under keora plantations at different locations of Char Kukri-Mukri and Hatia islands.

- 3.10 **Financial statement:** :
- 3.10.1 Total cost of the study : Tk. 95,65,000.00
- 3.10.2 Cumulative cost : Tk. 67,30,000.00
- 3.10.3 Cost of the year : Tk. 12,00,000.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : FD and adjacent coastal dwellers.

## FOREST PRODUCTS WING

### VENEER AND COMPOSITE WOOD PRODUCTS DIVISION

- 1.0 **Study** : On-going
- 1.1 Programme area : Post Harvest Utilization -Physical Processing
- 1.2 Title of the study : **Design and fabrication of furniture using bamboo composites.**
- 1.3 Justification : NA
- 1.4 **Objective(s)** :
- 1.4.1 To assess the potential of bamboo composites for making quality furniture.
- 1.4.2 To assess the economic feasibility of commercially valuable furniture made of bamboo composites.
- 1.5.0 Expected output : Development of cost effective technology for manufacturing bamboo composite furniture.
- 1.6.0 Study period
- 1.6.1 Starting year : 2005-06
- 1.6.2 Completion year : 2014-15
- 1.7.0 **Personnel(s)** :
- 1.7.1 Study Leader : Dr. K. Akhter, DO
- 1.7.2 Associates : M. M. Rahaman, RO; M. Rakibul Islam, F.I.
- 1.8.0 **Activities for the year :**
- a. Visit to Bamboo plantation area and furniture shop & industries (Dhaka, Thakurgaon and Panchagor)
  - b. Improvement of furniture design.
  - c. Procurement of bamboo culms (*Bambusa vulgaris/Bambusa balcooa*)
  - d. Preparation and processing of bamboo mats, bamboo strips.
  - e. Manufacture of furniture components.
  - f. Manufacture of one bed and one bed side table using bamboo panel and bamboo mat overlaid particleboard.
  - g. Calculation of manufacturing cost.
- 1.8.1 Activities calendar :

Activities (as per 1.9)	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a												
b												
c												
d												
e												
f												
g												

- 1.9.0 Previous progress :
- a. Different types of composite products such as, bamboo mat wood veneer board, bamboo ply and flattened bamboo ply were made using muli (*Melocanna baccifera*) bamboo. One chair, one shelf and one table were prepared and kept for service test.
  - b. Bamboo mat overlaid particleboard and bamboo ply were made using bhajjia (*Bambusa vulgaris*) bamboo. Twelve molded chairs and two tables were made and distributed for popularizing the technology.
  - c. Four molded chairs were made using bamboo mat wood veneer and bamboo ply and

- kept in service test. One armed chair was made by bamboo mat overlaid particleboard and bamboo ply and kept in service test
- d. Twelve molded chairs and three tables were fabricated by composite products of borak (*Bambusa balcooa*) bamboo and kept in Director's office, CRO's office, BFRI show-rooms, Dhaka and Chittagong, as exhibits for dissemination of the technology.
  - e. Two shelves, one dining table and four chairs were fabricated using composite product of bhajjia bamboo and kept for service test in VCWP Division.
  - f. Four armed chairs and one almirah were fabricated using bamboo particle board and bamboo Ply.
  - g. Two single sofa and one three seated sofa were prepared using bamboo ply and one computer table was prepared using bamboo ply and bamboo strips overlaid particle board. The furniture are kept in VCWP division for service test
  - h. Four molded chair, two tea tables were made using bamboo ply. One dressing table and one reading table were made using bamboo ply and bamboo strips overlaid particle board. The bamboo composite furnitures are kept in VCWP division for service test.
  - i. One sofa set were made using bamboo mat overlaid particleboard and are kept in VCWP division for service test.
  - j. One dinning table and four dinning chair using bamboo mat overlaid particleboard were made and are kept in VCWP division for service test.
- 1.9.1 Achievement(s) : Bamboo composites can be used as furniture materials which can be promoted to exportable commodity.
- 1.10 **Financial statement** :
- 1.10.1 Total cost of the study : Tk. 9,50,000.00
  - 1.10.2 Cumulative cost : Tk. 8,45,000.00
  - 1.10.3 Cost of the year : Tk. 1,04,000.00
  - 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries:** Furniture industries, Plywood and particleboard industries, farmers/bamboo growers, general people, village women, NGOs.
- 2.0 **Study** : On-going
- 2.1 Programme area : Post Harvest Utilization -Physical Processing
- 2.2 Title of the study : Studies on particleboard made of rubber wood (*Hevea brasiliensis*), gol pata (*Nipa fruticans*) and raj koroï wood (*Albizia richardiana*).
- 2.3 Justification (For new study) :
- 2.4.0 **Objective(s)** :
- 2.4.1 To determine the suitability of making particleboard in mixed wood species
- 2.5 **Expected output:** Maximum utilization of rubber wood (*Hevea brasiliensis*), gol pata (*Nipa fruticans*) and raj koroï wood (*Albizia richardiana*) by making particleboard of mixed wood species
- 2.6 Study period :
- 2.6.1 Starting year : 2013-14
  - 2.6.2 Completion year : 2014-15
- 2.7.0 **Personnel(s)** :
- 2.7.1 Study Leader : M. M. Rahaman, RO
  - 2.7.2 Associates : Dr. K. Akhter, DO; & M. Rakib Islam, F.I.
- 2.8.0 Activities for the year :
- a) Preparation of dry chips.
  - b) Manufacturing of particleboard

- c) Preparation and conditioning of test sample.
- d) Determination of strength properties
- e) Visit to particleboard industry Dhaka
- f) 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								■	■	■	■	■
f											■	■

2.9.0 **Previous progress:** Raw materials were collected. Logs were peeled using veneer Lathe machine. Knife angle and pressure bar were adjusted for 1.5 mm thickness veneer. Veneers were dried up to suitable moisture (8%) content

2.9.1 Achievement(s) : NA

2.10 **Financial statement** :

2.10.1 Total cost of the study : Tk 2, 50,000.00

2.10.2. Cumulative cost : Tk 85,000.00

2.10.3 Cost of the year : Tk. 1,30,500.00

2.10.4 Source of fund : GOB

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

3. **Study** : New

3.1 Programme area : Post Harvest Utilization -Physical Processing

3.2 Title of the study : Development of doors and partition using bamboo composite products.

3.3 Justification: Forests of Bangladesh cannot meet the demand of wood base industries of the country. It 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. Most of the commercially valuable tree species are slow growing. To minimize the gap between demand and supply of wood, it is important to replace wood with a fast growing appropriate substitute. Bamboo is the most potentially important non-timber forest product which can replace wood in construction and other uses. It is appropriate substitute of wood which is versatile and highly renewable material. It is fast growing and can harvest within 3 years. It is comparatively cheap and has a tremendous growth potential in rural areas. Every household of Bangladesh 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. Research has been carried out at Bangladesh Forest Research Institute to increase the service life of bamboo and to develop new value added bamboo composites. Some of the important products have already been developed are Bamboo Particle Board, Bamboo Mat Board, Bamboo Cement Composite, Bamboo Laminated Panel. Bamboo Laminated Panel is crack and deformation resistant and strength property is comparable to teak. The panel is suitable for making furniture, flooring and interior decoration. Bamboo composite furniture is well decorative and comfortable. These have been fabricated using bamboo strips, bamboo panel, bamboo mat board, and bamboo mat overlaid veneer board and bamboo mat overlaid particleboard. The present study is undertaken to develop doors and partition using bamboo composite products.

Manufacture of doors and partition using bamboo composites instead of wood will decrease the pressure on wood and thus will conserve forests.

3.4. **Objective(s)** :

3.4.1 To assess the potential of bamboo composites for making doors and partition.

3.4.2 To evaluate the economic feasibility of doors and partition made of bamboo composites

3.4.3 To disseminate the information to the end-users

3.5 **Expected output:**

a) Development of cost effective technology for manufacturing doors and partition using bamboo composites.

b) Decrease the pressure on valuable timber

c) Creation of income-generating opportunities for bamboo growers

d) Improvement of livelihood of the rural people.

3.6 Study period

3.6.1 Starting year : 2014-15

3.6.2 Completion year : 2018-19

3.7.0 **Personnel(s)** :

3.7.1 Study Leader : Dr. K. Akhter, DO

3.7.2 Associates : M.M. Rahaman, RO; & M.Rakib Islam, F.I.

3.8.0 Activities for the year :

a) Visit to Bamboo plantation area (Cox's Bazar and Nilfamari).

b) Selection of design of doors and partition

c) Procurement of bamboo culms (*Bambusa vulgaris/Bambusa balcooa*).

d) Preparation and processing of bamboo mats, bamboo strips

e) Manufacture of bamboo composites

f) Manufacture of one door and one partition using bamboo composites

g) Visit to Bamboo product shop & industries (Rangamati and Dhaka)

h) Calculation of manufacturing cost

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												

3.9.0 **Previous progress** : NA

3.9.1 Achievement(s) :NA

3.10 **Financial statement** :

3.10.1 Total cost of the study : Tk 6,00,000/-

3.10.2. Cumulative cost : Tk NA

- 3.10.3 Cost of the year : Tk. 1,25,000/-  
 3.10.4 Source of fund : GOB  
 3.11 **Beneficiaries:** Door & windows industries, Bamboo/wood plywood and particleboard industries, farmers/bamboo growers, construction company, general people, village women, NGOs

4. **Study** : New  
 4.1 Programme area : Post Harvest Utilization -Physical Processing  
 4.2 Title of the study : Suitability of manufacturing medium density fiberboard (MDF) using *Acacia* hybrid and rubber wood (*Hevea brasiliensis*).  
 4.3 Justification : 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. Rubber wood is used for making furniture and doors and windows. The stem and branches of rubber trees are used as fuel wood or remain unused. The aim of the study is to determine the suitability of manufacturing medium density fiberboard (MDF) from stem and branches of rubber wood (*Hevea brasiliensis*) and *Acacia* hybrid which will reduce pressure on wood and other composite products.

- 4.4. **Objective(s)** :  
 4.4.1 To determine the suitability of medium density fiberboard (MDF) made from stem and branches of rubber wood (*Hevea brasiliensis*) and *Acacia* hybrid  
 4.5 **Expected output:** Maximum utilization of rubber wood and *Acacia* hybrid for manufacturing medium density fiberboard (MDF)..

- 4.6 Study period  
 4.6.1 Starting year : 2014-15  
 4.6.2 Completion year : 2016-17  
 4.7.0 **Personnel(s)** :  
 4.7.1 Study Leader : M.M. Rahaman, RO  
 4.7.2 Associates : Dr. K. Akhter, DO; & M.Rakib Islam, F.I.

- 4.8.0 Activities for the year :  
 a) Review of literature.  
 b) Collection of rubber stem and branches  
 c) Processing of raw materials.  
 d) Visit particleboard industries (Kustia and Dhaka)  
 4.8.1 Activities :  
 calendar

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

- 4.9.0 **Previous progress** : NA  
 4.9.1 **Achievement(s)** :NA



- 4.10 **Financial statement** :
- 4.10.1 Total cost of the study : Tk 3,50,000/-
- 4.10.2. Cumulative cost : Tk NA
- 4.10.3 Cost of the year : Tk. 90,000/-
- 4.10.4 Source of fund : GOB
- 4.11 **Beneficiaries:** Wood merchants, plywood and particleboard industries/ BFIDC & NGOs

### 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 : Potential uses of treated round bamboo for making quality furniture.
- 1.3 **Justification:** NA
- 1.4 **Objectives** :
- 1.4.1 To establish round bamboo as a quality furniture material after preservative treatment
- 1.4.2 To improve the design and quality of bamboo furniture.
- 1.4.3 To increase the uses of bamboo for making furniture as an alternative to timber.
- 1.5 **Expected output** : Better utilization of bamboo as furniture materials.
- 1.6 **Study period** :
- 1.6.1 Starting year : 2011-12
- 1.6.2 Completion year : 2015-16
- 1.7 **Personnel(s)** :
- 1.7.1 Study leader : Ramiz Uddin, DO
- 1.7.2 Associates : N A Mridha, RO; M.Ashaduzzaman Sarker,RO & T K Dey, RA-1
- 1.8 **Activities for the year** :
- a) Collection of research materials.
- b) Treatment of the bamboo by 10% borax-boric acid (5% borax + 5% boric + 90% water) solution.
- c) Manufacture of fifteen seat benches, fifteen high benches, five tables, five chairs and one cot.
- d) Arrangement of two days training programme on quality furniture making by round bamboo for representatives of bamboo based cottage industries and bamboo artisans at Tangail.
- e) Cost comparison of the furniture
- 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: Two chairs, two tea tables, three alna, one single seat sofa and one double seat sofa were manufactured by Rangoon bamboo and put under service test.

1.9.1 **Achievement** : Thick and thin walled bamboo species produce quality furniture.

1.10 **Financial statement** :

1.10.1 Total cost of the study : Tk 6,50,000/-

1.10.2 Cumulative cost : Tk 2,00,000/-

1.10.3 Cost of the year : Tk 1,04,000/-

1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : General public, Bamboo based cottage industries, NGOs.

2. **Study** : New

2.1 Programme Area : Post harvest utilization-Physical Processing.

2.2 Title of the Study : Survey and improvement of sawing technique of different wood species for maximum yield.

2.3 **Justification** : The importance of sawmilling sector cannot be underplayed, as the use of wood products is increasing and subsequently wood based industries are expanding rapidly in Bangladesh. The conversion of round log into sawn-timber requires many steps from the moment when it arrives at sawmill. Problems that arise from conventional sawing practices include low yields and less than adequate timber quality, all of which results increase loses of timber resources. The aim of this study is therefore to fix 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 with sawing unit throughout the country.

2.4 **Objective(s)** :

2.4.1 To determine the cause of timber loss during sawing

2.4.2 To maximize the yields of timber by applying improved sawing techniques.

2.5 **Expected output** :

-Application of improved sawing technique

-Minimizing sawing wastage and maximizing yield.

2.6 **Study period** :

2.6.1 Starting year : 2014-15

2.6.2 Completion year : 2017-18

2.7 **Personnel(s)** :

2.7.1 : M.Ashaduzzaman Sarker,RO

1.7.2 Associates : Ramiz Uddin, DO; N A Mridha, RO & T K Dey, RA-1

2.8 **Activities for the year** :

a) Collection of mango logs and other materials.

b) Visit to sawmill at two locations, namely- Dhaka and Chittagong.

c) Collection of data on present sawing status from saw mill for low, moderate and high density wood species.

d) Collection of data on timber grade variation among the different density groups from timber based industries and wholesale timber shops.

e) Implementation of different sawing techniques and Collection of data on those techniques

f) Analysis and reporting

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 : NA  
 2.9.1 Achievement : NA  
 2.10 **Financial Statement** :  
 2.10.1 Total cost of the study : Tk. 6,00,000.00  
 2.10.2 Cumulative cost : Tk.  
 2.10.3 Cost of the year : Tk. 96,000.00  
 2.10.4 Source of Fund : GOB  
 2.11 **Beneficiaries** : Sawmill owners, timber traders, timber users, BFIDC and FD

### Seasoning and Timber Physics Division

1. **Study** : On-going  
 1.1 Programme area : Post harvesting utilization- physical processing.  
 2.2 Title of the study : Studies on solar kiln for efficient seasoning of different thicknesses of wood.  
 1.3 Justification :  
 1.4 **Objective (s)** :  
 1.4.1 To determine the seasoning characteristics of wood of different thicknesses.  
 1.5 **Expected output** : Application of solar kiln for effective seasoning of wood of different thicknesses.  
 1.6 **Study period** :  
 1.6.1 Starting year : 2011-2012  
 1.6.2 Completion year : 2015-2016  
 1.7 Personnel(s) :  
 1.7.1 Study leader : M. Rowson Ali, RO  
 1.7.2 Associates : Md. Jahangir Alam, DO and U. K. Rokeya, RO  
 1.8 **Activities for the year** :  
 a) Selection of three standing trees of mango (*Mangifera indica*) and three standing trees of *Hybrid acacia* in the southern part of Bangladesh and collection of 80 cft. round wood for preparation of 122-183 cm x 25-30 cm x 2.5-4.0-5.0 cm size planks.  
 b) Testing of 60 sample planks for determination of seasoning efficiency in two seasoning conditions (air drying and solar kiln)  
 c) Maintenance of two solar kilns through repairing and painting.  
 d) 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												

- 1.9 Previous progress if any : Seasoning schedule of ghora-neem (*Melia azadarach*) and rain tree (*Samanea saman*) wood in three conditions (air dry, solar kiln and solar kiln with burner) and Seasoning schedule of silkoroi (*Albizia procera*) wood in two conditions (air dry and solar kiln) were determined  
 1.9.1 Achievement (s), if any :  
 1.10 **Financial statement** :

- 1.10.1 Total cost of the study : Tk.7, 84,550.00  
 1.10.2 Cumulative cost : Tk. 4, 12,300.00  
 1.10.3 Cost of the year : Tk. 1, 62,000.00  
 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 : Training and technology transfer.  
 2.2 Title of the study : Entrepreneurship development of solar kiln technology to the stakeholders for efficient seasoning of wood.  
 2.3 Justification :  
 2.4 **Objective (s)** : To disseminate solar kiln technology to the wood traders, furniture makers and wood based cottage industries  
 2.5 Expected output (quantify) : Capacity building and developed knowledge in solar kiln technology for drying of wood  
 2.6 Study period :  
 2.6.1 Starting year : 2014-2015  
 2.6.2 Expected completion year : 2014-2015  
 2.7 Personnel (s) :  
 2.7.1 Project leader : Md. Jahangir Alam DO  
 2.7.2 Associates : M. Rowson Ali RO and U. K. Rokeya RO  
 2.8 Activities for the year :  
 a) Selection of stakeholders/trainee in different areas of Bangladesh (Meherpur, Rangamati, Khulna and Madaripur)  
 b) Preparation of training materials  
 c) Arrangement of training programme  
 d) Collection of information and sharing of knowledge with stakeholders  
 e) 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 if any :  
 2.9.1 Achievement (s), if any : NA  
 2.10 Financial statement :  
 2.10.1 Total cost of the study : Tk. 79,400.00  
 2.10.2 Cumulative cost : Tk.  
 2.10.3 Cost of the year : Tk. 79,400.00  
 2.10.4 Source of fund :  
 2.11 Beneficiaries : FD, BFIDC, Wood based Industries, Universities and other disciplines of BFRI.

3. **Study** : On-going  
 3.1 Programme area : Post harvesting utilization-physical processing  
 3.2 Title of the study : Studies on physical and mechanical properties of *palmyra palm (Borassus flabellifer)* wood

- 3.3 Justification :
- 3.4 Objective (s) :
- 3.4.1 To investigated the physical and mechanical properties of *palmyra* palm wood for appropriate use.
- 3.5 Expected output: Determination of physical and mechanical properties of *palmyra* palm wood for its appropriate use.
- 3.6 Study period :
- 3.6.1 Starting year : 2013-2014
- 3.6.2 Completion year : 2014-2015
- 3.7 Personnel (s) :
- 3.7.1 Study leader : U. K. Rokeya, RO
- 3.7.2 Associates : Md. Jahangir Alam, DO and M. Rowson Ali, RO
- 3.8 Activities for the year (with quantifiable indicator) :
- a) Preparation of 250 samples for testing physical and mechanical properties in air-dry condition.
- b) Determination of the physical and mechanical properties of *palmyra* palm woods in air-dry conditions following ASTM (American Society for Testing Materials) standards.
- c) Data analysis and report writing.
- 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 : 40 cft. round log were collected from Bandarban and. Data were taken for measuring physical and mechanical properties in green condition
- 3.9.1 Achievement (s), if any : NA
- 3.10 Financial statement :
- 3.10.1 Total cost of the study : Tk.1,20,000/-
- 3.10.2 Cumulative cost : Tk.78,600/-
- 3.10.3 Cost of the year : Tk 9.000/-
- 3.10.4 Source of fund :GOB
- 3.11 Beneficiaries : FD, BFIDC, Wood based Industries, Universities and BFRI.

### PULP AND PAPER DIVISION

1. **Study** : On-going
- 1.1 Programme Area : Post Harvest Utilization – Chemical Processing
- 1.2 Title of the study : Production of high yield pulp from bagasse, wastes of sugar mill of Bangladesh
- 1.3 Justification (For new study): Not applicable
- 1.4 **Objective (s)** :
- 1.4.1. To improve pulping process for production of high yield pulp
- 1.5 Expected output : Proper supplementation of the raw material would be enhanced
- 1.6 **Study period** :
- 1.6.1 Starting year : 2010-11

- 1.6.2 Completion year : 2014-15
- 1.7 **Personnel(s)** :
- 1.7.1 Study Leader : Dr. Daisy Biswas, DO
- 1.7.2 Associates : Md. Misbahuddin, FI ; Urboshi Roy, FI. & Nazma Khatun, RO
- 1.8 Activities for the year :
- a) Preparation of hand sheets of pulp made from bagasse by KOH-MAQ process
- b) Evaluation of physical strength properties of the prepared hand sheets.
- c) Reporting of findings
- 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, if any : Bagasse sample was collected from Faridpur Sugar Mills Ltd., Modhukhali, Faridpur. The bagasse was depithed in hydropulper prior pulping to minimize the problems arises during pulping like requirement of high cooking chemical, inferior quality of pulp and poor black liquor properties. Then the pulps were prepared in 1M NH<sub>3</sub> solution with five different doses viz., 11,13,15,17 and 19% of KOH.. The kappa number and yields were measured. The yields remain 60 to 62%. Kappa number reduced with the increased of KOH.
- 1.9.1 Achievements, if any: Delignification was found easiest at highest level of KOH
- 1.10 **Financial statement** :
- 1.10.1 Total cost of the study : Tk. 2,50,000
- 1.10.2 Cumulative cost : Tk. 2,00,000
- 1.10.3 Cost of the year : Tk. 50,000
- 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries** : Pulp and Paper Industries

2. **Study** : On-going
- 2.1 Programme area : Post Harvest Utilization – Chemical processing
- 2.2 Title of the study : Oxygen delignification of kraft pulp of stem and branches of rubber tree (*Hevea brasiliensis*)
- 2.3 Justification : Not applicable
- 2.4 **Objective(s)** :
- 2.4.1 To investigate the bleaching response of rubber pulp for using as high quality paper.
- 2.5 Expected output: High quality pulp for making printing and writing paper.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2011-12
- 2.6.2 Completion year : 2015-16
- 2.7 **Personnel(s)** :
- 2.7.1 Study Leader : Dr. Daisy Biswas, DO

2.7.2 Associates : Md. Misbahuddin, FI ; Urboshi Roy, FI. & Nazma Khatun, RO

2.8 Activities for the year :

- a) Bleaching of the prepared pulp with oxygen at 110PSI by maintaining 80 and 110°C temperature
- b) Determination of kappa number and yield
- c) Preparation of hand sheets of bleached pulp.
- d) Evaluation of physical strength properties of hand sheets
- e) Reporting of findings.

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, if any:** Bleachable grade kraft and soda pulp from stem and branch of rubber wood were prepared. The colour of the pulp of rubber stem is more brownish compared to branch. There were some hardened rubber particle was found during stem pulp washing. It seemed that during cooking the latex leached out from the chips and on cooling it became hardened. Some bleaching experiments were done at 110 psi oxygen pressure for 60 min. at 95°C. It was found that the kappa number reduced from 27 to 16 for stem pulp and 18 to 12 for branch pulp. Hand sheets from bleached stem pulp were made.

1.9.1 Achievements, if any : Delignification was found easier in case of branches compared to stem

2.10 **Financial statement** :

2.10.1 Total cost of the study : Tk. 3,00,000

2.10.2 Cumulative cost : Tk. 1,95,000

2.10.3 Cost of the year : Tk. 50,000

2.10.4 Source of fund : GOB

2.11 **Beneficiaries** : Pulp and Paper Industries

3. **Study** : On-going

3.1 Programme area : Post Harvest Utilization – Chemical processing

3.2 Title of the study : **Production of nano composite from fibers of *Acacia* hybrid and simul (*Bombaxceiba*) tree species of Bangladesh**

3.3 Justification (For new study) : NA

3.4 **Objective (s)** :

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

3.4.2 To produce ethanol and environment friendly packaging materials.

3.5 Expected output :

-Better utilization of pulping raw materials as environment friendly value added product.

- Ensure rational utilization of species.

3.6 **Study period** :

- 3.6.1 Starting year : 2013-14  
 3.6.2 Completion year : 2017-18  
 3.7 **Personnel(s)** :  
 3.7.1 Study Leader : Md. Misbahuddin, FI.  
 3.7.2 **Associates:** Dr. 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  
 3.8 **Activities for the year** :  
 a) Determination of chemical constituent of the species.  
 b) Preparation of kraft pulp.  
 c) Determination of kappa number and yield.  
 d) Preparation and characterization of nanocellulose from pulp/wood  
 3.8.1 Activities calendar

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

- 3.9 **Previous progress, if any:** The freshly cut *Acacia* hybrid tree was collected from Banshkhali, Chittagong with bark on. These were debarked and chipped using a laboratory chipper. The chips 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.  
 3.9.1 Achievements, if any : Nil  
 3.10 **Financial statement** :  
 3.10.1 Total cost of the study : Tk. 25,00,000  
 3.10.2 Cumulative cost : Tk. 1,50,000  
 3.10.3 Cost of the year : Tk. 1,50,000  
 3.10.4 Source of fund : GOB  
 3.11 **Beneficiaries** : Pulp, Paper and Pharmaceutical Industry.

4. **Study** : New  
 4.1 Programme area : Post Harvest Utilization – Chemical processing  
 4.2 Title of the study : Suitability of *Acacia* hybrid and rubber tree (*Hevea brasiliensis*) for making hardboard.  
 4.3 Justification (For new study) : *Acacia mangium* and *Acacia auriculiformis* were introduced in Bangladesh as shade tree in tree gardens. At present thousands of hectares of these species have been planted by Forest Department and also local people. The cross pollination of these species results *Acacia* hybrid. It is a fast growing medium sized leguminous tree. The species is more productive than either of the parent species. In Bangladesh it has very limited use. Bangladesh Forest Research Institute has been conducting research to determine its end uses. To this end, hardboard making study is undertaken for knowing the suitability of the species  
 4.4 **Objective (s):**  
 4.1. To investigate the suitability of *Acacia* hybrid and rubber tree (*Hevea brasiliensis*)



- for making hardboard
- 4.5. Expected output : Supplement lignocellulosic raw material for making hardboard.
- 4.6. **Study period** :
- 4.6.1. Starting year : 2014-15
- 4.6.2. Completion year : 2016-17
- 4.7. **Personnel(s)** :
- 4.7.1. Study Leader : Nazma Khatun, RO
- 4.7.2. Associates : Md. Misbahuddin, FI; Urboshi Roy, FI & Daisy Biswas, DO
- 4.8. Activities for the year :
- a) Processing of chips.
- b) Making hardboard at different freeness level.
- c) Reporting
- 4.8.1. Activities calendar

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

- 4.9. Previous progress, if any : Nil
- 4.10. Achievements, if any : Nil
- 4.11. **Financial statement** :
- 4.10.1. Total cost of the study : Tk. 3,00,000
- 4.10.2. Cumulative cost : Tk. Nil
- 4.10.3. Cost of the year : Tk. 1,00,000
- 4.10.4. Source of fund : GOB
- 4.11. **Beneficiaries** : Hard board Industry and local people

### Wood Preservation Division

1. **Study** : On-going
- 1.1. Programme area : Post Harvest Utilization – Chemical processing
- 1.2. Title of the study : Investigation of preservative chemicals leaching from treated materials in water and soil.
- 1.3. Justification : NA
- 1.4. **Objective (s)** :
- 1.4.1. To investigate the water and soil contamination due to preservative treatment
- 1.4.2. To disseminate the information to the end-users
- 1.5. **Expected output:** Information for the wood & bamboo users, betel leaf farmers, general public and cottage industries
- 1.6. **Study period** :
- 1.6.1. Starting year : 2012 – 2013
- 1.6.2. Completion year : 2014 – 2015
- 1.7. **Personnel(s)** :
- 1.7.1. Study Leader : Dr. Khurshid Akhter, DO.
- 1.7.2. Associates : Md. Matiar Rahman, Ass. Soil Scientist; Abdus Salam, RO & Mozammel Hoque Chy, RO.

- 1.8 **Activities for the year** :
- Collection of soil & water samples from experimental sites.
  - Preparation of soil & water samples at BFRI, Chittagong.
  - Analysis of water and soil samples at Bangladesh Agriculture Research Institute, Gazipur.
  - 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.													

1.9 **Previous progress, if any** : Treated bamboo sticks were supplied in betel leaf farm at Barisal and Gybanda. Soil and water samples were collected from betel leaf farm at Barisal and Gybanda. Soil and water samples were prepared at BFRI and analyzed in soil science division, Bangladesh Agriculture Research Institute (BARI) to investigate the presence of preservative chemicals.

- 1.9.1 Achievement, if : NA
- 1.10 **Financial statement** :
- 1.10.1 Total cost of the study :Tk. 4,50,000/-
- 1.10.2 Cumulative cost :Tk 2,80,000/-
- 1.10.3 Cost of the year :Tk. 1,19,000/-
- 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries** : REB, PDB, BFIDC, betel leaf farmers and general public

2. **Study** : On-going
- 2.1 Programme area : Post Harvest Utilization – Chemical processing
- 2.2 Title of the study : Treatability and natural durability of bhudum (*Dendrocalamus giganteus*) bamboo species.
- 1.3 Justification : NA
- 2.4 **Objectives(s)** :
- 2.4.1 To develop treating schedule for preservative treatment.
- 2.4.2 To determine outdoor service life of bamboo species treated with CCB preservative
- 2.4.3 To disseminate the information to the end-users.
- 2.5 **Expected output:** Generate information related to preservative treatment for the bamboo users, betel leaf farms, general public and cottage industries.
- 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 : Mozammel Hoque Chy, R O.
- 2.7.2 Associates : Abdus Salam, R O.; Dr. Khurshid Akhter, D O
- 2.8 Activities for the year :
- Procurement of CCB preservative, chemicals, treatment materials, bhudum (*Dendrocalamusgiganteus*) bamboo.
  - Processing of bamboo and preparation of samples for soaking process.
  - Treatment of samples with 10 % ( CCB ) solution by soaking method.
  - Installation of treated and untreated samples in stake yards at BFRI campus & PTU

Campus, Barisal for service test.

- e) Collection of data from previously installed rajkoroi (*Albiziarichardiana*) wood, rubber wood (*H. brasiliensis*) wood, lambu (*Khaya* Sp.) wood, baijja (*Bambusa vulgaris*) bamboo, borak (*Bambusa balcooa*) bamboo, muli (*Melocanna baccifera*) bamboo samples at BFRI & Barisal stake yard which were treated with preservatives..
- f) Determination of penetration & retention
- g) Analysis of data. & 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.												
g.												

2.9 Previous progress : Bhudum (*Dendrocalamus giganteus*) bamboo were treated by sap-displacement method. Retention & penetration of preservative chemicals were determined.

2.9.1 Achievement(s),if any : NA

2.10 **Financial statement** :

2.10.1 Total cost of the study : Tk. 6,00,000/-

2.10.2 Cumulative cost : Tk. 1,40,000/-

2.10.3 Cost of the year : Tk. 1,05,000/-

2.10.4 Source of fund : GOB

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

3. **Study** : New

3.1 Programme Area : Post Harvest Utilization –Chemical Processing

3.2 **Title of the Study** : **Extension of preservation treatment technology to the end- users..**

3.3 **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

3.4 **Objectives** :

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

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

3.5 **Expected output.**

- a) Increase the use of treatment technology .
- b) Development of local entrepreneurship which will provide employment generation.
- c) Conserve the forest resources

3.6 **Study period** :

3.6.1 Starting year : 2014-2015

3.6.2 Completion year : 2016-2017

3.7 **Personnels** :

3.7.1 Study Leader : Abdus Salam, R O

3.7.2 Associates : Dr. Khurshid Akhter, DO; Md. Anisur Rahman, SRO; & Mozammel Hoque Chy, R O.

3.8 **Activities for the year** :

- a) Procurement of raw materials, chemicals and other inputs.
- b) Treatment of demonstration materials for training and motivation programme.
- c) Arrangement of training and motivational activities in Rajshahi and Sitakundu  
Monitoring of service life of previously established experiments in betel leaf & vegetable farms in Barisal and Gybanda.
- d) Distribution of 2000 nos. treated bamboo sticks at Rajshahi and Sitakundu betel leaf & vegetable farm.
- e) 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.												

3.9 Previous progress, if any : NA.

3.9.1 Achievement(s),if any : NA.

3.10 **Financial statement** :

3.10.1 Total cost of the study : Tk.6,00,000/-

3.10.2 Cumulative cost : Tk.

3.10.3 Cost of the year : Tk.2,00,000/-

3.10.4 Source of fund : GOB

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

4. **Study** : New

4.1 Programme Area : Post Harvest Utilization –Chemical Processing

4.2 **Title of the Study** : **Durability assessment of byajja (*Bambusa vulgaris*) and borak (*Bambusa balcooa*) after water treatment..**

4.3 Justification : Preservative chemicals are used to enhance the durability of wood/ bamboo and wood /bamboo products. Such chemicals are Copper sulphate, Sodium dichromate, Boric Acid, Borax etc. Although these preservatives are useful to protect bamboo and wood from bio-deterioration. But environmental pollution is related with those chemicals. Water treatment is traditional method which

decrease the attack of bio- deteriorating agent. But the period of immersion and extent of attack are need to be investigated. It was observed that starch content is related with the durability which increase the borer attack of bamboo. The present study is undertaken to investigate the starch content and durability of bamboo after water treatment without using preservative chemicals.

- 4.4 **Objectives** :
- 4.4.1 To develop the process of water treatment.
- 4.4.2 To determine the lignin content after water treatment
- 4.4.3 To investigate the effectiveness of water treatment against the wood degrading agents.
- 4.5 **Expected output** :
- a) Development of environmental friendly treatment process
- b) Increase the service life of wood, bamboo and other lignocellulosic material.
- c) Decrease the pressure on forest resources.
- 4.6 **Study period** :
- 4.6.1 Starting year : 2014-2015
- 4.6.2 Completion year : 2016-2017
- 4.7 **Personnel(s)** :
- 4.7.1 Study Leader : Dr. Khurshid Akhter, DO
- 4.7.2 Associates : Md. Anisur Rahman, SRO; Abdus Salam, R O & Mozammel Hoque Chy, R O.
- 4.8 **Activities for the year** :
- a) Procurement of bamboo of different age.
- b) Processing of bamboo samples of different size.
- c) Immersion of bamboo under water for different time period at 30,60,90,120,150 and 180 days interval.
- d) Preparation of product and kept for service test.
- e) Observation and Collection of data.
- f) Analysis and 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.						█	█	█	█			

- 4.9 Previous progress, if any : NA.
- 4.9.1 Achievement(s),if any : NA.
- 4.10 **Financial statement** :
- 4.10.1 Total cost of the study : Tk.2,40,000/-
- 4.10.2 Cumulative cost : Tk.
- 4.10.3 Cost of the year : Tk. 1,04,000/-
- 4.10.4 Source of fund : GOB
- 4.11 **Beneficiaries** : Bamboo planters, Bamboo based industry, NGO's and general public.

5. **Study** : New
- 5.1 Programme Area : Post Harvest Utilization –Chemical Processing
- 5.2 **Title of the Study** : Performance of neem (*Azadirachta indica* A.Juss) leaves and mehagani (*Switenia microphyla*) seeds extract as an eco-friendly wood preservative.
- 5.3 **Justification** : Conventional wood preservatives like CCA and CCB are facing lot of criticism all over the world. Most of these preservatives although found to be very effective against wood destroying agencies, being of synthetic origin, are said to cause a serious threat to the environment and to health of wood treatment workers. For the past few years there has been a substantial global awareness to outcast the conventional branded wood preservatives by the one which is of natural origin. It is essential to address the problem in view of environment protection. Eco-friendly wood preservatives may be considered as one option. The present study is an exploration of neem leaves against wood decaying fungi and termites. *Azadirachta indica* A. Juss, commonly known as neem is one of the most widely recognized and extensively studied plant species of Bangladesh. Every part of the tree has been thoroughly evaluated for its marked activity against insects, microbes, pests etc. and has gain world-wide recognition as potential therapeutic agent. Present study has been undertaken for further work on neem leaves and mehogany seeds to develop potential eco-friendly wood preservatives.
- 5.4 **Objectives** :
- 5.4.1 To develop environmental friendly wood preservatives
- 5.4.2 To investigate the effectiveness of preservatives against the wood decaying agents.
- 5.5 **Expected output** :
- a) Development of environmental friendly wood preservatives
- b) Increase the service life of wood, bamboo and other lignocellulosic material.
- c) Decrease the pressure on forest resources.
- 5.6 **Study period** :
- 5.6.1 Starting year : 2014-2015
- 5.6.2 Completion year : 2016-2017
- 5.7 **Personnels** :
- 5.7.1 Study Leader : Md. Anisur Rahman, SRO
- 5.7.2 Associates : Dr. K. Akhter, DO; Abdus Salam, R O & Mozammel Hoque Chy, R O.
- 5.8 **Activities for the year** :
- a) Collection and processing of neem leaves and mehogani seeds.
- b) Collection and processing of wood/bamboo.samples.
- c) Soaking of neem leaves and mehagani seeds in hot and cold water..
- d) Treatment of wood/bamboo samples.
- e) Investigation of preservatives against wood destroying agencies.
- f) Collection of data.
- g) Data analysis and report writing
- 5.8.1 Activities calendar

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

- 5.9 Previous progress, if any : NA.  
 5.9.1 Achievement(s),if any : NA.  
 5.10 **Financial statement** :  
 5.10.1 Total cost of the study : Tk.4,00,000/-  
 5.10.2 Cumulative cost : Tk.  
 5.10.3 Cost of the year : Tk.1,25,000/-  
 5.10.4 Source of fund : GOB  
 5.11 **Beneficiaries** : NGOs and general public, particularly the users of wood, bamboo, sun grass and other materials.

## FOREST CHEMISTRY DIVISION

1. **Study** : Ongoing  
 1.1 Programme Area : Post Harvest Utilization –Chemical Processing  
 1.2 **Title of the Study** : Extraction of agar (*Aquilaria malaccensis* Lam.) oil from artificial inoculated agar trees.  
 1.3 Justification : NA.  
 1.4 **Objectives** :  
 1.4.1 To develop suitable artificial inoculation method for better formation of agar resin.  
 1.4.2 To evaluate the effect of wounding density for maximum agar formation by nailing method.  
 1.4.3 To assess the site and location factors on the yield and quality of agar.  
 1.5 **Expected output** : Suitable artificial inoculation method and site/location factors for better formation of agar resin.  
 1.6 **Study period** :  
 1.6.1 Starting year : 2012-2013  
 1.6.2 Completion year : 2014-2015  
 1.7 **Personnels** :  
 1.7.1 Study leader : Dr. Mohammad Jakir Hossain, SRO  
 1.7.2 Associates : Dr. S. Akhter, DO; M. S. Rahman, RO; S. C. Nath, RA  
 1.8. **Activities for the year** :  
 a) Collection of agarwood from artificial inoculated agar trees.  
 b) Preparation of specimen samples (agar wood chips) from selected trees.  
 c) Extraction of agar oil from chips using pilot scale distillation system in laboratory.  
 d) Microscopic analysis of deposited agar resins in agarwood.  
 e) 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)													

- 1.9 Previous progress : Six experimental agar plantation sites were visited and investigated previously marked and nailed 167 trees to explore the nailing distance effect for the best formation of agarwood resins. Out of them 7 trees were cut and brought into laboratory for further analysis.

- 1.9.1 Achievement : Not applicable
- 1.10 **Financial statement** :
- 1.10.1 Total cost of the study : Tk. 7,00,000/-
- 1.10.2 Cumulative cost : Tk. 6,10,000/-
- 1.10.3 Cost of the year : Tk. 70,000/-
- 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries** : FD, Agar producers and traders.
2. **Study** : On going
- 2.1 Programme Area : Post Harvest Utilization-Chemical Processing.
- 2.2 Title of the Study : Chemical characterization of wood and bamboo species for various end uses.
- 2.4 **Objective**
- 2.4.1 To determine the extractive contents of lambu (*Khaya sp.*), rajkori (*Albizia richardiana*), jhau (*Tamarix gallica*), mitinga bamboo (*Bambusa tulda*) etc. To determine the major chemical constituents such as holo-cellulose, alpha-cellulose, lignin etc of these species. To suggest for end use according to their chemical constituents.
- 2.5 **Expected output** : Chemical characterization of the selective wood and bamboo species for specific end uses.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2012-2013
- 2.6.2 Completion year : 2014-2015
- 2.7 **Personnels** :
- 2.7.1 Study leader : M. S. Rahman, RO
- 2.7.2 Associates : Mohammad JakirHossain, SRO; S. C. Nath, RA(Gr.-1)
- 2.8 **Activities for the year** :
- a) Collection of various wood and bamboo species.
- b) Preparation of specimen samples viz. lambu (*Khaya sp.*), rajkori (*Albiziarichardiana*), jhau (*Tamarixgallica*), mitinga bamboo (*Bambusatulda*) etc.
- c) Determination of extractive contents.
- d) Determination of major chemical constituents such as holo-cellulose, alpha-cellulose, lignin etc.
- e) 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** : Extractive contents and major chemical constituents such as holo-cellulose, alpha-cellulose, lignin etc. of katbadam (*Terminaliacatappa*), jolpai (*Eleocarpus Robustus* (Roxb.) arjun (*Terminaliacarjuna*(Roxb.) andsil-koroi (*Albiziaprocera*) were determined.
- 2.9.1 Achievement : Not applicable
- 2.10 **Financial statement** :



- 2.10.1 Total cost of the study : Tk. 6,00,000/-
- 2.10.2 Cumulative cost : Tk. 3,40,000/-
- 2.10.3 Cost of the year : Tk. 60,000/-
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : FD, BFIDC, wood users, furniture makers, pulp and paper industries

- 3 **Study** : New
- 3.1 Programme Area : Post Harvest Utilization, Chemical Processing
- 3.2 **Title of the Study** : Artificial Inoculation of agarwood (*Aquilaria malaccensis* Lam.) by Chemical Inducing Agent(s).

3.3 **Justification** :

Agarwood/ Aquilaria tree, a highly expensive non-timber forest product mainly used for fragrances, incense, medicines. The healthy wood is not scented but under certain external factors or pathological condition the heart wood becomes saturated with fragrant resin. The process of resin deposits is not fully understood yet. Although wounding has been suggested to cause resin formation, the typical types of wounds that are produced in trees generate no resins or very low with inferior quality. The present study is undertaken to develop a simple and efficient method by inoculating different chemical media into the tree that will produce best grade of agar wood within a short period of time. This chemical inoculation technique will be a simple and efficient method to induce qualified agarwood formation throughout the whole tree.

In this technique different water soluble resin-inducing chemicals will be applied to the cells surrounding the wound or into the xylem part of *Aquilaria* trees. These chemical agents will interact with living parenchyma cells around the wounded region or with the cellular system that will stimulate resin secretion. These chemical agents will be chosen according to their some special properties so that they may kill some living parenchyma cells around the wounded region of the xylem or interact with the cellular system that will stimulate the secretion of agar resin. Due to water transportation, the water soluble inducers will be transported to the localized areas of the tree around the zone of application.

3.4 **Objectives** :

- 3.4.1 To explore an efficient and suitable chemical inducing agent(s) for the artificial inoculation.
- 3.4.2 To develop and optimize the inoculation technique for the best formation of resins.
- 3.4.3 To investigate the origin and/or process of agar resin deposition.

3.5. **Expected output** : Suitable artificial chemical inoculation method for the best formation of agar resin within short period of time and effect of site/location factor for better agar resin formation

3.6. **Study period** :

- 3.6.1 **Starting year** :2014-2015
- 3.6.2 **Completion year** :2018-2019

3.7 **Personnel(s)** :

- 3.7.1 **Study leader** : Dr.Mohammad Jakir Hossain, SRO
- 3.7.2 **Associates** : Dr.S. Akhter, DO; M. S. Rahman, RO; M. Saidur Rahman, SO (BCSIR Laboratories, Chittagong); S. C. Nath, RA (Gr.-1)

3.8 **Activities for the year** :

- a) Microscopic investigation of the anatomy of agarwood.
- b) Study the physiology of agarwood as well as agar resin formation process.
- c) Selection of agar trees.

d) In vitro application of suitable chemical inducing agent(s)

3.8.1 Activities calendar :

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

3.9 Previous progress : Not applicable

3.9.1 Achievement : Not applicable

3.10 **Financial statement** :

3.10.1 Total cost : Tk. 10,00,000/-

3.10.2 Cumulative cost : -

3.10.3 Cost of the year : Tk. 2,00,000/-

3.10.4 Source of fund : GOB

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

4 **Study** : New

4.1 Programme Area : Post Harvest Utilization, Chemical Processing

4.2 **Title of the Study** : Phytochemical analysis and antioxidant potential of 6 (six) indigenous medicinal plants.

4.3 **Justification:** Plants contain a wide variety of free radical scavenging molecules, such as flavonoids, anthocyanins, carotenoids, tannins, saponins, steroids, terpenoids and rotenoids which are rich in antioxidant activities. Antioxidants play a protective role in health and against diseases, and their consumption lower risk of cancer, heart disease, hypertension and stroke. The major groups of phytochemicals that may contribute to the total antioxidant capacity of plant include polyphenols and vitamins (C and E). Phenolic compounds of plants are hydroxylated derivatives of benzoic acid and cinnamic acids and have been reported to possess antioxidative and anticarcinogenic effects. Phenolic compounds including flavonoids are important in plant defense mechanisms against invading bacteria and other types of environmental stress. Flavonoids have long been recognized to possess anti-inflammatory, anti-allergic, antiviral and antiproliferative activities.

Several reports indicate that the antioxidant potential of medicinal plants may be related to the concentration of their phenolic compounds which include phenolic acids, flavonoids, anthocyanins and tannins. These compounds are of great value in preventing the onset and/or progression of many human diseases. In Bangladesh more than 700 medicinal plants are identified but majority of them are not evaluated in terms of their chemical ingredients or antioxidant properties. Therefore, the present study is undertaken to evaluate the efficacy of some medicinal plants those chemical compositions were partially determined or yet to be determined through phytochemical analysis and antioxidant activity.

4.4 **Objectives** :

4.4.1 To investigate the presence of phytochemicals in medicinal plants.

4.4.2 To determine the antioxidant potential for assessment their efficacy.

4.5. **Expected output** : Effort to explore new medicinal species with the help of taxonomist that/those have higher antioxidant properties

4.6. **Study period** :

4.6.1 **Starting year** :2014-2015

- 4.6.2 Completion year : 2016-2017
- 4.7 **Personnel(s)** :
- 4.7.1 Study leader : Dr. Mohammad Jakir Hossain, SRO
- 4.7.2 **Associates** : Dr. S. Akhter, DO; M. S. Rahman, RO; S. C. Nath, RA (Gr.-1)
- 4.8 **Activities for the year** :
- a) Explore and collection of four medicinal plants on priority basis.
- b) Extraction of plant materials for phytochemical analysis
- c) Screening of phytochemicals
- d) Determination of antioxidant activity through standard test method
- 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 : Not applicable
- 4.9.1 Achievement : Not applicable
- 4.10 **Financial statement** :
- 4.10.1 Total cost of the study : Tk. 6,00,000/-
- 4.10.2 Cumulative cost : -
- 4.10.3 Cost of the year : Tk. 1,70,000/-
- 4.10.4 Source of fund : GOB
- 4.11 **Beneficiaries** : Pharmaceuticals and Ayurvedic Industries, Medicinal plants producers and traders..

## TRAINING & TECHNOLOGY TRANSFER UNIT

### Activities: 2014-15

1. Activity : New
- 1.1 Programme Area : Training and Technology Transfer
- 1.2 Title : **Training for BFRI Staff Members and stakeholders.**
- 1.3 Justification: There is no alternative to training to increase the efficiency of human resources. Training makes a government servant enable to gather knowledge about different area and manage his works efficiently. Developed technologies can be disseminated through training. Training and makes a technology familiar to the mass people.
- 1.4 **Objective(s)** :
- 1.4.1 : To develop capacity of BFRI staff members
- 1.4.2 : To enhance capacity of stakeholders in their respective area
- 1.4.3 : To disseminate BFRI technology to the stakeholders
- 1.5 **Expected output** : Knowledge and skills of BFRI resource persons and stakeholders will be enhanced.  
: Capacity of individual level will be developed
- 1.6 **Period** :
- 1.6.1 Starting year : 2014-15
- 1.6.2 Completion year : 2014-15
- 1.7 **Personnel(s)** :
- 1.7.1 leader :

1.7.2 Associates :

1.7.3 :

1.8 **Activities for the year** :

Conduct training programme on :

- 1) Institutional Development:
- 2) Preservative treatment of wood and bamboo
- 3) Nursery pest and disease management
- 4) Pest and Disease management of medicinal plant
- 5) Apiculture in hilly area
- 6) Bamboo branch cutting technique & Bamboo grove management
- 7) Cultivation technique of medicinal plants
- 8) Mother tree selection technique
- 9) Nursery development and mixed plantation technique
- 10) Technique of Bamboo Furnitures
- 11) Development of Management of Costal Spp. Nursery .
- 12) Palm Seedlings Development and Plantations.
- 13) Nursery & Plantation technique of Golpata.
- 14) Nursery & Plantation technique of Mangrove Spp.

1.8.1 **Activities calendar:**

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
1) Institutional Development (BFRI Head Quarters)							■			■		
2) Preservative treatment of wood and bamboo ( Dinajpur, Jamalpur, Madupur, Cox's Bazar, Chittagong)							■	■	■	■		
3) Nursery pest and disease management (Naogan, Satkhira,Chittagong).						■	■	■				
4) Pest and Disease management of medicinal plant (Gaibanda)										■		
5) Apiculture in hilly area (Rangamati, Bandarban).							■		■			
6) Bamboo branch cutting & Bamboo grove management technique ( Dinajpur, Jamalpur, Madupur, Cox's Bazar, Rangamati, Chittagong etc.)						■	■	■	■			
7) Cultivation technique of medicinal plants (Rangpur)									■			
8) Mother tree selection technique (Sirajganj, Sylhet, Noakhali)							■	■		■		
9) Nursery development & mixed plantation technique (Bandarban, Sylhet).							■	■				
10) Technique of Bamboo Composite Furnitures (BFRI Head Quarters and Rangamati)							■			■		
11) Development & Management of Costal Spp. Nursery. (PTU Division)						■						
12) Palm Seedlings Development and Plantations. (PTU Division)							■					
13) Nursery & Plantation technique of Goal pata. (PTU Division)								■				
14) Nursery & Plantation technique of Mangrove Spp. (MSD Division)						■	■	■				

1.9 Previous progress, if any:

1.9.1 Achievement(s), if any : Farmers and nursery owners are using BFRI technologies in the field.

1.10 **Financial statement** :

- 1.10.1 Total cost : **Tk 8.00 lakh**  
 1.10.2 Cumulative cost :  
 1.10.3 Cost of the year : **Tk 8.00 lakh (TTTU-7.00 +PTU-.50 + MSD-.50)**  
 1.10.4 Source of fund : Revenue budget of GOB  
 1.14. Beneficiaries : BFRI's staff member and the stakeholders

2. **Activity** : New  
 2.1 Programme Area : Training and Technology Transfer  
 2.2 Title : **Seminars /Conference**

2.3 Justification: **Stakeholders** are not familiar with BFRI technologies. Introduction of BFRI technologies by workshop and seminar will be disseminated throughout Bangladesh.

- 2.4 Objective(s)  
 2.4.1 : To disseminate BFRI technologies to the stakeholders  
 2.4.2 : To share knowledge and experiences among scientists and stakeholders.  
 2.4.3 : To nurture scientific culture and enhance linkage among the scientists and stakeholders  
 2.5 **Expected output:** BFRI technologies will be disseminated to the stakeholders. Sharing of knowledge and experiences will benefit both BFRI scientists and stakeholders.

- 2.6 **Period** :  
 2.6.1 Starting year : 2014-2015  
 2.6.2 Completion year : 2014-2015

- 2.7 **Personnel(s)** :  
 2.7.1 leader :  
 2.7.2 Associates :  
 2.7.3 :

- 2.8 **Activities for the year** :  
 a) Conference on Annual Research Progress for 2013-14 and Research Programme for 2014-15  
 b) Seminar: Monthly seminars on topics of recent interest (title to be decided)  
 c) Bamboo Workshop

2.8.1 Activities calendar

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a)Conference												
b) Seminar												
c)Agar workshop												

- 2.9 Previous progress, if any : NA  
 2.9.2 Achievement(s), if any :

2.10 **Financial statement:**

- 2.10.1 Total cost : **Tk. 2.0 lakh**  
 2.10.2 Cumulative cost :  
 2.10.3 Cost of the year : **Tk. 2.0 lakh**  
 2.10.4 Source of fund : Revenue budget of GOB

- 2.11 **Beneficiaries** : Nursery owners, private entrepreneurs, Forest Department, Bangladesh Forest Industries and Development Corporation (BFIDC) and other forest or forest produce related stakeholders

- 3. Activity** : New
3. Programme Area : Training and Technology Transfer
- 3.1. Title : Publicity and Advertisement
- 3.2. Justification: Peoples and stakeholders will be familiar with BFRI technologies and activities  
**Stakeholders** are not familiar with BFRI technologies. Introduction of BFRI technologies through Publicity and advertisement will be disseminated throughout Bangladesh.
- 3.4 **Objective(s)** :
- 3.4.1 : To create awareness about BFRI technologies to the stakeholders and general man
- 3.4.2 : To disseminate BFRI technologies to the end users
- 3.5. **Expected output** : People will be made aware about BFRI technologies. BFRI Technologies will reach to the people.
- 3.6 **Period** :
- 3.6.1 Starting year : 2014-15
- 3.6.2 Completion year : 2014-15
- 3.7. **Personnel** :
- 3.7.1 Leader :
- 3.7.2 Associates :
- 3.8 **Activities for the year** :
- Participation: Tree Fair, Environment Fair and others
  - Advertisement in print and electronic media
  - Workshops in Districts & Upazilla and bamboo workshop
  - Preparing Digital Sign Board of BFRI Main gate.
  - Printing Materials & Publicity. (As per necessity)

3.8.1 Activities calendar :

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a) Tree Fair, Environment Fair and others													
b) Advertisement in print and electronic media													
c) Workshops in Districts & Upazilla and bamboo workshop													
d) Audio-Video Documentation													
e) Printing Materials & Publicity. (As per necessity)													

- 3.9.1 Previous progress, if any: NA
- 3.10 **Financial statement** :
- 3.10.1 Total cost : **Tk. 15.00 lakhs**
- 3.10.2 Cumulative cost :
- 3.10.3 Cost of the year : **Tk. 15.00 lakhs (TTTU-13.00 +PTU-1.0 + MSD-1.0)**
- 3.10.4 Source of fund: Revenue budget
- 3.14. **Beneficiaries** : People at all levels

