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RESEARCH PROGRAMME: 2012 – 2013

Government of the people's Republic of Bangladesh

Bangladesh Forest Research Institute

Chittagong

Contents of the Research Programme: 2012 – 13

FOREST MANAGEMENT WING

FOREST PRODUCTS WING

DEVELOPMENT/OTHER FUNDED PROJECTS

Summary of the Research Programme: 2012 – 13

Sl.No.	Name of the Division/Section	Total Number of Studies		
		Ongoing	New	Total
FOREST MANAGEMENT WING				
1	Silviculture Research Division	07	0	07
2	Silviculture Genetics Division	04	00	04
3	Seed Orchard Division	06	00	06
4	Forest Botany Division	05	00	05
5	Forest Inventory Division	02	00	02
6	Forest Economics Division	02	01	03
7	Soil Science Division	04	00	04
8	Minor Forest Products Division	05	00	05
9	Mangrove Silviculture Division	07	00	07
10	Forest Protection Division	03	01	04
11	Plantation Trial Unit Division	07	01	08
12	Wildlife Section	01	02	03
13	Technology Transfer Unit	05	00	05
	Sub-Total:	58	05	63
FOREST PRODUCTS WING				
14	Veneer and Composite Wood Product Division	01	01	02
15	Pulp and Paper Division	03	00	03
16	Wood Preservation Division	02	01	03
17	Forest Chemistry Division	00	02	02
18	Seasoning and Timber Physics Division	02	01	03
19	Wood Working and Timber Engineering Division	01	01	02
	Sub-Total:	09	06	16
	TOTAL :	67	11	78

Development/other funded projects:

Sl.no.	Title	Funded by
01	Enrichment and conservation of mangrove ecosystem	BARC
02	Community based adaptation to climate change through coastal afforestation in Bangladesh	CBACC-CF).
03	Coordinated Project on Improvement of Agro-forestry Practices for Better Livelihood and Environment: BFRI (Forest) Component	BARC
04	Pilot plant study and production of cement bonded particle board in a small scale industry as an environmental friendly durable construction material	CC
05	Coordinated sub-project on Farming System Research and Development for Farmers' Livelihoods Improvement: BFRI (Forest) Component (Hill Ecosystem)	BARC

List of new study: 2012-13

Sl.No.	Title of the Study	Division
Forest Management Wing		
1	Trial plantation of *Paulowlnia elongata* and lambu.	SRD
2	Ecological succession in the man-made coastal forests in relation to age and other related factors.	PTU
3	Avian species diversity in the Protected Areas (PA) of Bangladesh	WL
4	Study on effect of co-management on the relative abundance of Phayre's leaf monkey(*Trachypithecus phayrei*), Pig-tailed macaque (*Macaca nemestrina*) and Capped leaf monkey (*Trachypithecus pileatus*) in Rema-Kalenga Wildlife Sancuary, Hobigonj	WL
5	Socio-economic assessment of the coastal belt afforestation in Bangladesh.	F.Economics
Forest Products Wing		
6	Studies on peeling, drying, gluing and particleboard making characteristic of jhau (*Casuarina equisetifolia*) wood.	VCWP
7	Studies on physical and mechanical properties of jhau (*Casuarina equisetifolia*)	STP
8	Potential use of jhau (*Casuarina equisetifolia*), lambu (*Khaya sp*.) and arjun (*Terminalia arjuna)* wood for furniture, door and window.	WW
9	Investigation of the effect of preservative chemicals after leaching from treated materials	WP
10	Extraction of agar (*Aquilaria malaccensis* Lam.) oil from artificial innoculated agar trees.	FC
11	Characterization of wood and bamboo species for various end uses.	FC

FOREST MANAGEMENT WING

SILVICULTURE RESEARCH DIVISION

1. **Study** : On going
1.1 Programme Area : Biodiversity and Conservation.
1.2 Title of the Study : *Ex-situ* conservation of threatened forest tree species in different agro-ecological regions of Bangladesh.
1.3 Justification **:** NA
1.4 **Objectives** :
1.4.1 To conserve selected threatened forest tree species in different agroecological regions of Bangladesh.
1.4.2 To observe their suitability in particular sites.
1.5 **Expected output** : Fifty threatened indigenous forest tree species will be conserved over an area of fifty hectare in four agroecological regions of the country.
1.6 **Study period** :
1.6.1 Starting year : 2006-07
1.6.2 Completion year : 2014-15
1.7 **Personnels** :
1.7.1 Study leader : Nani Gopal Bhowmick, SRO.
1.7.2 Associates : Mohammed Shahid Ullah, SRO.
Nasrat Begum, SRO.
Azizul Haque, FI.
1.8 **Activities for the year**:

a) Collection of seeds and raising 18,000 seedlings of different threatened forest tree species namely barella, gutguttya, hijal, kaninjal, banderhola, dhup, karpur, bon-sonalu and tali (other important species will also be included based on the availability of seeds) at HQ, Charkai, Charaljani, Keochia and Lawachara Research Stations.
b) Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
c) Raising of 5.0 hectares experimental plantations at Charkai, Charaljani, Keochia and Lawachara SR stations.
d) Maintainance of 29.0 ha last years' experimental plantations (2006-07 6 ha, 2007-08 4 ha, 2008-09 4 ha, 2009-10 7 ha, 2010-11 4 ha and 2011-12 4 ha) through weeding, vacancy filling, cleaning, climber cutting, pruning, etc.
e) Collection of survival and growth (height and diameter at breast height) data at six months interval.
f) Compilation of data and 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.												

1.9 Previous progress (2006-11): Raised 29.0 ha experimental plantations at Charkai, Charaljani, Keochia and Lawachara Silviculture Research (SR) Stations with 30 threatened forest tree species viz. haldu (*Adina cordifolia*), boilam (*Anisoptera scaphula*), civit (*Swintonia floribunda*), uriam (*Mangifera sylvatica*), gandhi-gazari (*Miliusa velutina*), moos (*Brownlowia elata*), dholi-garjan (*Dipterocarpus gracilis*), raktan (*Lophopetalum fimbriatum*), kannyari (*Gardenia coronaria*), menda (*Litsea monopetala*), udal (*Firmiana colorata*), barun (*Crataeva magna*), gila-batna (*Castanopsis tribuloides*), shil-batna (*Castanopsis indica*), toon (*Toona ciliata*), tali (*Palaquium polyanthum*), kanaidinga (*Oroxylum indicum*), dharmara (*Stereospermum personatum*), kanak (*Schima wallichii*), chalmugra (*Gynocardia odorata*), banspata (*Podocarpus neriifolius*), banderhola (*Duabanga grandiflora*), putranjiva (*Putranjiva roxburghii*), parul (*Stereospermum suaveolens)*, bhutum (*Hymenodictyon orixensis*), bazna (*Zanthoxylum rhetsa*), gurja-batna (*Lithocarpus pachyphylla*), goda/awal (*Vitex peduncularis*), hargaza (*dillenia pentagina*), jawa/barela (*Holigarna caustica*), dhup (*Canarium resiniferum*), sidha-jarul (*Lagerstroemia parviflora*), khyaer (*Acacia catechu*), etc.

1.9.1 Achievements : Conserved 30 threatened species viz. haldu, boilam, civit, uriam, gandhi-gazari, moos, dholi-garjan, raktan, kannyari, menda, udal, barun, gila-batna, shil-batna, toon, tali, kanaidinga, dharmara, kanak, chalmugra, banspata, banderhola, putranjiva, parul, bhutum, bazna, gurja-batna, goda/awal, hargaza, jawa/barela, dhup, shidha-jarul, khayer etc. in the conservation plots in four agro-ecological regions of Bangladesh.

1.10 **Financial statement :**

1.10.1 Total cost of the study: Tk. 25,00,000.00

1.10.2 Cumulative cost : Tk. 17,20,000.00

1.10.3 Cost of the year : Tk. 3,50,000.00

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 : NA

2.4 **Objectives** :

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 : 2010-11

2.6.2 Completion year : 2014-15

2.7 **Personnels** :

2.7.1 Study leader : Nasrat Begum, SRO.

2.7.2 Associates : Mohammed Shahid Ullah, DFO.
Nani Gopal Bhowmick, SRO.
Azizul Haque, FI.

2.8 **Activities for the year:**

a. Collection of seeds from the selected mother trees and raising 4,500 seedlings at Charaljani and Charkai SR Stations.
b. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
c. Raising of 1.5 ha experimental plantations at Charaljani (0.50 ha) and Charkai (1.00 ha) SR Stations by seedlings and direct seed sowing in thallis.
d. Maintainance of 2.0 ha last year's experimental plantations through weeding, vacancy filling, cleaning, climber cutting, etc.
e. Colletion of survival and height growth data at four months interval.
f. Analysis of data and reporting.

2.8.1 Activities calendar :

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

2.9 Previous progress (2010-11): Two hectares experimental plantations were established at Charaljani (1.0 ha) and Charkai (1.0 ha) SR Stations through planting seedlings and sowing seeds in thallis.

2.9.1 Achievement : NA

2.10 **Financial statement** :

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

2.10.2 Cumulative cost : Tk. 74,000.00

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 **Objectives :**

3.4.1 To determine present status of oil palm plantation in Bangladesh.

3.4.2 To standardize nursery raising technique and management.

3.4.3 To standardize plantation (spacing) and management technique of oil palm.

3.4.4 To study the reproductive biology of oil palm in plantations of Bangladesh.

3.4.5 To introduce and test the high yielding variety (HYV) of oil palm.

3.5 **Expected output** :

a. Present status of oil palm in Bangladesh will be determined.
b. Nursery and plantation technique will be standardized.
c. Suitable variety of oil palm will be selected for large scale plantation in Bangladesh.

3.6 **Study period** :

3.6.1 Starting year : 2010-11

3.6.2 Completion year : 2019-20

3.7 **Personnels** :

3.7.1 Study leader : Mohammed Shahid Ullah, DFO, SRD.

3.7.2 Associates : Nani Gopal Bhowmick, SRO, SRD.
Rafiqul Islam, DO, FPD.
Rafiqul Haider, DO, MFPD.
Motiar Rahman, RO, SSD.
Nusrat Sultana, FI, SGD.

3.8 **Activities for the year:**

a. Visit to oil palm plantations raised by Govt. agencies or private owners at different locations (Chittagong, Bandarbans, Sylhet, Moulavibazar, Tangail, etc.) for collection of information on growth, flowering, fruiting, disease infestation, etc.
b. Collection of seeds and raising 1,500 seedlings in 9 X 6 polybag at Charaljani, Keochia and Charkai Research Stations (500 in each station).
c. Collection of data on germination period, germination percentage, survival, growth, disease infestation, etc. of the seedlings at nursery and field level.
d. Maintenance of seedlings in the nursery through weeding, watering, sorting, rearrangement, etc.
e. Raising of 4.5 ha new oil palm plantation with three spacings (viz. 5m x 5m, 6m x 6m, and 7m x 7m) with RCBD design at Charaljani, Keochia and Charkai Research Stations (1.5 ha in each station).
f. Maintainance of 9.0 ha last years' experimental plantations through weeding, gap-filling, cleaning, climber cutting, etc.
g. Watering the seedlings in the last year plantation during dry season (Feb – May) with different treatments.
h. Collection of data on survival, growth, number of fronds, etc.
i. Analysis of data 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 (2010-12): Established 9.0 ha experimental plantations at Charaljani, Keochia and Hinguli Research Stations. Analysed the soil samples of those three sites.

3.9.1 Achievement : NA

3.10 **Financial statement :**

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

3.10.2 Cumulative cost : Tk. 3,90,000.00

3.10.3 Cost of the year : Tk. 2,00,000.00
3.10.4 Source of fund : GOB
3.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.

4. **Study** : 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 : NA
4.4 **Objectives** :
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 : 1996-97
4.6.2 Completion year : 2014-15
4.7 **Personnels** :
4.7.1 Study leader : Mohammed Shahid Ullah, DFO.
4.7.2 Associates : Nasrat Begum, SRO.
Nani Gopal Bhowmick, SRO.
Azizul Haque, FI.
4.8 **Activities for the year:**
a) Maitenance of 50.0 ha experimental plantations (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	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												

4.9 Previous progress (1996-11) : Up to 2011, 101 ha experimental plantations (species elemination 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* (3rd rotation) was

assessed at Charkai SR Station. Phenological data of 240 indigenous and exotic tree species were compiled.

4.9.1 Achievements : 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 over an area of 101 ha.

4.10 **Financial statement :**

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

4.10.2 Cumulative cost : Tk. 31,70,000.00

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

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 : NA

5.4 **Objectives** :

5.4.1 To determine age, height and root-shoot ratio of seedlings for despatch 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 awerness 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 : 2006-07

5.6.2 Completion year : 2014-15

5.7 **Personnels** :

5.7.1 Study leader : Nani Gopal Bhowmick, SRO.

5.7.2 Associates : Mohammed Shahid Ullah, DFO.
Nasrat Begum, SRO.
Azizul Haque, FI.

5.8 **Activities for the year:**

a. Development of nursery bed at HQs, Charkai, Lawachara and Charaljani SR Station.
b. Collection of seeds of dominant/popular 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	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												

5.9 Previous progress (2006-11) : Raised and distributed more than 10 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 lebbeck* (L.) Benth), raj-koroi *(A. richardiana* King & Prain), sil-koroi *(A. procera* (Roxb.) Benth), chakua-koroi *(Albizia chinensis),* motor-koroi *(Albizia lucida),* arjun *(Terminalia arjuna* (Roxb.) Wt. & Arn.), pitraj *(Aphanamixis polystachya),* bohera *(Terminalia bellirica* (Gaertn.) Roxb.), haritaki *(Terminalia chebula* (Gaertn.) Retz.), menda *(Litsea monopetala* (Roxb.) Pers.), haldu *(Adina cordifolia),* katbadam *(Terminalia catappa* L.), palas *(Butea monosperma* (Lam.) Taub.), khayer *(Acacia catechu),* tamal *(Diospyros montana* Roxb.), krishnachura *(Delonix regia* (Bojer) Rafin), kalo-jam *(Syzygium cumini),* kanchan *(Bauhinia racemosa* Lamk.), jarul *(Lagerstroemia speciosa* (L.) Pers.), parul *(Stereospermum suaveolens* A. DC.), dhakijam *(Syzygium 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. 7,15,000.00

5.10.3 Cost of the year : Tk. 2,10,000.00

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): NA

6.4 **Objectives** :

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 : 2010-11

6.6.2 Completion year : 2016-17

6.7 **Personnels** :

6.7.1 Study leader : Mohammed Shahid Ullah, DFO.

6.7.2 Associates : Nasrat Begum, SRO.
Nani Gopal Bhowmick, SRO.
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. Maintainance of 2.32 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 (2010-11): Raised 4.62 ha experimental plantations at Keochia and Charaljani SRS.

6.9.1 Achievement : NA

6.10 **Financial statement :**

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

6.10.2 Cumulative cost : Tk. 1,10,000.00

6.10.3 Cost of the year : Tk. 1,05,000.00

6.10.4 Source of fund : GOB

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

7. **Study** **: On going**
7.1 Programme Area : Biodiversity and Conservation.
7.2 Title of the Study : Regeneration study of tree species in Chunati wild-life sanctuary.
7.3 **Justification** : NA
7.4 **Objectives** :
7.4.1 To determine the regeneration status of tree species in chunati wild life sanctuary.
7.4.2 To determine the regeneration trends in chunati wild life sanctuary.
7.5 **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.

7.6 **Study period** :
7.6.1 Starting year : 2010-11
7.6.2 Completion year : 2012-13
7.7 **Personnels** :
7.7.1 Study leader : Nasrat Begum, SRO.
7.7.2 Associates : Mohammed Shahid Ullah, DFO.
Nani Gopal Bhowmick, SRO.
Azizul Haque, FI.
7.8 **Activities for the year:**

a. Data on regeneration (seedlings of ≥ 20 cm in height and samplings of each species will be counted) of tree species will be collected (two times) from Chunati Beat, Harbung Beat, Cambul Beat, Pnuichari Beat and Napora Beat .
b. Data analysis and report writing.

7.8.1 Activities calendar :

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

7.9. Previous progress (2010-11): 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.
7.9.1 Achievement :
7.10 **Financial statement** :
7.10.1 Total cost of the study: Tk. 2,30,000.00
7.10.2 Cumulative cost : Tk. 1,20,000.00
7.10.3 Cost of the year : Tk. 60,000.00
7.10.4 Source of fund : GOB
7.11 **Beneficiaries** : FD, NGOs, Farmers, Educational institutions and other tree planting agencies.

SILVICULTURE GENETICS DIVISION

1. **Study** : 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 : NA
1.4 **Objectives** :
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 : 2003-04
1.6.2 Completion year : 2013-14
1.7 **Personnels** :
1.7.1 Study Leader : Sharmila Das, DO.
1.7.2 Associates : Nusrat Sultana, FI.
Saiful Alam Md. Tareq, FI.
1.8 **Activities for the year:**
a) Collection of planting materials of selected species from Sylhet (Moulavi Bazar), Mymensingh, Chittagong Hill Tracts and different areas of Chittagong.
b) Production of ten thousand bamboo propagules (Five thousand through branch cuttings and five thousand through seed and seedling proliferation).
c) Data collection on survival rate of cuttings.
d) Preparation of report.
1.8.1 Activities calendar :

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

1.9 Previous progress (2003-2011): About one lakh and fifty 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. 10,000,00.00
1.10.2 Cumulative cost : Tk. 8,54,240.00
1.10.3 Cost of the year : Tk. 1,30,000.00
1.10.4 Source of fund : GOB.
1.11 **Beneficiaries** : BFRI, FD, NGOs, Farmers, Universities.

2. **Study : On going**

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

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

2.3 Justification **:** NA

2.4 **Objectives :**

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 **:** 2003-04

2.6.2 Completion year **:** 2013-14

2.7 **Personnels :**

2.7.1 Study Leader **:** Sharmila Das, DO.

2.7.2 Associates **:** Nusrat Sultana, FI.
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*), gutguttya (*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 (2003-2011)**:** About fifty thousand seedlings of 15 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)* 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. 5,00,000.00

2.10.2 Cumulative cost **:** Tk.3,78,200.00

2.10.3 Cost of the year **:** Tk. 90,200.00

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 : NA

3.4 **Objectives** :

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 i*n 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 : 2008-09

3.6.2 Completion year : 2013-14

3.7 **Personnels** :

3.7.1 Study Leader : Sharmila Das, DO.

3.7.2 Associates : Nusrat Sultana, FI.
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 (2008-2011)**:** Culture establishment of farura, membra, budum, ora, brandisii and dolu have been done.

3.9.1 Achievements : Established bamboo demonstration plots through tissue culture plantlets in IFESCU, RU, JU, BSRI campuses and farmer's field in Phaithong of Bandarban hill district.

3.10 **Financial statement** :

3.10.1 Total cost of the study**:** Tk. 19,00,000.00

3.10.2 Cumulative cost : Tk. 18,09,280.00

3.10.3 Cost of the year : Tk. 61,040.00

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 **:** NA

4.4 **Objectives :**

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 i*n 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 **:** 2008-09

4.6.2 Completion year **:** 2013-14

4.7 **Personnels:**

4.7.1 Study Leader **:** Sharmila Das, DO.

4.7.2 Associates **:** Nusrat Sultana, FI.
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 plantlets into soil for hardening.
e) One thousand tissue culture seedlings will be produced.

4.8.1 Activities calendar **:**

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

4.9 Previous progress (2008-2011)**:** Culture establishment of boilam and lotkon have been done.

4.9.1 Achievements **:** NA

4.10 **Financial statement :**

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

4.10.2 Cumulative cost **:** Tk. 3,50,720.00

4.10.3 Cost of the year **:** Tk. 67,600.00

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 (PT).
1.4.3 To popularize superior quality seeds produced in seed orchards.
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 : Kabir Uddin Ahmed, DO
1.7.2 Associates : 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 220 plus trees of raktan, bajna, batna, agar, kadam, sida jarul, kanak, civit, gamar, dharmara, gutguitya, goda, mahogani, uriam, lohakat, pitraj, segun and akashmoni .
b. Collection of 800 kg seeds from plus trees for distribution toForest Department (FD) District Nursery Malik Samitee (DNMS) and other tree planters.

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 :Two thousand twenty nine plus trees of 28 different forest tree species (civit (*Swintonia floribunda*), boilam (*Anisoptera glabra*), dholi garjan (*Dipterocarpus pilosus*), telsur (*Hopea odorata*), chapalish (*Artocarpus chaplasha*), Hybrid *Acacia*, akashmoni (*Acacia auriculiformis*), gamar (*Gmelina arborea*), bakain (*Melia azedarach*), bahera (*Terminalia bellerica*), haritaki (*Terminalia chebula*), amloki (*Embelica officinalis*), arjun (Terminalia arjuna), neem (*Azadirachta indica*), rajkoroi (*Albizia richardiana*), *Eucalyptus camaldulensis) etc.* were selected and seeds are being collected. 9036 kg seeds of 25 different forest tree species telsur, gamar, garjan, teak (*Tectona grandis*), dhakijam (*Syzygium grande*) , kadam (*Anthocephalus chinensis*), bahera, haritaki, amloki, arjun), neem, toon (*Toona ciliata*), chickrassi (*Chukrassia tabularis*), rajkoroi distributed /sold to different tree planting agencies.

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

1.9.1. Achievements**:** Two thousand twenty nine plus trees of 50 species were selected and 9036 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**:**

1.10.2 Cumulative Cost **:** Tk. 7,15,996.00

1.10.3 Cost of the year **:** Tk. 91,000.00

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 **:** Kabir Uddin Ahmed, DO

2.7.2 Associates **:** 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

2.8 **Activities for the year:**

a. Raising of 7000 seedlings from 50 plus trees of akashmoni selected at SPA of Kaptai and Ichamati SOC
b. Establishment of 7 ha seedling seed orchard of akashmoni (2), jarul (1 ha), champa (1 ha), chickrassi (1 ha), toon (1 ha), goda (0.5 ha) and gutgutya (0.5ha) at Ichamati, Salna, Hyanko, Kaptai and Dulahazara.
c. Maintenance of existing 41 ha clonal seed orchard and 70 ha seedling seed orchards at Salna, Kaptai, Dulahazara, Ichamati and Hyankoo SOCs.
d. Collection of 200 kg teak seed and 250 kg gamar seed from Kaptai Seed Orchard Centre, 40 kg telsur seed and 2 kg pine seed from Ichamati Seed Orchard Centre and 5 kg eucalyptus seed from Salna Seed Orchard Centre.

e. Raising and maintenance of 38500 seedlings for establishment of 11 ha seedling seed orchard on next year of jarul (3 ha), civit (2 ha), teli garjan (2) sada garjan (1) baitta garjan (1) and dhakijam (2).
f. Maintenance of previous year's seedling at nursery of Head Quarter and Dulahazara, Ichamati, Hyankoo and Salna SOC.
g. Maintenance by gap filling in previously raised one year old 5 ha orchard at Ichamati, Kaptai, Dulahazara and Hyanko SOC.
h. Maintenance of nurseries at Head Quarter and seven seed orchard centres.
i. Production of 10000 rooted cuttings of hybrid *Acacia* at plant propagation unit of head quarter for distribution to DNMSs and 6 SOCs.
j. Preparation of 2000 teak ramets for clonal seed orchard establishment at Kaptai.
k. Raising of 6000 seedlings for raising 6 ha teak seed orchard at Kaptai.
l. Raising of 6000 gamar seedlings for raising 6 ha clonal seed orchard at Dulahazara and Hyanko.
m. Establishment of 6 ha teak clonal seed orchard at Kaptai.
n. Data collection from 4 hectare garjan SSO at Hyankoo and Dulahazara
o. Expenditure for collecting left over illicitly cutted wood logs from orchards
p. Procurement of ladder and nursery equipments.

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.												
o.												
p.												

2.9 Previous progress **:** From different seed orchards 4029 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, akashmoni, dhakijam etc. Sixty six ha. seedling seed orchard of garjan, doligarjan (*Dipterocarpus pilosus*), dhakijam, chapalish, eucalyptus sp, akashmoni and gamar and 39 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 32 ha. clonal seed orchard of teak, gamar and mahogany and 25 ha. seedling seed orchard of

garjan, dholigarjan dhakijam, chapalish, eucalyptus (*Eucalyptus camaldulensis, E. tereticornis, E. europhylla*), 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**:**

Cumulative cost **:** Tk. 50,19,884.00

Cost of the Year **:** Tk. 15,83,000.00

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 **:** Kabir Uddin Ahmed, DO

3.7.2 Associates **:** Md. Mezan-Ul-Hoque, RO; Md. Kamal Uddin, RO

3.8 **Activities for the year:**

a. Collection of 20 kg seeds from SPA of Kaptai and Ichamati SOCs.
b. Maintenance of seed production area of akashmoni 1ha at Ichamati and 1 ha at Kaptai Seed Orchard Centre.

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 230 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**:**

3.10.2 Cumulative cost **:** Tk. 1,93,280.00

3.10.3 Cost of the Year **:** Tk. 17,000.00

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 Staring Year : 2004-05

4.6.2 Completion year : 2016-17

4.7 **Personnels** :

4.7.1 Study leader : Md. Mezan-Ul-Hoque, RO

4.7.2 Associates : Kabir Uddin Ahmed, DO

4.8 **Activities for the year:**

a) Raising of 30000 seedlings of mahogany, gamar, hybrid acacia, akashmoni, kadam, toon, jarul, silkoroi, boilam, civit, champa, 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												

4.9 Previous progress : During previous years 159000 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:

4.10.2 Cumulative cost : Tk. 10,45,000.00

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

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 :

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 : Kabir Uddin Ahmed, DO

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**:**

5.10.2 Cumulative cost **:** Tk. 3,25,000.00

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 **:**Identification 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 **:** Kabir Uddin Ahmed, DO

6.7.2 Associates **:** Sukla Rani Bashak, SRO
Md. Kamal Uddin, RO
Md. Mezan-Ul-Hoque, RO

6.8 **Activities for the year:**

a) 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.

b) Raising of 5000 seedlings family wise and its maintenance.

c) Raising of plantation 6 ha plantation.

d) Fencing around the plantation

e) Appointment of watcher

f) Maintenances of previously raised trial plantation at Hyanko Seed Orchard Center (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 **:**

6.10.2 Cumulative cost **:** Tk. 6,01,840.00

6.10.3 Cost of the Year **:** Tk. 3,42,000.00

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 : Community based tree biodiversity conservation in Bandarban Hill District

1.3 Justification : NA

1.4 **Objectives** :

1.4.1 To promote community based tree biodiversity conservation involving local people and community.

1.4.2 To establish demonstration plot for conservation of indigenous tree species.

1.5 **Expected output:** Awareness of local people about values of local biodiversity and their conservation will be developed for future research work. Biodiversity of hill ecosystem will be conserved as a biodiversity hotspot. Motivation for community

based tree biodiversity conservation will be helpful for their perennial water source and better livelihoods.

1.6 **Study period** :

1.6.1 Starting year : 2008- 09

1.6.2 Completion year : 2012-13

1.7 **Personnels** :

1.7.1 Study leader : Mohammed Mohiuddin, D.O

1.7.2 Associates : Asim Kumar Paul, R.O; A.H. M. Jahangir Alam, R.O

1.8 **Activities for the year:**

a) Four group meetings with the Karbaries will be conducted (local leaders) and local peoples of Empupara, Chimbukpara and Sitapaharpara for awareness development for biodiversity conservation.
b) Motivate the local people for conservation of wild indigenous tree seedlings and enrichment planting with supplied indigenous species.
c) Motivate the local leaders and people for maintenance and conservation of planted 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 (2008-12): Tribal communities of Chittagong Hill Tracts have the tradition to maintain and conserve the community reserve around their paras or village. This reserve protects the village for fire, ensure perennial water source, and maintain the local environment. It is maintained by the traditional norm and rules of the society. This type of community reserve is becoming extinct among the tribal people due land scarcity, urbanization, and loss of social norms. Floristic composition of community reserve of Empu para and management practices had been carried out. To aware and sensitize the local people for conserving the community reserve a series of group meeting was conducted with the Karbaries (local leaders). PRA was conducted with the local people to select the site for enrichment plantation and biodiversity conservation. Last four year 20,000 seedlings of thirty indigenous species have been distributed in Chimbuk para, Sitapahar para and Empu para for enrichment plantation. The species were bandarhola, uriam, pitraj, sil-koroi, bahera, civit, chapalish, telsur, arjun, horitoki, kadam, jarul, garjan, champaful, neem, jolpai, haldu. A seven member's forest protection committee headed by the Karbari (local leader) has been formed in Empu para and Sitapahar para with consultation with the local community people to look after planted seedlings and to create conservation awareness among local people.

1.9.1 Achievements: Biodiversity of the community reserve has enriched and awareness has created among the local people for biodiversity conservation.

1.10 **Financial statement** :

1.10.1 Total cost of the study: Tk. 5,00000/-

1.10.2 Cumulative cost : Tk. 3,50000/-

1.10.3 Cost of the year : Tk. 1,00000/-

1.10.4 Source of fund : GOB

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

2. **Study** : **On going**

2.1 Programme Area : Biodiversity and Conservation

2.2 Title of the Study : Buddha-Bihar (*Kiyang*) based tree biodiversity conservation in Rangamati Hill District

2.3 Justification : NA

2.4 **Objectives** :

2.4.1 To conserve biodiversity by involving local religious leaders.

2.4.2 To enrich tree biodiversity in Buddha-Bihar (*Kiyang*) areas by participatory effort.

2.4.3 To develop a religious institution based biodiversity conservation model.

2.5 **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.

2.6 **Study period** **:**

2.6.1 Starting year : 2008– 09

2.6.2 Completion year : 2012 - 13

2.7 **Personnels:**

2.7.1 Study leader : Mohammed Mohiuddin, D.O

2.7.2 Associates : Asim Kumar Paul, R.O
A.H. M. Jahangir Alam, R.O

2.8 Activities for the year:

a) Four awareness or sensitizing group meetings with the religions leaders and community 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) Motivate the religion leaders and local people for maintenance and conservation of planted species
d) Reporting (The draft report).

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 (2008-12): 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. Consultation meetings and Participatory Rural Appraisal (PRA) were conducted for species selection and motivation for biodiversity conservation. A Participatory map and a priority species list has done for plantation around the Buddha-Bihar (*Kiyang*) area were selected by the Bantheyas and local people. Twenty thousand seedlings of 32 indigenous species were distributed to eight Bihar namely Bodhioppur Bonobihar, Khamarpara Adarsha Bonobihar, Shukarchari Modhapara Bonobihar, Nirbanpur Bonobihar, Toymidong Bonobihar, Benubon Arrano Kuthir Bonobihar and Rajbon Bhabona Kandra of Manikchari area of Rangamati. The supplied species were planted in the selected areas of Bihar. Heights of the planted tree species were measured and data were recorded.

2.9.1 Achievements: Awareness has created among the religious leaders and local people for biodiversity conservation in the Bihar.

2.10 **Financial statement** :

2.10.1 Total cost of the study: Tk. 5,00000/-

2.10.2 Cumulative cost :Tk. 3,50000/-

2.10.3 Cost of the year : Tk. 1,00000/-

2.10.4 Source of fund : GOB

2.11 **Beneficiaries :** Government Departments, Academic Institutes, NGOs, and Local communities.

3. **Study** : **On going**

3.1 Programme Area : Post Harvest Utilization- Physical Processing.

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

3.3 Justification : NA

3.4 **Objectives :**

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 : 2012 - 13

3.7 **Personnels** :

3.7.1 Study leader : Asim Kumar Paul, R.O

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

3.10 **Financial statement :**

3.10.1 Total cost of the study: Tk.1,00000.00

3.10.2 Cumulative cost : Tk. 40,000.00

3.10.3 Cost of the year : Tk. 30,000.00

3.10.4 Source of fund : GOB

3.11 **Beneficiaries :** FD, BFIDC, Academic Institutes, NGOs and Wood Traders, Farmers.

4. **Study** : On going

4.1 Programme Area : Post Harvest Utilization- Physical Processing.

4.2 Title of the Study : Anatomical variation of three timber species toon (*Toona ciliata*), sil-koroi (*Albizia procera*), rain-tree (*Samanea saman*) in relation to their four ecological regions of Bangladesh

4.3 Justification :

4.4 **Objectives :**

4.4.1 To determine the detail gross and minute anatomical features of three species of occurring in different regions of Bangladesh.

4.4.2 To determine the anatomical variation of three species in relation to difference regions.

4.5 **Expected output:**

a. Anatomical variation in relation to their ecological variation of three species will be known.

b. BFRI xylariam will be enriched with the permanent slides and data base.

4.6 **Study period :**

4.6.1 Staring year : 2009 –10

4.6.2 Completion year : 2012 - 13

4.7 **Personnel(s)** :

4.7.1 Study leader : Asim Kumar Paul, R.O

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

4.8 **Activities for the year**:

a. Microtome sections cutting of 24 wood blocks of three species for permanent slides.

b. Study of minute anatomical properties from permanent slides.

c. Gross and minute anatomical determination to find out the relationship with four ecological regions.

d. Writing of scientific reports.

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 (2009-12): The anatomical properties of wood vary depending of the different factors. Wood properties also vary with growing habitat of the species. Three wood samples of toon (*Toona ciliata*), rain-tree (*Samanea saman*) and sil-koroi (*Albizia procera*) were collected from Lama, Bandarban, Jessore, Sylhet and Bogra. Their local names and local uses are documented. Twenty wood blocks of toon (*Toona ciliata*), rain-tree (*Samanea saman*) and sil-koroi (*Albizia procera*) were prepared. The prepared blocks were boiled in hot water for softening and microtome sectioning.

4.9.1 Achievement :

4.10 **Financial statement :**

4.10.1 Total cost of the study: Tk. 1,00000.00

4.10.2 Cumulative cost : Tk. 60,000.00

4.10.3 Cost of the year : Tk. 20,000.00

4.10.4 Source of fund : GOB

4.11 **Beneficiaries :** FD, BFIDC, Academic Institutes, NGOs and Wood Traders.

5. **Study** : On going

5.1 Programme Area : Biodiversity and Conservation

5.2 Title of the Study : Regeneration status of tree species in plantation and natural forest of Paithong forest areas of Bandarban Hill District

5.3 Justification :

5.4 **Objectives** :

5.4.1 To determine regeneration status of tree species in different habitats (planted and natural forest) in Paithong forest areas.

5.4.2 To determine the vegetation dynamics of plantation and natural forest patches.

5.5 **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.

5.6 **Study period** :

5.6.1 Starting year : 2011- 12

5.6.2 Completion year : 2012- 13

5.7 Personnel**s** :

5.7.1 Study leader : Mohammed Mohiuddin, D.O

5.7.2 Associates : Syedul Alam, R.A (Grade-1)

5.8 **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.

5.8.1 Activities calendar :

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

5.9 Previous progress (2011-12): Five trips were carried out for regeneration status of tree species. Thirty 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 from the study area and processed for preservation in the herbarium of BFRI.

5.10 Achievement :

5.10 **Financial statement** :

5.10.1 Total cost of the study: Tk. 1,50,000.00

5.10.2 Cumulative cost : Tk. 41,000.00

5.10.3 Cost of the year : Tk. 90,000.00

5.10.4 Source of fund : GOB

5.11 **Beneficiaries** : Forest Department, Forestry Institutes, NGOs and policy people.

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 : NA

1.4 **Objectives** :

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** : 2010-21

1.6.1 Starting year : 2010-11

1.6.2 Completion year : 2020 – 21

1.7 **Personnel**s :

1.7.1 Study Leader : S. M. Zahirul Islam, RO

1.7.2 Associates : Md.Abul Hasnat Shah Jalal, DO
Mofizul Islam Khan, FI

1.8 **Activities for the year**:

a. Re-measurement of 50 established PSPs existing plantation at Chitagong and Cox's Bazar Forest Division.
b. Re-measurement of 54 established PSPs of mahogany in existing plantation at Jesshore and Faridpur Forest Division.
c. Summarization of collected data.

1.8.1 Activities calendar:

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

1.9 Previous Progress : Fifty four PSPs for mahogany at Jesshore & Faridpur and 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 submitted for publication.

1.9.1 Achievement :

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. 94,580.00
1.10.3 Cost of the year : Tk: 33,800.00
1.10.4 Source of fund : GOB

1.11 **Beneficiaries** **:** Forest Department, development policy maker, researchers, forestry teachers, students, trainees and trainers, BFIDC, timber traders, universities and NGOs

2. **Study** : Ongoing
2.1 Programme Area : Forest Inventory, Growth and Yield.
2.2 Title of the study : Growth and yield assessment of keora (*Sonneratia apetala*) and baen (*Avicennia officinalis*) in the coastal plantations of Bangladesh.
2.3 Justification : NA
2.4 **Objectives** :

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 : 2014-15

2.7 **Personnels**

2.7.1 Study Lead : Md.Abul Hasnat Shah Jalal, DO

2.7.2 Associates : S. M. Zahirul Islam, RO
Mofizul Islam Khan, FI

2.8 **Activities for the year**:

a. Yearly re-measurement of the trees in the established permanent sample plots 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 :

a) Prepared site indices curves and growth and yield tables for keora.

b) Financial 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: 21,000.00

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 : N.A

1.4 **Objectives** **:**

1.4.1 To evaluate economic benefit of bamboo plantations using branch cutting technique.

1.4.2 To assess the bamboo grower's interest of bamboo plantations using 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 using branch cutting and bamboo groves management technique on economy of rural people will be determined.

1.6 **Study period** :

1.6.1 Starting year : 2011-12

1.6.2 Completion year **:** 2012-14

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 bagarpara of Jessore and Jamalgonj of Sunamgonj district 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 (2011-12 year): Collected data from the study area of Dinajpur and Faithong is in compilation.

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 1,76,000.00

1.10.4 Source of fund : GOB

1.11. **Beneficiaries** **:** Bamboo grower, Private Entrepreneurs, NGOs.

2**.** **Stu**dy : 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 : NA

2.4 **Objective** :

2.4.1 To determine the financial rotation of babla (*Acacia nilotica*) based on it's the existing utilization.

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

2.6 **Study period** :

2.6.1 Starting year : 2011-12

2.6.2 Completion year : 2013-14

2.7 **Personnels** **:**

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 :**

a. Collection of information on existing babla plantations in Bhola and Barisal.
b. Collection of field data on height, diameter of trees, and establishment cost of nursery and plantations.
c. 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 (2011-12 year): Collected data form the study of Noakhali and Bagerhat is in compilation

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. 1,74,999.00

2.10.4 Source of fund : GOB.

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

3 **Study** : New

3.1 Programme Area : Forest Inventory and Economics

3.2 Title of the Study : Assessment of socio-economic impact on local people and financial aspect of the Coastal Afforestations of Bangladesh.

3.3 Justification: The people of coastal area are very poor and depend on agriculture as seasonal laborer. Poverty is a major problem and is acute due to natural disaster frequently, especially in coastal area of the country. The government has given priority to develop the coastal areas where most of the poor people live. So, the afforestation programme was to generate productive employment for the poor, and to provide a source of income from tree and tree product. The creation of additional forest resource would be based for socioeconomic and environmental development of the country. Now, it is proper time to assess the source of income and change of the livelihood of local people due to afforestation and its' economic viability in the coastal zone which is contributing to the national economy.

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 measure the change of livelihood due to afforestation in this area.

3.4.4 To make finiancial analysis of afforestation in Coastal zone.

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

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.A Taher Hossain; RO

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

3.8 **Activities for the year :**

a) Literature review.

b)Preparation of details workplan (including questionnaire)

c) Selection of the participated people with tree plantation in three locations (Range) from each of Noakhali and Potuakhali coastal afforestatio 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 questionnaire

f).Selection of the plantations raised in earlier period of ten different years for the collection of required data.

g) 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.												
g.												

3.9 Previous progress : NA**.**

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 2,42,500.00

3.10.4 Source of fund : GOB

3.11 **Beneficiaries :** FD, Private Planters. NGOs etc.

SOIL SCIENCE DIVISION

1. **Study** : On going

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 : Not applicable

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) Field management by two times weeding of 1.50 acre established plantation, repairing fence and land preparartion for cover crops
e) 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 acre rubber plantation

f) 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.												

1.9 Previous progress (2010-11): Initial soil and compost samples were analyzed and recorded. One hundred eighty mature rubber trees were selected for applying different treatments (compost and NPK fertilizer dose) and composts were applied in 0.50 acre new rubber plantation.

1.9.1 Achievement :Established 1.50 acre 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. 3,03,300.00

1.10.3 Cost of the year : Tk. 2,40,000.00

1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : BFIDC and private rubber planters.

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 prunning

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 (2007-11) : Data on height, girth and survival were recorded and found that maximum height (7.02 m), girth (31.26 cm) and survival (70%) was hybrid acacia. Soil loss was assessed by scaling method and found T_0 (Teak), T_1 (Teak+Mehogany), T_2 (Teak+Hybrid acacia), T_3 (Teak+Eucalyptus) and T_4 (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. 1,22,500.00

2.10.3 Cost of the year : Tk. 65,000.00

2.10.4 Source of fund : GOB

2.11 **Beneficiaries** : FD and private planters

3. **Study** : On going

3.1 Programme Area : Soil consevation and watershed management

3.2 Title of the Study : Effect of arhar (*Cajanus cajan*) as a mixed crop on soil erosion minimzation in zinger cultivation in the hills of Chittagong Hill Tracts (CHTs)

3.3 Justification : Not applicable

3.4 **Objectives** :

3.4.1 To quantify soil and nutrients loss in zinger cultivation in the hilly area

3.4.2 To assess the effect of arhar planting in zinger fields in hill slope on soil conservation

3.5 **Expected output** : Minimization of soil erosion for sustaining soil fertility and zinger production.

3.6 **Study period** :

3.6.1 Starting year : 2009-10

3.6.2 Completion year : 2012-13

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) Fifteen decimal established experimental plot will be maintained
b) Fifteen composite soil samples (0-15, 15-30 and 30-50 soil depth) will be collected for analysis of soil nutrients (pH, OM, N, P, K, S, Ca, Mg and micro nutrients)
c) Yield data of zinger and arhar will be collected
d) Soil erosion and existing nutrient status will be assessed
e) 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 (2009-11): Fifteen decimal hilly lands were cultivated for zinger and arhar production. Analyzed data showed that soil erosion was higher (38.85 ton/ha/yr) in the traditional system than that of experimental plots (31.24 and 26.41 ton/ha/yr). Soil nutrient loss was also higher in the traditional system. Yield of zinger was higher (15 ton/ha) than that of traditional system (12 ton/ha).

3.9.1 Achievement : Established 15 decimal experimental plot at Wagga, Kaptai, Rangamati Hill district.

3.10 **Financial statement** :

3.10.1 Total cost of the study: Tk. 3,00,000.00

3.10.2 Cumulative cost : Tk. 2,46,800.00

3.10.3 Cost of the year : Tk. 1,10,000.00

3.10.4 Source of fund : GOB

3.11 **Beneficiaries** : Ginger cultivators, hill farmers and private planters

4. **Study** : On going

4.1 Programme Area : Soil conservation and watershed management

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

4.3 Justification : Not applicable

4.4 **Objectives** :

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

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

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

4.6 **Study period** :

4.6.1 Starting year : 2010-11

4.6.2 Completion year : 2014-15

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) Root, stem, branch twig and leaf samples from 5 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 sample will be analyzed

d) 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.												

4.9 Previous progress (2010-11): Organic carbon content of twenty five species (12 mangrove, 8 forest and 5 bamboo species) and soil samples from adjacent selected tree species were analyzed and recorded.

4.9.1 Achievement : Twenty forest tree and five bamboo species were analyzed for data bank.

4.10 **Financial statement** :

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

4.10.2 Cumulative cost : Tk. 2,13,500.00

4.10.3 Cost of the year : Tk. 1,60,000.00

4.10.4 Source of fund : GOB

4.11 **Beneficiaries** : FD, NGOs and Academician

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 :

1.4 **Objectives** :

1.4.1 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 mapduri (*C. gracilis*) rattan species.

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

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

1.4.4 To develop a gene pool and conserve all the rattan species available in Bangladesh for scientific study and demonstrations.

1.4.5 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 : 2002-03

1.6.2 Completion year : 2014-15

1.7 **Personnel**s :

1.7.1 Study Leader : Md. Sah Alam, RO

1.7.2 Associate : Rafiqul Haider, DO
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 25,000 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.
h)

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 (2011 year): Studied fruit maturing time, seed per kg. of ten rattan species; seed germination period and germination percentage, root-shoot ratio of seedlings and seedling-growth in the nursery of four species; jail (*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, were studied.

1.9.1 Achievement : Nursery and plantation techniques of jail (*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. 3,42,930.00
1.10.3 Cost of the years : Tk. 1,50,000.00
1.10.4 Source of fund : GOB

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 : NA

2.4 **Objectives** :

2.4.1 To develop nursery techniques for production of planting materials.

2.4.2 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 : 2009-10

2.6.2 Completion year : 2012-13

2.7 **Personnel**s :

2.7.1 Study Leader : Md. Sah Alam, RO

2.7.2 Associate : Rafiqul Haider, DO
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-vomica), apang (Achyranthes aspera), bish katali (Polygonum hydropiper).*
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.												

2.9 Previous progress (2011 year): Nursery and plantation technique of different medicinal plants such as aswagandha, basak, satamuli, simul, sarpagandha, arjun, ulatkambal, dhutra, mehdi, bach, bel, bahera, raktakambal, shinduri, sonalo, sajna, haritaki, akand, kantikari, have been developed.

2.9.1 Achievement: Cultivation and uses of twelve medicinal plants of Bangladesh have been published (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 has been also published as folder.

2.10 **Financial statement** :

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

2.10.2 Cumulative cost : Tk. 2,10,000.00

2.10.3 Cost of the years : Tk. 69,000.00

2.10.4 Source of fund : GOB

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

3. **Study** : **On going**

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

3.2 Title of the Study : Germplasm conservation and management practices of different medicinal plants.

3.3 Justification :

3.4 **Objectives** :

3.4.1 To authenticate correct identification of medicinal plants.

3.4.2 To conserve medicinal plants for scientific study and demonstration.

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

3.4.4 To popularize cultivation and use of medicinal plants.

3.4.5 To determine management techniques for maximum yield of medicinal plants.

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

3.6 **Study period** :

3.6.1 Starting year : 2002-03

3.6.2 Completion year : 2014-15

3.7 **Personnels** :

3.7.1 Study Leader : Md. Sah Alam, RO

3.7.2 Associate : Rafiqul Haider, DO
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 10 new 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.
g) Development of medicinal plant museum.

3.8.1 Activities calendar :

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

3.9 Previous progress (2011 year): Twenty perennial (Toikor, Thanpura, Bokful, lotkon, Ashfol, Chagoladi, Jatropa, Choijhal, Panbilas, Fashon fruit, karipata etc.) and 28 annual (Nasta, Volas, jointi, japani pudina, Contkari, Hostikarnopolash, Ultotchondal, Ayapana, Ekangi, sugar plant, sweet bach, sal-pata etc.) medicinal plants species were collected from different locations of Bangladesh and conserved them at BFRI HQs nursery

3.9.1 Achievements: Conservation plots of 86 Nos. (Kalomegh,ghrita kanchan,pipul,sarpa gandha,choi jal anantamul, salpani, pan belash, bui kumra, ekangi, turuk chandal, karpur, sugar-plant, sweet-bach, 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. 4,80,000.00

3.10.3 Cost of the years : Tk. 1,00,000.00

3.10.4 Source of fund : GOB

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

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4. **Study** : On going

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

4.2 Title of the Study : Standardizing the nursery and plantation technique of khair (*Acacia catechu*).

4.3 Justification : NA

4.4 **Objectives** :

4.4.1 To observe the seed germination percentage with different treatments.

4.4.2 To observe the seed germination period, seedlings growth, etc. under different treatments.

4.4.3 To find out survival and growth performance of seedlings with different spacing.

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 **Personnels** :

4.7.1 Study Leader : Rafiqul Haider, DO

4.7.2 Associate : S. R. Merry, SRO
Md. Sah Alam, RO

4.8 **Activities for the year** :

a) Seed collection, placing seeds with different treatments (soaking seeds in hot water for 30 seconds, in cold water for one and two days) in nursery bed.
b) Observing seed germination percentage, germination period, seedlings growth, etc in the nursery.
c) Raising 1500 seedlings and maintenance at MFP HQs nursery for raising experimental plantation at HQs and Hinguli research Station.
d) Site selection and preparation (jungle cutting, debris clearing, etc.) for raising experimental plantation.

e) Field layout (three treatments, three replications, 9 plots), pit preparation, transportation of seedlings from nursery to the field and planting seedlings (100 seedlings in each plot/treatment).
f) Maintenance of experimental plantation through weeding, watering, manuring, etc.
g) Survival and growth data collection at three months interval.

4.8.1 Activities calendar :

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

4.9 Previous progress (2011 year): 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 :

4.10 **Financial statement** :

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

4.10.2 Cumulative cost : Tk. 73,365.00

4.10.3 Cost of the years : Tk. 60,000.00

4.10.4 Source of fund : GOB

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

5. **Study** **:** 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 : NA

5.4 **Objectives** :

5.4.1 To observe the physiological character of dhup

5.4.2 To standardize nursery techniques of dhup.

5.4.3 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 : 2011-12

5.6.2 Completion year : 2015-16

5.7 **Personnel**s :

5.7.1 Study Leader : Rafiqul Haider, DO

5.7.2 Associate : S. R. Merry, SRO
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 through 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).

5.8.1 Activities calendar :

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

5.9 Previous progress :
5.9.1 Achievement :
5.10 **Financial statement** :
5.10.1 Total cost of the study: Tk. 5,00,000.00
5.10.2 Cumulative cost : Tk. 37,300.00
5.10.3 Cost of the years : Tk. 70,000.00
5.10.4 Source of fund : GOB
5.11 **Beneficiaries** : FD, NGOs, Private planters, Farmers, Educational Institutes, Herbal drug producers, etc.

MANGROVE SILVICULRURE DIVISION

1. **Study** : On going
1.1 Programme Area : Breeding and Tree Improvement
1.2 Title of the Study : Vegetation dynamics and regeneration pattern in relation to salinity and siltation of the Sundarban.
1.3 Justification : NA
1.4 **Objectives** :
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** : 2007-16
1.6.1 Starting year : 2007-08
1.6.2 Completion year : 2015-16
1.7 **Personnels** :
1.7.1 Study leader : M. M. Rahman, DO
1.7.2 Associates : 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.												
b.												
c.												

1.9 Previous progress (2007-11): 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 recorded from the PSPs. Average seedlings recruitment in the year 2010 was found 33,133/ha/year. Among them, *Heritiera fomes* constituted 43.16%, *Excoecaria agallocha* 31.89%, *Ceriops decandra* 10.76%, *Bruguiera sexangula* 3.52%, *Avicennia officinalis* 1.01%, *Aegiceras corniculatum* 3.92%, *Xylocarpus mekongensis* 0.91%, *Sonneratia apetala* 0.20%, *Amoora cuculata* 2.41%, *Cynometra ramiflora* 1.21%, *Nypa fruticans* 0.10%, *Phoenix paludosa* 0.20%, *Rhizophora mucronata* 0.31%, *Acanthus illicifolius* 0.10% and *Brownlowia tersa* 0.30%. Height and DBH class of Sundri and Gewa were analysed. Highest number of sundri trees (51%) was found under DBH class >5<=10cm and only 3.5% Sundri trees was found above 30cm DBH. Highest number of gewa trees (74%) was found under DBH class >5<=10cm and only 1.5% gewa trees was found above 20cm DBH. Highest number of sundri trees (41%) was found under height class >5<=10m and only 2.3% sundri trees was found above 15m height. Highest number of gewa trees (47%) was found under height class >5<=10m and only 14% gewa trees was found above 10m height.

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

1.10 **Financial statement** :
1.10.1 Total cost of the study: Tk. 10,00,000.00
1.10.2 Cumulative cost : Tk. 4,30,000.00
1.10.3 Cost of the year : Tk. 1,75,000.00
1.10.4 Source of fund : GOB
1.11 **Beneficiaries** : FD, NGOs, Students, Teachers and Researchers.

2. **Study** : **On going**

2.1 Programme Area : Biodiversity and Conservation

2.2 Title of the Study : Development of mangrove arboretum in the Sundarban

2.3 Justification : NA

2.4 **Objectives** :

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** :

2.6.1 Starting year : 2006-07

2.6.2 Completion year : 2015-16

2.7 **Personnels** :

2.7.1 Study leader : A. S. M. Helal Siddiqui, RO

2.7.2 Associates : M. M. Rahman, DO
S. M. M. Hasnin, SRO

2.8 **Activities for the year**:

a) Resurvey of vegetation status of the arboretum areas.
b) Raising of 7,200 seedlings of three mangrove species namely Dhundul, Singra and bakul kankra for raising experimental plantation.
c) Gap filling and maintenance of previously raised Goran (0.9 ha), Khalshi (0.9 ha), Amur (0.9ha) and Hantal (0.9 ha).
d) 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(0.9 ha), amdhekur(0.9ha) and Marichabaen(0.9 ha). Bhatkathi (*Rhizophora apiculata*), Kankra (*Bruguiera gymnorhiza*), Goran and Dhundul (*Xylocarpus granatum)*
e) Collection of survival and growth data from the experimental plantations twice a year.
f) Compilation and analysis of data.

2.8.1 Activities calendar :

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

2.9 Previous progress (2007-11) : 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 Munshigang in the strong saline zone of the conservation plots. Dhundhul (1.5 ha), kirpa (1.8 ha), passur (0.9 ha), jhana (0.6 ha) and khalshi (0.9 ha) species were centralized in three conservation plots in different saline zones. Growth and survival of those planted species in the conservation plots in different years have been

analyzed. 1,800 Seedlings of amur (*Amoora cuculata*) and 1,800 seedlings of shingra (*Cynometra ramiflora*) were raised in three research stations for centralization in the arboretum.The following Bee foraging plants were recorded in the conservation plots: Khalshi, kirpa, golpata, goran, gewa, sundari, baen, keora, choyla, kankra, passur, amur, hargoja and hantal.

2.9.1 Achievements : Three conservation plots (Twenty hectares at each saline zone) were established at Dhangmari (Com. No. 31), Bogi (Com. No. 24) and Munshiganj (Com. No. 46) in the Sundarban. Five mangrove species were centralized in the three conservation plots of the Sundarban.

2.10 **Financial statement** :

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

2.10.2 Cumulative cost : Tk. 6,50,000.00

2.10.3 Cost of the year : Tk. 3,50,000.00

2.10.4 Source of fund : GOB

2.11 **Beneficiaries** : FD, NGOs, Students, Teachers, Researchers and Visitors.

3. **Study** : On going

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 : NA

3.4 **Objective** :

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** : 2006-16

3.6.1 Starting year : 2006-07

3.6.2 Completion year : 2015-16

3.7 **Personnels** :

3.7.1 Study leader : A. S. M. Helal Siddiqui, RO

3.7.2 Associates : M. M. Rahman, DO;
S. M. M. Hasnin, SRO

3.8 **Activities for the year**:

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.

3.8.1 Activities calendar :

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

3.9 Previous progress: A total of 3.5 ha mangrove and 3.5 ha non-mangrove species plantations were maintained. Growth data of one non-mangrove (Jarul- *Legerstroemia speciosa*) and eight mangrove species (Sundri- *Heritiera fomes*, gewa- *Excoecaria*

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

3.9.1 Achievement: 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. 1,50,000.00

3.10.4 Source of fund : GOB

3.11 **Beneficiaries** : FD, NGOs, Students, Teachers, Researchers and Local farmers.

4. **Study** : On going

4.1 Programme Area : Biodiversity and conservation

4.2 Title of the Study : Development of a mangrove museum.

4.3 Justification : NA

4.4 **Objectives** :

4.4.1 To collect and preserve the representative specimens of flora and fauna from the Sundarban.

4.4.2 To demonstrate the specimens of flora and fauna to the students, teachers, researchers and visitors.

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

4.6 **Study period** :

4.6.1 Starting year : 2008-09

4.6.2 Completion year : 2015-16

4.7 **Personnels** :

4.7.1 Study leader : S M. M. Hasnin, SRO

4.7.2 Associates : M. M. Rahman, DO
A. S. M. Helal Siddiqui, RO.

4.8 **Activities for the year**:

a) Procurement of 25 litre formaldehyde and other materials.
b) Collection and preservation of fleshy fruits, plant parts and available faunal specimens from the Sundarbans.
c) Maintenance of previously collected flora and faunal specimens in the museum.
d) Preparation of videos, still pictures, digital pictures and lamination of still pictures.
e) Reprocessing of hides of tiger, deer and lizard.
f) Collection and reprocessing of hides of crocodile and python.

4.8.1 Activities calendar :

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

4.9 Previous progress: Museum room was renovated and furnished with iron racks, multipurpose almirah, display boards and xylarium. Fifteen herbarium specimens of mangrove species were prepared. Fleshy fruits and plant parts of major mangrove species' specimens and twenty five fish specimens were collected from the Sundarbans and preserved in the museum. Sixteen wood samples of mangrove tree species were prepared and preserved in the museum. Previously collected flora and faunal specimens from the Sundarban were maintained in the museum.

4.9.1 Achievements: A museum has been established at the Divisional Head Quarter of Mangrove Silviculture Division, Khulna in 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. 1,50,000.00

4.10.4 Source of fund : GOB

4.11 **Beneficiaries** : FD, NGOs, Students, Teachers, Researchers and Visitors.

5. **Study** : On going

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 : 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** :

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** : 2010-15

5.6.1 Starting year : 2010-11

5.6.2 Completion year : 2014-15

5.7 **Personnels** :

5.7.1 Study leader : 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.												
b.												
c.												
d.												
e.												
f.												

5.9 Previous progress : Propagules (seeds) of Khalshi (*Aegiceras corniculatum*) were collected from the Sundarban and nursery was raised. Data on soil pH, water salinity, light intensity, inundation and siltation in the selected sites were collected. Germination of the seeds, survival and growth performance of the seedlings in the nursery were recorded.

5.9.1 Achievement :

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. 3,70,000.00

5.10.4 Source of fund : GOB

5.11 **Beneficiaries** : FD, NGOs, Teachers, Researchers and Local farmers.

6. **Study** : On going

6.1 Programme Area : Post harvest utilization-Chemical processing

6.2 Title of the Study : Investigation on the unused part of harvested golpata (*Nypa fruticans*) from the Sundarban.

6.3 Justification: Golpata (*Nypa fruticans*) is an economically important mangrove species in the Sundarbans. A huge amount of golpata leaves are harvested annually. At the time of harvesting the unused part of leaves are left in the Sundarbans. That is why the better utilization and management with the unused part of harvested golpata are to be determined.

6.4 **Objectives** :

6.4.1 To improve the better utilization and management with the unused part of harvested golpata.

6.5 **Expected output** : Determination of better utilization and management with the remaining part of harvested golpata.

6.6 **Study period** :

6.6.1 Starting year : 2011-12

6.6.2 Completion year : 2012-13

6.7 **Personnels** :

6.7.1 Study leader : M. M. Rahman, DO

6.7.2 Associates : S. M. M. Hasnin, SRO
A. S. M. Helal Siddiqui, RO

6.8 **Activities for the year**:

a) Field visit and survey of golpata extraction areas in the Sundarban.
b) Collection of materials (unused part of harvested golpata) for lab analysis.
c) Data compilation and reporting.

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 : Field has been visited and data have been collected for lab analyses.

6.9.1 Achievement : On going process.

6.10 **Financial statement** :

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

6.10.2 Cumulative cost : Tk.60,000.00

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

6.10.4 Source of fund : GOB

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

7. **Study** : On going

7.1 Programme Area : Breeding and Tree Improvement

7.2 Title of the Study : Selection and development of the top dying tolerant sundri (*Heritiera fomes*) trees in the Sundarban.

7.3 Justification : 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.

7.4 **Objective** :

7.4.1 To develop a pure line of top dying tolerant sundri trees.

7.5 **Expected output** : Selection and development of top dying resistant sundri trees in the Sundarban.

7.6 **Study period** : 2008-16

7.6.1 Starting year : 2008-09

7.6.2 Completion year : 2015-16

7.7 **Personnel(s)** :

7.7.1 Study leader : M. M. Rahman, DO

7.7.2 Associates : S. M. M. Hasnin, SRO
A. S. M. Helal Siddiqui, RO

7.8 **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.

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.												

7.9 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.

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

7.10 **Financial statement** :

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

7.10.2 Cumulative cost : Tk. 6,30,000.00

7.10.3 Cost of the year : Tk. 2,90,000.00

7.10.4 Source of fund : GOB

7.11 **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 : Development of improved techniques of agar initiation in agar tree (*Aquilaria malaccensis* Lam.)
1.3 Justification : NA
1.4 **Objectives** :
1.4.1 To develop improved techniques of artificial initiation of agar in agar trees
1.4.2 To train agar entrepreneurs on artificial agar deposition and oil extraction
1.5 **Expected output** : Increased production of agar will be ensured
1.6 **Study period** **:**
1.6.1 Starting year : 2006-07
1.6.2 Completion year : 2012-13
1.7 **Personnels** **:**
1.7.1 Study leader : M. R. Islam, D.O.
1.7.2 **Associates** : M.Z. Rahman, R.A. (Gr-I)
K.A. Zaman F.I.
S. Nasreen F.I.

1.8 **Activities for the year** :

a) Harvesting and assessment of wood core samples of previously treated agar trees in Fasiakhali (Cox's Bazar), Borodora (Chittagong South), Korerhat (Chittagong north), Bagaihat (Chittagong Hill Tracts), Lathitila, Bagmara and Lawachara (Moulvibazar)
b) Collection and identification of fungi from agar-enriched wood and air spore.
c) Visit to new agar plantation area of Tangail, Mymensingh and Dinajpur districts.
d) Training to the agar entrepreneurs.

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 (2011-12): Selected agar trees in agar plantations at Fasiakhali (Cox's bazar North), Baroduara (Chittagong south), Korerhat (Chittagong north), Bagaihat (Chittagong Hill Tracts), Lathitila, Bagmara and Lawachara (Moulvibazar) are treated with different nailing densities (1-5 cm). Agar enriched wood core samples are collected from treated nailing trees and also data recorded. Three Petri dish with media are used for collection of air spora in different time (3-5 minute) three types of fungus like *Aspergillus sp., Curvularia sp. and Botryodiplodia sp*. are identified from air spora. Recently a defoliator (Lepidoptera) insect collected from agar trees at Fasiakhali. This insect causing serious defoliation in nurseries and plantations.

1.9.1 Achievements : BFRI's previous studies revealed that physical injury, not any specific fungus, triggers the deposition of agar in wood of agar trees.

1.10 **Financial statement** :
1.10.1 Total Cost : Tk, 15,00,000/-
1.10.2 Cumulative cost : Tk. 14,00,000/-

1.10.3 Cost of the year : Tk. 60,000/-
1.10.4 Source of Fund : GOB
1.11 **Beneficiaries** : Agar planters, extractors, traders and 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 commercially important medicinal plants and their management
2.3 Justification : NA
2.4 **Objectives**:
2.4.1 To identify pests and pathogens of commercially important medicinal plants
2.4.2 To determine the nature and extent of damage by each pest and pathogen
2.4.3 To know the biology and ecology of key pests and pathogens
2.4.4 To develop/adapt suitable management techniques for key pests/pathogens
2.5 **Expected output** : Increased production of commercially important medicinal plants will be ensured
2.6 **Study period**
2.6.1 Starting year : 2005-06
2.6.2 Completion year : 2012-13
2.7 **Personnels** :
2.7.1 Study leader : M.R. Islam, D.O.
2.7.2 Associates : M. Z. Rahman, R.A.;
K.A. Zaman F.I.;
S. Nasreen F.I.
2.8 Activities for the year :
a) Laboratory and field trial for pest management using different groups 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, Rajshahi, Gaibandha, Rangpur, Natore and Naogaon 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.
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 (2011-12): Insects and diseases samples were collected from medicinal plants of FPD & MFPD nursery. Root rot of ashwagandha, kalomegh, tulsi are recorded. Collar rot of gritakumari, die-back of basak and powdery mildew of tulsi are also collected from nurseries & field visit. Scale insect is recorded from basak and sarpogandha. Spittle bug infestation is recorded from tulsi and akanda. Aphid is also collected from sarpogandha and tulsi.

Tulsi (Black and white) leaves are infested by Spittle bug (05%) and powdery mildew (10%). Basak is infested by sooty mould fungus (10 %), scale insect (6%) and die-back (10%). Basak leaf spot are noticed about 5 %. Sarpogandha leaves are infested by aphid and scale insect (10%). Gritakumari collar rot is noticed and recorded (15%). Root rot of Ashwagandha caused by *Fusarium* solani, Root rot of Kalomegh caused by *Curvularia* sp. Powdery mildew of tulsi, die- back of basak and collar rot of gritakumari are cultured in media in the laboratory. A leaf defoliator (*Danus chysippus)* of akanda is identified, ecology is studied.

For nursery development and management weeding, fertilization (Organic), watering, regular observation, data collection, sample collection and management practices are going on. Five kinds of fungicide (Bordeaux mixture, Cupravit, Theovit, Dithane M-45 and Amcozim) are sprayed to control the powdery mildew of tulsi in five plots. Primary result showed that Bordeaux mixture successfully controled the disease (90%). Neem oil is sprayed to control scale insect of sarpogandha, spittle bug of tulsi and akanda. Initially result found effective (95%).

2.9.1 Achievements: 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 powders was found more effective. Aphid, jassid, mealybug and scale insect of Asawagandha were controled by Neem oil @ 2ml./L. Psylid and mole cricket insect are collected from ashwagandha. Mount and preserve in the laboratory.

2.10 **Financial statement**

2.10.1 Total Cost of the study: Tk.15,00,000.00

2.10.2 Cumulative cost : Tk. 4,64,851.00

2.10.3 Cost of the year : Tk 1,40,000.00

2.10.4 Source of Fund : GOB

2.11 **Beneficiaries** : Medicinal plant cultivators, FD, NGOs, general public and BFRI

3. **Study** : On going

3.1 Programme Area : Forest Pests and Diseases

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

3.3 **Objectives** :

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

3.5 **Expected output** : Pest and disease-free seeds will be made available that leads to better germination and production of healthy and sound seedlings.

3.6 **Study period**

3.6.1 Starting year : 2007-08

3.6.2 Completion year : 2012-13

3.7 **Personnels**

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) To develop suitable pest /disease management techniques for key pests/diseases
b) Collection of infested/infected seeds (sil koroi , fulkaroi, ipil ipil, raintree, akasmony, meinzeri, gamer, teak, mahogany, sissoo, 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.
c) Nature and extent of damage by each pest and pathogen.
d) Rearing/culture and identification of key pests and pathogens.

3.8.1 Activities calendar :

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

3.9 Previous progress (2007-11): Seeds of sil koroi, ful koroi, ipil ipil, rain tree, akasmoni, acacia hybrid, minzeri, gamer, teak, mahogany, sissoo, chickrasi, arjun, sonalu, kankra, passur and sundri were collected and kept in laboratory for observation and experiment.Nature and extent of damage are recorded from collected seeds. Some diseased seeds Jarul, Mahogani, Kankra are cultured in media and some fungus identified they are as *Aspergillus sp., Penicillium sp.* and *Mucor sp.* Initially seeds are dried and kept with Neem oil mixture for observation.

3.9.1 Achievements : Bruchids, scolytids and a moth were recorded from ipil-ipil, teak, koroi, kankra and sundry and passur seeds. Some fungi were identified from ipil ipil, koroi and rain tree.

3.10 **Financial statement**

3.10.1 Total Cost : Tk.15,00,000.00
3.10.2 Cumulative cost : Tk. 4,60,961.00
3.10.3 Cost of the year : Tk. 1,00,000.00
3.10.4 Source of Fund : GOB

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

4. Study : New

4.1 Programme Area : Forest Pests and Diseases

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

4.3 Justification (for new study): *Paulownia sp* is an exotic and very fast growing multipurpose tree. In Bangladesh Destiny and other NGO's have already been planted some areas of Bangladesh for the last few years. Before going to large scale plantations (a newly introduced plants tree) with an exotic species it is necessary to know the site suitability, survival, growth performance pest and diseases infestation and environmental impact. Its needs an integrated research to understand the phytosnitary status of *Paulownia* of However, there is

no such information of the species in Bangladesh. So the present study has undertaken with objectives in order to get a status report of pest and diseases of *Paulownia sp* in Bangladesh.

4.4 Objective(s) :

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

4.4.2 To identify pest and pathogens of *Paulownia sp*

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

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

4.6 Study period

4.6.1 Starting year : 2012-13

4.6.2 Completion year : 2014-15

4.7 Personnel(s)

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

4.7.2 Associates : M.Z. Rahman, R.A. (Gr-I)

4.7.3 : K.A. Zaman F.I.

4.7.4 : S. Nasreen F.I.

4.8 Activities for the year :

a) Survey and determination present status of *Paulownia sp.* in Bangladesh
b) To collected information on pests and diseases of *Paulownia sp* from nursery and plantation of Bangladesh..

4.9 Activities calendar**:**

Activities	J	A	S	O	N	D	J	F	M	A	M	J
a. Survey and determination present status of *Paulownia sp.* in Bangladesh												
b. To collected information on pests and diseases of *Paulownia sp* from nursery and plantation of Bangladesh..												

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

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

4.10 Financial statement :

4.10.1 Total Cost : Tk,

4.10.2 Cumulative cost : Tk.

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

4.10.4 Source of Fund : GOB

4.11 Beneficiaries : FD, NGO's, Farmers, Educational institutions and other tree planting agencies.

PLANTATION TRIAL UNIT DIVISION

1. **Study** : On going

1.1 Programme Area : Plantation technique and forest management

1.2 **Title of the study** **:** Growth performance of different mangrove and non-mangrove species in the coastal areas of Bangladesh.

1.3 Justification : NA

1.4. **Objective** :

1.4.1 To select site-suitable mangrove and mainland species for coastal areas of Bangladesh.

1.5. **Expected output** : Sustainable coastal forest management strategy is expected to be developed depending on the growth performance of mangrove and non-mangrove species.

1.6 **Study period** :

1.6.1 Starting year : 2007-08

1.6.2 Completion year : 2012-13

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) Maintenance of 14.0 ha older trials of mangrove (9.17 ha), non-mangrove (4.0 ha) and palm (0.83 ha) species by weeding, cleaning, climber cutting, fence repairing etc. in different islands of Rangabali and Char Kukri-Mukri Research Stations.
b) Collection of growth data from the experimental plantations once a year.
c) Compilation and analysis of data.
d) 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.												

1.9 Previous progress: A total of 14.33 ha older trials of mangrove, non-mangrove and palm species were maintained by weeding, cleaning, climber cutting and fence repairing. Growth and survival data from experimental plots of mangrove, non-mangrove and palm species were recorded once a year at different sites of Rangabali and Char Kukri-Mukri islands. Recorded growth data were compiled and analyzed.

1.9.1 Achievement: A total of 14.33 ha older experimental plantations of mangrove (9.5 ha), non-mangrove (4.0 ha) and palm (0.83 ha) species have been established at different sites of Rangabali and Char Kukri-Mukri islands. Some major mangrove species *viz.* sundri (*Heritiera fomes*), gewa (*Excoecaria agallocha*), passur (*Xylocarpus mekongensis*), hantal (*Phoenix paludosa*), khalshi *(Aegiceras corniculatum)*, shingra (*Cynometra ramiflora*) and kankra (*Bruguiera sexuangula*) have been found promising as underplantings to enrich and sustain coastal forest in Bangladesh. Similarly, in the raised lands of coastal areas, promising performance among non-mangrove species have been found for jhao (*Casuarina equisetifolia*), sada koroi (*Albizia procera*), kala koroi (*Albizia lebbeck*), raintree (*Samanea saman*) and payra (*Pithecellobium dulce*). Among the palm species palmyra palm (*Borassus flabellifer*), coconut (*Cocos nucifera*), (*Phoenix sylvestris*) and betel nut (*Areca catechu*) have been found promising in the foreshore area of the coastal habitat.

1.10 **Financial statement** :
1.10.1 Total cost of the study: Tk. 15,87,000.00
1.10.2 Cumulative cost : Tk. 14,37,000.00
1.10.3 Cost of the year : Tk. 1,50,000.00
1.10.4 Source of fund : GOB
1.11 **Beneficiaries** : Forest Department and adjacent coastal dwellers.

2. **Study** : On going
2.1 Programme Area : Production of quality planting materials
2.2 **Title of the study** : Establishment of Seed Production Areas (SPA) and demonstration plots for priority planting mangrove species.
2.3 Justification : NA
2.4. **Objective(s)** :
2.4.1 To develop interim source of improved quality seeds of mangrove species.
2.4.2 To establish demonstration plots with PT/SPA seeds.
2.5. **Expected output**: Establishment of better quality seed sources of major mangrove species in the coastal areas of Bangladesh.
2.6 **Study period** :
2.6.1 Starting year : 1997-98
2.6.2 Completion year : 2012-13
2.7. **Personnel (s)** :
2.7.1 Study leader : M. G. Moula, RO
2.7.2 Associates : S. A. Islam, DO
M. A. Habib, FI
M. G. Rasul, FI
M.A.Q. Miah, FI
2.8. **Activities for the year** :
a) Maintenance of previously raised 6.0 ha demonstration plots of keora, sundari and baen at Char Kukri-Mukri, Rangabali and Char Osman Research Stations.
b) Collection of survival and growth data from the experimental plots once a year.
c) Compilation and analysis of data.
2.8.1. Activities calendar :

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

2.9 Previous progress: Eight thousand seedlings of baen have been raised at Rangabali, Char Kukri-Mukri, Sitakundu and Char Osman Research Stations. A total of 1.6 ha demonstration plots with baen seedlings (PT seeds and mass collection) have been raised in 4 Research Stations. Previously raised 4.4 ha demonstration plots of keora, sundari and baen have been maintained.
2.9.1 Achievements: Four hectares SPA of keora were established and maintained at Char Taposhi of Patuakhali Forest Division and 4.4 hectares demonstration plots of keora, sundari and baen have been established at Rangabali and Char Kukri-Mukri Research Stations.
2.10 **Financial statement** :
2.10.1 Total cost of the study: Tk. 9,50,000.00

2.10.2 Cumulative cost : Tk. 8,90,000.00
2.10.3 Cost of the year : Tk. 60,000.00
2.10.4 Source of fund : GOB
2.11 **Beneficiaries** : FD, Coastal Farmers (Nursery owner, seed sellers).

3. **Study** : On going
3.1 Programme Area : Social Forestry
3.2 Title of the study : Study on the improvement of coastal homesteads through resource generation.
3.3 Justification : NA
3.4. **Objectives** :
3.4.1 To improve livelihood status of coastal rural farmers through resource generation in coastal homesteads.
3.4.2 To assess and prepare database on existing and recreating of different resources.
3.5. **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.
3.6 **Study period** :
3.6.1 Starting year : 2006-07
3.6.2 Completion year : 2012-13
3.7. **Personnels** :
3.7.1 Study leader : S. A. Islam, DO
3.7.2 Associates : M. G. Moula, RO
M. A. Habib, FI
M. G. Rasul, FI
M.A.Q. Miah, FI

3.8. **Activities for the year**:

a) Raising of 3000 seedlings of timber tree species such as rain tree, sil koroi, kalo koroi, akashmoni, neem, and mehogoni (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 and 186 seedlings of mango (improved variety).
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) 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 : A total of 1250 seedlings of timber tree species such as rain tree, sil koroi, akashmoni, neem, and mehogoni; 1200 seedlings of fruit tree species such as kalojam, kathal, amloki, tentul, amra and supari have been raised and distributed to the selected 62 farmers at Rangabali and Char Kukri-Mukri islands. Eight different types of vegetable seeds/seedlings were procured and distributed to the 62 selected farmers.

3.9.1 Achievements: A total of 62 farmers of the coastal 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 their homesteads.

3.10 **Financial statement** :

3.10.1 Total cost of the study: Tk. 10,30,000.00

3.10.2 Cumulative cost : Tk. 7,83,600.00

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

3.10.4 Source of fund : GOB

3.11 **Beneficiaries** : Coastal rural farmers.

4. **Study** : On going

4.1 Programme Area : Plantation technique and forest management

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

4.3 Justification : NA

4.4. **Objectives** :

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

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

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

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

4.6 **Study period** :

4.6.1 Starting year : 2009-10

4.6.2 Completion year : 2012-13

4.7. **Personnels** :

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**:

a) Organizing four awareness meetings with coastal rural people for cultivating bamboo, rattan and golpata in the coastal homesteads at Rangabali, Char Kukri-Mukri, Char Osman and Sitakundu/ Cox's Bazar Research Stations.
b) Collection of seeds of rattan (jalibet) and golpata for raising 6000 seedlings of rattan and 2000 seedlings of golpata.
c) Raising 6000 seedlings of rattan species, 4000 seedlings (branch cutting) of bamboos (*Bambusa balcooa/ B. vulgaris*) and 2000 seedlings of golpata.
d) Supplying of seedlings to the selected coastal farmers.
e) Maintenance and supervision of seedlings planted in previous years.

f) Collection and analysis of data.

4.8.1. Activities calendar :

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

4.9 Previous progress: Two meetings cum training programs were organized at Char Kukri-Mukri and Char Osman 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 8000 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.

4.9.1 Achievements: 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.

4.10 **Financial statement** :

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

4.10.2 Cumulative cost : Tk. 5,76,000.00

4.10.3 Cost of the year : Tk. 2,25,000.00

4.10.4 Source of fund : GOB

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

5**.** **Study** : On going

5.1 Programme Area : Plantation technique and forest management

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

5.3 Justification : NA

5.4. **Objective(s)** :

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

5.4.2 To provide the sources of honey plants.

5.5. **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.

5.6 **Study period** :

5.6.1 Starting year : 2010-11

5.6.2 Completion year : 2014-15

5.7. **Personnel (s)** :

5.7.1 Study leader : 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**:

a) Collection of seeds of khalshi (*Aegiceras corniculatum*) gewa (*Excoecaria agallocha*), goran (*Ceriops decandra*), passur (*Xylocarpus mekongensis*) and baen (*Avicennia officinalis*) from the Sundarban.
b) Raising seedlings of khalshi (7,200 nos.) gewa (2400 nos), goran (4,800 nos), passur (4,800 nos.) and baen (2400 nos.) at Rangabali, Char kukri-Mukri, Stakundu and Char Osman Research Stations.
c) Raising of 4.0 ha experimental mixed plantations of khalshi, gewa, goran, passur and baen at 3:1:2:2:1 ratio with 3 replications.
d) Maintenance of 6.4 ha experimental plantations raised in previous years.
e) Collection and analysis of data.

5.8.1. Activities calendar :

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

5.9 Previous progress: 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.

5.9.1 Achievement: A total of 6.4 ha experimental mixed plantations of bee foraging plant species have been raised.

5.10 **Financial statement** :

5.10.1 Total cost of the study: Tk. 8,00,000.00
5.10.2 Cumulative cost : Tk. 3,30,000.00
5.10.3 Cost of the year : Tk. 2,15,000.00
5.10.4 Source of fund : GOB
5.11 **Beneficiaries** : FD, NGO and rural farmers.
6. **Study** : On going
6.1 Programme Area : Plantation technique and forest management
6.2 Title of the study : Development of model vegetation to protect soil erosion, salt spray and other climatic changes in the coastal belt of Bangladesh.
6.3 Justification : NA
6.4. **Objectives** :

6.4.1 To develop a better model plantation of suitable species against major climatic changes in the coastal belt of Bangladesh.
6.4.2 To select mangrove species that can tolerate cyclonic and salt hazard.
6.4.3 To increase the coastal forest product.

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

6.6 **Study period** :
6.6.1 Starting year : 2010-11
6.6.2 Completion year : 2014-15

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) Collection of 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 rain tree for raised lands for raising model plantations.
b) Raising 30 thousands seedlings of theses species at Rangabali, Char kukri-Mukri, Char Osman and Sitakundu Research Stations.
c) Procurement of Refract meter and Wind meter for measuring water/soil salinity and wind velocity.
d) Raising of 7.0 ha experimental model plantations of these species at 4 Research Stations.
e) Establishment of 36 siltation gauge in the experimental plantations for measuring siltation/ soil erosion.
f) Collection of data on different climatic parameters and from experimental plantations.

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: 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 27 thousands seedlings of theses mangrove and non-mangrove species were raised at Rangabali, Char kukri-Mukri, Char Osman and Sitakundu Research Stations. A total of 6.12 ha experimental plantations have been raised at 4 Research Stations.

6.9.1 Achievement : A total of 6.12 ha experimental plantations have been established at Rangabali, Char kukri-Mukri, Char Osman and Sitakundu Research Stations.

6.10 **Financial statement** :

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

6.10.2 Cumulative cost : Tk. 3,00,000.00

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

6.10.4 Source of fund : GOB

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

7**.** **Study** : On going

7.1 Programme Area : Plantation technique and forest management

7.2 Title of the study : Establishment of pilot plots of six mangrove species as underplanting in keora plantations.

7.3 Justification : NA

7.4. **Objective** :

7.4.1 To establish pilot plots of site-suitable mangrove species in differently inundated coastal habitats.

7.5. **Expected output** : Coastal vegetation is expected to be enriched and sustained.

7.6 **Study period** :

7.6.1 Starting year : 2008-09

7.6.2 Completion year : 2012-13

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**:

a) Maintenance of previously raised 10,000 seedlings of 6 mangrove species (sundri, passur, gewa, khalshi, kankra and hantal) in the nursery.
b) Establishment of 2.0 ha pilot plots with these 6 mangrove species under established keora plantations.
c) Maintenance of previously raised 9.0 ha experimental plots.
d) Collection and compilation 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.												

7.9 Previous progress : Ten thousand seedlings of six mangrove species (sundri, passur, gewa, khalshi, kankra and hantal) were raised in the nursery at Rangabali and Char Kukri-Mukri Research Station.

7.9.1 Achievements: A total of 9.0 hectares pilot plots of six mangrove species (sundri, passur, gewa, khalshi, kankra and hantal) have been established at Rangabali and Char Kukri-Mukri Forest Research Stations.

7.10 **Financial statement** :

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

7.10.2 Cumulative cost : Tk. 6,95,000.00

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

7.10.4 Source of fund : FTDD funded study transferred to GOB

7.11 **Beneficiaries** : Forest Department and adjacent coastal dwellers.

8. **Study** : New

8.1 Programme Area : Conservation of Biodiversity.

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

8.3 Justification: There are 710 km long coastal belt in Bangladesh along the Bay of Bengal. There are numerous islands of varying sizes. Continuous siltation and sedimentation gradually forming newly accreted lands throughout coastal belt. The Forest Department initiated mangrove afforestation in 1966 mainly with the primary objective of saving life and properties of the people living in the area from cyclone and tidal bore. About 1,72,000 ha coastal plantations have been raised till to date. The pioneer mangrove tree species keora (*Sonneratia apetala*) and baen (*Avicenia officinalis*) appear promising for accelerating the process of

siltation and soil stabilization. Out of these 90% are keora plantations. This coastal man-made forest faces serious threat due to geomorphic changes, ecological succession and inadequate regeneration of other mangrove species. Succession refers to orderly change in the communities of species. Geomorphic changes in the mangrove environment are rapid. Succession is the outcome of the interaction of a number of factors. Sufficient study in this direction has not been made. Therefore, this study has been taken to determine the changes of vegetations and the factors responsible for this process for the sustainable management of coastal mangrove forests.

8.4. **Objectives** :

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

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

8.4.2 To increase coastal forest resources of the country.

8.5. 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.

8.6 **Study period** :

8.6.1 Starting year : 2012-13

8.6.2 Completion year : 2016-17

8.7. **Personnels** :

8.7.1 Study leader : S. A. Islam, DO

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

8.8. **Activities for the year:**

a) Establishment of Temporary Sample Plots (TSP) in the man-made forests according to age class at different islands of the coastal belt of Bangladesh.
b) Procurement of Refract meter for measuring water/soil salinity.
c) Recording data on siltation, soil erosion, soil/water salinity, inundation frequency, and impact of human and animal interferences.
d) Collection of growth data of the plantations and status of natural regenerations.

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 : Not applicable.

8.9.1 Achievement : Not applicable.

8.10 Financial statement :

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

8.10.2 Cumulative cost :

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

8.10.4 Source of fund : GOB

8.11 Beneficiaries : Forest Department, 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 ecological aspects of the wildlife resources
1.6 **Study period :**
1.6.1 Starting Year : 2004-05
1.6.2 Completion year : 2015-16
1.7. **Personnels:**
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	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a												
b												
c												

1.9. Previous progress : A total of 02 (two) wildlife specimens collected and preserved in the wildlife museum.
1.9.1. Achievement : NA
1.10. **Financial statement :**
1.10.1 Total cost of the study: Tk. 5,00,000.00
1.10.2 Cumulative cost :
1.10.3 Cost of the year : Tk. 24,000.00
1.10.4 Source of fund : GOB
1.11 **Beneficiaries :** Researchers, Students and Teachers of different educational Institutions and Forest Department and NGOs

2. **Study** : New
2.1 Programme Area : Biodiversity and conservation
2.2 Title of the Study : Avian species diversity in the Hazarikhil wildlife sanctuay
2.3 Justification: Bangladesh is a country of rich Biodiversity. There are about, 9,900 species of birds in the world of which a total of 690 species is expected to occur in Bangladesh. There are 34 notified protected areas in Bangladesh till January, 2012.Many protected areas do not even have a checklist of birds species. Bird is not only as part of the biodiversity of an area, but also as useful indicators for habitat status and efficacy of management measures. Hazarikhil wildlife Sanctuary (1177.33

ha) is a new protected area notified on 6, April, 2010. No scientific and systematic monitoring of birds has yet done there. To make out an avian species diversity of the Sanctuary is very important for taking further sophisticated initiatives of future sustainable conservation of this sanctuary's biodiversity. So this study has been taken for the assessment of avian species diversity of the Sanctuary.

2.4 **Objectives :**

2.4.1 To establish a database on avian species of Hazarikhil Wildlife Sanctuary (WS), Chittagong

2.4.2 To make out development needs for sustainable conservation of birds diversity of the WS

2.5 **Expected output:** Development of management plan for sustainable conservation of avian species in the PAs of Bangladesh

2.6 **Study period** :

2.6.1 Starting year : 2012-13

2.6.2 Completion year : 2014-15

2.6.3 **Personnels** :

2.7.1 Study leader : M.A. Rahman, R.O

2.7.2 Associates : M. K. Islam, RA (Gr-1)

: S.M. Mainuddin, (FI)

2.8 **Activities for the year:**

a) Assessment of avian species diversity in Hazarikhil Wildlife Sanctuary, Chittagong

b) 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												

2.9 Previous progress : NA

2.9.1 Achievement : NA

2.10 **Financial statement**

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

2.10.2 Cumulative cost : NA

2.10.3 Cost of the year : Tk. 1,06,000.00

2.10.4 Source of fund : GOB

2.11. **Beneficiaries**:Researchers, Students and Teachers of different educational Institutions, Forest Department and NGOs

3 Study. : New

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: Worldwide, many primate species are in critical danger and threatened with extinction. This is the case for most non human primate species. Although those are often considered as well known, data on their present status including population numbers, distribution, and population trends are insufficient for most species. Available information suggests that most non human primate species are experiencing a decline in numbers and/or distribution. In Bangladesh, the harbor of ten species of non-

human primates. Among those species Phayre's leaf monkey (*Trachypithecus phayrei*), Pig tailed macaque(*Macaca nemestrina*) are critically endangered (CR) and Capped leaf monkey (*Trachypithecus pileatus*) is endangered (IUCN, 2000). Hilly forested areas of the country which are exist in Chittagong and Sylhet are the major habitat of these species. As wildlife has been avaible in the protected area because of good protection, conservation and well management so survey will be done in protected areas. Only seven hilly protected areas Rema-Kalenga wildlife sanctuary, Lawachara national park(NP), SatchariNP of Sylhet and FashiakhaliWS,ChunatiWS,Teknaf NP, HimchariNP, of Chittagong and PablakhaliWs and Kapti NP of CHT support these species (M.M.H. Khan, 2008). But specific data on the those species present status, population and major threats to its existence are scarce. So the study has been taken to make out above aspects supportive for future sustainable conservation of the species.

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: 2014-2015

3.7 Personnel:

3.7.1 Study leader: M.A.Rahman

3.7.2 Associates: M. K. Islam, RA -1

3.7.3 : 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 line transect surveys and total count methods in FashiakhaliWS, Teknaf NP, HimchariNP, Chittagong.

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: 8,00,000.00

3.10.2 Cumulative cost : NA

3.10.3 Cost of the year : 2,50,000.00

3.10.4 Source of fund : GOB

3.11 Beneficiaries : Researchers, students and teachers of different educational institutions and Forest Department / NGOs

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 : NA
1.4 **Objectives** :
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 : 2012-13
1.6.2 Completion year : 2012-13
1.7. **Personnels** :
1.7.1 Study leader :
1.7.2 Associates :
1.8 **Activities for the year**:

Conduct training programme on:

a. Preservative treatment
b. Nursery pest and disease management
c. Bamboo branch cutting technique
d. Cultivation technique of medicinal plants
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 techniques

1.8.1 Activities calendar :

Activities	**Months**											
a.												
b.												
c.												
d.												
e.												
f.												
g.												
h.												
i.												
j.												

1.9 Previous progress : Thirty-Two training programmes were organized during 2010-2011 and 946 persons were participated in the training programme.

1.9.1 Achievement : 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 :
1.10.3 Cost of the year : Tk. 7,00,000.00
1.10.4 Source of fund : GOB
1.11. **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 :
2.4 **Objectives :**
2.4.1 To disseminate BFRI technologies to the stakeholders
2.4.2 To share knowledge and experiences among scientists and stakeholders.
2.4.3 To nurture scientific culture and enhance linkage among the scientists and stakeholders
2.5 **Expected output**: BFRI technologies will be disseminated to the stakeholders. Sharing of knowledge and experiences will benefit both BFRI scientists and stakeholders.
2.6 **Study period :**
2.6.1 Starting year : 2012-13
2.6.2 Completion year : 2012-13
2.7 **Personnels** :
2.7.1 Study leader :
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 2010-11 and Research Programme for 2011-12
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 : Three workshops were organized one in Satkania and other two in Cox's Bazar and Moulovibazar respectively during 2010-11 and 390 persons were participated on that programme.
2.9.2 Achievement : Dissemination of BFRI technologies and information through workshop and seminar
2.10 **Financial statement** :
2.10.1 Total cost of the study:
2.10.2 Cumulative cost :
2.10.3 Cost of the year : Tk. 3,00,000.00

2.10.4 Source of fund : 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

3.1. Title of the study : Publicity and Advertisement

3.2. Justification :

3.4 **Objectives** :

3.4.1 To create awareness about BFRI's technologies to the stakeholders and general people

3.4.2 To disseminate of BFRI's technologies to the end users

3.5. **Expected output** : People will be made aware about BFRI technologies. BFRI Technologies will reach to the people.

3.6 **Study period** :

3.6.1 Starting year : 2012-13

3.6.2 Completion year : 2012-13

3.7. **Personnel** :

3.7.1 Study leader :

3.7.2 Associates :

3.8 **Activities for the year**:

a) Participation: Tree fair, Environment fair and furniture fair

b) Demonstration: BFRI's documentary and technologies 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)												
b)												
c)												
d)												

3.9 Previous progress : Participated in seven fairs including tree fair at Dhaka, Chittagong, Barisal, National Scout Jamboree Fair at Dhaka, Environment Fair and furniture mela.

3.9.1 Achievement : 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:
3.10.2 Cumulative cost :
3.10.3 Cost of the year : Tk. 12,00,000.00
3.10.4 Source of fund : GOB
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 :
4.4. **Objectives** :
4.4.1 To documentation of BFRI's technologies in audio visual form.
4.4.2 To disseminate of BFRI's 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 : 2012-13
4.6.2 Completion year : 2012-13
4.7. **Personnel** :
4.7.1 Study leader :
4.7.2 Associates :
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-visual documentation												

4.9 Previous progress, if any: Seven minutes documentary on BFRI activities has been prepared in 2010-2011 financial year.
4.9.1 Achievement(s), if any :
4.10 **Financial statement** :
4.10.1 Total cost of the study:
4.10.2 Cumulative cost :
4.10.3 Cost of the year : Tk. 2,00,000.00
4.10.4 Source of fund : 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 : NA
5.4 **Objectives** :
5.4.1 To documentation of BFRI's technologies in printed form
5.4.2 To disseminate of BFRI's 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 : 2012-13
5.6.2 Completion year : 2012-13
5.7 **Personnel** :
5.7.1 Study leader :

5.7. 2 Associates :

5.8. **Activities for the year**:

Leaflet:

a) *KwÂ Kjg c×wZ‡Z euk PvI*
b) *eu‡ki Svo e¨e¯'vcbv*
c) *eu‡ki goK `gb e¨e¯'v*
d) *cvb ei‡R e¨eüZ eu‡ki kjv, Lyuw, KvBg I Q‡bi e¨enwiK Avqy®‹vj e„×*
e) *ivmvqwbK msi¶Yx c‡qv‡M Avmeve I wbgvY Kv‡R e¨eüZ Kv‡Vi Avqy®‹vj e„×*
f) *e„‡¶i Pviv †ivcY I cwiPhv*
g) *Nyb †cvKvi AvµgY I Zvi wbqšY*
h) *bvmwvi‡Z DB †cvKvi AvµgY I Zvi wbqšY*
i) *bvmwvi‡Z Pvivi X‡j cov †ivM*
j) *e„¶ exR msi¶Y I ¸`vgRvZKiY*
k) *‡Kv_vq Kx MvQ jvMv‡eb*
l) *cvnvox AÂ‡j AMvi‡nvj c×wZ‡Z Pviv †ivcY*

Folder:

m) *eu‡ki †hwRZ cY¨ (K‡¤úwRU †cvWv±m)*
n) *‡gnMwbi WMv wQ`Kvix †cvKvi AvµgY I Zvi wbqšY*
o) *‡m¸‡bi cvZv‡fvRx †cvKv I Zvi wbqšY*
p) *Avmeve I M„n wbgvY mvgMx †Zix‡Z ivevi Kv‡Vi e¨envi*

5.8.1 Activities calendar :

Activities	Months											
	J	A	S	O	N	D	J	F	M	A	M	J
a.												
b.												
c.												
d.												
e.												
f.												
g.												
h.												
i.												
j.												
k.												
l.												
m.												
n.												
o.												
p.												

5.9. Previous progress : Total 65,310 copies printing materials were printed during 2010-2011.

5.9.1 Achievements : 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

5.10.2 Cumulative cost :

5.10.3 Cost of the year : Tk. 8,00,000.00

5.10.4 Source of fund : 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 **Objectives** :
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**: Development of cost effective technology for manufacturing bamboo composite furniture.
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 in Dhaka and Sylhet
b. Improvement of furniture design.
c. Procurement of bamboo culms (*Bambusa vulgaris/Bambusa balcooa*)
d. Preparation and processing of bamboo mats, bamboo strips.
e. Manufacturing of furniture components.
f. Manufacturing of furniture 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 (2005-11): 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.

Bamboo mat overlaid particleboard and bamboo ply were made using bhyjia (*Bambusa vulgaris*) bamboo. Twelve molded chairs and two tables were made and distributed for popularizing the technology.

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

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.

Two selves, one dining table and four chairs were fabricated using composite product of bhyjia bamboo and kept for service test in VCWP Division.

Four armed chairs and one almirah were fabricated using bamboo particle board and bamboo Ply.

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

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.

One scientific paper titled "Preservative treatment of strips of *Bambusa balcooa* by soaking process using Borax-Boric acid" was published in proceedings of IRG 38th Annual Meeting, Istanbul, Turkey, 25-29 May 2008.

1.9.1 Achievements: Bamboo composites can be used as furniture materials which can be promoted to exportable commodity.

1.10 **Financial statement** :

1.10.1 Total cost of the study: Tk 9,50,000.00

1.10.2 Cumulative cost :

1.10.3 Cost of the year : Tk. 85,500.00

1.10.4 Source of fund : GOB

1.11 **Beneficiaries** : Furniture industries, plywood and particleboard industries, farmers/bamboo growers, general people, village women, NGOs.

2. **Study** : New

2.1 Programme area : Post Harvest Utilization -Physical Processing

2.2 Title of the study : Studies on peeling, drying, gluing and particleboard making characteristis of jhau (*Casuarina equisetifolia*) wood.

2.3 Justification (For new study): The utilization of plywood and particleboard as a replacement of larger solid structure lumber is increasing day by day. As a result, the plywood and particleboard markets are growing rapidly for housing and household materials like doors, windows and furniture etc. The forest of Bangladesh has 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 utilized otherwise. Jhau (*C. equisetifolia*) is occurring scattered and planted as road side avenue and shed trees throughout the country. There are many such old trees planted during the British period. Some times occur naturally in the seashore of Cox s-bazar, Teknaf. Generally this whole timber is used for boat mast. This wood can be appropriate alternative wood for plywood and particleboard making. The aim of the project is to find out the peeling, drying, gluing characteristics of jhau (*C. equisetifolia*) wood for plywood and particleboard making. The suitability of the wood for plywood and particleboard making will reduce pressure on common species.

2.4. Objective :

2.4.1. To determines the suitability of jhau (*Casuarina equisetifolia*) wood for plywood and particleboard making.

2.5 **Expected output**: Jhau wood can be alternative wood species for plywood and particle board making to reduce pressure on conventional ones.

2.6 **Study period** : 2012-14

2.6.1 Starting year : 2012-13

2.6.2 Completion year : 2013-14

2.7 **Personnels :**

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 jhau (*C. equisetifolia*)

b) Cross cut of logs to bolts of suitable length and preserve in log pond

c) Peeling of bolts into1.5 mm thick veneer

d) Drying of veneer up to suitable moisture (8%) content

e) Visit to plywood and particleboard industries in Dhaka

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 :

2.9.1 Achievement :

2.10 **Financial statement** :

2.10.1 Total cost of the study: Tk 2,15,500.00

2.10.2 Cumulative cost

2.10.3 Cost of the year : Tk. 75,000.00

2.10.4 Source of fund : GOB

2.11 Beneficiaries : Wood merchants, plywood industries, villagers/ farmers, 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 : Not applicable

1.4 **Objective (s) :**

1.4.1. Pulping process improvement for the production of high yield pulp

1.5. Expected output : Supplementation of the raw material would be enhanced

1.6. **Study period** : 2010-14

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) Collection, processing and pretreatment of raw material
b) Preparation of pulp with KOH-MAQ by varying pulping time
c) Determination of kappa number and yield

1.8.1 Activities calender

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

1.9 Previous progress : Nil

1.9.1 Achievements : Nil

1.10 **Financial statement :**

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

1.10.2 Cumulative cost : Tk. 70,000

1.10.3 Cost of the year : Tk. 75,000

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): NA

2.4 **Objective(s)** :

2.4.1 To investigate the bleaching response of rubber wood pulp for using as high quality paper.

2.5 Expected output : High quality pulp for making printing and writing paper

2.6. **Study period** : 2011-14

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) Processing of stem and branches of rubber tree.
b) Preparation of kraft pulp with 18% active alkali by maintaining 150 min. cooking time to achieve 20-25 kappa number
c) Bleaching of the prepared pulp with oxygen at various pressure
d) Determination of kappa number and pulp yield

2.8.1 Activities calender :

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

2.9 Previous progress : On going project
2.9.1 Achievements : Nil
2.10 **Financial statement :**
2.10.1 Total cost of the study: Tk. 2,00,000
2.10.2 Cumulative cost : Tk. 45,000
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 : NA
3.4 **Objective (s) :**
3.4.1. Determination of the optimum ratio of bamboo and wood with respect to yield and quality pulp
3.5. **Expected outpt** : Rational utilization of the raw material would be enhanced.
3.6. **Study period** : 2011-14
3.6.1. Starting year : 2011-12
3.6.2. Completion year : 2013-14
3.7 **Personnels**
3.7.1 Study Leader : Daisy Biswas, DO
3.7.2 Associates : Md. Misbahuddin, FI; Urboshi Roy, FI and M. S. Rahman, RO.
3.8. **Activities for the year:**
a) Collection and processing of wood and bamboo material.
b) Preparation of kraft pulp by varying alkali dose and pulping time with the chips of bamboo and wood
c) Determination of kappa number and pulp yield.
d) Preparation of hand sheets of kraft pulp made from chips of bamboo and *A. richardiana* wood in previous year
e) Evaluation of physical strength properties.
3.8.1 Activities calender :

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

3.9. Previous progress : *Bambusa vulgaris* and *Albizia richardiana* were collected locally. Kraft pulps were prepared by varying wood and bamboo ratio with 16,18 and 20% active alkali maintaining 150 min cooking time at 170°C. Yield of the pulps were comparable to other commonly used hardwood species.
3.10 Achievements :
3.11 **Financial statement :**
3.10.1 Total cost of the study : Tk. 4,50,000

3.10.2 Cumulative cost : Tk. 43,000
3.10.3 Cost of the year : Tk.1,00,000
3.10.4 Source of fund : GOB
3.11 **Beneficiaries** **:** Pulp and Paper Industries

WOOD PRESERVATION DIVISION

1**. Study** : On going
1.1 Programme Area : Post Harvest Utilization –Chemical Processing
1.2 Title of the Study : Extension of preservation treatment technology to the end-users.
1.3 Justification : NA
1.4. **Objectivess** :
1.4.1 To motivate people to use preservation treatment technology through training, workshop, group discussions, etc.
1.4.2 To provide technical support to the business initiators small entrepreneurs, common people for development of entrepreneurship in preservative treatment
1.5 Expected output : Use of preservative treatment technology by common people and development of small entrepreneurship
1.6 Study period **:** 2007- 13
1.6.1 Starting year : 2007- 08
1.6.2 Completion year : 2012- 13
1.7 **Personnels** **:**
1.7.1 Study Leader : Abdus Salam, RO.
1.7.2 Associates : Mozammel Hoque Chy, RO.; K. Akhter, DO.
1.8 **Activities for the year:**

a) Procurement of raw materials, chemicals and other inputs.
b) Treatment of demonstration materials for training and motivation programme.
c) Renovation of bamboo demonstration model house at BFRI campus.
d) Arrangement of training and motivational activities in Rajshahi, Panchanagor, Kushtia, Barisal and Jessore.
e) Monitoring of service life of previously established experiments in betel leaf and vegetable farms in Moheshkhali, Barisal and Jessore.
f) Distribution of 2500 nos. treated bamboo sticks at Rajshahi, Panchanagor, Kushtia, Barisal and Jessore betel leaf and vegetable farmers.
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 (2007-2011):

- About 1,200 interested people were imparted training on preservation technique from different areas. Necessary advices were given to them about chemically treated materials.
- 100 betel leaf and vegetable farmers were trained on the treatment of sticks and thatching materials at Barishal, Jessore & Tangial.
- Entrepreneurship has been developed by Raozan, Ctg. It was observed that thousands of treated bamboo sticks were exported in Middle East countries using preservation technique through this entrepreneurship.
- Evaluation was made on the service life of betel leaf sticks supplied in 2006 at Banskhali and Moheshkhali. It was observed that the treated bamboo sticks were damaged after five years.
- A bamboo demonstration house was constructed in Bancharampur, Brammen Baria using treated materials. Information about Preservative treatment technology has been delivered to 100 nos. visitors of Bancharampur, Brammen Baria.
- Seven imported wooden round logs from Mongla Port Authority have been tested and investigated the penetration of chemicals inside the logs.

1.9.1 Achievements : Preservation technology is being popularized among the farmers, betel leaf farms, vegetables farmers, furniture industries, NGOs, REB, BFIDC University/College students etc.

1.10 **Financial statement** :

1.10.1 Total cost of the study : Tk. 9,63,000.00

1.10.2 Cumulative cost :

1.10.3 Cost of the year : Tk. 1,95,000.00

1.10.4 Source of fund : GOB

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

2**.** **Study** : On going

2.1 Programme Area : Post Harvest Utilization –Chemical Processing

2.2 Title of the Study : Evaluation of CCB preservative and treatability& durability of wood and bamboo species.

2.3 Justification : NA

2.4 **Objectivess** **:**

2.4.1 To develop treating schedule for preservative treatment.

2.4.2 To determine outdoor service life of wood and bamboo species treated with CCB.

2.4.3 To disseminate the information to the end-users.

2.5 **Expected output** **:** Treatment schedule and service life of wood and bamboo species.

2.6 **Study period** : 2007-14

2.6.1 Starting year : 2007- 08

2.6.1 Completion year : 2013- 14

2.7 **Personnels** **:**

2.7.1 Study Leader : Mozammel Hoque Chy, RO.

2.7.2 Associates : Abdus Salam, R O.; K. Akhter, DO

2.8 **Activities for the year:**

a) Procurement of CCB preservative and zinc chloride , jhau (*Casuarina equisetifolia*), lambu *(Khaya* Sp.) wood, rajkoroi (*Albizia richardiana*) wood, rubber (*H.brasiliensis*) wood and baijja (*Bambusa vulgaries)* bamboo, muli *(Melocanna baccifera)* bamboo, barak (*Bambusa balcooa*) bamboo, rangoon (*Thyrsostachys oliveri*) bamboo.

b) Processing of timber & bamboo and preparation of samples

c) Treatment of samples with 10% CCB solution by soaking and Lowry Empty cell Pressure process for target retention of 8-16 kg/m^3 following standard shedule.

d) Installation of treated and untreated samples in stake yards at BFRI campus & Barisal PTU campus for service test

e) Collection of data from BFRI & Barisal stake yard.

f) Analysis of data and determination of treatability group.

g) Reporting.

2.8.1 Activities calendar :

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

2.9 Previous progress (2007-2011): Baijja *(Bambusa vulgaries)* bamboo, rubber *(Hevea brasiliensis)* wood, rajkorai (*Albizia Richardiana*) wood were treated by soaking method using CCB solution. The treated samples were installed in the stake- yard for service test.

Underground portion of the untreated samples of baijja (*Bambusa vulgaris)* were destroyed completely after 9 months and treated samples are still in sound condition.

Underground portion of the untreated samples of rubber (*Heavea brasiliensis)* wood were destroyed completely after 9 months and treated samples are still in good condition.

Underground portion of the untreated samples of rajkoroi (*Albizia richardiana)* were destroyed completely after 6 months and treated samples are still in good condition.

2.9.1 Achievement : NA.

2.10 **Financial statement** :

2.10.1 Total cost of the study: Tk. 3,18,833.00

2.10.2 Cumulative cost : Tk.

2.10.3 Cost of the year : Tk. 1,13,920.00

2.10.4 Source of fund : GOB

2.11 **Beneficiaries** : REB, PDB, BFIDC and general public.

3. **Study** **:** New

3.1 Programme Area : Post Harvest Utilization–Chemical Processing

3.2 **Title of the Study** **:** Assessment of residual effect of preservative chemicals from treated materials.

3.3 Justification**:** Preservative treated materials are economical and durable material for the construction of houses and other purposes. But treated materials in contact with the ground or unprotected area are at risk of leaching. Leaching of chemicals decreases the durability and contaminates the soil and water. Chemicals are leached out from treated materials during rainy season. Soil contamination problems found at wood preservation sites, stake yards and betel leaf farms where bamboo treated sticks are used. Low quality wood, bamboo and other materials are treated by different treatment method. Chance of contamination varies from method to method. There is a chance of spill out preservatives in the soil directly in sites where soaking method is used. In the sites of pressure method, the expected soil contamination is comparatively low. It is very important to determine the amount of leaching of preservative chemicals. The present study has been under taken to investigate the leaching preservative chemicals from treated materials in water and soil.

3.4 **Objectives** **:**

3.4.1 To asses the water and soil contamination due to leaching of preservative treatment.

3.4.2 To disseminate the information to the end-users.

3.5 **Expected output:** The study will develop 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.

3.6 **Study period** **:**

3.6.1 Starting year : 2012- 13

3.6.2 Completion year : 2014- 15

3.7 **Personnels** **:**

3.7.1 Study Leader : K. Akhter, DO

3.7.2 Associates : Md. Matiar Rahman, ASS; Abdus Salam, RO
Mozammel Hoque Chy, RO

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) Chemical analysis of water and soil samples at BFRI laboratory and SRDI, Dhaka.
h) Analysis of data.
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 : NA
3.9.1 Achievement : NA.
3.10 **Financial statement** :
3.10.1 Total cost of the study: Tk. 4,50,000.00
3.10.2 Cumulative cost : Tk.
3.10.3 Cost of the year : Tk. 1,21,600.00
3.10.4 Source of fund : GOB
3.11 **Beneficiaries** **:** REB, PDB, BFIDC, betel leaf farmers and general public.

FOREST CHEMISTRY DIVISION

1. **Study** **: New**
1.1 Programme Area : Post Harvest Utilization-Chemical Processing.
1.2 Title of the Study : Extraction of agar (*Aquilaria malaccensis* Lam.) oil from artificial innoculated agar trees.
1.3 Justification : Agar wood, highly valuable resinous and fragrant heartwood produced from the plant of *Aquilaria* species and is used as performance and incense for religious ceremonies in the Arab countries and medicinal components in some oriental medicine. Agar is considered to be a pathological product produced when it is injured by insects, physical cuts, bacterial infections and chemical stimulation. In a natural environment, it often takes several years for a wild damaged to form agar wood. Formation of agar is an internal phenomenon of trees and no external indication is found. Agar traders indiscriminately cut agar trees for agar which causes serious depletion of all *Aquilaria* species. This makes that species as endangered and listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 2004. In many countries, research on artificial deposition of agar in agar tree to increase agar deposition is initiated. The common methods are deliberate wounding of trees by hammering of nails into tree trunks. A chemical treatment method has also been developed. In 2005, a study was initiated by BFRI to enhance agar deposition in agar wood by artificial innoculation method. Two methods of wounding - nailing and drilling were used on the trunk of standing agar trees. The experiment was conducted in 5 agar plantations sites namely Sylhet, Chittagong (North), Chittagong (South), Cox's Bazar (North) and Chittagong Hill Tracts (North) Forest Divisions. The main objectives of the study were to determine of appropriate age and time for artificial innosulation and artificial wounding design and time for felling of the treated trees. The present study is taken to determine appropriate inoculation method and to asses the site and location factors on the yield and quality of agar formation. After completion the study, of appropriate inoculation method, inoculation time and best location/sites can be recommended.
1.4 **Objectives** **:**
1.4.1 To determine suitable artificial inoculation method for agar deposition.
1.4.2 To evaluate the effect of wounding density in formation of oil in agar trees.
1.4.3 To asses the age site and location factors on the yield and quality of agar.

1.5 Expected output : Suitable artificial inoculation method and age site location factors for higher dissolution of agar will be evaluated.

1.6 **Study period** : 2012- 15

1.6.1 Starting year : 2012- 13

1.6.2 Completion year : 2014- 15

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 various experimental sites.
b) Extraction of oil from agar wood in laboratory and pilot scale distillation apparatus is field.
c) Physical and chemical characterization of the extracted oils.
d) Analysis of data.

1.8.1 Activities calendar :

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

1.9 Previous progress : NA

1.9.1. Achievement : NA

1.10 Financial statement :

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

1.10.2 Cumulative cost : NA

1.10.3 Cost of the year : Tk. 4,00,000.00

1.10.4 Source of fund : GOB

1.11 Beneficiaries : Agar producers and traders enterprises and FD.

2. **Study** : New

2.1 Programme Area : Chemical Harvest Utilization-Chemical Processing.

2.2 Title of the Study : Characterization of wood and bamboo species for various end uses.

2.3 Justification: Wood quality determination is an important factor for proper utilization of wood. Wood quality parameters such as seasoning, bending stage, wood working and finding natural durability and treatability, plywood and particle board, pulp making properties of different wood species were studied at BFRI. Chemical constituents and extractive of wood play and important factors for utilization of wood. For species wise recommendation for various end uses, it is important to study the chemical parameters. Therefore the proposed study is undertaken for chemical characterization of wood and bamboo species. After completion of the study species wise recommendation can be given for proper 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 : 2012- 14

2.6.1 Starting year : 2012- 13

2.6.2 Completion year : 2013- 14
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.
c) Chemical characterization of the samples.
d) Analysis of data 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.												

2.9 Previous progress : Not applicable
2.9.1 Achievement : Not applicable
2.10 **Financial statement** :
2.10.1 Total cost of the study: Tk. 6,00,000.00
2.10.2 Cumulative cost : NA
2.10.3 Cost of the year : Tk. 3,00,000.00
2.10.4 Source of fund : GOB.
2.11 **Beneficiaries** : FD, BFIDC, wood users, furniture makers, pulp and paper industries.

SEASONING AND TIMBER PHYSICS DIVISION

1. **Study** : On going
1.1 Programme area : Post harvesting utilization- physical processing.
1.2 Title of the study : Studies on solar kiln for efficient seasoning of different thickness of wood.
1.3 Justification : NA
1.4 **Objective** :
1.4.1 To determine the seasoning characteristics of different thickness of wood
1.5 **Expected output:** Application of solar kiln for effective seasoning of different thickness of wood.
1.6 **Study period** : 2011- 14
1.6.1 Starting year : 2011- 12
1.6.2 Completion year : 2012- 13
1.7. **Personnels** :
1.7.1 Study leader : M. Rowson Ali, RO
1.7.2 Associates : Md. Jahangir Alam, DO and U. K. Rokeya, RO
1.8 **Activities for the year:**
a) Selection of five standing trees of silkoroi (*Albizia procera*) at greater Chittagong and collection of 50 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) Maintenance of two solar kilns through repairing and painting.
d) Data analysis and report writing

1.8.1 Activities calendar :

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

1.9 Previous progress if any: Seasoning schedule of mahogany, rubber, rajkoroi, lambu, arjun, rain tree, ghora-neem and jalpai wood were determined.
1.9.1 Achievement : NA
1.10 Financial statement : Tk. 4,64,550.00
1.10.1 Total cost of the study: Tk. 1,14,550.00
1.10.2 Cumulative cost :
1.10.3 Cost of the year : Tk. 1, 75,000.00
1.10.4 Source of fund : GOB
1.11 **Beneficiaries** : FD, BFIDC, Wood based Industries, Universities and BFRI.

2. **Study** : On going
2.1 Programme area : Training and technology transfer.
2.2 Title of the study : Dissemination of solar kiln technology to the stakeholders for efficient seasoning of wood.
2.3 Justification : Seasoning and Timber Physics Division has developed a technology on solar kiln for drying of different timber species. It is important to disseminate the benefits of solar kiln and proper seasoning schedule, installation cost of solar kiln and its merits and demerits. In this regards and as per demand of stake holders to aware this technology to the end-user through training progamme for better utilization of wood.
2.4 **Objective** :
2.4.1 To disseminate solar kiln technology to the wood traders, furniture makers and wood based cottage industries
2.5 **Expected output** : Capacity building and developed knowledge in solar kiln technology for drying of wood
2.6 **Study period** : 2011-14
2.6.1 Starting year : 2011-12
2.6.2 Completion year : 2013-14
2.7 **Personnels** :
2.7.1 Project leader : Md. Jahangir Alam DO
2.7.2 Associates : M. Rowson Ali RO and U. K. Rokeya RO
3.8 **Activities for the year:**
a) Selection of stakeholders/trainee in different areas of Bangladesh (Rangamati, Sylhet, Rajshahi)
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: Two training progrrame were conducted at kaligaonj, Satkhira and Pabna Sadar.

2.9.1 Achievement: Wood traders were trained on wood seasoning technology using solar kil.

2.10 **Financial statement** :

2.10.1 Total cost of the study: Tk. 3,60,650.00

2.10.2 Cumulative cost : Tk. 60,650.00

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

2.10.4 Source of fund : GOB

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 jhau (*Casuarina equisetifolia*)

3.3 Justification: Jhau (*C. equisetifolia*) is mostly planted as roadside avenue and shade tree throughout the country. There are many such old trees planted during the British period. Sometimes occur naturally in the sea shore of Cox's Bazar and Teknaf. Till now, physical and mechanical properties of about 92 forest and homestead timber species were determined. Basic information on physical and mechanical properties is needed prior to using wood species for making furniture and other uses. As per demand of end users the species has been selected for finding their physical and mechanical properties.

3.4 **Objective :**

3.4.1 To assess the suitability of jhau (*Casuarina equisetifolia*) wood for making furniture and construction materials.

3.5 Expected output: Determination of physical and mechanical properties of jhau (*C. equisetifolia*) wood for appropriate use.

3.6 Study period :

3.6.1 Starting year : 2012-13

3.6.2 Completion year : 2012-13

3.7. **Personnels**

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:**

a) Three standing trees of jhau (*C. equisetifolia*) will be selected at Cox's Bazar coastal belt and collection of 40 cft. round wood.

b) Preparation of 270 samples for testing physical and mechanical properties in green condition.

c) Preparation of 250 samples for testing physical and mechanical properties in air-dry condition.

d) Determination of the physical and mechanical properties of jhau (*C. equisetifolia*) woods following ASTM (American Society for Testing Materials) standards both in green and air-dry conditions.
e) 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 : NA
3.10 **Financial statement** :
3.10.1 Total cost of the study:
3.10.2 Cumulative cost :
3.10.3 Cost of the year : 1,50,000.00
3.10.4 Source of fund :
3.11 **Beneficiaries**: FD, BFIDC, GOB,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 : NA
1.4 **Objectives** :
1.4.1 To establish round bamboo as a quality furniture materials 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** : 2011-14
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-ll
1.8 **Activities for the year**:
a) Collection of research input.
b) Collection of research sample (bamboo) from Sylhet.
c) Manufacturing of two chairs and two reading tables for service test.
d) Find out the suitable bamboo species for furniture.

1.9 Activities calendar:

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

1.9 Previous progress: Research sample rangoon bamboo (*Thyrsostachys oliveri*) has been collected from Tangail.

1.9.1 Achievements : Nil

1.10 **Financial statement** :

1.10.1 Total cost of the study: Tk 1,27,470.00

1.10.2 Cumulative cost : Tk 1,27,470.00

1.10.3 Cost of the year : Tk 72,470.00

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 : Potential use of jhau (*Casuarina equisetifolia*), lambu (*Khaya sp*.) and arjun (*Terminalia arjuna)* wood for furniture and construction materials.

2.3 Justification: Working and finishing properties of jhau, lambu and arjun wood have been determined. The study indicates that the species is suitable for furniture and other construction materials. The present study has been taken to find out the performance of furniture and construction materials made from these non-conventional timber species using improved techniques. Performance of furniture and construction materials in service condition will provide final recommendation.

2.4 **Objectives** :

2.4.1 To assess the suitability of jhau, lambu and arjun wood for making furniture, construction materials using improved techniques.

2.4.2 To decrease the pressure on traditional timber species.

2.5 **Expected output** : Alternate use of jhau, lambu and arjun wood for making furniture and construction materials.

2.6 **Study period** : 2012-15

2.6.1 Starting year : 2012-13

2.6.2 Completion year : 2014-15

2.7 **Personnel(s)**:

2.7.1 Study leader : Ramiz Uddin, DO

2.7.2 Associates : N A Mridha, RO

: T K Dey, RA-ll

2.8 **Activities for the year**:

a) Collection of research input.

b) Preservative treatment of sawn timber in association with Wood Preservation Division.

c) Manufacture of four book shelf six chairs and six computer tables using improved design and techniques for service test.

d) Distribution of furniture made by jhau, lambu and arjun in the office of CRO (M),CRO (P) and six Divisions of Forest Product Branch.

2.8.1 Activities calendar:

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

2.9 Previous progress : NA

2.9.1 Achievements(s) : NA

2.10 **Financial statement :**

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

2.10.2 Cumulative cost :

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

2.10.4 Source of fund : GOB

2.11 **Beneficiaries** : BFIDC, FD, NGOs, Wood based industries, Common people.

DEVELOPMENT PROJECTS OF BANGLADESH FOREST RESEATCH INSTITUTE

1. **Study** : On going

1.1 Programme Area : Biodiversity and Conservation

1.2 Title of the Study : Enrichment and Conservation of Mangrove Ecosystem.

1.3 Justification:The problems of the Sundarban are diversified due to its complex ecosystem and hence the proposed research agenda includes both bio-ecological and socio-economic investigations in order to improve and maintain sustained productivity as well as in reducing of natural disasters and to increase their adaptation to the long term effect of climate change.

1.4 **Objectives** :

1.4.1 To enrich mangrove ecosystem and determine better silvicultural techniques for major mangrove species

1.4.2 To conserve a wider range of mangrove forest gene resources for future generations.

1.4.3 To develop the appropriate management strategies for sustainable yield and protective services from mangrove ecosystems.

1.5 **Expected output**: The study will help to introduce the threatened mangrove species such as psssur (*Xylocarpus mekongensis*), sundari (*Heritiera fomes*), dhundhul (*Xylocarpus granatum*), kirpa (*Lumnitzera racemosa*), jhana (*Rhizophora mucronata*), khalshi (*Aegiceras corniculatum*) and shingra (*Cynometra ramiflora*) in the newly accreted char land, poorly regenerated area, NCC(non commercial cover) area of the Sundarban. The swampy and low lying area adjacent to the Sundarban will also be covered by the mangrove species. As a result the productivity of the forest will be increased as well as the improvement of livelihood towards the mangrove dwellers. It will improve the natural ecosystems and biodiversity of the forest and provide positive impact on national poverty alleviation programs of the country. Thus environmental

disaster as well as tsunami, cyclone, sidr will be decreased and forestry sector must be improved.

1.6 **Study period** : 2010-14
1.6.1 Starting year : 2010-11
1.6.2 Completion year : 2013-14
1.7 **Personnel(s)** :
1.7.1 Study leader : Dr. M. M. Rahman, DO
1.7.2 Associates : S. M. M. Hasnin, SRO
: A. S. M. Helal Siddiqui, RO

1.8 **Activities for the year**:

a) Field visit to the Sundarban before collecting seeds/propagules.
b) Seeds/propagules collection.
c) Seeds/propagules sorting, treatment and storage.
d) Nursery raising (soil collection and preparation, bag filling, bed preparation, shed preparation, fencing, seed sowing, mulching etc.) for next year plantation.
e) Maintenance of nursery.
f) Selection of promising seedlings at nursery stage for plantation.
g) Data collection, collation and 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: A total of 18,000 healthy seeds / propagules of khilshi, kirpa, sundari, passur, goran and kankra were collected from the Sundarban. The average of germination percentage of sundri (*Heritiera fomes)*, pasur (*Xylocarpus mekongensis*), baen (*Avicennia officinalis*), kankra (*Bruguiera gymnorrhiza*), singra (*Cynometra ramiflora*) and kirpa (*Lumnitzera ramiflora*) were 70, 81, 75, 93, 55 and 29 respectively. Three experimental sites were selected for mangrove species trials in three salinity zones of the Sundarban. These were barren and covered with grasses or non-commercial species like gila lata (*Derris trifoliate*), chanda lota (*Dalbergia candenatensis*), sun grass (*Saccharum spontaneum*), hargoja (*Acanthus ilicifolius*), hanthal (*Phoenix paludosa*), tiger fern (*Acrostichum aureum*), bhola (*Hibiscus tiliaceous*), nal khagra (*Phragmites karka*), hogla (*Typha elephantina*), kutum kata (*Caesalpinia crista*), dhanshi (*Myriostachya wightiana*) and kewa katta (*Pandanus foetidus*). The experiment was laid out in all the three salinity zones of the Sundarban. The seedlings were planted during September. The number of seedlings per species planted 567 at each location. Six mangrove species were planted at each site. The heights of the seedlings varied between 14cm and 81cm at the time of planting depending on the species. The average height before planting of sundri (*Heritiera fomes)*, pasur (*Xylocarpus mekongensis*), baen (*Avicennia officinalis*), kankra (*Bruguiera gymnorrhiza*), singra (*Cynometra ramiflora*) and kirpa (*Lumnitzera*

ramiflora) were 57cm, 78cm, 24cm, 40cm, 15cm and 20cm respectively. Planting was carried out over an area of 1.5ha in three experimental sites of the Sundarban.

Mangrove Silviculture Division of Bangladesh Forest Research Institute, Khulna, conducted four training programs among the local farmers on "Nursery and Plantation Techniques" at 4 Upazillas in three districts adjacent to the Sundarban from 24 January to 27 January, 2011. A total number of 80 farmers, 20 in each training program were participated. The participants accepted the information regarding nursery and plantation techniques very eagerly. It is very fruitful for the farmers. The training program will increase practical knowledge for raising nursery and plantation among the farmers. The training programs also improve to raise their home garden. The program will reduce the pressure on the forest resources of the Sundarban. So, it will help to conserve the biodiversity as well as ecosystems of the Sundarban.

1.9.1 Achievement : NA

1.10 **Financial statement** :

1.10.1 Total cost of the study : Tk. 16,40,000.00

1.10.2 Cumulative cost : Tk. 9,05,000.00

1.10.3 Cost of the year : Tk. 7,35,000.00

1.10.4 Source of fund : IDA, IFAD & GOB through BARC

1.11 **Beneficiaries** : Forest Department, NGOs, Researchers and Local farmers.

2. Study/ Project : On going

2.1 Programme Area : Plantation technique and forest management

2.2 Title of the study/ Project : Community based adaptation to climate change through coastal afforestation in Bangladesh (CBACC-CF).

2.3 Justification : NA

2.4. **Objective(s)** :

2.4.1 To reduce vulnerability of coastal communities to the impacts of climate change-induced risks in four upazilas in the coastal districts of Borguna and Patuakhali (Western region), Bhola (Central region), Noakhali (Central region), and Chittagong (Eastern region).

2.5. **Expected output** : Promotion of climate-resilience development in the coastal areas of Bangladesh.

2.6 **Study period** : 2011-13

2.6.1 Starting year : 2009-10

2.6.2 Completion year : 2012 (December)

2.7. **Personnels** :

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) Collection of seeds of mangrove species such as sundari, passur, kankra, khalshi, gewa, shingra and baen for raising 15,000 seedlings.
b) Raising of 15,000 seedlings of theses species in polybags with the participation of contractual farmers at Char kukri-Mukri Research Stations and Hatia.
c) Selection and preparation of sites for the establishment of 5 ha model demonstration plantations at Char kukri-Mukri and Hatia islands.

d) Raising of 5 ha model demonstration plantations of these species at Char kukri-Mukri and Hatia islands.
e) Maintenance of previously raised 95 ha model plantations.
f) Collection of survival and growth data from the model demonstration plantations twice a year.

2.8.1. Activities calendar :

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

2.9 Previous progress (2009-11): A total of 1,20,000 seedlings of different mangrove species such as sundari, passur, kankra, khalshi, gewa, shingra and baen were raised in the nursery at Char Kukri-Mukri and Hatia with the participation of contractual farmers. A total of 95 ha model demonstration plantations have been established at different locations of Char Kukri-Mukri and Hatia islands.

2.9.1 Achievement(s): A total of 95 ha model demonstration plantations have been established under keora plantations at different locations of Char Kukri-Mukri and Hatia islands.

2.10 **Financial statement** :

2.10.1 Total cost of the study : Tk. 34,15,000.00

2.10.2 Cumulative cost : Tk. 32,59,000.00

2.10.3 Cost of the year : Tk. 1,56,000.00

2.10.4 Source of fund : UNDP funded CBACC-CF Project in Bangladesh.

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

3 **Study** : On going

3.1 Programme Area : Forest productivity enhancement.

3.2 Title of the Study : Coordinated Project on Improvement of Agro-forestry Practices for Better Livelihood and Environment: BFRI (Forest) Component

3.2.1 Sub title of the study: Collection, plantation, evaluation and conservation of herbal medicinal plants, and estimation of medicinal ingredients in the plants in hill eco-system through Agro-forestry.

3.3 Justification : NA

3.4 **Objectives** :

3.4.1 To collect, make plantation, evaluate and conserve herbal medicinal plants in hill eco-system through agro-forestry in CHT.

3.4.2 To develop pest and disease management technique.

3.4.3 To estimate active chemical ingredients

3.5 **Expected Output** : The study will help to introduce medicinal plants species such as kalomegh (*Andrographis paniculata*), bashok (*Adhatoda vasica*), sarpaganda (*Rauvolfia serpentina*), aswagandha (*Withania somnifera*) and tulsi (*Ocimum tenuiflorum*)) in the hilly area of CHT. The productivity of the hill forest soil will be improved which will increase livelihood of the hilly people. It will increase natural

eco systems and biodiversity of the forest and provide positive impact on national proverty allevation programme of the country.

3.6 **Study Period** : 2011-13

3.6.1 Starting year : 2011-12

3.6.2 Completion year : 2012-13

3.7 **Personnels**

3.7.1 Project Leader : Dr. Shaheen Akhter, CRO(P)

3.7.2 Associates : Syeeda Rayhana Merry, SRO, MFPD
Dr. Atiur Rahman, Assistant Professor, Chittagong University

3.8 **Activities for the year**:

a) Collection baseline data for benchmark survey
b) Selection of farmer through field visit
c) Collection of seed/propagule
d) Nursery raising and maintenance
e) Site selection and establishment of experiment plot
f) Conservation and maintenance of medicinal plants
g) Data collection on growth and yield
h) Sample collection and determination of active ingredients
i) Standardization of appropriate extraction technique
j) Development of preservation technique of medicinal plant parts
k) Collection of pest/diseases samples
l) Rearing, identification and recording nature and extent of damage
m) Development of suitable management techniques for key pest and pathogen through IPM and IDM
n) Arrangement of Training program
o) Visit and Develop linkage between farmers and Unani, Ayuvedic and Pharmaceutical companies
p) Preparation of quarterly, annually and final Report

3.8.1 Activities calendar :

Activities	Months											
	M	J	J	A	S	O	N	D	J	F	M	A
a.												
b.												
c.												
d.												
e.												
f.												
g.												
h.												
i.												
j.												
k.												
l.												
m.												
n.												
o.												
p.												

3.9 Previous progress: In total of 5000 healthy propagules of bashak (from Bogra), satomuli (from Natore), aswagandha (from Bogra), tulsi (from Natore) and kalomegh (from Sirajganj) were raised/collected for conservation. Three experimental sites were selected for medicinal plant in three hill districts of Bangladesh. Data on survival and height of 45 days old plantation of 4 medicinal plants was recorded from Bandarban site and survival and height of aswagandha and satomuli from Rangamati site. At Bandarban site survival percentages of kalomegh, aswagandha, bashak, satomuli are found 70%, 75%, 90% and 50% respectively. Height of this four species was found to vary 30.48 to 50.8 cm. On the other hand survival percentages of bashak and satomuli at Bandarban site are found 93% and 45% respecitvely.Seedlings of aswagandha, tulsi and kalomegh were raised in the propagation chamber using BFRI developed technology (Seedling raising and management technique of small seed of medicinal plant). The experiment was conducted using fresh seed and treated seed (soaked in water for 24 hours). From this experiment we found that in case of fresh seed germination percentages of aswagandha, tulsi and kalomegh were found 50%, 70% and 55% respectively but in case of treated seed, germination percentages of aswagandha, tulsi and kalomegh were found 90%, 20% and 80% respectively. Better germination was found in treated seed of aswagandha and kalomegh, but in case of tulsi better germination was found in fresh seed. The results are in corporate with previous findings. Conservation plot was selected at BFRI campus to conserve selected medicinal plant for demonstration and using a source of seed/propagules. The program will help to utilize land properly. So it will help to conserve the biodiversity as well as ecosystems of the hilly area.

3.9.1 Achievement : NA

3.10 **Financial statement** :

3.10.1 Total cost of the study : Tk. 1,16,40,000.00

3.10.2 Cost of the year : Tk. 78,88,100.00

3.10.3 Source of fund : IDA, IFAD, GOB through NATP Project of Bangladesh Agriculture Research Council (BARC).

3.11 **Beneficiaries** : Local farmers, NGO

4. **Study** : New

4.1 Programme Area : Post Harvest Utilization- Physical Processing

4.2 Title of the study : Pilot plant study and production of Cement Bonded Particle Board (CBPB) in a small scale industry, as an environmental friendly durable construction material.

4.3 Justification**:** In the rural area of Bangladesh, 80% peoples depend on forest produces for their housing materials. They use generally bamboo and other vegetable fibers for the construction of houses materials. These materials are very susceptible to degradation by biological agents and damaged within few years. In rural area peoples are also live in mud houses. Bangladesh has long rainy season, humid weather and disaster like flood. In some low land area, tin are also used for the construction of houses which are very uncomfortable in summer season and also damaged due to rust. These unusual situations affect the mental and physical health of rural people, especially women and children suffer mainly. Children's education is also hampered due to unfavorable environment. In addition, sea level rising due to climate change will make the situation worst. The circumstances therefore demands weather resistant, durable low cost and long lasting housing materials to fulfill the growing need of the population.

4.4 **Objectives** :

4.4.1 To manufacture CBPB, an environmental friendly durable housing material

4.4.2 To conduct pilot plant trial for manufacturing CBPB.

4.4.3 To estimate the production cost of CBPB.

4.4.4 To popularize use of CBPB as housing material.

4.4.5 To study socio economic impact in utilizing the CBPB as material.

4.4.6 To assess market potential of CBPB in different region of the country

4.4.7 To facilitate job opportunity and women empowerment.

4.4.8 To estimate total costing in setting up a large scale industry in manufacturing CBPB.

4.5 **Expected output**: The production of Cement bonded particleboard (CBPB) will minimize the housing problem of the low and medium income group people. It will ensure better utilization of scarce resource materials. The product has internal use, such as, partition walls, wall lining, ceiling panels, flooring, fire protection door, toilet materials and external use, such as, wall panel, wall cladding, roof decking, materials of mobile houses and poultry houses etc. It will provide employment and enhance livelihood of rural people. Use of CBP will increase the use of CBP and promote timber substitution with protection of environment. It will also generates employment and enhance women empowerment.

4.6 **Study period** :

4.6.1 Starting year : 2011-12

4.6.2 Completion year : 2013-14

4.7 **Personnels**

4.7.1 Study leader : Project Leader: K. Akhter, DO

4.7.2 Associates : Daisy Biswas, DO
M. M. Rahaman, RO

4.8 **Activities for the year**:

a. Appointment of advisor and relevant consultants
b. Construction of working shed
c. Procurement of equipment and vehicle
d. Setting of equipment
e. Appointment of project personnel
f. Arrangement of workshop, seminar and training

4.8.1 Activities calender

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

4.9 Previous progress : NA

4.9.1 Achievement : NA

4.10 **Financial statement** :

4.10.1 Total cost of the study: Taka 495.00 (Lakh)

4.10.2 Cumulative cost :

4.10.3 Cost of the year : Taka 336.6 (Lakh)

4.10.4 Source of fund : GOB (Climate Change Trust Fund)

4.11 **Beneficiaries** : Particleboard industries, BFIDC, NGO & Rural people

5. **Study** **:** New

5.1 Programme Area **:** Farming System Research

5.2 Title of the Study **:** Coordinated sub-project on Farming System Research and Development for Farmers' Livelihoods Improvement: BFRI (Forest) Component (Hill Ecosystem)

5.3 Justification**:** Traditional Jhum/shifting cultivation is the age-old farm production system developed as an indigenous technology by the hill forest dwellers in the Chittagong Hill Tracts (CHTs) that has served the needs of many generations with goods and services in a sustainable manner. However, jhum cycle under shifting cultivation has been shortened from 10-15 years to 2-3 years, suppressing the productivity cycle in the slope land conditions disrupted the replenishment of soil fertility. This process has ultimately threatened land productivity and biodiversity in the region. Thus, the demand and supply gap in all sorts of forest and agro forestry products are widened. Due to shortened jhum cycle along with other technical weakness, the shifting cultivation is no more in a position to cope with future needs of the hill farmers. Therefore, to cope up with growing demand in food, fuel wood, timber and other services, it is necessary to stewardship the system productivity, profitability as well as biodiversity conservation by introducing various hill farming technologies developed by BFRI in cooperation with extension agencies like Forest Department (FD), Department of Agricultural Extension (DAE) and NGOs.

5.4 **Objectives :**

5.4.1 To develop location-specific system-based technologies.

5.4.2 To modify/fine tune on-station technologies generated by NARS institutes at different Agro-ecological Zones (AEZs).

5.4.3 To integrate component technologies (crops, livestock, fisheries and agro-forestry and homestead, etc.) for improving farm practices & establish linkage with different stakeholders.

5.4.4 To improve family income and livelihoods.

5.5 **Expected output** **:** Development of farming system technologies to maximize farm productivity and efficient use of resources.

5.6 **Study period** **:**

5.6.1 Starting year **:** 2012-13

5.6.2 Completion year **:** 2013-14

5.7 **Personnels** **:**

5.7.1 Study Leader **:** Sharmila Das, DO.

5.7.2 Associates **:** Md. Motiar Rahman, ASS

5.8 **Activities for the year:**

a) Staff recruitment
b) Procurement of capital items (equipment, tools, small, transports, furniture etc.)
c) Identify and establish linkage with all actors (both govt. & non-govt.) involved in agricultural development.
d) Selection of site representing particular ecosystems (AEZ), community and resource poor farm house holds.
e) Selection of cooperator farmers with focus on resource poor households who are willing to participate.

f) Conduct PRA or other quick survey for generating benchmark information to identify and prioritize problems/constraints and assess needs and opportunities for future development.

g) Organize workshop with participating agencies like DAE, DLS, DOF and NGO etc. and NARS Institutes.

h) Prepare work plan and comprehensive implementation schedule.

i) Establishment of field demonstration/ technologies.

5.8.1 Activities calendar**:**

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

5.9 Previous progress **:** NA

5.9.1 Achievements **:** NA

5.10 **Financial statement :**

5.10.1 Total cost of the study**:** Tk. 49,83,200.00

5.10.2 Cumulative cost **:**

5.10.3 Cost of the year **:** Tk. 35,00,000.00

5.10.4 Source of fund **:** IDA, IFAD, GOB through NATP Project of Bangladesh Agriculture Research Council (BARC).

5.11 **Beneficiaries :** Hill Farmers (marginal, small and medium).