

## RESEARCH PROGRAMME: 2013 – 2014



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

## Contents of the Research Programme: 2013 – 14

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## Summary of the Research Programme: 2013 – 14

Sl.No.	Name of the Division/Section	Total Number of Studies		
		Ongoing	New	Total
<b>FOREST MANAGEMENT WING</b>				
1	Silviculture Research Division	06	02	08
2	Silviculture Genetics Division	04	00	04
3	Seed Orchard Division	06	00	06
4	Forest Botany Division	03	02	05
5	Forest Inventory Division	02	00	02
6	Forest Economics Division	03	00	03
7	Soil Science Division	03	01	04
8	Minor Forest Products Division	05	00	05
9	Mangrove Silviculture Division	06	00	06
10	Forest Protection Division	03	00	03
11	Plantation Trial Unit Division	05	02	07
12	Wildlife Section	03	01	04
13	Technology Transfer Unit	05	00	05
<b>Sub-Total:</b>		54	8	62
<b>FOREST PRODUCTS WING</b>				
14	Veneer and Composite Wood Product Division	01	01	02
15	Pulp and Paper Division	03	01	04
16	Wood Preservation Division	01	01	02
17	Forest Chemistry Division	02	00	02
18	Seasoning and Timber Physics Division	02	02	04
19	Wood Working and Timber Engineering Division	01	01	02
<b>Sub-Total:</b>		10	06	16
<b>Total :</b>		64	14	78

## List of new studies: 2013-14

Sl.No.	Title of the Study	Division
<b>Forest Management Wing</b>		
1	Conservation of indigenous/native forest tree species in different agro-ecological regions of Bangladesh.	SRD
2	Suitability of <i>Khaya anthotheca</i> (lambu) plantation in Bangladesh.	SRD
3	Floristic composition and restoration of village common forest of Kapru Para, Bandarban Hill District.	FBD
4	Studies on ethnobotanical plants used by the Chakma communities of Rangamati Hill District	FBD
5	Effect of using preservative treated bamboo materials on soil properties and production of betel leaf in betel leaf cultivation	SSD
6	Monitoring and maintenance of older trial plantations in the coastal areas of Bangladesh.	PTUD
7	Selection of salt tolerant fruit and medicinal tree species in the coastal areas of Bangladesh.	PTUD
8	Present status of Asian elephant ( <i>Elephas maximus</i> ) in Chunati Wildlife Sanctuary (WS)	WLS
<b>Forest Products Wing</b>		
9	Studies on particleboard made of rubber wood ( <i>Hevea braziliensis</i> ), gol pata ( <i>Nipa fruticans</i> ) and raj kori wood ( <i>Albizia richardiana</i> ).	VCWP
10	Production of nano composite from fibers of <i>Acacia hybrid</i> and simul ( <i>Bombax ceiba</i> ) tree species of Bangladesh	PPD
11	Treatability and natural durability of bhudum ( <i>Dendrocalamus giganteus</i> ) bamboo.	WPD
12	Studies on physical and mechanical properties of palmyra palm ( <i>Borassus flabellifer</i> ) wood	STPD
13	Studies on strength properties of five bamboo species of Bangladesh	STPD
14	Characterization of palm ( <i>Palmyra palm</i> ) for working and finishing properties.	WW&TED

## List of on-going studies: 2013-14

Sl.No.	Title of the Study	Division
<b>Forest Management Wing</b>		
1.	Regeneration study of tree species in Chunati wild-life sanctuary.	SRD
2.	: Development of planting technique of Sal ( <i>Shorea robusta</i> ).	SRD
3.	Study on the development of Oil Palm ( <i>Elaeis guineensis</i> ) cultivation in Bangladesh.	SRD
4.	Growth performance of different forest tree species in research plots.	SRD
5.	Large scale production of quality seedlings of important forest tree species.	SRD
6.	Spacing trial of agar plantation ( <i>Aquillaria malacences</i> ).	SRD
7.	Mass propagation of bamboos ( <i>Dendrocalamus giganteus</i> , <i>B. tulda</i> , <i>B. vulgaris</i> , <i>B. bambos</i> , <i>Thyrsostachys</i> sp., <i>Schizostachyum dullooa</i> and <i>D. brandisii</i> ) through branch cuttings and seedlings proliferation	SGD
8.	Conservation of threatened plant species through domestication	SGD
9.	Development of tissue culture techniques for different bamboo species viz., farua ( <i>Bambusa polymorpha</i> ), budum ( <i>Dendrocalamus giganteus</i> ), china bamboo ( <i>D. latiflorus</i> ), wappi ( <i>Thyrsostachys</i> sp.) and pencha ( <i>D. hamiltoni</i> )	SGD
10.	Development of tissue culture techniques for 1) Timber trees: boilam ( <i>Anisoptera scaphula</i> ), tamal ( <i>Diospyros montana</i> ). 2) Medicinal plant: amloki ( <i>Phyllanthus emblica</i> ) and 3) Fruit tree: lotkon ( <i>Baccaurea sapida</i> )	SGD
11.	Selection of plus trees of important agroforestry and forest tree species	SOD
12.	Establishment and management of seed orchards	SOD
13.	Superior stands/ woodlots selection and conversion into Seed Production Area (SPA).	SOD
14.	Popularizing quality seeds and planting materials	SOD
15.	Testing of seeds before distribution and standardization of seed storage behaviour	SOD
16.	Centralization of high yielding clones of rubber ( <i>Hevea brasiliensis</i> ) and establishment of orchard	SOD
17.	Buddha-Bihar ( <i>Kiyang</i> ) based tree biodiversity conservation in Rangamati Hill District	FBD
18.	Regeneration status of tree species in plantation and natural forest of Paithong forest areas of Bandarban Hill District	FBD
19.	Anatomical properties of lambu ( <i>Khaya</i> sp.) tree grown in Bangladesh	FBD
20.	Growth and yield assessment of akashmoni ( <i>Acacia auriculiformis</i> ) and mahogany ( <i>Swietenia macrophylla</i> ) through establishment of permanent sample plots (PSPs).	FID
21.	Growth and yield assessment of keora ( <i>Sonneratia apetala</i> ) and baen ( <i>Avicennia officinalis</i> .) in the coastal plantations of Bangladesh.	FID
22.	: Impact analysis of bamboo plantations raised by branch cutting and bamboo groves management	FED
23.	Determination of financial rotation of babla ( <i>Acacia nilotica</i> ) plantations in Bangladesh	FED
24.	Impact of the Coastal afforestation of Bangladesh in respect of financial and socioeconomic conditions of local people.	FED
25.	Effect of integrated soil fertility management in rubber plantation at Dantmara Rubber Estate, Fatikchari, Chittagong	SSD
26.	Minimization of soil erosion in teak through trials by mixed plantations at Faitong, Lama, Bandarban Hill District	SSD

27.	Assessment of carbon storage trends in the soil-plant system in different forest areas	SSD
28.	: Nursery, plantation and management techniques, and conservation of ten rattan species available in Bangladesh.	MFPD
29.	Nursery and plantation techniques of five selected medicinal plants.	MFPD
30.	Germplasm conservation and management practices of different medicinal plants.	MFPD
31.	Standardization the nursery and plantation techniques ( <i>Acacia catechu</i> ).	MFPD
32.	Study on nursery and plantation technique of dhup ( <i>Canarium resiniferum</i> ).	MFPD
33.	Vegetation dynamics and regeneration pattern in relation to soil pH, salinity and siltation of the Sundarban.	MSD
34.	Centralization and conservation of mangrove vegetation in three salinity zones of the Sundarban.	MSD
35.	Growth performance of mangrove and non-mangrove experimental plantations in the Sundarban.	MSD
36.	Development of a mangrove museum.	MSD
37.	Development of nursery and plantation techniques of Khalshi ( <i>Aegiceras corniculatum</i> ) in the coastal zone of Bangladesh.	MSD
38.	Selection and development of the top dying tolerant sundri ( <i>Heritiera fomes</i> ) trees in the Sundarban.	MSD
39.	Major pests and diseases of commercially important medicinal plants and their management	FPD
40.	Major pests and diseases of forest seeds and their management	FPD
41.	Phytosanitary study of <i>Paulownia sp.</i> existing in Bangladesh .	FPD
42.	Study on the improvement of coastal homesteads through resource generation.	PTUD
43.	Introduction of bamboo, rattan and golpata in the coastal homesteads of Bangladesh.	PTUD
44.	Introduction of major bee foraging mangrove plant species in the coastal belts of Bangladesh	PTUD
45.	Development of model vegetation to protect soil erosion, salt spray and other climatic changes in the coastal belt of Bangladesh.	PTUD
46.	Ecological succession in the man-made coastal forests in relation to age and other related factors.	PTUD
47.	: Development and maintenance of wildlife museum	WLS
48.	Avian species diversity of Hazarikhil Wildlife Sanctuary, Chittagong	WLS
49.	Present status of Phayre's leaf monkey ( <i>Trachypithecus phayrei</i> ), Pig-tailed macaque ( <i>Macaca nemestrina</i> ) and Capped leaf monkey ( <i>Trachypithecus pileatus</i> ) in hill forest of Bangladesh	WLS
50.	Training for BFRI Staff Members and stakeholders	TTTU
51.	Workshops and Seminars	TTTU
52.	Publicity and Advertisement	TTTU
53.	Audio-video documentation	TTTU
54.	Printing Materials and Publicity	TTTU
<b>Forest Products Wing</b>		
55.	: Design and fabrication of furniture using bamboo composites.	VCWP
56.	Production of high yield pulp from biases,wastes of sugar mill of Bangladesh	PPD

57.	Oxygen delignification of kraft pulp of stem and branches of rubber tree ( <i>Hevea brasiliensis</i> )	PPD
58.	Pulp making characteristics of baizzya ( <i>Bambusa vulgaris</i> ) in a mixture with hardwood species.	PPD
59.	Investigation of preservative chemicals leaching from treated materials in water and soil.	WPD
60.	Extraction of agar ( <i>Aquilaria malaccensis</i> Lam.) oil from artificial inoculated agar trees.	FCD
61.	Chemical characterization of wood and bamboo species for various end uses.	FCD
62.	Studies on solar kiln for efficient seasoning of different thicknesses of wood.	STPD
63.	Dissemination of solar kiln technology to the stakeholders for efficient seasoning of wood.	STPD
64.	Potential uses of treated round bamboo for making quality furniture.	WWTED

## Division wise Research Budget: 2013-14

<b>Sl.No.</b>	<b>Name of the Division/Section</b>	<b>No of Study</b>	<b>Budget (Tk.)</b>
<b>01</b>	<b>Silviculture Research Division</b>	<b>08</b>	<b>14,00,000</b>
<b>02</b>	<b>Silviculture Genetics Division</b>	<b>04</b>	<b>3,00,000</b>
<b>03</b>	<b>Seed Orchard Division</b>	<b>06</b>	<b>14,00,000</b>
<b>04</b>	<b>Forest Botany Division</b>	<b>05</b>	<b>4,50,000</b>
<b>05</b>	<b>Forest Inventory Division</b>	<b>02</b>	<b>75,000</b>
<b>06</b>	<b>Forest Economics Division</b>	<b>03</b>	<b>2,00,000</b>
<b>07</b>	<b>Soil Science Division</b>	<b>04</b>	<b>3,00,000</b>
<b>08</b>	<b>Minor Forest Products Division</b>	<b>05</b>	<b>4,50,000</b>
<b>09</b>	<b>Mangrove Silviculture Division</b>	<b>06</b>	<b>13,00,000</b>
<b>10</b>	<b>Forest Protection Division</b>	<b>03</b>	<b>4,00,000</b>
<b>11</b>	<b>Plantation Trial Unit Division</b>	<b>07</b>	<b>13,00,000</b>
<b>12</b>	<b>Wildlife Section</b>	<b>04</b>	<b>2,00,000</b>
<b>13</b>	<b>Technology Transfer Unit</b>	<b>05</b>	
<b>Sub-Total:</b>		<b>62</b>	<b>77,75,000</b>
<b>14</b>	<b>Veneer and Composite Wood Products Division</b>	<b>02</b>	<b>2,00,000</b>
<b>15</b>	<b>Pulp and Paper Division</b>	<b>04</b>	<b>3,50,000</b>
<b>16</b>	<b>Wood Preservation Division</b>	<b>02</b>	<b>3,00,000</b>
<b>17</b>	<b>Forest Chemistry Division</b>	<b>02</b>	<b>3,00,000</b>
<b>18</b>	<b>Seasoning and Timber Physics Division</b>	<b>04</b>	<b>3,00,000</b>
<b>19</b>	<b>Wood Working and Timber Engineering Division</b>	<b>02</b>	<b>2,00,000</b>
<b>Sub-Total:</b>		<b>16</b>	<b>16,50,000</b>
<b>Total:</b>		<b>78</b>	<b>94,25,000</b>



## FOREST MANAGEMENT WING

### Silviculture Research Division

1. **Study** : On-going
- 1.1 Programme Area : Biodiversity and conservation.
- 1.2 Title of the Study : Regeneration study of tree species in Chunati wild-life sanctuary.
- 1.3 Justification (For new study) :
- 1.4 **Objective (s)** :
  - 1.4.1 : To determine the regeneration status of tree species in chunati wild life sanctuary.
  - 1.4.2 : To determine the regeneration trends in chunati wild life sanctuary.
- 1.5 **Expected output** :
  - a. Regeneration status of the species in chunati wild life sanctuary will be known.
  - b. Regeneration trends of chunati wild life sanctuary will be determined.
  - c. Enrichment planting strategy will be formulated.
- 1.6 **Study period** :
  - 1.6.1 Starting year : 2010-2011
  - 1.6.2 Completion year : 2013-2014
- 1.7 **Personnel (s)** :
  - 1.7.1 Study leader : Nasrat Begum, SRO.
  - 1.7.2 Associates : Mohammed Shahid Ullah, DFO.
  - 1.7.3 : Azizul Haque, FI.
- 1.8 **Activities for the year** :
  - a. Data on regeneration (seedlings of  $\geq 20$  cm in height and samplings of each species will be counted) of tree species will be collected (two times) from Aziz Nagar Beat and Jaldhi Beat.
  - b. 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.												

- 1.9 **Previous progress** : Regeneration data of tree species were collected from Chunati Beat, Lohagara, Cambul and Pnuichari Beat, Banshkhali, Chittagong. Soil samples were collected from Chunati beat, Harbung Beat, Punichari Beat and Napora Beat and analyzed.
- 1.9.1 Achievement(s) :
- 1.10 **Financial statement** :
  - 1.10.1 Total cost of the study : Tk. 2,30,000.00
  - 1.10.2 Cumulative cost : Tk. 1,18,600.00
  - 1.10.3 Cost of the year : Tk. 40,000.00
  - 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.

2. **Study** : On-going
- 2.1 Programme Area : Plantation Techniques and Forest Management.
- 2.2 Title of the Study : Development of planting technique of Sal (*Shorea robusta*).
- 2.3 Justification (For new study) : NA
- 2.4 **Objective (s)** :

- 2.4.1 To develop suitable planting technique of sal
- 2.4.2 To enrich the degraded sal forest through aided regeneration
- 2.4.3 To monitor the change of biodiversity of sal forest overtime after establishing the plantation.
- 2.5 **Expected output** : Techniques for restoration of degraded sal forest will be developed.
- 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 : Nasrat Begum, SRO.
- 2.7.2 Associates : Mohammed Shahid Ullah, DFO.
- 2.7.3 : Azizul Haque, FI.
- 2.8 **Activities for the year** :
- Collection of seeds from the selected mother trees and raising 2,400 seedlings at Charaljani (1200) and Charkai (1200) SR Stations.
  - Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
  - Raising of 1.0 ha experimental plantations at Charaljani (0.50 ha) and Charkai (0.50 ha) SR Stations by seedlings and direct seed sowing in thallis.
  - Maintainance of 3.0 ha last years' experimental plantations through weeding, vacancy filling, cleaning, climber cutting, etc.
  - Colletion of survival and height growth data at four months interval.
  - Analysis of data and reporting.

2.8.1 Activities calendar :

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

- 2.9 Previous progress : Three hectares experimental plantations were established at Charaljani (1.5 ha) and Charkai (1.5 ha) SR Stations through planting seedlings, stamps and sowing seeds in thallis.
- 2.9.1 Achievement(s), if any : NA
- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 5,00,000.00
- 2.10.2 Cumulative cost : Tk. 1,88,000.00
- 2.10.3 Cost of the year : Tk. 60,000.00
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : FD, Educational institutions and Forestry related agencies.

3. **Study** : On-going
- 3.1 Programme Area : Plantation techniques and forest management.
- 3.2 Title of the Study : Study on the development of Oil Palm (*Elaeis guineensis*) cultivation in Bangladesh.
- 3.3 Justification : NA
- 3.4 **Objective (s)** :
- To determine present status of oil palm plantation in Bangladesh.
  - To standardize nursery raising technique and management.
  - To standardize plantation (spacing) and management technique of oil palm.
  - To study the reproductive biology of oil palm in plantations of Bangladesh.
  - To introduce and test the high yielding variety (HYV) of oil palm.
- 3.5 **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.
- 3.6 **Study period** :
- 3.6.1 Starting year : 2010-2011
- 3.6.2 Completion year : 2019-2020
- 3.7 **Personnel (s)** :
- 3.7.1 Study leader : Mohammed Shahid Ullah, DFO, SRD.
- 3.7.2 Associates : Nasrat Begum, SRO
- 3.7.4 : Azizizul Haque, FI
- 3.8 **Activities for the year** :
- a. Collection of seeds and raising 1,000 seedlings in 9 X 6 polybag at Keochia and Charkai Research Stations (500 in each station).
- b. Collection of data on germination period, germination percentage, survival, growth, disease infestation, etc. of the seedlings at nursery and field level.
- c. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
- d. Raising of 3.0 ha new oil palm plantation with three spacings (viz. 5m x 5m, 6m x 6m, and 7m x 7m) with RCBD design at Keochia and Charkai Research Stations (1.5 ha in each station).
- e. Maintenance of 10.5 ha last years' experimental plantations through weeding, gap-filling, cleaning, climber cutting, etc.
- f. Watering the seedlings in the last years' plantations during dry season (Feb – May).
- g. Collection of data on survival, growth, number of fronds, etc.
- h. Analysis of data and report writing.

3.8.1 Activities calendar :

Activities (as per 3.8)	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
SRD and MFPD activities:													
a.													
b.													
c.													
d.													
e.													
f.													
g.													
h.													

- 3.9 Previous progress: Raised 13.5 ha experimental plantations at Charaljani, Keochia, Charkai and Hinguli Research Stations. Aalysed the soil samples of the plantation sites.
- 3.9.1 Achievement(s), if any : NA
- 3.10 **Financial statement** :
- 3.10.1 Total cost of the study : Tk. 15, 00,000.00
- 3.10.2 Cumulative cost : Tk. 5,89,000.00
- 3.10.3 Cost of the year : Tk. 1,52,000.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.
- 4. **Study** : On-going
- 4.1 Programme Area : Plantation techniques and forest management.
- 4.2 Title of the Study : Growth performance of different forest tree species in research plots.
- 4.3 Justification (For new study) : NA

- 4.4 **Objective (s)** :
- 4.4.1 To assess the growth performance of different tree species in four agroecological regions of the country.
- 4.4.2 To determine the silvics of different forest tree species.
- 4.4.3 To develop future quality seed sources.
- 4.5 **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.
- 4.6 **Study period** :
- 4.6.1 Starting year : 1996-1997
- 4.6.2 Completion year : 2014-2015
- 4.7 **Personnel (s)** :
- 4.7.1 Study leader : Mohammed Shaid Ullah, DFO
- 4.7.2 Associates : Nasrat Begum, SRO
- 4.7.3 : Azizul Haque, FI.
- 4.8 Activities for the year :
- a. Maintenance of 75.0 ha experimental plantations (ex-situ conservation plots, species elimination and site suitability trial, provenance trial, mixed species trial plantations, broom grass plantations, bamboo plantations, etc) raised up to 2011 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.

4.8.1 Activities calendar :

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

- 4.9 Previous progress : Up to 2012, 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.
- 4.9.1 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
- 4.10 **Financial statement** :
- 4.10.1 Total cost of the study : Tk. 40, 00,000.00
- 4.10.2 Cumulative cost : Tk. 34,29,000.00
- 4.10.3 Cost of the year : Tk. 3,18,000.00
- 4.10.4 Source of fund : GOB
- 4.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.

5. **Study** : On-going
- 5.1 Programme Area : Production of quality planting materials.
- 5.2 Title of the Study : Large scale production of quality seedlings of important forest tree species.
- 5.3 Justification (For new study) : NA
- 5.4 **Objective (s)** :
- 5.4.1 To determine age, height and root-shoot ratio of seedlings for dispatch from nursery to plantation.
- 5.4.2 To provide quality seedlings to planters for successful plantation establishment.
- 5.4.3 To develop linkages with planters for awareness development about quality seedling.
- 5.5 Expected output :
- a. Awareness development about quality seeds and seedlings.
- b. Increased yield of timber and fuel wood.
- 5.6 **Study period** :
- 5.6.1 Starting year : 2006-2007
- 5.6.2 Completion year : 2014-2015
- 5.7 **Personnel (s)** :
- 5.7.1 Study leader : Nasrat Begum, SRO.
- 5.7.2 Associates : Mohammed Shaid Ullah, DFO.
- 5.7.3 : Azizul Haque, FI.
- 5.8 **Activities for the year** :
- a. Development of nursery at HQs, Charkai, Lawachara and Charaljani SR Station.
- b. Collection of seeds of dominant/popular/threatened forest tree species from seed orchards, plantations and natural forests.
- c. Raising of 50,000 seedlings at HQs and four research stations
- d. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
- e. Collection of data on seedlings growth, collar diameter, root-shoot ratio of different species.
- f. Report writing.
- 5.8.1 Activities calendar :

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

- 5.9 **Previous progress:** Raised and distributed more than 10.5 lakh quality seedlings of about more than 56 forest tree species raised viz- acacia hybrid (*Acacia auriculiformis* X *A. mangium*), banderhola (*Duabanga grandiflora* (Roxb. ex DC.) Wall.), civit (*Swintonia floribunda* Griff.), teli-garjan (*Dipterocarpus turbinatus* Gaertn.), gamar (*Gmelina arborea* Roxb.), sal (*Shorea robusta* Gaertn.f.), shegun (*Tectona grandis* L.), lohakat (*Xylia kerrii* Craib & Huta), chickrassi (*Chukrassia velutina* W & A), eucalyptus (*Eucalyptus camaldulensis* Dehnn.), raintree (*Samanea saman* (Jacq.) Merr.), mahogany (*Swietenia mahogoni* (L.) N.J.Jacquin), sonalu (*Cassia fistula* L.), kala-koroi (*Albizia lebbek* (L.) Benth), raj-koroi (*A. richardiana* King & Prain), sil-koroi (*A. procera* (Roxb.) Benth), chakua-koroi (*Albizia chinensis*), motor-koroi (*Albizia lucida*), arjun (*Terminalia arjuna* (Roxb.) Wt. & Arn.), pitraj (*Aphanamixis polystachya*), bohera (*Terminalia bellirica* (Gaertn.) Roxb.), haritaki (*Terminalia chebula* (Gaertn.) Retz.),

menda (*Litsea monopetala* (Roxb.) Pers.), haldu (*Adina cordifolia*), katbadam (*Terminalia catappa* L.), palas (*Butea monosperma* (Lam.) Taub.), khayer (*Acacia catechu*), tamal (*Diospyros montana* Roxb.), krishnachura (*Delonix regia* (Bojer) Rafin), kalo-jam (*Syzygium cumini*), kanchan (*Bauhinia racemosa* Lamk.), jarul (*Lagerstroemia speciosa* (L.) Pers.), parul (*Stereospermum suaveolens* A. DC.), dhakijam (*Syzygium grandis*), chapalish (*Artocarpus chama*), telsur (*Hopea odorata*), champa (*Michelia champaca*), cryptocarya (*Cryptocarpa amygdalina*), baobab (*Andansonia digitata*), kerung (*Pongamia pinnata* L.), boiam (*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*), etc.

5.9.1 Achievement : Developed appropriate nursery technique for 30 indigenous and exotic forest tree species.

5.10 **Financial statement** :

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

5.10.2 Cumulative cost : Tk. 8,90,500.00

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

5.10.4 Source of fund : GOB

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

6. **Study** : On-going

6.1 Programme Area : Plantation Techniques and Forest Management.

6.2 Title of the Study : Spacing trial of agar plantation (*Aquillaria malacences*).

6.3 Justification (For new study) :

6.4 **Objective (s)** :

6.4.1 : To determine the optimum spacing for agar plantation.

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

6.5 **Expected output** :

a. Optimum spacing for agar plantation will be determined.

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

6.6 **Study period** :

6.6.1 Starting year : 2010-2011

6.6.2 Completion year : 2016-2017

6.7 **Personnel (s)** :

6.7.1 Study leader : Mohammed Shaid Ullah, DFO.

6.7.2 Associates : Nasrat Begum, SRO.

6.7.3 : Azizul Haque, FI

6.8 **Activities for the year** :

a. Collection of agar seeds and raising 6000 seedlings at Charkai, Charaljani and Keochia SR Stations.

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

c. Raising of 3.48 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 Charaljani, Keochia and Charkai SR Stations.

d. Maintenance of 8.12 ha last year's experimental plantations through weeding, gap-filling, cleaning, climber cutting, pruning, etc.

e. Collection of data on survival and height growth of the seedlings in the plantations at six month interval.

f. Analysis of data and reporting.

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.												

6.9 Previous progress : Raised 8.12 ha experimental plantations at Keochia and Charaljani SRS.

6.9.1 Achievement(s), if any : NA

6.10 **Financial statement** :

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

6.10.2 Cumulative cost : Tk. 2,78,000.00

6.10.3 Cost of the year : Tk.1,50,000.00

6.10.4 Source of fund : GOB

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

7. **Study** : New

7.1 Programme Area : Biodiversity and Conservation.

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

7.3 Justification : Once Bangladesh was famous for its floral biodiversity. About 5700 species of angiosperms and more than 800 forest tree species were available in Bangladesh. But in course of time due to different reasons such as over population, urbanization, over extraction/unrolley cutting of forest resources, plantation of exotic species through clearing of indigenous/natural species, etc. the number has been decreasing alarmingly. In the mean time some forest tree species have already been extinct and many are in the verge of extinction. Scientists are suspecting 106 numbers of plant species are endangered. However the number may be much more than that. Now a day's conservation of biodiversity is an important issue all over the world. As a national institute on forestry research BFRI has a responsibility and should take necessary steps to conserve all the native/indigenous forest tree species of Bangladesh. Therefore, the study has been undertaken.

7.4 **Objective (s)** :

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

7.4.2 To observe their suitability in particular sites.

7.5 **Expected output** : 120-150 indigenous forest tree species will be conserved over an area of fifty hectare at four Silviculture Research Stations.

7.6 Study period :

7.6.1 Starting year : 2013-2014

7.6.2 Completion year : 2024-2025

7.7 **Personnel (s)** :

7.7.1 Study leader : Mohammed Shahid Ullah, DFO

7.7.2 Associates : Nasrat Begum, SRO

7.7.3 : Azizul Haque, FI

7.8 **Activities for the year** :

a. Collection of seeds and raising 36,000 seedlings of different indigenous forest tree

- species at Charkai, Lawachara and Keochia Research Stations.
- b. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
- c. Development of water supply facilities at Charkai and Lawachara research Stations' nursery.
- d. Raising of 12.0 hectares plantations at Charkai, Lawachara and Keochia SR stations.

7.8.1 Activities calendar :

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

- 7.9 Previous progress, : NA
- 7.9.1 Achievement(s), if any : NA
- 7.10 **Financial statement** :
- 7.10.1 Total cost of the study : Tk. 30,00,000.00
- 7.10.2 Cumulative cost : Nil
- 7.10.3 Cost of the year : Tk. 3,30,000.00
- 7.10.4 Source of fund : GOB
- 7.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.

8. **Study** : **New**

- 8.1 Programme Area : Plantation Techniques and Forest Management
- 8.2 Title of the Study : Suitability of *Khaya anthotheca* (lambu) plantation in Bangladesh.

8.3 **Justification** : *Khaya anthotheca* popularly known as lambu, a fast growing exotic tree species having multipurpose uses. For the last few years, the tree has been widely planting by the private planters all over Bangladesh, specially in the northern and south-western region of the country due to its initial rapid height growth. Before going to a large scale plantation with an exotic species, it is necessary to know the site suitability, survival, growth, disease infestation, environmental effect, etc. of that species in the new habitat. However, there is no such information for introduction of lambu in Bangladesh. So, the study has been undertaken with the following objectives.

- 8.4 **Objective (s)** :
- 8.4.1 : To develop/standardize nursery technique of lambu
- 8.4.2 : To develop suitable plantation technique of lambu.
- 8.4.3 : To find out survival, growth and site suitability of lambu
- 8.4.4 : To observe the disease infestation, environmental effect, etc. if any in the plantation.
- 8.5 **Expected output** : Feasibility of large scale plantation of lambu in Bangladesh.
- 8.6 **Study period** :
- 8.6.1 Starting year : 2013-2014
- 8.6.2 Completion year : 2023-2024
- 8.7 **Personnel (s)** :
- 8.7.1 Study leader : Mohammed Shahid Ullah, DFO
- 8.7.2 Associates : Nasrat Begum, SRO.  
: Azizul Haque, FI.

- 8.8 **Activities for the year** :
- a. Collection of baseline information.
- b. Collection of seeds and raising 6000 seedlings.



- c. Development of water supply facilities in the nursery of Keochia Research Station.  
 d. Raising trial plantation over an area of 2 ha (0.5 ha in each station) at four Silviculture Research Stations.

8.8.1 Activities calendar :

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

8.9 **Previous progress** : NA

8.9.1 Achievement(s), : NA

8.10 **Financial statement** :

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

8.10.2 Cumulative cost : Nil

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

8.10.4 Source of fund : GOB

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

### Silviculture Genetics Division

1. **Study** : On-going

1.1 Programme Area : Bamboo and Non-Timber Economic Crops

1.2 **Title of the Study:** Mass propagation of bamboos (*Dendrocalamus giganteus*, *B. tulda*, *B. vulgaris*, *B. bambos*, *Thyrsostachys* sp., *Schizostachyum dullooa* 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 : 2003-2004

1.6.2 Completion year : 2014-2015

1.7 **Personnel (s)**

1.7.1 Study Leader : Dr. Sharmila Das, DO.

1.7.2 Associates : Nusrat Sultana, FI.

1.7.3 : Saiful Alam Md. Tareq, FI.

1.8 **Activities for the year** :

- Collection of planting materials of selected species from Sylhet ( Moulavi Bazar), Mymensing, Chittagong Hill Tracts and different areas of Chittagong.
- Production of ten thousand bamboo propagules (Five thousand through branch cuttings and five thousand through seed and seedling proliferation).
- Data collection on survival rate of cuttings.
- 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, if any (2003-2012) : About one lakh and fifty seven 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. 9,81,640.00

1.10.3 Cost of the year Tk. 1,27,400.00

1.10.4 Source of fund : GOB.

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

**Study** : On-going

2.

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 : 2003-2004

2.6.2 Completion year : 2014-2015

2.7 **Personnel (s)** :

2.7.1 Study Leader : Dr. Sharmila Das, DO.

2.7.2 Associates : Nusrat Sultana, FI.

2.7.3 : Saiful Alam Md. Tareq, FI.

2.8 **Activities for the year** :

a) Exploration to Sylhet (Moulavi Bazar and Sreemangal), Dhaka (Gazipur and Mirpur) and different areas of Chittagong.

b) Collection of seeds and seedlings of five threatened species viz. boilam (*Anisoptera scaphula*), pitali (*Trewia nudiflora*), batna (*Castanopsis indica*), gutguttia (*Protium serratum*) and raktan (*Lophopetalum fimbriatum*).

c) Raising of five thousands seedlings of selected species and maintenance of seedlings in the nursery.

d) Raising one acre plantation as conservation plot 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, if any (2003-2012) : About fifty five thousand seedlings of 21 threatened species were raised in nursery. Five thousand and six hundred seedlings of dakroom (*Mitragyna parvifolia*), uriam (*Mangifera sylvatica*) and other available threatened species such as haldu (*Adina cordifolia*) and jhumkabhadi (*Engelhardtia spicata*), boilam (*Anisoptera scaphula*), pitali (*Trewia nudiflora*), batna (*Castanopsis indica*), gutguttya (*Protium serratum*) and raktan (*Lophopetalum fimbriatum*) are being maintained in the nursery for raising conservation plots.

2.9.1 Achievements 0.50 acre of conservation plots of 8 threatened species raised at Foy's Lake as gene resource conservation plot.

2.10 **Financial statement**

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

2.10.2 Cumulative cost Tk. 4,54,600.00

2.10.3 Cost of the year Tk. 76,400.00

2.10.4 Source of fund GOB.

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

3. **Study** : On-going

3.1 Programme Area : Breeding and Tree Improvement

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

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 : 2008-2009

3.6.2 Completion year : 2014-2015

3.7 **Personnel (s)** : 2014-2015

3.7.1 Study Leader : Dr. Sharmila Das, DO

3.7.2 Associates : Nusrat Sultana, FI.

3.7.3 : 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 plant lets 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, if any (2008-2012) : Culture establishment of farura, membra, budum, ora , brandisii and dolu have been done.

3.9.1 Achievements (s) : 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. 18,57,020.00

3.10.3 Cost of the year : Tk. 47,740.00

3.10.4 Source of fund : GOB.

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

4. **Study** : On-going

4.1 Programme Area : Breeding and Tree Improvement

4.2 **Title of the Study:** Development of tissue culture techniques for 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 2008-2009

4.6.2 Completion year 2014-2015

4.7 **Personnel (s)**

4.7.1 Study Leader Dr. Sharmila Das, DO.

4.7.2 Associates Nusrat Sultana, FI.

4.7.3 Saiful Alam Md. Tareq, FI.

4.8 **Activities for the year** :

a) Collection of explants from Narsingdi, Cox's Bazar 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 plant lets 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, if any (2009-2012) : Culture establishment of boilam and lotkon have been done.
- 4.9.1 Achievements (s), : NA
- 4.10 **Financial statement** :
- 4.10.1 Total cost of the study : Tk. 5,00,000.00
- 4.10.2 Cumulative cost : Tk. 3,99,180.00
- 4.10.3 Cost of the year : Tk. 48,460.00
- 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 : 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 : 1992-93
- 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. Selection of 200 plus trees of raktan, uriam, bajna, batna, dholi-garjan, teli-garjan, baitya-garjan, toon, dharmara, gutguitya, goda, kanak, agar, kadam, sidha- jarul, mahogani, lohakat, jhau, boilam and akasmoni.
- b. Collection of 1000 kg seeds from plus trees for distribution to Forest Department (FD) District Nursery Malik Samitee (DNMS) and other tree planters.
- c. Selected 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.												

1.9 **Previous progress :** Two thousand twenty nine plus trees of 42 different forest tree species namely-civit (*Swintonia floribunda*), boilam (*Anisoptera scaphula*), dholi-garjan (*Dipterocarpus alatus*), telsur (*Hopea odorata*), chapalish (*Artocarpus chama*), acacia hybrid (*Acacia auriculiformis X A. mangium*), akasmoni (*Acacia auriculiformis*), gamar (*Gmelina arborea*), ghora-nim (*Melia sempervirens*), bohera (*Terminalia bellirica*), haritaki (*Terminalia chebula*), amloki (*Phyllanthus emblica*), arjun (*Terminalia arjuna*), neem (*Azadirachta indica*), raj-koroi (*Albizia richardiana*), eucalyptus (*Eucalyptus camaldulensis*), champa (*Michelia champaca*), chickrassi (*Chukrasia velutina*), dhaki-jam (*Syzygium grandis*), teli-garjan (*Dipterocarpus turbinatus*), jhau (*Casuarina equisetifolia*), mangium (*Acacia mangium*), raintree (*Samanea saman*), sil-koroi (*Albizia procera*), toon (*Toona ciliata*), debdaru (*Polyanthia longifolia*), babla (*Acacia nilotica*), raktan (*Lophopetalum fimbriatum*), bajna (*Xanthoxylum rhetsa*), jat batna (*Castanopsis lancifolia*), agar (*Aquilaria agallocha*), kadam (*Anthocephalus chinensis*), sidha-jarul (*Lagerstroemia parviflora*), kanak (*Schima wallichii*), dharmara (*Stereospermum personatum*), gutguttya (*Protium serratum*), goda (*Vitex peduncularis*), mahogany (*Swietenia mahagoni*), uriam (*Mangifera sylvatica*), lohakat (*Xylia kerrii*), pitraj (*Aphanamixis polystachya*) and shegun (*Tectona grandis*) were selected and seeds are being collected.

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

Seeds and scions were collected from selected PTs of teak, garjan, telsur, gamar, akasmoni and acacia hybrid were used for raising plantation and orchards

1.9.1 **Achievements :** Two thousand one hundred twenty nine plus trees 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. 6,94,037.00
- 1.10.3 Cost of the year : Tk. 55,000.00
- 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 : NA
- 2.4 **Objectives :**
- 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 : 1992-93
- 2.6.2 Completion Year : 2019-20
- 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:**
- Raising of 7000 seedlings from 50 plus trees of akasmoni selected at SPA of Kaptai and Ichamati SOCs for establish 2.0 ha seedling seed orchard at Salna and Hyanko SOCs.
  - Establishment of 30.0 ha (2.0 ha in each species) seedling seed orchard of teligarjan, dholi-garjan, baittya-garjan, dharmara, dhaki-jam, agar, champa, chickrassi, toon, goda, gutguitya, boilam, jarul, civit and akasmoni at Ichamati, Salna, Hyanko, Kaptai and Dulahazara SOCs (6.0 ha in each centre). Toon, dharmara, goda, kanak, agar, kadam, sidha-jarul, mahogani, lohakat, jhau, boilam and akasmoni.
  - Maintenance of existing 40.0 ha clonal seed orchard and 70.0 ha seedling seed orchards at Ichamati, Salna, Hyanko, Kaptai and Dulahazara SOCs.
  - Collection of 200 kg teak seeds and 100 kg gamar seeds from Kaptai Seed Orchard Centre, 40 kg telsur seeds from Ichamati Seed Orchard Centre and 5 kg eucalyptus seeds from Salna Seed Orchard Centre for seedling raising and supply.
  - Raising and maintenance of 1,90,500 seedlings for establishment of 30.0 ha seedling seed orchard on this year and next year at Ichamati, Salna, Hyanko, Kaptai and Dulahazara SOCs (38,000 seedlings in each centre).
  - Maintenance of previous year's seedling at nursery of Head Quarter and Dulahazara, Ichamati, Hyanko and Salna SOCs.
  - Maintenance by gap filling in previously raised one year old 6.5 ha orchard at Ichamati, Kaptai, Dulahazara and Hyanko SOCs.
  - Maintenance of nurseries at Head Quarter and seven seed orchard centres.
  - Production of 15,000 rooted cuttings of hybrid *Acacia* at plant propagation unit of head quarter for distribution to DNMSs and six SOCs.
  - Preparation of 2,500 teak ramets and 2,500 gamar ramets for clonal seed orchard establishment at Kaptai, Hyanko, Ichamati and Dulahazara SOCs.
  - Raising of 10,000 gamar and teak seedlings for establish 10.0 ha clonal seed orchard at Kaptai, Hyanko, Ichamati and Dulahazara SOCs.
  - Establishment of 6.0 ha teak and 8.0 ha gamar clonal seed orchard at Kaptai, Hyanko, Ichamati and Dulahazara SOCs.
  - Data collection at Ichamati, Salna, Hyanko, Kaptai and Dulahazara SOCs.
  - 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.																				
h.																				
i.																				
j.																				
k.																				
l.																				
m.																				
n.																				

- 2.9 **Previous progress** : From different seed orchards 4529 kg seeds of teak, gamar, pine, telsur and eucalyptus were collected and distributed. 88,000 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 SOC's 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. europaylla*), 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. 91,59,885.00  
Cost of the Year : Tk. 11,15,660.00  
Source of the fund : GOB
- 2.11 **Beneficiaries** : Forest Department (FD), NGOs and other Tree Planting Agencies and Private Land Owners.
3. **Study** : On going
- 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 : NA
- 3.4 Objectives of the study :
- 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 : 1996-97
- 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. Collection of 30 kg. seeds of akasmoni and 5 kg. seeds of acacia hybrid from SPA



at Kaptai and Ichamati SOCs.

- b. Maintenance of seed production area of akashmoni (1.0 ha) at Ichamati and Kaptai (1.0 ha) and acacia hybrid (0.50 ha) at Salna SOCs.

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 : About 260 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.

3.9.1 Achievement : Two hectare SPA of akashmoni was 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. 3,43,720.00

3.10.3 Cost of the Year : Tk. 11,280.00

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 :

4.4 **Objective** :

4.4.1 To develop awareness about the importance and benefits of using 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 Starting Year : 2004-05

4.6.2 Completion year : 2016-17

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 50,000 seedlings of mahogany, gamar, hybrid acacia, akashmoni, kadam, toon, jarul, silkoroi, boilam, civit, champa, haritaki, amloki, bohera, neem, raintree, kala-koroi etc. considering the demands of earlier years.

b. Distribution of seedlings among the farmers, planters and other users.

c. Improvement of nursery facilities at BFRI HQ and Ichamati SOC.

4.8.1 Activities calendar :

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

c													
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4.9 Previous progress : During previous years 1,84,000 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. 13,84,545.00

4.10.3 Cost of the year : Tk. 75,000.00

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** : On going

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 : 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 : 1992-93

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 seeds of major forest tree species (e.g. agar, chapalish, civit, boilam).

b. Germination, purity and viability tests of the collected seeds from seed orchard centres 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 : Routine testing of the collected seeds were done prior to distribution of seeds. Laboratory facilities were strengthened

5.9.1 Achievements : Unified systems of seed distribution for akashmoni 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. 1,95,632.00

5.10.3 Cost of the year : Tk. 25,000.00.

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** : On going
- 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 :
- 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 : 2008-09
- 6.6.2 Completion Year : 2019-20
- 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-Ul-Hoque, RO; A.K.M Azad, RO; Md. Moklesur Rahaman, FI
- 6.8 **Activities for the year:**
- Remarking fifty number Plus tree of rubber trees.
  - Information collection on latex production and selection of rubber tree on the basis of latex yield and collection of seeds from the 50 selected trees.
  - Raising of 1.50ha rubber clonal orchard at Hyanko SOC.
  - Maintenances of previously raised 3.25 ha trial plantation (3 times) at Hyanko SOC.
  - Preparation of 2,000 rubber ramets at Hyanko SOC.
  - Fertilizing in the rubber clonal trial (3 times) at Hyanko SOC.

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.												

6.9 Previous progress : One hundred twenty 120 trees were selected at Datmara Rubber estate, 20000 seedlings were raised to produce ramets by using selected clones. From 32 trees selected on the basis of latex yield were used in raising 2 ha clonal trial at Datmara rubber estate.

6.9.1 Achievement : 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. 7,18,740.00

6.10.3 Cost of the Year : Tk. 1,18,060.00

6.10.4 Source of the fund : GOB

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

## Forest Botany Division

1. Study : On-going
- 1.1 Programme Area : Biodiversity and Conservation
- 1.2 Title of the Study : Buddha-Bihar (*Kiyang*) based tree biodiversity conservation in Rangamati Hill District
- 1.3 Justification (For new study) :
- 1.4 **Objective(s)** :
  - 1.4.1 To conserve biodiversity by involving local religious leaders.
  - 1.4.2 To enrich tree biodiversity in Buddha-Bihar (*Kiyang*) areas by participatory effort.
  - 1.4.3 To develop a religious institution based biodiversity conservation model
- 1.5 **Expected output:**
  - a. Religious leaders and local people will be motivated for indigenous tree plantation and conserve tree biodiversity in Buddha-Bihar (*Kiyang*) areas.
  - b. Biodiversity of hill forest will be conserved and enriched for future research work.
  - c. Awareness will create among religious leaders and local people for tree biodiversity conservation at local level.
- 1.6 **Study period** :
  - 1.6.1 Starting year : 2008 - 09
  - 1.6.2 Completion year : 2013 - 14
- 1.7 **Personnel(s)** :
  - 1.7.1 Study leader : Mohammed Mohiuddin, D.O
  - 1.7.2 Associates : Asim Kumar Paul, R.O
  - 1.7.3 : A.H. M. Jahangir Alam, R.O
- 1.8 Activities for the year:
  - a. Three group meetings with the religions leaders and local people at Bodhipur, Nirbanpur and Khamarpara Buddha-Bihar towards the plantation around the Buddha-Bihar (*Kiyang*) areas.
  - b. Motivation to the religions leaders and local people for wild seedlings collection from the natural forest for enrichment plantation around the Bihar areas.
  - c. Enrichment plantation with native tree species for restoration and conservation of native plant species.
  - d. Reporting (The draft 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, if any (04 year) : Buddha-Bihar (*Kiyang*) is the religious institution for the followers of Buddhu religion. Most of the Buddha-Bihar (*Kiyang*) of Rangamati Hill District is situated at the top of the hills. During establishment of new Bihar they cut the natural vegetation and after establishment the Buddha-Bihar the religion leaders and local people do not cut any species. Therefore, Buddha-Bihar (*Kiyang*) is an important place for tree biodiversity conservation. Bodhipur Bonobihar, Khamar para Adarsha Bonobihar and Nirbanpur Bonobihar study sties through consultation with local religious leaders. Species selection was done consulting the local people and religion leaders. A Participatory site map was drawn for enrichment plantation. As per desire of the local people twenty five thousand seedlings of 32 indigenous tree species were supplied to eight Bihars of Manikchari area of Rangamati. These species were planted in the selected areas of Bihars enrichment plantation. Survival percentage and heights of the planted tree species were measured and data were recorded.

- 1.9.1 Achievement(s), : Awareness has created among the religious leaders and local people for biodiversity conservation in the Bihar.
- 1.10 **Financial statement** :
- 1.10.1 Total cost of the study : Tk. 6,50,000/-
- 1.10.2 Cumulative cost : Tk.
- 1.10.3 Cost of the year : Tk. 1,50,000/-
- 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries** : Government Departments Academic Institutes,NGOs,and Local communities.

2. Study : Ongoing
- 2.1 Programme Area : Biodiversity and Conservation
- 2.2 Title of the Study :Regeneration status of tree species in plantation and natural forest of Paithong forest areas of Bandarban Hill District
- 2.3 **Justification** : NA
- 2.4 **Objective(s)** :
- 2.4.1 To determine regeneration status of tree species in different habitats (planted and natural forest) in Paithong forest areas.
- 2.4.2 To determine the vegetation dynamics of plantation and natural forest patches.
- 2.5 **Expected output:**
- a. Data base on regeneration status and phyto-sociological information in planted and natural habitats of Paithong forest area will be developed.
- b. BFRI herbarium will be enriched with botanical specimens of the study area.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2011- 12
- 2.6.2 Completion year : 2013 - 14
- 2.7 **Personnel(s)** :
- 2.7.1 Study leader : Mohammed Mohiuddin, D.O
- 2.7.2 Associates : Syedul Alam, R.A (Grade-1
- 2.8 **Activities for the year**
- a. Data collection on tree seedlings regeneration and phyto-sociological data in natural and planted forest.
- b. Botanical specimen collections and processing of the samples
- c. Identification of species and data analysis.
- d. Compilation of reports.

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, if any (2011-12) : Four trips were carried out for regeneration status of tree species. Twenty two permanent sample plots were lay out representing various slopes (hill top and hill base) in natural and planted areas of Paithong forest areas. Naturally and planted seedlings from the permanent sample plots were listed and counted. Among them, batna, goda, kannayri, dharmara, assar, pitraj and putijam were most common tree seedling species. Twenty botanical specimen collection of the study area and processed for preservation.

- 2.9.1 Achievement(s), :

- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 1,50 000 /-
- 2.10.2 Cumulative cost : Tk.
- 2.10.3 Cost of the year : Tk. 25,000 /-
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : Forest Department, Forestry Institutes, NGOs and policy people.

3. Study : **Ongoing**
- 3.1 Programme Area : Post Harvest Utilization- Physical Processing.
- 3.2 Title of the Study : Anatomical properties of lambu (*Khaya sp.*) tree grown in Bangladesh
- 3.3 Justification : 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:**
- a. Data base on anatomical properties of lambu (*Khaya sp.*) woods will be developed.
- b. BFRI xylarium will be enriched with wood collections and permanent slides.
- 3.6 **Study period** :
- 3.6.1 Starting year : 2011 -12
- 3.6.2 Completion year : 2013 -14
- 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
- 3.7.3 : Mohammed Mohiuddin, D.O
- 3.8 **Activities for the year:**
- a. Microtome sections cutting and preparation of permanent slides.
- b. Study of gross anatomical properties and minute anatomical properties from permanent slides
- c. 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, if any (2011-12) : Work plan has been prepared consulting the pertinent literature. 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/-
- 3.10.2 Cumulative cost : Tk.
- 3.10.3 Cost of the year : Tk. 25,000/-
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : FD, BFIDC, Academic Institutes, NGOs and Wood Traders, Farmers.

4. Study : **New**
- 4.1 **Programme Area** : **Biodiversity and Conservation.**

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

4.3 **Justification (For new study)** : The community people of the Kapru Para belongs to Murong Community. They are maintaining village common forest as the culture and heritage. This reserve ensures the perennial water supply to the villagers. At present this village is considered as the remnant vegetation of the Bandarban forest composition. The study on the floristic composition of this reserve will help to species section for restoration of common reserve forests.

4.4 **Objective(s)** :

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

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

4.5 **Expected output:**

- Plant diversity and status of the reserve will be known and this will help in future conservation.
- Awareness of local people about values of local biodiversity and their conservation will be developed for future research work.
- Motivation for community people for restoration for their perennial water source and better livelihoods.

4.6 **Study period** : 20013- 14

4.6.1 Starting year :

4.6.2 Completion year : 2015-16

4.7 **Personnel(s)** :

4.7.1 Study leader : Mohammed Mohiuddin, D.O

4.7.2 **Associates:** Syedul Alam RA-1; A.H. M. Jahangir Alam, R.O; S. M. Zahirul Islam , RO

4.8 **Activities for the year:**

- Preparation of work plan consulting pertinent literatures.
- Group discussion with local people and karbaries.
- Preparation of site map and laying out sample plots.
- Collection of botanical samples and processing of the samples.
- Motivate the local people for conservation of wild indigenous tree seedlings and enrichment planting with supplied indigenous species.
- Motivate the local peoples towards enrichment plantation for restoration.

4.8.1 Activities calendar :

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

4.9 Previous progress, if any (2013-14) : New

4.9.1 Achievement(s), : New study

4.10 **Financial statement** :

4.10.1 Total cost of the study : Tk. 5,00, 000/-

4.10.2 Cumulative cost : Tk

4.10.3 Cost of the year : Tk. 1,50,000/-

4.10.4 Source of fund : GOB

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

5. Study : New

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

- 5.2 Title of the Study : Studies on ethnobotanical plants used by the Chakma communities of Rangamati Hill District
- 5.3 **Justification (For new study)** : The Chamka community is the dominant tribe of the Rangamati hill district. This community used a good number plant species as herbal medicine. The plant species and knowledge system is becoming extinct with innovation modern medicine and habitat destruction. BFRI have no data base on the herbal medicine of the Chakma tribe. The study will helps to enrich on the herbarium collection and data base information on herbal medicine.
- 5.4 **Objective(s)** :
- 5.4.1 To collect the ethnobotanical plants and their information used by the Chakma tribe of Rangamati Hill District.
- 5.4.2 To find out conservation strategy and to develop data base for ethno medicinal plants.
- 5.5 **Expected output:**
- a. Ethnomedicinal plants used by the Chakma tribe will be documented.
- b. BFRI herbarium will be enriched with ethnobotanical samples.
- 5.6 **Study period** :
- 5.6.1 Starting year : 2013- 14
- 5.6.2 Completion year : 2015-16
- 5.7 **Personnel(s)** :
- 5.7.1 Study leader : Mohammed Mohiuddin, D.O
- 5.7.2 Associates : Syedul Alam RA-1
- 5.8 **Activities for the year:**
- a. Preparation of work plan consulting pertinent literatures.
- b. Group discussion with herbal healers.
- c. Collection of ethno-botanical samples and processing of the samples.
- e. Collection of information on conservation strategy.
- f. 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													
f													

- 5.9 Previous progress, : NA
- 5.9.1 Achievement(s), : New study
- 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. 1,00,000/-
- 5.10.4 Source of fund : GOB
- 5.11 **Beneficiaries** : Forest Departments, Academic Institutes, NGOs, and Communities.

## FOREST INVENTORY DIVISION

1. **Study** : On-going
- 1.1 Programme Area : Forest Inventory, Growth and Yield.
- 1.2 Title of the study : Growth and yield assessment of akashmoni (*Acacia auriculiformis*) and mahogany (*Swietenia macrophylla*) through establishment of permanent sample plots (PSPs).



- 1.3 Justification (For new study) :
- 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.
- b) Growth and yield of the species at different plantation sites.
- c) Physical rotation of these species.
- 1.6 **Study period** : 2010-2021
- 1.6.1 Starting year : 2010-11
- 1.6.2 Completion year : 2020 – 2021
- 1.7 **Personnel (s)**
- 1.7.1 Study Leader : S. M. Zahirul Islam, RO
- 1.7.2 Associates : Md. Abul Hasnat Shah Jalal, DO
- 1.7.3 : Mofizul Islam Khan, FI
- 1.8 **Activities for the year:**
- a) Re-measurement 50 established PSPs existing plantation at Chitagong and Cox,s Bazar Forest Division.
- b) Re-measurement 54 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, if any : Fifty four PSPs for mahogany at Faridpur and Rajbari , 50 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, 35,780.00
- 1.10.3 Cost of the year : Tk: 45,000.00
- 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** : On- going
- 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** : 1988-2015
- 2.6.1 Starting year : 1988-89
- 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 PSPs at Chittagong and Cox's Bazar coastal areas.
- b) Summarization of collected data.
- 2.8.1 Activities calendar :

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

- 2.9 Previous Progress, : 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:
- 2.10.3 Cost of the year : Tk: 30,000.00
- 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** : On going
- 1.1 Programme Area : Forest Inventory and Economics
- 1.2 Title of the Study : Impact analysis of bamboo plantations raised by branch cutting and bamboo groves management technique
- 1.3 Justification (For new study) : N.A
- 1.4 **Objectives** :
- 1.4.1 :To evaluate economic benefit of bamboo plantations by using branch cutting technique.

- 1.4.2 :To assess the bamboo grower's interest of bamboo plantations by branch cutting technique.
- 1.4.3 :To determine the economic impact of bamboo groves management technique.
- 1.5 **Expected output** : Economic gain of the bamboo plantations by using branch cutting and bamboo groves management technique on economy of rural people will be determined.
- 1.6 **Study period** :2011-12 to 2013-14
- 1.6.1 Starting year : 2011-12
- 1.6.2 Completion year : 2013-14
- 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) Selection of bamboo growers at Modupur of Tangail through pilot survey.
- b) Arrangement of group discussion with the selected bamboo growers.
- c) Collection of data on plantation establishment cost, bamboo plantation area and economic return from the selected bamboo growers.
- 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 (FY of 2011-12 & 2012-13) : The survey was conducted on bamboo plantation of the bamboo growers under Faithong & Dinajpur in 2011-12 and Sylhat/Sunamgonj & Jessore in 2012-13 to assess economic performance, where the bamboo branch cutting technique had been disseminated. The average Internal Rate of Return (IRR) and Benefit Cost ratio (B-C ratio) under faithong and Dinajpur were found 46% and 6.16 for the branch cutting and 34% and 4.51 for the rhizome method respectively. The analysis of collected data for another two locations is ongoing and that will be submitted later on.

1.9.1 Achievement : NA.

1.10 **Financial statement** :

1.10.1 Total cost of the study : Tk. 3,20,000.00

1.10.2 Cumulative cost : Tk. 95,784.00

1.10.3 Cost of the year : Tk. 20,000.00

1.10.4 Source of fund : GOB

1.11. Beneficiaries : FD, Bamboo growers, Private Entrepreneurs, NGOs.

2. **Study** : On going.

2.1 Programme Area : Forest Inventory and Economics

2.2 Title of the study : Determination of financial rotation of babla (*Acacia nilotica*) plantations in Bangladesh

2.3 Justification (For new study): N.A

2.4 **Objective** :

2.4.1 :To determine the financial rotation of babla (*Acacia nilotica*) based on its the existing utilization.

2.5 **Expected output** : Optimum rotation of babla (*Acacia nilotica*) will be determined

2.6 **Study period** : 2011-12 to 2013-14

2.6.1 Starting year : 2011-12

- 2.6.2 Completion year : 2013-14
- 2.7 **Personnel (s)** :
- 2.7.1 Study leader : M.A. Taher Hossain; RO
- 2.7.2 Associate : Hasina Mariam; DO, Md. Melon; FI; Forjana Yasmin; RA-1.
- 2.8 **Activities for the year** :
- Collection of information on existing babla plantations in Patuakhali and Chittagong.
  - Collection of field data on height, diameter of trees, and establishment cost of nursery and plantations.
  - Compilation and analysis of collected data.

2.8.1 Activities calendar

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

2.9 **Previous progress ( FY of 2011-12 & 2012-13) :** Data on babla species were collected from the mixed and mono plantation of Bagerhat SFD and Noakhali C/A Division in 2011-12 and Barisal SFD in 2012-13. The analysis of collected data is ongoing. Optimum financial rotation will be finalized after data collection and completion of data analysis for remaining Forest Divisions of the study areas.

- 2.9.1 Achievement : N.A.
- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 3,10,000.00
- 2.10.2 Cumulative cost : Tk. 84,424.00
- 2.10.3 Cost of the year : Tk. 50,000.00
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : FD, Private Planters. NGOs etc.

3 **Study** : On going

- 3.1 Programme Area : Forest Inventory and Economics
- 3.2 Title of the Study : Impact of the Coastal afforestation of Bangladesh in respect of financial and socioeconomic conditions of local people.

3.3 Justification (For new study) : N.A

3.4 **Objectives** :

3.4.1 : To find out production system through intercropping of seasonal and/or annual crop in the forest floor of afforestation areas.

3.4.2 : To assess income generation of local people.

3.4.3 : To make financial analysis of afforestation in Coastal zone.

3.4.4 : To estimate the sequestered carbon in the selected years of plantations of Coastal Afforestation

3.5 **Expected output:** Generation of employment & income, production system, input- output ratio of local people and the economic profitability of afforestation in Coastal zone.

3.6 **Study period** : 2012-13 to 2014-15

3.6.1 Starting year : 2012-13

3.6.2 Completion year : 2014-15

3.7 **Personnel (s)** :

3.7.1 Study leader : M.A Taher Hossain; RO

3.7.2 Associates : Hasina Mariam; DO, Md. Melon; FI; Forzana Yasmin; RA-1; Rukshana Akther, FI

3.8 **Activities for the year:**

- Collection of data to determine the required number of plots as sample size through pilot survey from Bagerhat and Barisal social forest divisions.

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

3.9 Previous progress (2012-13) : Progress will be submitted later on.

3.9.1 Achievement : NA.

3.10 **Financial statement** :

3.10.1 Total cost of the study : Tk 6,50,000.00

3.10.2 Cumulative cost :

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

3.10.4 Source of fund : GOB

3.11 **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 : NA

1.4 **Objectives** :

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 : M. Zahirul Alam, Asst. Soil Scientist

1.7.2 **Associates** : Md. Jahangir Alam, DO; Md. Motiar Rahman, 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 (2012-13) : New site of one year plantation of one hectare was selected for establishment of cover crops. Fencing was completed. Soil and compost samples were analyzed and recorded. Compost was applied in 144 numbers of mature rubber trees. Data on latex yield were collected and recorded.

1.9.1 Achievement : Established one hectare rubber plantation at Dantmara Rubber Estate 1.10

**Financial statement** :

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

1.10.2 Cumulative cost : Tk. 2,51,920.00

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

1.10.4 Source of fund : GOB

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

2. **Study** : On-going

2.1 Programme Area : Soil conservation and watershed management

2.2 Title of the Study : Minimization of soil erosion in teak through trials by mixed plantations at Faitong, Lama, Bandarban Hill District

2.3 Justification : Not applicable

2.4 **Objectives** :

2.4.1 To compare soil loss in mono and mixed plantations of teak

2.4.2 To determine appropriate species for mixed plantations of teak

2.5 **Expected output** : Appropriate tree combination with teak to reduce soil erosion

2.6 **Study period** :

2.6.1 Starting year : 2007-08

2.6.2 Completion year : 2014-15

2.7 **Personnels** :

2.7.1 Study leader : M. Zahirul Alam, Asst. Soil Scientist

2.7.2 **Associates:** Md. Jahangir Alam, DO; Md. Motiar Rahman, Asst. Soil Scientist

2.8 **Activities for the year** :

a) One hectare established plantation will be maintained through weeding and pruning

b) Data on height, girth and survival percentage will be collected from established plantation

c) Soil loss will be assessed by scaling method

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 (2012-13) : Data on height, girth and survival were recorded and found that maximum height (11.50 m), girth (42.0 cm) and survival (65%) was hybrid acacia. Soil loss was assessed by scaling method and found T<sub>0</sub> (Teak), T<sub>1</sub> (Teak+Mehogany), T<sub>2</sub> (Teak+Hybrid acacia), T<sub>3</sub> (Teak+Eucalyptus) and T<sub>4</sub> (Teak+Garjan) were 1.29, 1.25, 0.88, 0.79 and 1.32 ton/ha/yr respectively.

2.9.1 Achievement : Established 1.50 hectare mixed plantations at Faitong, Lama, Bandarban Hill District

2.10 **Financial statement** :

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

2.10.2 Cumulative cost : Tk. 1,06,524.00

2.10.3 Cost of the year : Tk. 20,000.00

2.10.4 Source of fund : GOB

2.11 **Beneficiaries** : FD and private planters

3. **Study** : Ongoing

3.1 Programme Area : Soil conservation and watershed management

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

3.3 Justification : Not applicable

3.4 **Objectives** :

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

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

3.5 **Expected output** : Prepared data bank on carbon storage trends from different forest tree species and soil

3.6 **Study period** :

3.6.1 Starting year : 2010-11

3.6.2 Completion year : 2014-15

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) Root, stem, twig and leaf samples from 2 forest trees species and 5 bamboos 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

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 : Organic carbon content of two forest tree species (Sal and Mangium) and four bamboo species (Ora, Pharus, Dalu and Thai bans) were collected and analyzed. Soil samples from adjacent selected tree species were analyzed and recorded.
- 3.9.1 Achievement : Twenty six forest tree and nine bamboo species were analyzed for data bank
- 3.10 **Financial statement** :
- 3.10.1 Total cost of the study : Tk. 6,00,000.00
- 3.10.2 Cumulative cost : Tk. 1,89,840.00
- 3.10.3 Cost of the year : Tk. 60,000.00
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : FD, NGO and academician
4. **Study** : New
- 4.1 Programme Area : Soil conservation and watershed management
- 4.2 Title of the Study : Effect of using preservative treated bamboo materials on soil properties and production of betel leaf in betel leaf cultivation
- 4.3 **Justification** : The deep green heart shaped leaves of betel vine are known as *Paan* in Bangladesh. The scientific name of betel vine is *Piper betel* L. and it belongs to the family Piperaceae, i.e. the Black Pepper family. The most probable place of origin of betel vine is Malaya. In spite of its alienness, the plant is much more popular in Bangladesh than in any other country of the world since the antiquity. The vine is a dioeciously (male and female plants are different) shade loving perennial root climber. It grows best under the shaded, tropical forest ecological conditions with a rainfall of about 2250-4750 mm, relative humidity and temperature ranging from 40-80% and 15-40°C respectively. A well-drained fertile sandy or sandy loam or sandy clay soil with pH range of 5.6-8.2 is considered suitable for its cultivation. The vine is raised by vegetative propagation from the cuttings under partially shaded and humid environment inside the *Boroj*, which is a small hut like structure of approximately 2 m in height and 0.02 ha in area. It is constructed with the locally available materials like bamboo stems, jute sticks, paddy straw & petioles and leaves of banana etc. wherein the vines are grown on elevated beds imitating the natural ecological conditions suitable to the crop. Bamboos of different sizes are generally used for fencing and poles in betel leaf farms. Bamboo sticks are used as climber for betel leaf vine. These bamboo materials have very short service life because there are being used without having any preservative treatment. After treatment, the service life of the materials can be increased by four to five times. To increase the service life of bamboo sticks used in the betel leaf farms are treated by soaking methods using water borne preservatives copper sulfate ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ), sodium dichromate ( $\text{Na}_2\text{Cr}_2\text{O}_7 \cdot 2\text{H}_2\text{O}$ ) and boric acid ( $\text{H}_3\text{BO}_3$ ). Since Bangladesh has long rainy season, some preservative chemicals are leached out from treated bamboo materials with rain water. So, there is at risk of leaching materials to contaminate the soil and water as well as plant nutrients. In this regard, the study has been taken to find out the effect of preservative chemicals on soil properties and the production of betel leaf in the betel leaf cultivation.
- 4.4 **Objectives** :
- 4.4.1 To monitor the changes in soil properties for using preservative treated bamboo materials in betel leaf cultivation
- 4.4.2 To assess the yield and quality of betel leaf in the betel leaf farms
- 4.5 **Expected output** : Conservation of soil properties and sustainable production of betel leaf
- 4.6 **Study period** :
- 4.6.1 Starting year : 2013-14
- 4.6.2 Completion year : 2015-16



- 4.7 **Personnels** :
- 4.7.1 Study leader : Md. Motiar Rahman, Asst. Soil Scientist
- 4.7.2 **Associates:** Md. Jahangir Alam, DO; M. Zahirul Alam, Asst. Soil Scientist
- 4.8 **Activities for the year:**

- a) Site and farmer will be selected at Sitakunda, Chittagong
- b) Initial soil samples will be collected from the experimental plots
- c) Land will be prepared for planting of betel leaf
- d) Shading and fencing will be set up in the experimental plots
- e) Betel leaf rhizome will be planted in the experimental plots
- f) Staking will be set up in betel leaf of the experimental plots
- g) Management (weeding, furrowing etc.) and maintenance (repairing fence, shade etc.) will be done of the experimental plots
- h) Soil and betel leaf samples will be collected from the experimental plots for analysis of soil and plant nutrients
- i) Data on production of betel leaf will be collected from the experimental plots
- j) Data 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.													
g.													
h.													
i.													
j.													

- 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. 4,00,000.00
- 4.10.2 Cumulative cost : Not applicable
- 4.10.3 Cost of the year : Tk. 1,00,000.00
- 4.10.4 Source of fund : GOB
- 4.11 **Beneficiaries** : Betel leaf farmers, researchers and academicians

## MINOR FOREST PRODUCTS DIVISION

1. Study : On-going
- 1.1 Programme Area : Bamboo and Non-timber Economic Crops.
- 1.2 Title of the Study : Nursery, plantation and management techniques, and conservation of ten rattan species available in Bangladesh.
- 1.3 Justification (For new study) :
- 1.4 Objective(s) :
  - a) To develop suitable techniques for production of quality planting materials of ten 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*) rattan species.
  - 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 all the 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 : Appropriate technique will be available for production of quality planting materials for plantation raising and management of different rattan species will be available.

Conservation and centralization of all rattan species available in Bangladesh will be possible

Permanent seed source of different rattan species will be created

1.6 Study period

1.6.1 Starting year : 2002-2003

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 & c) S. R.Merry, SRO

1.8 Activities for the year :

- a) Seed collection of different rattan species from three to four locations.
- b) Nursery trial for bhudum (*C. latifolius*), sundi (*C. guruba*), and sita (*Calamus erectus*) rattan species.
- c) Raising 20,000 seedlings of different rattan species for trial plantation, establishment of conservation plots and remaining seedlings for distribution on payment basis.
- d) Maintenance of seedlings in the nursery through weeding, watering, manuring, etc.
- e) Raising trial plantations of 1.0 hectare at BFRI Headquarter and Hinguli Research Station.
- f) Maintenance of 5.0 hectare old trial plantation and conservation plots at BFRI Headquarter and Hinguli Research Station through vacancy filling, weeding and other tending operations.
- g) 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)											■	
g)				■	■					■	■	

1.9 Previous progress if any :

Studied fruit maturing time, seed per kg. counted of 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*) and golla (*Daemonorops jenkinsiana*) udum (*C. longisetus*).

Raised experimental plantations and conservation plots over an area of 5.0 ha.

Survival percentage, growth of seedlings in the plantation, site suitability of four

species, etc. were studied.

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

Nursery and plantation techniques of jali (*Calamus tenuis*), kerak (*C. viminalis*) and golla (*Daemonorops jenkinsiana*) bet have been 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. 1,29,000.00

1.10.4 **Source of fund**

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

2. Study : On-going

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.

2.3 Justification (For new study) :

2.4 Objective(s) :

a) To develop nursery techniques for production of planting materials.

b) To develop plantation and sound management techniques for sustained yield.

2.5 Expected output : Appropriated nursery, plantation and management techniques of selected medicinal plants will be known.

2.6 Study period

2.6.1 Starting year : 2009-2010

2.6.2 Completion year : 2012-2013

2.7 Personnel :

2.7.1 Study Leader : Md. Sah Alam, RO

2.7.2 Associates : Rafiqul Haider, DO & c) S.R. Merry, SRO

2.8 Activities for the year :

a) Collection of propagating materials and raising 1500 seedlings (300 for each species) of five medicinal plants such as, chalmugra (*Hydnocarpus kurzii*), ritha (*Sapindus mukorossi*), kuchila (*Strychnos nux-vomoca*), anantamul (*Hemidesmus indicus*), Kurchi (*Holarrhena antidysenterica*).

b) Maintenance of seedlings in the nursery.

c) Establishment of 0.25 hectare experimental plantations with five selected medicinal plants Hinguli Research Station.

d) Maintenance of 1.0 hectare trial plantations at BFRI Headquarter and Hinguli Research Station.

e) Collection of data on survival, growth and biomass 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 ( ... year) : Nursery and plantation technique of different medicinal plants such as aswagandha, basak, satamuli, simul, sarpagandha, arjun, ulatkambal, dhutura, mehdi, bach, bel, bahera, raktakambal, shinduri, sonalo, sajna, haritaki, akand, kantikari, have been developed.
- 2.9.1 Achievement (s) (if any) : Cultivation and uses of twelve medicinal plants of Bangladesh have been published as a bulletin-7. Nursery and plantation techniques of aswagandha, basak, satamoli and simul have been developed. How to raise seedlings from small seeds of medicinal plants (in bangla) have been published as a folder. Maintenance of medicinal plants without chemical fertilizer and insecticide have been also published as a folder.
- 2.10 Financial statement :
- 2.10.1 Total cost of the study : Tk. 3,50,000.00
- 2.10.2 Cumulative cost : Tk. 2,58,000.00
- 2.10.3 Cost of the year : Tk. 75,005.00
- 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) :
- 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:** Genetic sources for quality planting materials will be enriched. Management techniques for maximum yield of Medicinal plants will be developed.
- 3.6 Study period
- 3.6.1 Starting year 2002-2003
- 3.6.2 Completion year 2014-2015
- 3.7 Personnel
- 3.7.1 Project Leader a) Md. Sah Alam, RO
- 3.7.2 Associates b) Rafiqul Haider, DO & c) S.R. Merry, SRO
- 3.8 Activities for the year
- a) Collection of propagating materials for 25 annual and five perennial medicinal plants from Bogra, Dinajpur, Natore, Bandarban and Khagrachari districts of Bangladesh.
- b) Nursery bed preparation and development.
- c) Raising 4,000 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 40 annual and establishment of

conservation plots with five perennial medicinal plants at HQs 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)		■			■	■	■	■				■
g)				■	■	■	■	■	■	■	■	■

3.09 Previous progress if any : Twenty perennial (. Toikor, Thanpura, Bokful, lotkon, Ashfol, Chagolladi, Jatropa, Choijhal, Panbilas, Fashonfruit, Karipata etc.) and 28 annual (Nasta, Volas, jointi, japanipudina, Contkari, Hostikarnopolash, Ultotchondal, Ayapana, Ekangi, Sugar plant, Sweet bauch, Salat-pata etc.) medicinal plants species were collected from different locations of Bangladesh and conserved them at BFRI HQs nursery

3.9.1 Achievement (if any) : Conservation plots of 86 Nos. (Kalomegh,ghritoa kanchan,pipul, sarpa gandha,choi jal anantamul, salpani, pan belash, bui kumra, ekangi, turuk chandal, karpur, , sugar-plant, sweet-bauch, all-spices, jayanti, nagalingom, brammi, ayapana, taspata, japani-pudina, aswagandha, mahedi, ram-tulsi, khoir etc.) of annual and 18 nos. perennial medicinal plants are established 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. 5,70000.00

3.10.3 Cost of the year Tk. 86,415.00

3.10.4 Source of fund

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

4 Study On-going

4.1 Programme Area Bamboo and Non- timber Economic Crops

4.2 Title of the Study Standardization the nursery and plantation techniques (Acacia catechu).

4.3 Justification (For New study) :

4.4 **Objective(s) :**

- To observe the seed germination percentage with different treatments.
- To observe the seed germination period, seedlings growth, etc. under different treatments.
- To find out survival and growth performance of seedlings with different spacing.
- Documentation of traditional khair processing

4.5 Expected output Improved nursery and plantation technique of khair

4.6 Study period

4.6.1 Starting year 2010-11

4.6.2 completion year 2013-14

4.7 Personnel(s)

4.7.1 Project Leader a) Rafiqul Haider, DO

4.7.2 Associates b) S. R. Merry, SRO & c) Md. Sah Alam, RO

4.8 Activities for the year :

- a) Maintenance of experimental plantations through weeding, watering, manuring, etc.
- b) Survival and growth data collection at six months intervals.
- c) Documentation of traditional khair processing
- d) Organizing two group discussion programmes for validation of traditional khair processing.
- e) Report writing

#### 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)													

#### 4.9 Previous progress if any :

Studied seed germination period and germination percentage, root-shoot ratio of khair. Raised experimental plantations and conservation plots over an area of 1.0 ha. Survival percentage, growth of seedlings in the plantation, site suitability of khair, etc. were studied.

4.9.1 Achievement (if any) NA

#### 4.10 Financial statement

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

4.10.2 Cumulative cost Tk. 1,60,700.00

4.10.3 Cost of the year Tk. 87,505.00

4.10.4 Source of fund GOB

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

5 Study On-going

5.1 Programme Area Bamboo and Non- timber Economic Crops.

5.2 Title of the Study Study on nursery and plantation technique of dhup (Canarium resiniferum).

5.3 Justification (For new study) :

5.4 Objective(s)  
 a. To observe the physiological character of dhup  
 b. To standardize nursery techniques of dhup.  
 c. To developed plantation techniques of dhup.

5.5 Expected output Improved nursery and plantation technique of dhup

5.6 Study period

5.6.1 Starting year 2011-2012

5.6.1 Completion year 2015-2016

5.7 Personnel

5.7.1 Project Leader a) Rafiqul Haider, DO

5.7.2 Associates b) S. R. Merry, SRO & c) Md. Sah Alam, RO

5.8 Activities for the year :

- a) Collection of Seed from different locations in Bangladesh.
- b) Placing seeds with different treatments (soaking seeds in hot water for 30 seconds, in cold water for one and two days) in nursery bed.
- c) Observing seed germination percentage, germination period, seedlings growth, etc in the nursery.
- d) Raising 300 seedlings and maintenance at MFP HQs nursery for raising experimental plantation at HQs and Hinguli research Station.
- e) Raising seedlings though cutting with two rooting hormone –IAA and IBA (500ppm and

1000ppm)

- f) Site selection and preparation (jungle cutting, debris clearing, etc.) for raising experimental plantation.
- g) Field layout (three plots with 2x2 meter spacing), pit preparation, transportation of seedlings from nursery to the field and planting seedlings (100 seedlings in each plot/treatment at).

#### 5.8.1 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)												
5.09	Previous progress		NA									
5.09.1	Achievement		NA									
5.10	Financial statement											
5.10.1	Total cost of the study		Tk. 5,00,000.00									
5.10.2	Cumulative cost		Tk. 1,21000.00									
5.10.3	Cost of the year		Tk. 71,090.00									
5.10.4	Source of fund		GOB									
5.11	Beneficiaries		FD, NGOs, Private planters, Farmers, Educational Institutes, Herbal drug producers, etc.									

### Mangrove Silviculture Division

- 1. **Study** : On-going
- 1.1 Programme Area : Breeding and Tree Improvement
- 1.2 Title of the Study : Vegetation dynamics and regeneration pattern in relation to soil pH, salinity and siltation of the Sundarban.
- 1.3 **Justification:** The Sundarbans, like other mangrove ecosystems, is dynamic and complex. Changes in this ecosystem are occurring continuously. To ascertain these changes, regular collection of relevant data from the forests on a long-term basis is a prerequisite. Continuous forest inventory through Permanent Sample Plots (PSPs) are useful to record changes in the various parameters associated with the stand density, species composition, structure and species shifts. The Sundarban forest is dependent on natural regeneration in order to be managed under a sustainable yield basis. The main problem of the forest is inadequacy of natural regeneration. So, the present study will help to record past and present regeneration and vegetation status of the forest that could improve the management system of the Sundarban.
- 1.4 **Objective(s)** :
  - 1.4.1 To determine the species composition.
  - 1.4.2 To determine the natural regeneration status of major mangrove species.
  - 1.4.3 To understand the vegetation dynamics in the Sundarban over time.
  - 1.4.4 To assess the impact of salinity and siltation on the change of vegetation
- 1.5 **Expected output** : Species composition, vegetation dynamics and regeneration status of major mangrove species in the Sundarbans.
- 1.6 **Study period** : 2007-2016
  - 1.6.1 Starting year : 2007-08
  - 1.6.2 Completion year : 2015-16
- 1.7 **Personnel(s)** :

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

1.8.1 Activities calendar :

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a) Maintenance (Demarcation of plots, replacement of damaged signboards, number-plates, jungle cutting etc.) of 30 PSPs in different salinity zones throughout the Sundarban.													
b) Collection of data on regeneration, salinity and siltation data from the PSPs.													
c) Compilation and analysis of data.													

1.9 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 heihgt 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: Establishment and maintenance of mangrove arboretum is very much essential for conservation of genetic resources and to study taxonomy, ecology, silviculture, genetic diversity etc. of all mangrove species available in the Sundarban.

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** : Conservation of mangrove species and improvement of biodiversity in the Sundarban.
- 2.6 **Study period** : 2006-2016
- 2.6.1 Starting year : 2006-07
- 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** :
- Raising of 7,200 seedlings of three mangrove species namely passur, Singra and khalshi for raising experimental plantation.
  - Gap filling and maintenance of previously raised dhundul (0.9 ha), singra (0.9 ha), and bakul kankra (0.9 ha).
  - Maintenance of previously raised experimental plantations of kirpa (1.8 ha), passur (0.9 ha), jhana (0.6 ha), khalshi (1.8 ha), amur (1.8 ha) bakul kankra(1.8 ha), amdhekur (0.9ha), dhundul (1.8 ha) and marichabaen(0.9 ha).
  - Collection of survival and growth data from the experimental plantations twice a year.
  - 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. Raising of 7,200 seedlings of three mangrove species namely passur, Singra and khalshi for raising experimental plantation.		■	■	■								
b. Gap filling and maintenance of previously raised dhundul (0.9 ha), singra (0.9 ha), and bakul kankra (0.9 ha).			■	■								
c. Maintenance of previously raised experimental plantations of kirpa (1.8 ha), passur (0.9 ha), jhana (0.6 ha), khalshi (1.8 ha), amur (1.8 ha) bakul kankra(1.8 ha), amdhekur (0.9ha), dhundul (1.8 ha) and marichabaen(0.9 ha).					■	■				■	■	■
d. Collection of survival and growth data from the experimental plantations twice a year.					■	■				■	■	
e. Compilation and analysis of data.	■	■									■	■

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. Dhundul (1.5 ha), kirpa (1.8 ha), passur (0.9 ha), jhana (0.6 ha) and khalshi (0.9 ha) species were centralized in three conservation plots in different saline zones. Growth and survival of those planted species in the conservation plots in different years have been analyzed. 1,800 Seedlings of amur (*Amoora cuculata*) and 1,800 seedlings of shingra (*Cynometra ramiflora*) were raised in three research stations for centralization in the arboretum. The following Bee foraging plants were recorded in the conservation plots: Khalshi, kirpa, golpata, goran, gewa, sundari, baen, keora, choyla, kankra, passur, amur, hargoja and hantal.

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. 3,75,000.00
- 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 : There are poorly stocked less productive areas in the Sundarban. The Mangrove Silviculture Division studied the growth performance of mangrove and non-mangrove species in poorly stocked less productive areas of the Sundarbans since 1988. Those are all preliminary results of planted mangrove and non-mangrove species. So, monitoring or continuous investigation up to several years are to be needed to find out the actual performance of mangrove species with a view to study the survival, establishment and growth of these mangrove species.

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

3.6 Study period : 2006-2016

3.6.1 Starting year : 2006-07

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 3.5 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. Maintenance of 5 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.													

3.9 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 Achievement(s) : 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. 1,80,000.00

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) : Establishment of a mangrove museum is very much essential for preservation and demonstration of the flora and faunal specimens of the Sundarban to the students, researchers and general people of the country which will create awareness and will help protect and preserve the Sundarban ecosystem.

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 : 2008-2016

4.6.1 Starting year : 2008-09

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

2.7.3 Associate : 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.
- b) Maintenance of previously collected flora and faunal specimens in the museum.
- c) Preparation of videos, 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. 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 videos, still pictures, digital pictures and lamination of still pictures.													

4.9 Previous progress : Museum room was renovated and furnished with iron racks, multipurpose almirah, display boards and xyarium. 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 Achievement(s) : A museum has been established at the Divisional Head Quarter of Mangrove Silviculture Division, Khulna in 2002 having 55 flora and 50 faunal specimens and twelve wood samples of mangrove tree species.

4.10 **Financial statement** :

4.10.1 Total cost of the study : Tk. 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) : Khalshi (*Aegiceras corniculatum*) is an important honey producing mangrove species in the Sundarban. Nursery and plantation techniques of this species are most essential for conservation of the species in the Sundarban because the natural population of the species has declined in a large scale.

5.4 **Objective(s)** :

5.4.1 To develop nursery and plantation techniques of Khalshi.

5.5 Expected output : Development of nursery and plantation techniques of Khalshi. Extension and conservation of the species, honey production, employment and income generation.

5.6 Study period : 2010-2015

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 :

a) Raising experimental plantations with the previously raised seedlings.

- b) Collection of propagules (seeds) from the Sundarban and nursery raising for next year experimental plantations.
- c) Collection of data on soil pH, water salinity, light intensity, inundation and siltation in the selected sites.
- d) Observation on germination of the seeds, survival and growth performance of the seedlings in the nursery.
- e) Maintenance of nursery
- f) Data collection and analysis.

5.8.1 Activities calendar :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a. Raising experimental plantations with the previously raised seedlings.		■	■									
b. Collection of propagules (seeds) from the Sundarban and nursery raising for next year experimental plantations.										■	■	■
c. Collection of data on soil pH, water salinity, light intensity, inundation and siltation in the selected sites.					■	■				■	■	
d. Observation on germination of the seeds, survival and growth performance of the seedlings in the nursery.										■	■	■
e. Maintenance of nursery										■	■	■
f. Data collection and analysis.	■				■	■						■

5.9 Previous progress, if any : Propagules (seeds) of Khalshi (*Aegiceras corniculatum*) were collected from the Sundarban and nursery were 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 Achievement(s) :

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. 2,25,000.00

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) : A lot of sundari trees have been dying due to a disorder known as top dying. Studies have been conducted but actual cause for the disorder has not yet been ascertained. So, a study for improvement of the species is necessary.

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 : 2008-2016
- 6.6.1 Starting year : 2008-2009
- 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
- 6.7.3 : A. S. M. Helal Siddiqui, RO
- 6.8 **Activities for the year** :
- a) Planting of previously raised seedlings of selected sundari trees at three locations of the Sundarban.
  - b) Observation of flowering and fruiting behaviors in the selected trees.
  - c) Collection of data on soil pH, water salinity, light intensity, inundation and siltation in the selected sites.
  - d) Collection of seeds from the selected trees.
  - e) Raising seedlings at H/Q, Bogi and Dhangmari Research Stations for next year plantations.
  - f) Observation on germination of the seeds, survival and growth performance of the seedlings in the nursery.
  - g) Data compilation.
- 6.8.1 Activities calendar :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a. Planting of previously raised seedlings of selected sundari trees at three locations of the Sundarban.												
b. Observation of flowering and fruiting behaviors in the selected trees.												
c. Collection of data on soil pH, water salinity, light intensity, inundation and siltation in the selected sites.												
d. Collection of seeds from the selected trees.												
e. Raising seedlings at H/Q, Bogi and Dhangmari Research Stations for next year plantations.												
f. Observation on germination of the seeds, survival and growth performance of the seedlings in the nursery.												
g. Data compilation.												

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

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. 2,40,000.00

6.10.4 Source of fund :GOB

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

## FOREST PROTECTION DIVISION

1 **Study** : On-going

1.1 Programme Area : Forest Pests and Diseases

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

1.3 Justification (for new study) :

1.4 **Objective(s)** :

1.4.1 To identify pests and pathogens of commercially important medicinal plants

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

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

1.4.4 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 : 2007-2008

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 : M. Z. Rahman, R.A. (Gr-1); K.A. Zaman F.I.; S. Nasreen F.I.

1.8 Activities for the year :

a) Laboratory and field trial for pest management using different group's pesticide (botanicals, bio-pesticide and chemical pesticide).

b) Collection of pest and disease samples from commercially important medicinal plants (ghritakanchon, aswagandha, black & white tulsi, basak, kalomegh, akanda, sotomoly and sarpogandha) from Bogra, Joypurhat, Gaibandha, Rangpur, Natore and New area of Chittagong Hill Tracts, Sylhet, Moulvibazar, Tangail districts.

c) Recording of nature and extent of damage by each pest and pathogen.

d) Rearing/culture and identification of key pests and pathogens

e) 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.		■	■			■	■		■	■	■	
e.	■	■	■			■	■		■	■	■	

1.9 Previous progress, if any(2011-12): Neem oil, Urea, Garlic juice ,Kerosin oil treatments are applied to control mite of ashwagandha.Data collection are going on. Neem oil @2-4 /lit.is applied on Tulsi for control scale insect .Observation and data collection are going on. Bordeaux mixture is apply to control the sooty mould fungi of sarpogandha Primary result showed that Bordeaux mixture successfully controled the disease.  
Insects and diseases samples were collected from medicinal plants from FPD and MFPD nursery of BFRI campus. Sooty mould of sarpogandha, die-back of basak, powdery mildew of tulsi, red mite of basak & ashwagandha, scale insect, black aphid & Homopteran bug of tulsi are collected and recorded. Root rot of tulsi is first time record  
Tulsi (Black and white) are infested by scale sect(90%),blackaphid(35%) Homopteran bug (60%) , root rot(35%) and powdery mildew (90%). Basak are infested by red mite(98%) and die-back (95%) .Sarpogandha leaves are infested by sooty mould (98%).  
Root rot of tulsi, die- back of basak are cultured in media in the laboratory. Nature of injury was recorded 75%.

Regular observation and data collection were done. Weeding, soil management, fertilization (Organic), watering, sample collection and management practices were going on.

1.9.1 **Achievement(s), if any :** Powdery mildew of tulsi was controlled by Bordeaux mixture @2.5gm./L. Root rot and Leaf blight of Ashwagandha were controlled by Dithane M-45@ 2gm/L. & Bordeaux mixture @2.5gm./L. Out of these bordeaux mixture was found more effective. Sapsucker of Tulsi was controlled by Chilly powder and Garlic @ 2m.l./L. Out of these chilly powder was found more effective. Aphid, jassid, mealybug and scale insect of Asawagandha were controled by Neem oil @ 2ml./L. Psygid and mole cricket insect are collected from ashwagandha. Mount and preserve in the laboratory.

1.10 **Financial statement :**

1.10.1 Total Cost of the study : Tk.10,00000/-

1.10.2 Cumulative cost : Tk. 6,97,891/-

1.10.3 Cost of the year : Tk 1,63000/-

1.10.4 Source of Fund : GOB

1.11 **Beneficiaries :** Medicinal plant cultivators, FD, NGOs, general public

2. **Study :** On-going

2.1 Programme Area : Forest Pests and Diseases

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

2.3 Justification (for new study) :

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 : 2007-2008

2.6.2 Completion year : 2013-2014

2.7 **Personnel(s) :**

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



2.7.2 Associates : M. Z. Rahman, R.A. (Gr. I); K.A. Zaman F.I.; S. Nasreen F.I.

2.8 **Activities for the year :**

- a) To develop suitable pest /disease management techniques for key pests/diseases
- b) Collection of infested/infected seeds (sil koroï , fulkaroï, ipil ipil, raintree, akasmony, meinzeri, gamer, teak, mahogany, sissou, cickrasi, arjun, sonalu, kankra, passur & sundri) from the field and in storage condition from Sundarban (Khulna, Satkhira, Bagerhat,) Dhaka, Gazipur, Mymensingh, Kaptai, Rangamati, Cox's bazar districts.
- d) Nature and extent of damage by each pest and pathogen.
- e) Rearing/culture and identification of key pests and pathogens.

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, if any(2011-12) : Previous collected seeds( sil koroï, ipil ipil, Jarul, akasmoni, acacia hybrid, teak, mahogany ) are dried and kept with Neem oil mixture, Savin powder, Classic, Malathion and Bavistin for observation. Data collection are going on. Nature and extend of damage are recorded from collected seeds.

2.9.1 Achievement(s), if any : Bruchids, scolytids and a moths were recorded from ipil-ipil, teak, koroï, kankra, sundry and passur seeds. Some fungi were identified from ipil ipil , koroï and rain tree.

2.10 **Financial statement :**

2.10.1 Total Cost : Tk.15,00000/-

2.10.2 Cumulative cost : Tk. 6,16921/-

2.10.3 Cost of the year : Tk. 1,17,000/-

2.10.4 Source of Fund : GOB

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

3. **Study** : On-going

3.1 Programme Area : Forest Pests and Diseases

3.2 Title of the Study : Phytosanitary study of *Paulownia sp.* existing in Bangladesh .

3.3 Justification (for new study) :

3.4 **Objective(s)** :

3.4.1 To survey the present status to *Paulownia sp.* in Bangladesh

3.4.2 To identify pest and pathogens of *Paulownia sp*

3.4.3 To determine present status of pest and diseases of *Paulownia sp* in Bangladesh.

3.5 **Expected output** : Increased production of *Paulownia sp* will be ensured

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 : M. R. Islam, D.O.

3.7.2 Associates : M.Z. Rahman, R.A. (Gr-I); K.A. Zaman F.I.; S. Nasreen F.I

3.8 **Activities for the year :**

- a) Survey and determination present status of *Paulownia sp.* in Bangladesh
- b) To collect information on pests and diseases of *Paulownia sp* from nursery and plantation of Bangladesh..
- c) Recording of nature and extent of damage by each pest and pathogen.

3.8.1 **Activities calendar :**

Activities	J	A	S	O	N	D	J	F	M	A	M	J
a. Survey and determination present status of <i>Paulownia sp.</i> in Bangladesh												
b. To collected information on pests and diseases of <i>Paulownia sp</i> from nursery and plantation of Bangladesh..												
c. Recording of nature and extent of damage by each pest and pathogen.												

- 3.9 Previous progress, if any(year) : Infested samples were collected from field visit. Two Lepidopteran moths were reared from *Paulowniasp.*
- 3.9.1 Achievement(s), : N.A.
- 3.10 **Financial statement** :
- 3.10.1 Total Cost : Tk,
- 3.10.2 Cumulative cost : Tk.
- 3.10.3 Cost of the year : Tk. 1,20,000/-
- 3.10.4 Source of Fund : GOB
- 3.11 **Beneficiaries** : FD, NGO's, Farmers, Educational institutions and other tree planting agencies.

## PLANTATION TRIAL UNIT DIVISION

1. **Study** : On-going
- 1.1 Programme area : Social Forestry
- 1.2 Title of the study : Study on the improvement of coastal homesteads through resource generation.
- 1.3 Justification : NA
- 1.4 **Objective(s)** :
- 1.4.1 To improve livelihood status of coastal rural farmers through resource generation in coastal homesteads
- 1.4.2 To assess and prepare database on existing and recreating of different resources.
- 1.5 Expected output:** Improvement of livelihood status of coastal rural farmers through resource generations in the homesteads as well as enrich existing pattern of coastal vegetation.
- 1.6 **Study period** :
- 1.6.1 Starting year : 2006-07
- 1.6.2 Completion year : 2013-14
- 1.7 **Personnel (s)** :
- 1.7.1 Study leader : S. A. Islam, DO
- 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) Raising of 2500 seedlings of timber tree species such as rain tree, sil koro, rajkoro, akashmoni, neem, and mehogni (500 seedlings for each species) at Rangabali and Char Kukri-Mukri Research Stations.
- b) Raising of 1400 seedlings of fruit tree species such as kalojam, kathal, amloki, tentul, amra, jambura and lebu (200 seedlings for each species) at Rangabali and Char Kukri-Mukri Research Stations.
- c) Procurement of different seasonal vegetable seeds/ seedlings.
- d) Supply of timber and fruit tree seedlings and vegetable seeds/ seedlings to the selected 62 farmers to enrich vegetation in the farmer's homesteads.
- e) Maintenance of previously raised fruit and timber tree species in the farmer's homesteads

f) Collection and analysis of data.

g) Preparation of scientific paper.

1.8.1 Activities calendar :

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

1.9 Previous progress, if any : A total of 1800 seedlings of timber tree species such as rain tree, sil koroi, kala koroi, akashmoni, neem, and mehogoni; 1200 seedlings of fruit tree species such as kalojam, kathal, amloki, tentul, amra, jambura and lebu have been raised and distributed to the selected 62 farmers at Rangabali and Char Kukri-Mukri islands. Different types of seasonal vegetable seeds/seedlings were procured and distributed to the 62 selected farmers.

1.9.1 Achievement(s), if any : A total of 62 farmers of the remote coastal char areas were selected at Char Nazir and Char Kasem under Rangabali Research Station; and Char Aminpur, Shahabajpur and Babuganj under Char Kukri-Mukri Research Station. Different salt tolerant timber species, fruit tree species and mangrove species have already been established in 62 homesteads.

1.10 **Financial statement** :

1.10.1 Total cost of the study : Taka 10,30,000.00

1.10.2 Cumulative cost : Taka 9,83,600.00

1.10.3 Cost of the year : Taka 1,00,000.00

1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : Coastal rural farmers.

2. **Study** : On-going

2.1 Programme Area : Plantation technique and forest management

2.2 Title of the study : Introduction of bamboo, rattan and golpata in the coastal homesteads of Bangladesh.

2.3 Justification (for new study) :

2.4 **Objective(s)** :

2.4.1 To investigate the possibility for introduction of bamboo rattan and golpata in coastal homesteads of Bangladesh.

2.4.2 To select site suitability of bamboo, rattan and golpata in the coastal areas.

2.4.3 To increase the productivity of bamboo, rattan and golpata in the coastal areas.

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

2.6 **Study period** :

2.6.1 Starting year : 2009-10

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. G. Moula, RO; M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI

2.8 **Activities for the year:**

a) Organizing two awareness meetings with coastal rural people for cultivating bamboo, rattan and golpata in the coastal homesteads at Rangabali and Char

Osman Research Stations.

- b) Collection of seeds of rattan and golpata for raising 6000 seedlings of rattan and 2000 seedlings of golpata.
- c) Collection of bamboo (*Bambusa balcooa/ B. vulgaris*) branch for raising 4000 seedlings from branch cutting.
- d) Raising 6000 seedlings of rattan, 4000 seedlings of bamboos and 2000 seedlings of golpata.
- e) Supplying of seedlings to the selected coastal farmers.
- f) Maintenance and supervision of seedlings planted in previous years.
- g) 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.											■	■	■
f.					■	■					■	■	■
g.					■	■					■	■	■

2.9 Previous progress, if any : Four meetings cum training programs were organized at Rangabali, Char Kukri-Mukri, Char Osman and Sitakundu Research Stations with coastal rural people for awareness development about nursery and plantation techniques for 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.

2.9.1 Achievement(s), if any : Till to date, 480 coastal homesteads have been selected for introducing bamboo, rattan and golpata. A total of 5,800 seedlings of bamboo, 10,800 seedlings of rattan and 6,295 seedlings of golpata have been distributed to 480 coastal homesteads.

2.10 **Financial statement** :

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

2.10.2 Cumulative cost : Taka 7,80,000.00

2.10.3 Cost of the year : Taka 1,75,000.00

2.10.4 Source of fund : GOB

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

3 **Study** : On-going

3.1 Programme Area : Plantation technique and forest management

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

3.3 Justification (for new study) :

3.4 **Objective(s)** :

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

3.4.2 To provide the sources of honey plants.

3.5 **Expected output** : Knowledge on the proper methods and suitable sites for plantations for different bee foraging mangrove species in the coastal belts; and providing sources of honey. There will be a scope for introducing apiculture with bees.

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 : M. G. Moula, RO  
 3.7.2 Associates : S. A. Islam, DO; M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI

3.8 **Activities for the year :**

- Collection of seeds of khalshi (*Aegiceras corniculatum*) gewa (*Excoecaria agallocha*), goran (*Ceriops decandra*), passur (*Xylocarpus mekongensis*), dhundul (*Xylocarpus granatum*), hantal (*Phoenix paludosa*) 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 10.4 ha experimental plantations raised in previous years.
- Collection 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.													
d.													
e.													

3.9 Previous progress, if any : A total of 21,600 seedlings of khalshi, gewa, goran, passur 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 have been raised at 4 Research Stations. Data on growth and survival have been recorded.

3.9.1 Achievement(s), if any : A total of 10.4 ha experimental mixed plantations of bee foraging plant species have been raised.

3.10 **Financial statement :**

3.10.1 Total cost of the study : Taka 8,00,000.00

3.10.2 Cumulative cost : Taka 5,30,000.00

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

3.10.4 Source of fund : GOB

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

4. **Study** : On-going

4.1 Programme Area : Plantation technique and forest management

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

4.3 Justification (for new study) :

4.4 **Objective(s)** :

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

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

4.4.3 To increase the coastal forest product.

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

4.6 **Study period** :

4.6.1 Starting year : 2010-11

- 4.6.2 Completion year : 2014-15  
 4.7 **Personnel (s)** :  
 4.7.1 Study leader : S. A. Islam, DO  
 4.7.2 Associates : M. G. Moula, RO; M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI

4.8 **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; and karanja, payra, jhao, babla and rain tree for raised lands for raising model plantations.
- Raising 18,000 seedlings of these species at Rangabali, Char kukri-Mukri and Char Osman Research Stations.
- Raising of 4.0 ha experimental model plantations of these species at 3 Research Stations.
- Establishment of 18 siltation gauge in the experimental plantations for measuring siltation/ soil erosion.
- Collection of data on different climatic parameters and from experimental plantations.

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, if any : 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 24 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 have been raised at 4 Research Stations.

4.9.1 Achievement(s), if any : A total of 10.12 ha experimental plantations have been established at Rangabali, Char kukri-Mukri, Char Osman and Sitakundu Research Stations.

4.10 **Financial statement :**

- 4.10.1 Total cost of the study : Taka 20,00,000.00  
 4.10.2 Cumulative cost : Taka 5,35,000.00  
 4.10.3 Cost of the year : Taka 2,00,000.00  
 4.10.4 Source of fund : GOB

4.11 **Beneficiaries** : Forest Department, coastal farmers, planers and NGOs

5. **Study** : On-going

5.1 Programme Area : Conservation of Biodiversity.

5.2 Title of the study : Ecological succession in the man-made coastal forests in relation to age and other related factors.

5.3 Justification (for new study) :

5.4. **Objective(s)** :

5.4.1 To observe the changes of vegetation and natural regeneration in the coastal man-made forests.

5.4.2 To determine the impact of related climatic factors, which are responsible for the ecological succession in the coastal forests.

- 5.4.2 To increase coastal forest resources of the country.
- 5.5 **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.
- 5.6 **Study period** :
- 5.6.1 Starting year : 2012-13
- 5.6.2 Completion year : 2016-17
- 5.7 **Personnel (s)** :
- 5.7.1 Study leader : M. G. Moula, RO
- 5.7.2 Associates : S. A. Islam, DO; M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI
- 5.8 **Activities for the year** :
- Establishment of 27 new Temporary Sample Plots (TSP) in the man-made forests according to age class at Sitakundu.
  - Remarking of previously established 81 TSP plots by replacing poles and painting trees.
  - Procurement of Refract meter for measuring water/soil salinity.
  - Recording data on siltation, soil erosion, soil/water salinity, inundation frequency and impact of human and animal interferences.
  - Collection of growth data of the plantations and status of natural regenerations.

5.8.1. Activities calendar :

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

- 5.9 Previous progress, if any : A total of 81 Temporary Sample Plots (TSP) were established at Rangabali, Char kukri-Mukri, Char Osman and Sitakundu Research Stations. Data on growth of planted trees, regeneration status were recorded from the TSPs.
- 5.9.1 Achievement(s), : A total of 81 Temporary Sample Plots (TSP) were established at Rangabali, Char kukri-Mukri, Char Osman and Sitakundu Research Stations for assessing ecological succession.
- 5.10 **Financial statement** :
- 5.10.1 Total cost of the study : Taka 20,00,000.00
- 5.10.2 Cumulative cost : Taka 1,35,000.00
- 5.10.3 Cost of the year : Taka 2,00,000.00
- 5.10.4 Source of fund : GOB
- 5.11 **Beneficiaries** : Forest Department, planers and NGOs

6. **Study** : New
- 6.1 Programme Area : Plantation technique and forest management
- 6.2 **Title of the study** : Monitoring and maintenance of older trial plantations in the coastal areas of Bangladesh.
- 6.3 Justification (for new study) : The Forest Department started mangrove afforestation in the coastal belt of Bangladesh from 1966. About 1,90,000 ha of coastal plantations have been raised in Bangladesh till to date. Among them keora and baen occupying more than 90% area of the coastal forest. These plantations encountered a number of problems. Morphological changes, species succession and insect infestation threatening the sustainability of coastal forest. No regeneration appeared under keora plantations due to rising of forest floor,

compactness of soil and non-availability of seed source of other mangrove species. Therefore, after harvesting of matured keora trees, there will be no second rotation crops for sustainability of this forest. In order to maintain a continuous forest cover in the coastal belt, trial plantations of 11 major mangrove species under keora plantations were initiated from 1991-1995 in different char lands of the coastal belt. The growth performance of those species was recorded over time. By this time, some scientific report was published in some renowned journals. The trial plantations are now 16-21 years old. It was observed that flowering and fruiting of these species were started in 8-10 years old stands. After falling seeds to the muddy ground huge seedlings of some species were appeared in and around plantation areas. Natural regeneration mainly of gewa, sundari and hantal were observed in and around trial plots both at Rangabali and Char Kukri-Mukri areas. So, these plantations serve as valuable mangrove seed sources in the coastal char lands. This becomes an opportunity to develop second rotation vegetation naturally in the man-made keora forests. Similarly, some non-mangrove species in the raised lands were undertaken in different coastal islands. The present study is aimed to preserve and maintained these trial plots for the development and sustainability of coastal forests.

- 6.4 **Objective(s)** :
- 6.4.1 To assess the growth performance and phenology of different mangrove and non-mangrove species at different char lands.
- 6.4.2 To develop future seed sources for sustainable coastal forest management.
- 6.5 **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.
- 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. G. Moula, RO; M. A. Habib, FI; M. G. Rasul, FI M.A.Q. Miah, FI
- 6.8 **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) Collection of data on height, DBH, canopy diameter, bole height and phenology etc. from the experimental plantations once a year.
- c) 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.												

- 6.9 Previous progress, : Not applicable
- 6.9.1 Achievement(s), : New Study
- 6.10 **Financial statement** :
- 6.10.1 Total cost of the study : Taka 15,00,000.00
- 6.10.2 Cumulative cost : Taka -
- 6.10.3 Cost of the year : Taka 2,00,000.00
- 6.10.4 Source of fund : GOB
- 6.11 **Beneficiaries** : Forest Department and adjacent coastal dwellers.



7. **Study** : New
- 7.1 Programme Area : Plantation technique and forest management
- 7.2 Title of the study : Selection of salt tolerant fruit and medicinal tree species in the coastal areas of Bangladesh.
- 7.3 Justification (for new study) : The coastal region of Bangladesh covers an area of about 47,201 km<sup>2</sup> extending along the Bay of Bengal. The zone constitutes 20% of the area and 28% of the population of Bangladesh. The coastal and offshore areas include tidal, estuaries and river floodplains in the south along the Bay of Bengal. There are numerous old and new islands of varying sizes accreted in the estuaries of the big rivers and the Bay of Bengal. There are 32.07 million homesteads in Bangladesh and over 74% of the population lives in the rural areas. Approximately 7% area (0.53 million ha) of the total 8.4 million ha of cultivable land in Bangladesh is occupied by homesteads which is extremely productive. Homesteads represent a land use system involving deliberate management of multipurpose trees and shrubs in limited association with seasonal vegetables. Homesteads play a vital role in providing timber, fuelwood, fodder, and fruits. About 70 different kinds of fruit are grown in Bangladesh and about 90% fruits come from the homesteads. On the other hand, many medicinal plant species including trees, shrubs and herbs are grown in Bangladesh. The diversity and distribution pattern of the plant species is influenced by macro and micro environmental factors. Most fruit trees are relatively sensitive to salinity with little exception and few other species believed to be moderately salt tolerant. It is generally believed that growth and yield of woody crops suffer from both osmotic effect and toxicities caused by chloride or sodium accumulation. The vegetation coverage is reducing due to increasing soil salinity in different countries. But there are some terrestrial plants that can grow well in saline soil. To address the situation selection and breeding programme can be initiated to identify salt tolerant fruit and medicinal tree species. Adaptability of the species to a particular site in stressed condition is very important for species selection. In this study, emphasis has been given only tree species. The present study has been undertaken to select suitable: fruit and medicinal tree species in the coastal belt of Bangladesh .
- 7.4 **Objective(s)** :
- 7.4.1 To select suitable salt tolerant fruit and medicinal tree species in the coastal areas of Bangladesh.
- 7.4.2 To observe the growth performance of different fruit and medicinal tree species in different sites.
- 7.4.2 To assess the production of fruits in different fruit tree species.
- 7.5 **Expected output** : Site-suitable fruit and medicinal tree species will be selected in the coastal areas of Bangladesh.
- 7.6 **Study period** :
- 7.6.1 Starting year : 2013-14
- 7.6.2 Completion year : 2017-18
- 7.7 **Personnel (s)** :
- 7.7.1 Study leader : S. A. Islam, DO
- 7.7.2 Associates : M. G. Moula, RO; M. A. Habib, FI; M. G. Rasul, FI; M.A.Q. Miah, FI
- 7.8 Activities for the year :
- Selection of 100 farmer's homesteads (25 from each research station) for for raising trial plots in their homegarden at Rangabali, Char Kukri-Mukri, Char Osman and Sitakundu Research Stations.
  - Raising/purchasing of 5600 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 100 homesteads.
  - Raising of 12000 seedlings of medicinal tree species such as neem, arjun, simul, bohera, gora neem, khoer, katbadam, kadam, sonalu and pitraj

- d) Raising of 4.0 ha experimental plantations of medicinal tree species at 4 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.

7.8.1. Activities calendar :

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

- 7.9 Previous progress, : New study
- 7.9.1 Achievement(s), : New study
- 7.10 **Financial statement** :
- 7.10.1 Total cost of the study : Taka 20,00,000.00
- 7.10.2 Cumulative cost : Taka 00
- 7.10.3 Cost of the year : Taka 2,25,000.00
- 7.10.4 Source of fund : GOB
- 7.11 **Beneficiaries** : Forest Department, coastal farmers, planers and NGOs.

### Wildlife Section

- 1. **Study** : On-going
- 1.1 Programme Area : Biodiversity and conservation
- 1.2 Title of the Study : Development and maintenance of wildlife museum
- 1.3 Justification : NA
- 1.4 **Objectives** :
- 1.4.1 To collect wildlife species and displaying objects
- 1.4.2 To preserve wildlife specimens for future demonstration and research
- 1.5 **Expected output** : Enrichment of information on the morphological, taxonomical and cological aspects of the wildlife resources.
- 1.6 **Study period** :
- 1.6.1 Starting Year : 2004-2005
- 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 and preservation
- b) Preparation of videos, posters, still pictures of collected wildlife specimen
- c) Report writing and Printing

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												



- 3.1 Programme Area : Biodiversity and conservation
- 3.2 Title of the Study : Present status of Phayre’s leaf monkey (*Trachypithecus phayrei*), Pig-tailed macaque (*Macaca nemestrina*) and Capped leaf monkey (*Trachypithecus pileatus*) in hill forest of Bangladesh
- 3.3 Justification : NA
- 3.4 **Objective** :
- 3.4.1 To evaluate the distributions and population of the non human primate species in hill forest of Bangladesh for sustainable conservation
- 3.5 Expected Output : Formulation of effective conservation measures for the species in hill forest of Bangladesh
- 3.6 **Study Period** :
- 3.6.1 Starting Year : 2012-2013
- 3.6.2 Completion year : 2014-201
- 3.7 Personnel :
- 3.7.1 Study leader : M.A.Rahman
- 3.7.2 Associates : M. K. Islam, RA -1; S.M. Mainuddin, FI
- 3.8 **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 Kapti NP, Dudpukuria WS, Baryadhala NP and Eidgor Range, Cox’s Bazar.
- b) Report writing and printing
- 3.8.1 Activities calendar :

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

- 3.9 Previous progress : NA
- 3.9.1 Achievement(s) : NA
- 3.10 **Financial statement** :
- 3.10.1 Total cost of the study : Tk. 8, 00, 000/-
- 3.10.2 Cumulative cost : NA
- 3.10.3 Cost of the year : Tk.80,000/-
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : Researchers, students and teachers of different educational institutions and Forest Department / NGOs

4. **Study** : New
- 4.1 Programme Area : Biodiversity and conservation
- 4.2 Title of the Study : Present status of Asian elephant (*Elephas maximus*) in Chunati Wildlife Sanctuary (WS)
- 4.3 Justification : Land-use patterns in the former range of elephants in Bangladesh have changed remarkably and natural habitats available for elephant conservation have undergone a marked reduction over the last few decades (IUCN, 2004a). At present, there is a small population of wild elephants, approximately 196-227 animals (Sukumar, 2006) and distributed as scattered population in several herds restricted to the south-eastern (156 animals) and northern (40 animals) parts of Bangladesh(IUCN, 2004). Chunati WS is one those south-eastern habitats . Where human-elephant conflict is a direct outcome of the excessive changes in land-use patterns and the continued conversion of natural elephant habitat to human uses. But there is scanty data on asian elephant population and its habitat using outline in the Chunati WS . Such information is needed for taking further management initiatives to protect the species in this areas and minimize human elephant conflicts. So, the study is necessary for sustainable

conservation of elephant in the Chunati WS .

- 4.4 **Objectives** :
- 4.4.1 To estimate the population of Asian elephant in Chunati WS
- 4.4.2 To find out habitat using pattern and feeding ecology Asian elephant in Chunati WS
- 4.4.3 To unearth breeding facilities of used by Asian elephant in Chunati WS
- 4.4.4 To evaluate local people attitude to the elephant in and around the sanctuary
- 4.5 **Expected output** : Development of management plan for sustainable conservation of Asian elephant in Chunati WS
- 4.6 **Study period** :
- 4.6.1 Starting year : 2013-2014
- 4.6.2 Completion year : 2013-2014
- 4.7 **Personnels** :
- 4.7.1 Study leader : M.A. Rahman, R.O
- 4.7.2 Associates : M. K. Islam, RA (Gr-1); S.M. Mainuddin, (FI)
- 4.8 **Activities for the year** :
- a) Determination of distribution and assessment of population of Asian elephant (*Elephas maximus*) species using sampling survey and total count methods in Chunati WS, Chittagong.
- b) Observation of wild Asian elephant habitat using and feeding in Chunati WS, Chittagong.
- c) Record of wild Asian elephant movement in Chunati WS, Chittagong.
- d) Report writing and printing
- 4.8.2 Activity Calendar :

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

- 4.9 Previous progress : NA
- 4.9.1 Achievement : NA
- 4.10 **Financial statement** :
- 4.10.1 Total cost of the study : Tk. 2, 80,000/-
- 4.10.2 Cumulative cost : NA
- 4.10.3 Cost of the year : Tk. 75,000/-
- 4.10.4 Source of fund : GOB
- 4.11 **Beneficiaries** : Forest Department, Researchers, Students and Teachers of Different educational and NGOs Institutions

## TRAINING & TECHNOLOGY TRANSFER UNIT

1. **Study** : On-going
- 1.1 Programme Area : Training and Technology Transfer
- 1.2 Title of the Study : Training for BFRI Staff Members and stakeholders
- 1.3 Justification (For new study) :
- 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 **Study period** :
- 1.6.1 Starting year :
- 1.6.2 Completion year : 2013-14

- 1.7 **Personnel(s)** :
- 1.7.1 Study leader : TTTU
- 1.7.2 Associates :
- 1.8 **Activities for the year** : Conduct training programme on
- Preservative treatment
  - Nursery pest and disease management
  - Bamboo branch cutting technique
  - Cultivation technique of medicinal plants
  - Bamboo grove management
  - Solar kiln technique
  - Mother tree selection technique
  - Nursery development and mixed plantation technique
  - Apiculture in hilly area
  - Vegetative propagation technique
  - Bamboo tiles and composite furniture
  - Cement bonded particleboard.
  - Nursery technique of medicinal plant

1.8.1 Activities calendar :

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a) Preservative treatment				■	■	■	■	■	■	■	■	■	■
b) Nursery pest and disease management				■	■	■	■	■	■	■	■	■	■
c) Bamboo branch cutting technique	■	■	■										
d) Cultivation technique of medicinal plant				■	■	■	■	■	■	■	■	■	■
e) Bamboo grove management	■	■	■										
f) Solar kiln technique						■	■	■	■	■	■	■	■
g) Mother tree selection technique			■	■	■	■	■	■	■	■	■	■	■
h) Nursery development and Mixed plantation technique				■	■	■	■	■	■	■	■	■	■
i) Apiculture in hilly area					■	■	■	■	■	■	■	■	■
j) Vegetative propagation technique					■	■	■	■	■	■	■	■	■
k) Bamboo tiles and composite furniture					■	■	■	■	■	■	■	■	■
L) Cement bonded particleboard.					■	■	■	■	■	■	■	■	■
m) Nursery technique of medicinal plant					■	■	■	■	■	■	■	■	■

- 1.9 Previous progress, if any : Eighteen training programmes were organized during 2012-2013 and 540 persons were participated in the training programme
- 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 of the study :
- 1.10.2 Cumulative cost : Tk.
- 1.10.3 Cost of the year : Tk 8.00 lakh
- 1.10.4 Source of fund : Revenue budget of GOB
- 1.14 **Beneficiaries** : BFRI's staff member and the stakeholders
2. **Study** : On-going
- 2.1 Programme Area : Training and Technology Transfer
- 2.2 Title of the Study : Workshops and Seminars

- 2.3 Justification(For the new study) :
- 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
- 2.6 **Study period** : BFRI scientists and stakeholders.
- 2.6.1 Starting year :
- 2.6.2 Completion year : 2013-2014
- 2.7 **Personnel(s)** :
- 2.7.1 Study leader : TTTU
- 2.7.2 Associates :
- 2.8 **Activities for the year** :
- a) Workshop: Introduction of BFRI technologies at 5 (2+3) districts and upazillas (to be decided) with the help of district administrative.
- b) Workshop on Annual Research Progress for 2012-13 and Research Programme for 2013-14
- c) Seminar: Monthly seminars on topics of recent interest (title to be decided)
- 2.8.1 Activities calendar :

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

- 2.9 Previous progress, if : Three workshops were organized at BFRI, Brahmonbaria and Borguna during 2012-13 and 390 persons were participated on that programme.
- 2.9.2 Achievement(s), : Dissemination of BFRI technologies and information through workshop and seminar
- 2.10 **Financial** :

- 2.10.1 Total cost of the study : Tk. 4.0 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. **Study** : On-going
- 3.1 Programme Area : Training and Technology Transfer
- 3.2. Title of the study : Publicity and Advertisement
- 3.3 Justification (For the new study) :
- 3.4 **Objective(s)** :
- 3.4.1 To create awareness about BFRI technologies to the stakeholders and general public.
- 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 be disseminated to the people.
- 3.6 **Study period** :
- 3.6.1 Starting year : 2013-14
- 3.6.2 Completion year : 2013-14
- 3.7 **Personnel** :
- 3.7.1 Study leader : TTTU
- 3.7.2 Associates :
- 3.8 **Activities for the year** :
- a) Participation: Tree Fair, Environment Fair and others
- b) Demonstration: BFRI documentary and technology through Mass Communication and Agricultural Information System (AIS)
- c) Advertisement in print media on:
- BFRI information
  - Bamboo branch cutting
  - Preservative treatment
  - Plus tree selection
  - Nursery raising and development
  - Nursery pest and disease management
  - Bamboo grove management
  - Use of treated bamboo sticks at *Pan boroj*
- d) Advertisement in electronic media
- \* Telecast BFRI invented technology as advertisement on TV channels.

3.8.1 Activities calendar :

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a) Participation: Tree Fair, Environment Fair at Dhaka, Chittagong, Khulna, Sylhet and Dinajpur etc throughout the country													
b) Demonstration: BFRI documentary and Technology through Mass Communication and Agricultural Information Systems (AIS).													
c) Advertisement in print media													
d) Advertisement in electronic media													

- 3.9 Previous progress, if any : Participated in seven fairs including tree fair at Dhaka, chittagong, Barisal, Environment Fair and furniture mela.
- 3.9.1 Achievement(s), if any : Awareness has been created among the mass people through demonstration of BFRI technologies in the fairs.
- 3.10 **Financial statement** :
- 3.10.1 Total cost of the study : Tk.14.00 lakhs
- 3.10.2 Cumulative cost :
- 3.10.3 Cost of the year : Tk. 14.00 lakhs
- 3.10.4 Source of fund : Revenue budget
- 3.14 **Beneficiaries** : People at all levels
- 4 **Study** : On-going
- 4.1 Programme Area : Training and Technology Transfer
- 4.2 Title of the study : Audio-video documentation
- 4.3 Justification (For new study) :



- 4.4 **Objective(s)**
- 4.4.1 To document BFRI technologies in audiovisual form.
- 4.4.2 To disseminate BFRI technologies among the mass people and stakeholders
- 4.5 **Expected output** : Awareness will be created among the mass people about BFRI technologies. BFRI technologies will be disseminated to the people.
- 4.6 **Study period** :
- 4.6.1 Starting year : 2013-14
- 4.6.2 Completion year : 2013-14
- 4.7 **Personnel** :
- 4.7.1 Study leader : TTTU
- 4.7.2 Associates :
- 4.7.3 :
- 4.8 **Activities for the year** :
  - a) Update of audio-visual documentation on BFRI's technologies.

4.8.1 Activities calendar :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a) Audio-video umentation												

- 4.9 Previous progress, :
- 4.9.1 Achievement(s), if any :
- 4.10 **Financial statement** ;
- 4.10.1 Total cost of the study : Tk. 2.0 lakh
- 4.10.2 Cumulative cost :
- 4.10.3 Cost of the year : Tk. 2.0 lakh
- 4.10.4 Source of fund : Rev budget of GOB
- 4.11 Beneficiaries : People at all levels
  
- 5. **Study** : On-going
- 5.1 Programme Area ; Training and Technology Transfer
- 5.2 Title of the study : Printing Materials and Publicity
- 5.3 Justification (For new study) :
- 5.4 Objective(s) :
- 5.4.1 To document BFRI technologies in printed form
- 5.4.2 To disseminate BFRI technologies
- 5.5 Expected output : Awareness will be created among the mass people about BFRI technologies. BFRI technologies will be disseminated to the people
  
- 5.6. Study period :
- 5.6.1 Starting year : 2013-14
- 5.6.2 Completion year : 2013-14
- 5.7 Personnel : TTTU
- 5.7.1 Study leader :
- 5.7.2 Associates :
- 5.8 Activities for the year :

**Leaflet:**

- a) *KwÁ Kj g c×wZtZ etk Pvl*
- b) *etiki Sro e"e"vcv*
- c) *etiki goK `gb e"e"v*
- d) *cvb ei tR e"eüZ etiki kjv, Lyl, KvBg I Qtbi e"enwi K AvqVij epx*
- e) *ivmivqibK msi qYx c0qqtM Aimeve I ubgPv Kv tR e"eüZ Kv tVi AvqVij epx*
- f) *et qji Priv tivcY I cwi PhP*
- g) *Nly tcvKvi AvµgY I Zvi ubqšY*
- h) *bvmwiti tZ DBi tcvKvi AvµgY I Zvi ubqšY*
- i) *bvmwiti tZ Privi Xtj cov tiM*
- j) *e q exR msi qY I `vgRvZKi Y*
- k) *tKv\_vq Kx MvO j vM tfeb*
- l) *cvviox AÁtj AMritnj c×wZtZ Priv tivcY*

**Folder:**

- m) *etiki thwRZ cY" (K t=úwRU tçMv±m)*
- n) *tgnMibi Wwv uQ`Kvix tcvKvi AvµgY I Zvi ubqšY*
- o) *t m, tbi cvZvtfvRi tcvKv I Zvi ubqšY*
- p) *Aimeve I Mq ubgPv mvgM0 tZixtZ ivevi Kv tVi e"enwi*

5.8.1 Activities calendar :

Activities	Months												
	J	A	S	O	N	D	J	F	M	A	M	J	
a) Kivã Kjg cxiZtZ euk Pvl													
b) euki Svo e'e'rcbr													
c) euki goK `gbe'e'rcbr													
d) civ eitR e'eüZ euki kjv, Luj, KivBg I Qtbi e'enwi K Avqyvj epx													
e) ivmrvubK msi qYx cQqitM Avmeve I ubgPY KvtR e'eüZ KvtVi Avqyvj epx													
f) etqji Priv tivCY I cwi PhP													
g) Ngy tcvKvi AvµgY I Zvi ubqšY													
h) bvmñitZ DBt cvKvi AvµgY I Zvi ubqšY													
i) bvmñitZ Privi Xtj cov tivM													
j) etqji er msi qY I , `vgRvZKiY													
k) tKiv_vq Kx MvQ jvMteb													
l) civvox AAjt AMiñnj cxiZtZ Priv tivCY													
m) euki thwRZ cY (Kt=úwRU tcMv±m)													
n) tgnMbi Wlv wQ`Kvix tcvKvi AvµgY I Zvi ubqšY													
o) tm_ tbi cvZvtfvRx tcvKv I Zvi ubqšY													
p) Avmeve I Mp ubgPY migMñ tZixtZ ivevi KvtVi e'envi													

- 5.9 Previous progress, if any : Total 65,310 copies printing materials were printed during 2012-2013.
- 5.9.1 Achievement(s), if any : Disseminate and aware BFRI technologies to all sector people through these printing materials.
- 5.10 **Financial statement** :
- 5.10.1 Total cost of the study : Tk. 8.00 lakh
- 5.10.2 Cumulative cost :
- 5.10.3 Cost of the year : Tk.8.00 lakh
- 5.10.4 Source of fund : Rev budget of GOB
- 5.11 **Beneficiaries** : People at all levels

## FOREST PRODUCTS WING

### VENEER AND COMPOSITE WOOD PRODUCTS DIVISION

- 1 **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 economic feasibility of commercially valuable furniture made of bamboo composites
- 1.5 Expected output :
- 1.6 Study period : 2005-15
- 1.6.1 Starting year : 2005-06
- 1.6.2 Completion year : 2014-15
- 1.7 **Personnel(s)** :
- 1.7.1 Study Leader : K. Akhter, DO
- 1.7.2 Associates : M. M. Rahaman, RO
- 1.8 **Activities for the year** :
- a. Visit to Bamboo plantation area and furniture shop & industries (Dhaka and Tangail)
  - b. Improvement of furniture design.
  - c. Procurement of bamboo culms (*Bambusa vulgaris/Bambusa balcooa*)
  - d. Preparation and processing of bamboo mats and bamboo strips.
  - e. Manufacturing of furniture components.
  - f. Manufacturing of one dining table and four dining chair using bamboo mat overlaid particleboard.
  - g. Calculation of manufacturing cost.

1.8.1 Activities calendar :

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

- 1.9 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 scientific paper titled “Preservative treatment of strips of *Bambusa balcooa* by soaking process using Borax-Boric acid” was published in proceedings of IRG 38<sup>th</sup> Annual Meeting, Istanbul, Turkey, 25-29 May 2008.
- 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
- 1.10.2 Cumulative cost : Tk. 7,45,000
- 1.10.3 Cost of the year : Tk. 1,00,000
- 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 **Study** : New
- 2.1 Programme area : Post Harvest Utilization -Physical Processing
- 2.2 Title of the study : Studies on particleboard made of rubber wood (*Hevea braziliensis*), gol pata (*Nipa fruticans*) and raj kori wood (*Albizia richardiana*).
- 2.3 Justification (For new study) : The shortage of durable solid/round wood is increasing day by day. The forest of Bangladesh have nearly 500 hard wood species of which only one tenth are in great demand for furniture and plywood industries. A vast majority of the timber species is unutilized. The utilization of plywood and particleboard as a replacement of larger solid structure lumber is increasing. As a result, the plywood and particleboard markets are growing rapidly for making housing and household materials like doors, windows and furniture etc. Raj kori (*Albizia richardiana*) is occurring scattered and planted in the southern parts of Bangladesh. Generally this timber is used for making furniture, door-windows, boat and other purposes. The peeling, drying, gluing and particleboard making of *Albizia richardiana* and rubber wood were determined. It was found that in the case of rajkori the strength property (MOR) of particleboard does not fulfill the Indian, German and British standard, but (IB) Internal bond strength fulfill German and British standard. On the other hand strength property (MOR) of rubber wood particleboard fulfills the Indian and British standard. Internal bond strength fulfill Indian, German and British standard. So it is necessary to carry out the research on mixture wood to improve the strength property. *Nipa fruticans* is available in Bangladesh (60,000 metric ton/per year). It is commonly used as fuel wood. Reports show that MDF board and particleboard can be produced from *Nipa fruticans* fronds. However some technological adjustment is required. Therefore the study is under taken to find out the suitability of making particleboard using mixture wood and unused part of golpata (*Nipa fruticans*).
- 2.4 **Objective(s)** :
- 2.4.1 To determine the suitability of making particleboard in mixed wood species.

- 2.5 Expected output :  
 2.6 Study period : 2013-2016  
 2.6.1 Starting year : 2013-14  
 2.6.2 Completion year : 2015-16  
 2.7 **Personnel(s)** :  
 2.7.1 Study Leader : M. M. Rahaman, RO  
 2.7.2 Associates : K. Akhter, DO  
 2.8 Activities for the year :  
 a) Collection of rubber wood (*Hevea brassiliensis*), gol pata (*Nipa fruticans*) and raj koroi wood (*Albizia richardiana*) log.  
 b) Cross cut logs to bolts of suitable length and preserve in log pond  
 c) Peeling of the bolts into 1.5 mm thick.  
 d) Drying of chips up to suitable moisture (8%) content  
 e) Visit to plywood & particleboard industry Dhaka & Rongpur  
 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 : NA  
 2.9.1 Achievement(s) : NA  
 2.10 **Financial statement** :  
 2.10.1 Total cost of the study : Tk 2, 50,000  
 2.10.2. Cumulative cost : NA  
 2.10.3 Cost of the year : Tk. 1,00,000  
 2.10.4 Source of fund : GOB  
 2.11 Beneficiaries : Wood merchants, plywood and particleboard industries/ BFIDC & NGOs.

### 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 the production of high yield pulp  
 1.5 Expected output : Supplementation of the raw material would be enhanced  
 1.6 **Study period** :  
 1.6.1 Starting year : 2010-11  
 1.6.2 Completion year : 2013-14  
 1.7 **Personnel(s)** :  
 1.7.1 Study Leader : Daisy Biswas, DO  
 1.7.2 Associates : Md. Misbahuddin, FI and Urboshi Roy, FI.  
 1.8 Activities for the year :  
 a) Preparation of pulp with KOH-MAQ by varying pulping time  
 b) Determination of kappa number and yield

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. Dry matter content was 80.56 %. Depiting was done in hydopulper prior pulping to minimize the problem arises during pulping like requirement of high cooking chemicals inferior quality of pulp and poor black liquor properties. Then the depithed bagasse was preserved in open air for air dry.

1.9.1 Achievements, if any : Nil

1.10 **Financial statement** :

1.10.1 Total cost of the study : Tk. 2,00,000

1.10.2 Cumulative cost : Tk. 1,45,000

1.10.3 Cost of the year : Tk. 55,000

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 (For new study): 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 : 2013-14

2.7 **Personnel(s)** :

2.7.1 Study Leader : Daisy Biswas, DO

2.7.2 Associates : Md. Misbahuddin, FI and Urboshi Roy, FI.

2.8 Activities for the year :

a) Bleaching of the prepared pulp with oxygen at various pressure

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 were prepared. Some bleaching experiments were done at 110 psi oxygen pressure for 60 min. at 95°C.

- 1.9.1 Achievements, if any : NA
- 2.10 **Financial statement** :
- 2.10.1 Total cost of the study : Tk. 2,00,000
- 2.10.2 Cumulative cost : Tk. 1,20,000
- 2.10.3 Cost of the year : Tk. 75,000
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : Pulp and Paper Industries
3. **Study** : On-going
- 3.3 Programme area : Post Harvest Utilization – Chemical processing
- 3.2 Title of the study : Pulp making characteristics of baizzya (*Bambusa vulgaris*) in a mixture with hardwood species.
- 3.3 Justification (For new study) : Not applicable
- 3.4 **Objective (s):**
- 3.4.1 To determine the optimum ratio of bamboo and wood with respect to yield and quality pulp
- 3.5. Expected output : Rational utilization of the raw material would be enhanced.
- 3.6. **Study period** :
- 3.6.1. Starting year : 2011-12
- 3.6.2. Completion year : 2013-14
- 3.7 **Personnel(s)**
- 3.7.1 Study Leader : Daisy Biswas, DO
- 3.7.2 Associates : Md. Misbahuddin, FI; Urboshi Roy, FI; M. S. Rahman, RO
- 3.8. Activities for the year :
- a) Preparation of hand sheets of kraft pulp made from chips of baizzya, kadam and rubber wood species.
- b) Evaluation of physical strength properties of the hand sheets.
- c) Reporting of findings
- 3.8.1 Activities calendar

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

- 3.9 Previous progress, if any : *Bambusa vulgaris*, rubber (*Hevea brasiliensis*) and kadam (*Anthocephalus chinensis*) wood were collected. Kraft pulps were prepared varying wood and bamboo ratio with 16, 18 and 20% active alkali maintained at 170°C cooking temperature. Yield and kappa number were determined.
- 3.10 Achievements, if any : Nil
- 3.11 **Financial statement** :
- 3.10.1 Total cost of the study : Tk. 4,50,000
- 3.10.2 Cumulative cost : Tk. 1,50,000
- 3.10.3 Cost of the year : Tk. 70,000
- 3.10.4 Source of fund : GOB
- 3.11 **Beneficiaries** : Pulp and Paper Industries
4. **Study** : New
- 4.1 Programme area : Post Harvest Utilization – Chemical processing
- 4.2 Title of the study : Production of nano composite from fibers of *Acacia hybrid*



and simul (*Bombax ceiba*) tree species of Bangladesh

4.3 Justification (For new study) : Cellulose is the most abundant natural polymer and it has been receiving great attention as raw materials. Nano cellulose is materials composed of nano sized cellulose fibrils with width less than 20 nm. These fibrils are isolated from any cellulose source including wood-based fiber through high pressure, high temperature and high velocity impact homogenization. Nano cellulose is expected to enhance the fiber-fiber bond strength and, hence, have a strong strengthening effect on paper materials. It may be useful as a barrier in grease proof type of papers, a wet end additive to enhance retention, dry and wet strength in commodity type of paper and board products, construction, automotive, furniture, electronics, pharmacy, and cosmetics. For companies producing electroacoustic devices, nanocellulose is used as a membrane for high quality sound. Additionally, nanocellulose is applied in membrane for combustible cells (hydrogen); additives for high quality electronic paper (e-paper); ultrafiltrating membranes (water purification); membranes used to retrieve mineral and oils. Products from nanocellulose are highly durable, renewable, biodegradable and environmental friendly.

During pulping a part of cellulose is degraded by cooking chemicals. The degraded cellulose could be useful for the production of nanocomposite. As a result, the pulp production would be economically beneficial. The development of nanocomposites is the new area of research in Bangladesh. During plan period two first growing tree species namely *Acacia hybrid* and simul (*Bombax ceiba*) has been studied. It is assumed that the outcome of the study would have positive contribution towards national economy and more rational utilization of our forest resources.

4.4 **Objective (s)** :

- 4.4.1 To develop modern technique for extraction of nanocellulose from wood pulp.
- 1.4.2 To produce ethanol and environment friendly packaging materials.
- 4.5 Expected output : Better utilization of pulping raw materials as environment friendly value added product.

4.6 **Study period** :

- 4.6.1 Starting year : 2013-14
- 4.6.2 Completion year : 2017-18

4.7 **Personnel(s)** :

- 4.7.1 StudLeadey r : Md. Misbahuddin, FI.
- 4.7.2 Associates : Daisy Biswas, DO, and Urboshi Roy, FI. Md. Didarul Alam Chowdhury, Lecturer, Department of Applied & Environment Chemistry, University of Chittagong.

4.8 **Activities for the year** :

- a) Study related literature review.
- b) Collection, processing and pretreatment of *Acacia hybrid*.
- c) Preparation of pulp and collection of black liquor.
- d) Determination of kappa number and yield.

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, : NA

4.9.1 Achievements, if any : NA

4.10 **Financial statement** :

4.10.1 Total cost of the study : Tk. 25,00,000

- 4.10.2 Cumulative cost : NA  
 4.10.3 Cost of the year : Tk. 1,50,000  
 4.10.4 Source of fund : GOB  
 4.11 **Beneficiaries** : Pulp, Paper and Pharmaceutical Industry.

### Wood Preservation Division

1. **Study** : New  
 1.1 Programme area : Post Harvest Utilization – Chemical processing  
 1.2 Title of the study : Treatability and natural durability of bhudum (*Dendrocalamus giganteus*) bamboo.  
 1.3 Justification : Bamboo are commonly used by the villagers in the construction of thatched and semi-pacca houses. They are also used for betel leaf farming, fishing, etc. in our country. They are usually not treated with any preservative against wood deteriorating agencies before they are put into use. As a result, the untreated bamboo poles, splits deteriorate quickly and therefore need to be replaced frequently within short time. But properly treated bamboo lasts 8-10 years or more in outdoor condition. Treatability and natural durability of some thick wall bamboo, borak and baijja. have been determined and technology on those information are being transferred to the end users. Further research works on the treatability and durability of other available bamboo species in the country is needed. This study has been undertaken to determine the treatability and durability of bhudum (*Dendrocalamus giganteus*) bamboo.  
 1.4 **Objectives(s)** :  
 1.4.1 To develop treating schedule for preservative treatment.  
 1.4.2 To determine outdoor service life of bamboo species treated with CCB preservative  
 1.4.3 To disseminate the information to the end-users.  
 1.5 **Expected output** : The study will be helpful for the bamboo users,  
 1.5.1 **Beneficiaries** : Betel leaf farms, general public and cottage industries about the treatment of the preservative chemicals.  
 1.6 **Study period** :  
 1.6.1 Starting year : 2013-2014  
 1.6.2 Completion year : 2017-2018  
 1.7 **Personnel (s)** :  
 1.7.1 Study Leader : Mozammel Hoque Chy, R O.  
 1.7.2 Associates : Abdus Salam, R O.; Khurshid Akhter, D O  
 1.8 Activities for the year :  
 a) Procurement of CCB preservative chemicals, treatment materials, instruments  
 b) Processing of bamboo and preparation of samples for soaking, sap-displacement and pressure process.  
 c) Treatment of samples with 20% CCB solution by sap-displacement method.  
 d) Installation of treated and untreated samples in stake yards at BFRI campus & Barisal PTU Campus for service test.  
 e) Collection of data from previously installed rajkoroi (*Albizia richardiana*) wood, rubber (*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 preservative.  
 f) Analysis of data and determination of treatability group.  
 g) Reporting.

1.8.1 **Activities** calendar :

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

- 1.9 Previous progress : NA  
 1.9.1 Achievement(s),if any : NA  
 1.10 **Financial statement** :  
 1.10.1 Total cost of the study : Tk. 6,00,000/-  
 1.10.2 Cumulative cost : NA  
 1.10.3 Cost of the year : Tk. 1,80,000/-  
 1.10.4 Source of fund : GOB  
 1.11 **Beneficiaries** : Betel leaf farms, Bangladesh Fisheries Industries Development Corporation (BFIDC) and general public.

2. **Study** : Ongoing  
 2.1 Programme Area : Post Harvest Utilization –Chemical Processing  
 2.2 **Title of the Study** : Investigation of preservative chemicals leaching from treated materials in water and soil.  
 2.3 Justification : NA.  
 2.4 **Objectives** :  
 2.4.1 To investigate the water and soil contamination due to preservative treatment.  
 2.4.2 To disseminate the information to the end-users.  
 2.5 **Expected output** The study will developed the information for the wood & bamboo users, betel leaf farmers ,general public and cottage industries about the leaching of the preservative chemicals in soil and water.  
 2.6 **Study period** :  
 2.6.1 Starting year : 2012-2013  
 3.6.2 Completion year : 2014-2015  
 3.7 **Personnels** :  
 3.7.1 Study Leader : Khurshid Akhter, D O  
 3.7.2 Associates : Md. Matiar Rahman, ASS; Abdus Salam, R O & Mozammel Hoque Chy, R O.  
 3.8 **Activities for the year** :  
 a) Collection of raw materials.  
 b) Treatment of bamboo/wood samples.  
 c) Soaking of treated materials in water.  
 d) Collection of water samples after leaching.  
 e) Selection of contamination area.  
 f) Collection of soil samples.  
 g) Water and soil samples will be tested at BFRI laboratory and SRDI, Dhaka.  
 h) Analysis of water and soil samples.  
 i) 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.				■	■	■	■					
e.					■	■	■	■	■			
f.						■	■	■	■	■		
g.							■	■	■	■	■	
h.								■	■	■	■	■
i.										■	■	■

3.9 Previous progress, if any : Bamboo strips were treated using CCB preservative chemicals Treated materials were soaked under water Water samples were collected. Treated bamboo sticks were supplied in betel leaf farm. Contamination area was selected at betal leaf farm, Batajor, Barisal. Soil samples were collected. Water and soil samples were given to Bangladesh Agricultural Research Institute Gajipur, Dhaka for analysis.

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. 70,000/-

3.10.3 Cost of the year : Tk. 1,20,000/-

3.10.4 Source of fund : GOB

3.11 **Beneficiaries** : REB, PDB, BFIDC, betel leaf farmers and general public.

## 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 determine suitable artificial inoculation method for formation of agar.

1.4.2 To evaluate the effect of wounding density in formation of oil in agar trees.

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 higher formation of agar.

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 : S. Akhter, DO

1.7.2 Associates : M. S. Rahman, RO; S. C. Nath, RA (Gr.-1)

1.8. **Activities for the year** :

a) Collection of agar wood from experimental agar trees from experimental plots

b) Extraction of oil from agar wood in laboratory and pilot scale distillation apparatus



1.8.1 Activities calendar :

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

1.9 Previous progress : Six experimental agar plantation sites were visited and marked 167 nos. of experimental agar trees. Communication was made with Forest Department for collection of those trees for preparation of agar chips for further experiment.

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. 3,80,000/-

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

1.10.4 Source of fund : BFRI (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 evaluate chemical properties of different wood and bamboo species.

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 : S. Akhter, DO; 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. sil-koroi (*Albizia procera*), lambu (*Khaya sp.*), katbadam (*Terminalia catappa*), jolpai (*Eleocarpus Robustus* Roxb.) rajkoro ( *Albizia richardiana*) and 11 bamboo species, golpata (*Nypa fruticans*) fronds.

c) Determination of extractive contents.

Determination of major chemical constituents such as holo-cellulose, alpha-cellulose, lignin etc.

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 : Extractive contents and major chemical constituents such as holo-cellulose, alpha-cellulose, lignin etc. of baijja (*Bambusa vulgaris*), borak (*B. balcooa*), ora (*Dendrocalamus longispatus*) and ragoon (*Thyrsostachys oliveri*) 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. 2,20,000/-
- 2.10.3 Cost of the year : Tk. 1,00,000/-
- 2.10.4 Source of fund : GOB
- 2.11 **Beneficiaries** : FD, BFIDC, wood users, furniture makers, pulp and paper industrie

### 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 different thicknesses of wood
- 1.5 **Expected output** : Application of solar kiln for effective seasoning of different thicknesses of wood
- 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) Five standing trees of gamar (*Gmelina arborea*) will be selected at greater Chittagong and collection of 40 cft. round wood for preparation of 122-183 cm x 2.54-4.0 cm x 2.54-4.0-5.08 cm size planks.
- b) Testing of 60 sample planks for determination of seasoning efficiency in two seasoning conditions (air drying and solar kiln)
- c) Two solar kilns will be maintained 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 mahogany, rubber, rajkoroi, lambu, arjun, rain tree, ghora-neem and jalpai wood 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. 2, 85,150.00
- 1.10.3 Cost of the year : Tk. 1, 50,600.00
- 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 : Dissemination 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 : 2011-2012
- 2.6.2 Expected completion year : 2015-2016
- 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 (Jhenaidah, Cox's Bazar, Dinajpur and Barisal)
- 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.												

- 2.9 Previous progress if any : Two training programme were conducted at kaligaong, Satkhira and Pabna Sadar.
- 2.9.1 Achievement (s), if any : NA
- 2.10 Financial statement :
- 2.10.1 Total cost of the study : Tk. 3, 60,650.00
- 2.10.2 Cumulative cost : Tk. 1, 40,050.00
- 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** : New
- 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 : Palmyra palm (*Borassus flabellifer*) is a fruit bearing tree mostly planted as roadside avenue and homestead all over the country. Till now, physical and mechanical properties of about 92 forest and homestead timber species were determined. Information on physical and mechanical properties of palmyra palm wood is limited. But basic information on physical and mechanical properties is needed prior to using for its various purposes. Due to scarcity of wood, palmyra palm wood may serve as an alternative source of raw materials for making furniture and low-cost household materials. As per demand of stakeholders, the species has been selected for



finding their physical and mechanical properties.

- 3.4 Objective (s) :
- 3.4.1 To assess the suitability of palmyra palm wood for making furniture and construction materials.
- 3.5 Expected output : Determination of physical and mechanical properties of palmyra tree wood for 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) :
- Three standing trees of palmyra palm will be selected and collection of 40 cft. round wood.
  - Preparation of 270 samples for testing physical and mechanical properties in green condition.
  - Preparation of 250 samples for testing physical and mechanical properties in air-dry condition.
  - Determination of the physical and mechanical properties of palmyra palm woods both in green and air-dry conditions following ASTM (American Society for Testing Materials) standards.
  - 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.												
e.												

- 3.9 Previous progress, : NA
- 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 : NA
- 3.10.3 Cost of the year : 50,000.00
- 3.10.4 Source of fund :
- 3.11 Beneficiaries : FD, BFIDC, Wood based Industries, Universities and BFRI.

4. **Study** : New
- 4.1 Programme area : Post harvesting utilization-physical processing
- 4.2 Title of the study : Studies on strength properties of five bamboo species of Bangladesh
- 4.3 Justification : Bamboo is naturally occurring plant which grows abundantly in most of the tropical countries. The short growth rotation, easy workability, straightness, high strength, comparative cheapness together with easy availability has made it popular to the people.. The different bamboo species are used in different purposes in our country. Thick walled village grown bamboos are generally used for post, beam, bridge and other structural purposes. Bamboo is also considered as potential raw materials to replace wood. Thirty four bamboo species are found in Bangladesh. So far strength

properties of 13 bamboo species were determined. The suitability of different bamboo species for making furniture and different construction materials is depend on its physical and mechanical properties. Therefore five bamboo species namely- brandisii, membra, mukla, thai and rengun has been selected for evaluation of their strength properties to find out their suitability for specific uses. .

- 4.4 **Objective (s)** :
- 4.4.1 To assess the suitability of bamboo species for making furniture and construction materials.
- 3.5 Expected output : Determination of strength properties of five bamboo species for appropriate use.
- 4.6 Study period :
- 4.6.1 Starting year : 2013-2014
- 4.6.2 Completion year : 2016-2017
- 4.7 **Personnel (s)** :
- 4.7.1 Study leader : M. Rowson Ali, RO
- 4.7.2 Associates : Md. Jahangir Alam, DO and U. K. Rokeya, RO
- 4.8 **Activities for the year** :
- a) Fifteen (5×3) standing bamboo species namely- brandisii, membra, mukla, thai and rengun will be selected at Bamboosetum, BFRI, Chittagong
- b) Preparation of samples for testing strength properties in green condition.
- c) Preparation of samples for testing strength properties in air-dry condition.
- d) Determination of the strength properties of five bamboo species both in green and air-dry conditions following Indian Standard/ASTM (American Society for Testing Materials) standards.
- e) Data 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.												

- 4.9 Previous progress, : NA
- 4.9.1 Achievement (s), : NA
- 4.10 **Financial statement** :
- 4.10.1 Total cost of the study : Tk. 20,000.00
- 4.10.2 Cumulative cost : NA
- 4.10.3 Cost of the year : Tk. 20,000.00
- 4.10.4 Source of fund :
- 4.11 **Beneficiaries** : FD, Wood based Industries, Universities and BFRI.

### 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 :
- 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 of 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 : 2013-14
- 1.7 **Personnels** :
- 1.7.1 Study leader : Ramiz Uddin, DO
- 1.7.2 Associates : N A Mridha, RO; T K Dey, RA-I
- 1.8 **Activities for the year** :
  - a) Collection of research input.
  - b) Collection of research sample (bamboo) from Sylhet.
  - c) Manufacturing of three alna, one single seat sofa and one double seat sofa for service test.
- 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 : Research sample ragoon bamboo ( *Thyrsostachys Oliveri* ) has been collected from Tangail and konkoi bamboo from Sylhet .
- 1.9.1 Achievement : Nil.
- 1.10 **Financial statement** :
- 1.10.1 Total cost of the study : Tk 2,00,000/-
- 1.10.2 Cumulative cost : Tk 1,17,220/-
- 1.10.3 Cost of the year : Tk 82,780/-
- 1.10.4 Source of fund : GOB
- 1.11 **Beneficiaries** : Common people, Bamboo based cottage industries, NGOs.

- 2. **Study** : New
- 2.1 Programme Area : Post harvest utilization-Physical Processing.
- 2.2 Title of the Study : Characterization of palm (*Palmyra palm*) wood for working and finishing properties.
- 2.3 Justification : The trunk of mature trees is usually strong and used as supporting beams to construct sheds, jetties and also in roofing. Palmyra palm tree has numerous uses. Almost every part of the tree has some kind of utility. People generally use the hard outer wood to posts, beams and for domestic purposes. The vacant stem of the Palmyra palm tree is considered as best for making water pipes. The present study covers working and finishing properties and its probable use as furniture and construction materials.
- 2.4 **Objective(s)** :
  - 2.4.1 : To assess the suitability of palm for furniture and construction materials
  - 2.4.2 : To decrease the pressure on traditional timber species.
- 2.5 **Expected output** : Better utilization of palm as furniture and construction materials.
- 2.6 **Study period** :
- 2.6.1 Starting year : 2013-14
- 2.6.2 Completion year : 2013-14
- 2.7 **Personnel(s)** :

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

2.8 **Activities for the year** :

- a) Collection of research input.
- b) Sample preparation as per ASTM standard.
- c) Data have been collected for machining, hand tools and finishing properties.
- d) One centre table and one tea table have been manufactured for service test.

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 : Nil

2.9.1 Achievement : Nil

2.10 **Financial Statement** :

2.10.1 Total cost of the study : Tk. 1,17,000/-

2.10.2 Cumulative cost : NA

2.10.3 Cost of the year : Tk. 1,17,000/-

2.10.4 Source of Fund : GOB

2.11 **Beneficiaries** : Common people, Cottage industries, NGOs.