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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF ENVIRONMENT AND NATURE PROTECTION
DEPARTMENT OF WATER, FOREST, HUNTING AND SOIL CONSERVATION
REPUBLIC OF SENEGAL

THE STUDY ON SUSTAINABLE MANAGEMENT OF THE MANGROVE IN THE PETIT-CÔTE AND SALOUM DELTA IN THE REPUBLIC OF SENEGAL

PILOT PROJECT AND AVICENNIA NURSING AND PLANTING EXPERIMENT

FINAL REPORT

FEBRUARY, 2005

JOINT VENTURE FOR THE STUDY ON SUSTAINABLE MANAGEMENT OF THE MANGROVE IN THE PETIT-CÔTE AND SALOUM DELTA IN THE REPUBLIC OF SENEGAL
JAPAN FOREST TECHNOLOGY ASSOCIATION
IC NET CO., LTD.

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PART I PILOT PROJECT

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1. Objectives of the Pilot Project

The Pilot Project was conducted to clarify the important points relating to the relevance of the planning items for the establishment of the implementation system for and the implementation of the Sustainable Management Plan for Mangrove Forests (Master Plan) formulated under the main Study. The objectives were to review the contents of the Master Plan and also to promote the capacity building of local residents as well as local organizations providing guidance for local residents, both of which played an important role in the implementation of the Pilot Project.

2. Background of the Pilot Project

2.1 Seminar and Workshops

In October, 2002, a seminar on the Master Plan was held in Dakar to which representatives of the central and local governments in Senegal, international aid organizations and foreign donors were invited.

Moreover, a workshop was held in three places, i.e. Fimela, Foundiougne and Toubacouta, in the Master Plan Area to explain the necessity for the conservation and sustainable management of mangrove forests, the nature of the expected management by local residents and the contents of the Pilot Project, etc. to representatives of local administrative bodies (at the regional, departmental and district levels), rural communities, villages and NGOs.

2.2 Menu (Candidate Activities) for the Pilot Project

The following candidate activities for the Pilot Project were selected based on the basic concepts of the Master Plan.

(1) Menu for Forestry

1) Planting of *Rhizophora*
2) Planting of *Avicennia*
3) Creation of village forests
4) Support for apiculture

(2) Menu for Fisheries

1) Introduction of improved kilns for smoking of ethomarose
2) Introduction of management techniques for natural mangrove oyster resources
3) Spread of ocean culture of natural mangrove oysters (by simple method)

4) Improvement of added value for processed shell products
5) Self-supply of protective gear for shellfish collection (making of heavy cloth shoes and gloves)
6) Making of life jackets
7) Introduction of brush shelter fishing method

(3) Eco-Tourism

1) Eco-tourism based on eco-routes

(4) Educational Activities on the Environment

1) Introduction and spread of environmental education, mainly featuring mangrove forests, at primary schools
2) Mangrove seminar and workshop for RC councillors
3) Visit to model villages of sustainable management of mangrove forests
4) Educational activities linked to local sporting and cultural activities
5) Diffusion of technology by local facilitators (diffusion of improved ovens for home cooking)

2.3 Selection of Target Areas and Villages for the Pilot Project

The target villages for the Pilot Project for the introduction of various activities were selected in accordance with the following process.

Firstly, areas where the same candidate activities for forestry or fishery could be implemented were selected, taking the zoning boundaries under the Master Plan and the boundaries of the RCs, each of which constitute a basic unit for development, into consideration. The target areas for the Pilot Project were selected from among these areas based on comparative examination of the current situation of forestry, fisheries, tourism and educational activities, geographical location, population, existence of established village organizations, availability of NGO assistance, access conditions and demonstration effect, etc.

Finally, from among the target areas for the Pilot Project, 10 villages (four villages belonging to the Solome Oyster Union were considered to constitute one village) of which the demonstration effect to other villages was believed to be high were selected as the target villages for the Pilot Project. The target areas and villages of the Pilot Project are listed in Annex A-1.

2.4 Preparation of the Pilot Project Implementation Plan

A workshop at the village level was held in each target village for the Pilot Project to prepare the participatory implementation plan for the Pilot Project. At this workshop, the concrete activities to be conducted under the Pilot Project were selected through discussions with local residents based on the feasibility of the candidate activities mentioned earlier. The work schedule, division of work and actual implementation sites were also decided at this workshop. The selected activities are shown in Table 2.4-1.

Table 2.4-1 (1) Selected Activities (Supervising Body: UICN)

Village	Forestry	Fisheries	Eco-Tourism	Education
Djirnda	Planting of *Rhizophora*	Introduction of an improved kiln for the smoking of ethomarose		
	10,000 with a planting distance of 50 cm x 50 cm; 10,000 with a planting distance of 25 cm x 25 cm	After the construction of one conventional kiln and improved kiln each, smoking was conducted.		
Moundé	Assistance for apiculture (making of protective masks)	Improvement of the added value for processed shellfish products	Introduction of eco-tourism	Acceptance of visitors from other villages as a model village
	Holding of a training session to teach how to make protective masks	Making of a washing table, drying table and simple shellfish smoking kiln	Setting up of eco-routes; training of eco-guides; making of souvenirs, kayaks and pamphlets, etc; introduction of eco-tourism	Spread of Pilot Project-related activities
		Making of protective heavy cloth shoes and gloves		
		Training session to make heavy cloth shoes and gloves		
Bassilamé Sérère	Planting of *Avicennia*		Introduction of eco-tourism	
	Nursing of 6,000 seedlings and planting of 5,000 seedlings		Setting up of eco-routes; training of eco-guides; making of souvenirs, kayaks and pamphlets, etc; introduction of eco-tourism	
	Creation of village forest			
	Planting of *Tectona grandis, Gmelia arborea, Cassia siamea, Prosopis juliflora* and *Eucalyptus camaldulensis* over an area of 0.5 ha			
Sokone Oyster Union		Introduction of management techniques for natural oyster resources		Education linked to the cultural and sporting activities of the Union
		Forming of a consensus through an oyster resources conference with the participation of all stakeholders		Educational play at the time of football meetings; prompting of youth participation in natural resources management
		Spread of oyster culture by means of simple direct seeding		
		Direct seeding of spats collected from Guirlandes or slate plates		
		Making of protective heavy cloth shoes and gloves		
		Training session to make heavy cloth shoes and gloves		
Mar Fafako	Planting of *Rhizophora*			Education linked to the cultural and sporting activities of the ASC
	10,000 with a planting distance of 50 cm x 50 cm; 10,000 with a planting distance of 25 cm x 25 cm			Educational play at the time of wrestling and football meetings; promotion of youth participation in natural resources management

Table 2.4-1 (2) Selected Activities (Supervising Body: WAAME)

Village	Forestry	Fisheries	Education
Kamatane Bambara		Production and sale of life jackets	
		Production and sale of 100 life jackets	
Gagué Chérif	Planting of *Avicennia*	Introduction of brush shelter fishing method	Education linked to the cultural and sporting activities in the village
	Nursing of 6,000 seedlings and planting of 5,000 seedlings	Practice of brush shelter fishing at two sites	Educational play at the time of football meetings; promotion of youth participation in natural resources management
Mbam		Production and sale of life jackets	Acceptance of visitors from other villages as a model village
		Production and sale of 100 life jackets	Spread of Pilot Project-related activities
Bangalère	Planting of *Rhizophora*		Spread of the use of improved ovens for home use
	10,000 with a planting distance of 50 cm x 50 cm; 10,000 with a planting distance of 25 cm x 25 cm		Diffusion of technology to make improved ovens for home use by village facilitators from Mar Fafako and Mbam
	Creation of village forest		
	Planting of *Eucalyptus camaldulensis, Acacia mellifera, Prosopis juliflora* and *Melaleuca leucadendron* over an area of 0.5 ha		
Bassoul	Creation of village forest	Introduction and management of improved smoking kiln led by the RC	Seminar for RC councillors
	Planting of *Eucalyptus camaldulensis, Acacia mellifera, Prosopis juliflora* and *Melaleuca leucadendron* over an area of 0.5 ha	Assistance for the establishment of a management plan for smoking kilns for ethomarose led by the RC	Efforts to incorporate the Master Plan in the existing programme of the RC; establishment of a smoking kiln operation and management plan

3. Implementation of the Pilot Project

3.1 Work Schedule and Implementation

The implementation period of the Pilot Project was set at 15 months, from July, 2003 to September, 2004. The local residents themselves prepared an activity plan at the village-level workshop for each activity planned under the Pilot Project. Based on these activity plans, the UICN and the WAAME prepared a draft monthly work schedule incorporating the detailed contents of the planned work and this schedule was finalized through discussions with the villagers at a general meeting of villagers held in each target village.

Based on the monthly work schedule by village, the UICN and the WAAME further prepared a detailed daily work schedule and the villagers of each target village conducted the planned activities in accordance with this daily work schedule from the second part of July, 2003. The daily work schedule for each village is given in Annex A-2.

UICN and WAAME always went out to meet the Study Team on arrival and accompanied the team members when they conducted guidance activities for citizens. The implementation methods in each pilot project were as follows.

(1) UICN

UICN conducted 16 activities in five villages. In addition to deciding the person with ultimate responsibility to supervise the pilot projects overall, an expert engineer was appointed as the site manager in the forest sector. The site manager was permanently assigned to the UICN office in Sokon in the project target area and was always ready to go out to the villages and instruct the residents when necessary. In the fisheries and ecotourism sectors too, experts were dispatched to the villages to provide guidance whenever necessary.

Announcing that it would conduct activities according to plan, UICN organized the residents in the villages, and communication with the residents also went smoothly. Preliminary training in each sector was also implemented almost according to schedule. Although there were some delays caused by natural conditions, the results of pilot project implementation were satisfactory. One criticism, however, was that the residents simply had to follow the lead set by UICN without having to think for themselves.

(2) WAAME

WAAME conducted 12 activities in five villages. WAAME formed a group consisting of four members, i.e. the project manager, forest expert, fisheries expert and extension/project education expert, and these members went out to the villages to provide guidance from their base in the WAAME office in Phunjun. As in the case of UICN, organization of residents in the villages went smoothly, although there were situations at the beginning where the organization didn't function or implementation of the pilot projects did not go well. There were also some cases where communication with the residents was poor and the guidance to residents was insufficient. However, performance increased as the organization was gradually modified and improved. Furthermore, because the emphasis was placed on resident initiative, there were some delays in execution compared to the planned schedule. Having said that, this approach was effective in fostering autonomy among the residents.

3.2 Workshop for Interim Evaluation

A workshop for interim evaluation was held in the target villages of the Pilot Project at the end of January, 2004. The purpose of this workshop was to evaluate the activities in the first year of the Pilot Project together with local residents at the interim stage of some seven months after commencement, to clarify improvement measures by finding the causes of problems encountered and to apply these improvement measures to the activities in the second year. The interim evaluation results are given in Annex A-3. The review of the activities under the Pilot Project at these workshops led to decisions to conduct further activities in the second year in the manner described below.

(1) Activities Relating to Forestry

1) Planting of *Rhizophora*

In the first year, seedlings were densely planted at planting intervals of either 50 cm x 50 cm or 25 cm x 25 cm. It was decided that the planting of a similar number of seedlings as the first year would be conducted in the second year and that the planting density would be determined by local residents in view of the fact that dense planting proved to be heavy work for local residents.

2) Planting of Avicennia

6,000 seedlings were produced in the first year for the purpose of planting 5,000 seedlings. It was decided that a similar number would be produced and planted in the second year. It was also decided that seeds of *Avicennia* would be collected from around each target village and that the seedlings from these seeds would be planted.

3) Village Forest

a. It was decided that the seedlings for planting in the second year would be produced at a village nursery. In the case of this proving difficult, however, the seedlings would be supplied by the DEFCCS free of charge.

b. It was decided that *Acacia mellifera* to be planted at Dassilamé Sérère, Banglère and Bassoul would be planted along the village boundaries to make them the boundary trees of the village forest in the future and that they would be protected from damage by animals using barbed wire until the planted trees have sufficiently grown.

4) Assistance for Apiculture (Making of Protective Masks)

As local residents used their own ideas when making these masks which proved useful, it was decided that the same activity would continue in the second year with possibly some improvements.

(2) Activities Relating to Fisheries

1) Introduction of Improved Kiln for Smoking of Ethomarose

As a continuation from the first year, it was decided that ethomarose would be smoked in both a conventional kiln and an improved kiln with a view to collecting data on the quality of smoked ethomarose and the fuel consumption rate. In addition to the implementation of the smoking work, the kilns used would be remodeled and/or repaired.

2) Introduction of Brush Shelter Fishing Method

It was decided that the types, sizes and quantity of fish caught by brush shelters would be compared with those of fish caught near brush shelters, water in and around mangrove forests and ordinary waters.

3) Improvement of Added Value of Processed Shellfish Products

As the washing table, drying table and simple smoking kiln for shellfish were completed in the first year, it was decided that improvement of the shellfish processing method would be attempted in the second year to improve the quality of processed shellfish to be sold in the market.

4) Making of Life Jackets

It was decided that the same number of life jackets as the first year would be made in the second year with improvement made to the float and lining.

5) Introduction of Management Method for Natural Oyster Resources

As in the case of the first year, an oyster resources conference would be held in the second year with a view to establishing a management system for natural oyster resources.

6) Spread of Oyster Culture by Simple Direct Seeding

It was decided that a simple direct seeding pond would be created in Soukouta and Sandicoly which were two villages where such a pond was not created in the first year among the four villages involved.

7) Making of Heavy Cloth Shoes and Gloves

It was decided that this activity would continue in the second year and that local residents would be urged to improve them on their own initiative.

8) Activities Relating to Eco-Tourism

In the first year, eco-tourism commenced after setting up eco-routes, making horse carts and kayaks, preparing pamphlets and training local eco-guides. It was decided to increase the number of kayaks and pamphlets in the second year and to retrain local eco-guides.

(3) Educational Activities

1) Spread of Improved Ovens for Home Use

As in the case of the first year, guidance and advice on the shape and building process of improved ovens would be provided for the WAAME which is implementing and managing this activity, to be followed by the retraining of local residents on how to build improved ovens.

2) Education Linked to Cultural and Sporting Activities

The provision of prizes to assist cultural and sporting activities in the first year would be discontinued in the second year as the continued effect of awarding prizes was not clearly established. Education through plays performed by villagers would continue in the second year as planned. An information board introducing the Pilot Project would be installed in each target village for the first time in the second year to improve the level of awareness of the Pilot Project among villagers.

4. Implementation Results of the Pilot Project in Each Village

4.1 Forestry

4.1.1 Planting of *Rhizophora*

(1) Background

The planting of *Rhizophora* at the three villages listed below was decided at the workshop to prepare the activity plan (hereinafter referred to as the planning workshop) held in these villages. The depletion of mangrove forests is continuing in the Saloum Delta due to an increased level of salinity caused by drought, cutting by local residents, sedimentation and the construction of roads, etc. The planting of *Rhizophora* aims at conserving or restoring these mangrove forests.

(2) Subject Villages

1) Djirnda (supervising body: UICN)
2) Mar Fafako (supervising body: UICN)
3) Bangalère (supervising body: WAAME)

(3) Activity Plan

Planting of Rhizophora in August and September when a large quantity of viviparous seeds can be collected in 2003 and 2004 using the following two methods.

1) Planting of 10,000 viviparous seeds in a planting area of 0.25 ha (100 m x 25 m) at a planting distance of 50 cm x 50 cm
2) Planting of 10,000 viviparous seeds in a planting area of 0.0625 ha (25 m x 25 m) at a planting distance of 25 cm x 25 cm

The total planting area is 0.3125 ha with 20,000 viviparous seeds.

(4) Implementation of the Plan

1) Establishment of Responsible Body

In Djirnda and Mar Fafako, a planting (reforestation) committee was established under the village development committee. In Bangalère, a *Rhizophora* planting (reforestation) committee was established under the management committee.

2) Details of Planting Activities

In the first year in Djirnda, viviparous seeds were collected in *Rhizophora* forests around the village in late August, 2003 and were immediately planted at the site decided at the planning workshop. The collection of 20,000 viviparous seeds and dense planting with a planting distance of 25 cm x 25 cm proved to be fairly hard work for the participating villagers. The technical guidance was provided in advance by a UICN supervisor on seed collection and planting was, however, very effective. The resulting high survival rate and scene of lush greenery due to the dense planting produced a strong demonstration effect for local residents, creating an incentive for local residents to plant *Rhizophora* seeds on their own initiative. The success of the activities in the first year enhanced the willingness of local residents to continue with the activities and it was decided to plant the same number of viviparous seeds (20,000) in the second year. The 45 participants in the first year were all women, many of which were planting committee members. The number considerably increased to 65 in the second year.

The activities at Mar Fafako in the first year were identical to those at Djirda except that the villagers had to travel a long distance by boat to collect viviparous seeds and the planting was conducted in August. The scale of the planting in the second year was the same as the first year. The participants consisted of 10 plus men and some 100 women, many of which were planting committee members, in the first year. The number vastly increased to 187 in the second year and there were more men than women.

In the case of Bangalère, the final decision on the planting sites for the first year was taken at a general meeting of the villagers. As high quality viviparous seeds are unavailable near the village, the WAAME supervisor transported 7,000 viviparous seeds collected around Bagadaji to Bangalère. The actual planting was conducted in late August and mid-September with a planting distance of 1 m x 50 cm. Subsequently in mid-November, the said WAAME supervisor revised the plan so that the planting of the originally planned quantity could be completed. However, an insufficient number of viviparous seeds was collected because of the fact that the timing for the collection of good viviparous seeds was missed. In the end, a further 1,600 viviparous seeds were planting with a planting distance of 25 cm x 25 cm at a plot of 5 m x 20 m (100 m^2). Although the survival rate was poor at Bangalère, the willingness of the villagers to continue the activities was strong and it was decided to conduct planting in the second year based on careful decisions on the timing of planting and the planting site. The number of participants was approximately 100 in the first year and approximately 80 in the second year. There were slightly more men than women.

(5) Activity Results

At Djirnda, the survival rate of the *Rhizophora* planted in the first year is 88% as of September, 2004. Competition between trees has already started as the trees have nearly grown to the state of crown closure. The favourable results at Djirnda can be explained by the planting of good quality viviparous seeds at the right time due to the availability of such seeds near the village, the selection of a suitable muddy soil site with an appropriate duration of flooding and avoidance of the sea water temperature becoming too high by means of dense planting. All of these indicate successful technical guidance by the UICN supervisor for local residents. In the case of the viviparous seeds planted in the second year, the survival rate as of September, 2004 is 100%.

At Mar Fafako, the survival rate of the *Rhizophora* planted in the first year is 86% as of September, 2004. As in the case of Djirnda, competition has started as the trees have nearly grown to the state of crown closure. Past planting results for *Rhizophora* at Mar Fafako have not been very favourable because of the use of floating viviparous seeds. The success of the planting this time can be attributed to the collection of mature viviparous seeds from mother trees, the good timing of planting, the selection of a suitable muddy soil site with an appropriate duration

of flooding and avoidance of the sea water temperature becoming too high by means of dense planting as advised by the UICN supervisor. These facts are the same as at Djirnda. The spread of a green mass of leaves due to the dense planting gives the impression of a high survival rate as well as high growth rate. The proximity of the planting site has produced a strong demonstration effect for the villagers, enhancing the attitude of local residents to protect mangrove plantations, including voluntary supplementary planting to replace dead seedlings. All of the viviparous seeds planted in the second year have so far survived.

At Bangalère, the survival rate of the viviparous seeds planted in the first year is only 8.7% (750 out of 8,600). The reasons for this very low survival rate are the low quality of the planted viviparous seeds, the short duration of the flooding of these seeds with sea water due to the relatively high elevation of the planting site and planting at a sandy site. However, the surviving *Rhizophora* is very vigorous. If the trees continue to grow, there is a possibility that they will spread by means of natural regeneration even though the overall coverage will be fairly small. Better seeds were collected in the second year and 7,000 and 16,000 viviparous seeds were planted with a planting distance of 50 cm x 50 cm and 35 cm x 25 cm respectively at muddy sites of which the ground elevation is slightly higher than that in the first year (meaning that the duration of flooding by sea water is longer). As the highest salinity in the dry season at Bangalère is around 5%, the planting in the second year is expected to be successful.

(6) Implications for the Master Plan

From the viewpoint of the self-reliant continuation of planting by villagers, an annual planting volume of 20,000 viviparous seeds appears to constitute a rather heavy workload. The planting of approximately 10,000 viviparous seeds is a more manageable volume for one village. In regard to the planting density, a planting distance of 25 cm x 25 cm is advantageous to achieve quick crown closure but means fairly heavy work. As the survival rate is probably the same for a planting distance of 50 cm x 50 cm, the employment of this planting distance is appropriate in consideration of the workload.

4.1.2 Planting of *Avicennia*

(1) Background

The planting of *Avicennia* at the two villages listed below was decided at the planning workshop. The depletion of mangrove forests is continuing in the Saloum Delta due to an increased level of salinity caused by drought, cutting by local residents, sedimentation and the construction of roads, etc. The planting of *Avicennia* aims at conserving or restoring these mangrove forests. The target sites for the planting of *Avicennia* are primarily those with a high salinity level. The reason for the planting of *Avicennia* at Dassilamé Sérère where the salinity level does not rise high is

that this was decided at a general meeting of the villagers because of the apparent degradation of *Avicennia* forests around the village in recent years.

(2) Subject Villages

1) Dassilamé Sérère (supervising body: UICN)
2) Gagué Chérif (supervising body: WAAME)

(3) Activity Plan

Potting of *Avicennia* seeds twice in 2003 and 2004 in the period from July to September when a large quantity of seeds can be collected. The planning details for the first year and second year are described below.

First year : planting of 5,000 potted seedlings over an area of 0.5 ha shaped to suit the river course with a planting distance of 1 m x 1 m

Second year : planting of 5,000 potted seedlings over an area of 0.125 ha shaped to suit the river course with a planting distance of 50 cm x 50 cm

(4) Implementation of the Plan

1) Establishment of Responsible Body

At Dassilamé Sérère, an environment committee was set up under the village development committee and this committee was made responsible for the planting of *Avicennia*. At Gagué Chérif, a member of the management committee was appointed as the responsible person for the planting of *Avicennia*.

2) Details of Planting Activities

The planting of *Avicennia* takes the form of the replanting of seedlings produced at a nursery. A range of preparatory work is, therefore, required, including reconfirmation of the planting site and nursery site, procurement and transportation of the equipment and materials required for the construction of the nursery and nursing, installation of shading, placing of wooden frames for placing of the pots, filling of the pots with soil, collection of seeds and sowing of the seeds into the pots.

At Dassilamé Sérère, six wooden frames were placed in the first year after reconfirmation of the nursery site. Seeds collected in the Saloum Delta area were sown in pots placed in four of these wooden frames while seeds collected in the Somone area were sown in pots placed in the other two wooden frames. The rainy season (August) in 2003 was particularly wet and the potted seeds were washing away by downpours and the tide, forcing local residents to

conduct the additional work of collecting supplementary seeds each time. As a sufficient quantity of seeds was not available nearby, the shortage of local seeds was compensated for by seeds collected by the UICN supervisor at Somone. By the time that 6,000 seeds had been potted from mid-August to early September after two incidents of loss, local people had learned their lesson and fixed the wooden frames for the pots with string to avoid any further loss due to rain or the tide.

Some three months after seeding, many of the seedlings had grown more than 50 cm, indicating favourable growth. This favourable state of the seedlings was due to the prevention of damage by fish by means of installing nets around the nursery, using shading and the low salinity level in 2003 because of the high rainfall. Because of better growth than expected, the planting timing was forwarded and some 5,900 seedlings were transplanted with a planting distance of 1 m x 1 m from late November to mid-December, 2003.

In the second year, 6,000 seedlings were produced as in the case of the first year. As the *Avicennia* nursing and planting experiment had established that the transplanting of 1.5 month old seedlings would achieve a good result, the seeds for the second year were collected in late July and transplanted in mid-September, 2004 with a planting distance of 50 cm x 50 cm.

Some 100 people led by members of the environment committee conducted the series of work described above in both the first year and the second year.

At Gagué Chérif, it was decided at a general meeting of the villagers to set up the planting site for the first year at Yaay A plot of 100 m^2 was set aside near the planting site for a nursery. Four wooden frames (one of which was a reserve) were placed to grow 2,000 seedlings each, totaling 6,000 seedlings. These wooden frames were encircled with netting to prevent damage to the seedlings by fish and shading made of klantan (like a draining board made of shredded bamboo) was placed above each wooden frame to prevent a temperature rise. The supply and transportation of the materials for the nursery were slightly delayed from the original schedule but the nursery was set up from late August to early September and the pots were filled with soil. As the rainy season in 2003 was quite wet, many seeds were washed away by rain, making it impossible to collect seeds from nearby *Avicennia* stands which were not many to start with. For this reason, the WAAME supervisor and some members of the management committee collected 2,500 seeds in late October and an additional 3,500 seeds in early November around Diogane. These seeds were then potted after pre-treatment. Because of the poor quality of these seeds, however, nursing was unsuccessful. In the second year, some 6,000 seeds were collected in mid-August, 2004 and were then potted.

(5) Activity Results

Some 3,400 seedlings planted at Dassilamé Sérère in the first year are still alive as of September, 2004, recording a survival rate of 58%. The surviving *Avicennia* seedlings are vigorous and there is a good chance of their further growth to create a stand as the planting site receives fresh water supply from upstream. In regard to the second year, planting was conducted in September, 2004. However, it is unclear how many of the transplanted seedlings will survive as they have been eaten by fish. At Gagué Chérif, some 43 seedlings produced in the first year have remained unplanted. These will be planted in the second year together with newly produced seedlings.

(6) Implications for the Master Plan

As far as the future planting of *Avicennia* seedlings is concerned, the production of 6,000 seedlings by a village constitutes a heavy burden. The production of some 4,000 seedlings, i.e. two-thirds of the number under the Pilot Project, is more realistic if villagers continue to plant *Avicennia* on a self-help basis.

Places such as Gagué Chérif where the salinity level reaches some 7% in the dry season are not particularly suitable for the growth of *Avicennia*. However, selection of the planting sites for *Avicennia* is based on the existence of naturally growing *Avicennia* trees and the best way forward for the planting of *Avicennia* is to conduct dense planting with a planting distance of 50 cm x 50 cm or even 25 cm x 25 cm in order to secure the survival of many seedlings. Once the base for growth is established, the planted *Avicennia* is expected to propagate through natural regeneration.

4.1.3 Creation of Village Forests

(1) Background

The creation of a village forest was decided at the planning workshop by the following three villages. Given the fact that mangrove wood is popularly used in the Saloum Delta area, the conservation of mangrove forests requires the supply of alternative wood to mangrove wood. This requirement led to the planning to the creation of a village forest.

(2) Subject Villages

1) Dassilamé Sérère (supervising body: UICN)
2) Bangalère (supervising body: WAAME)
3) Bassoul (supervising body: WAAME)

(3) Activity Plan

Creation of a plantation of some 1 ha in two years by the planting of *Eucalyptus camaldulensis*, *Melaleuca leucadendron*, *Proposis juliflora* and/or new species (such as *Tectona grandis*) with a planting density of 1,111 seedlings/ha and a planting distance of 3 m x 3 m.

(4) Implementation of the Plan

1) Establishment of Responsible Body

At Dassilamé Sérère, an environment committee was established under the village development committee and was assigned the responsibility for creating a village forest. At Bangalère and Bassoul, a village forest committee and a villagers' committee for village forest respectively were established under the management committee.

2) Details of Activities

The types of work involved in the creation of a village forest include reconfirmation of the planting site by villagers, procurement and transportation of fencing materials, erection of fencing, procurement and transportation of seedlings and planting of seedlings.

In the first year at Dassilamé Sérère, seedlings of *Tectona grandis* and *Gmelina arborea* were planted in August, 2003 as an experiment in addition to *Cassia siamea*, *Prosopis juliflora* and *Acacia mellifera*, all of which are often used for afforestation purposes in Senegal. Seedlings of *Tectona grandis* were specially obtained from the Casamance Region with the assistance of the DEFCCS as the planting of this species in Senegal is only conducted in this particular region. The number of seedlings planted was 120 per species, totaling 600 seedlings.

In the second year, 120 seedlings each of five species, i.e. *Tectona grandis*, *Gmelina arborea*, *Prosopis juliflora*, *Cassia siamea* and *Eucalyptus camaldulensis*, were planted in August, 2004, again totaling 600 seedlings. While efforts were made to produce these seedlings at a village nursery, the germination rate was very poor for all species except *Eucalyptus camaldulensis*. The necessary number of seedlings was finally supplied by the DEFCCS. In regard to the planting work in the first year, some 100 villagers with slightly more men than women, many of which were members of the environment committee, were mobilized for the creation of the village forest at the same time as the planting of the *Avicennia* seedlings. The number fell to some 30 in the second year.

The candidate sites for the village forest at Bangalère were selected at the planning workshop held in May, 2003 and Thiora Sarr was finally selected at a general meeting of the

villagers held on 11th July of the same year. The planned species and number of seedlings for planting were 150 for *Eucalyptus camaldulensis*, 100 for *Acacia mellifera*, 200 for *Prosopis juliflora* and 200 for *Malaleuca leucadendron*. While an area of 3 ha was reserved in view of possible future extension, the planting area in the first year was 0.5 ha. After fencing the area, planting was conducted in late August, 2003. The seedlings were obtained with the assistance of the Fimela Nursery of the DEFCCS. The planting was mixed planting. Although weeding was delayed, some 60% of the originally planned area was planted in early November. At the time of the interim evaluation, it was decided to introduce barbed wire fencing to prevent the seedlings from being eaten by animals in the dry season.

In the second year, a village nursery was established to supply seedlings. The number of seedlings actually produced, however, was insufficient and the shortfall was met by the WAAME. While the species planted were the same as those in the first year, the number of seedlings differed: 300 of *Eucalyptus camaldulensis*, 140 of *Melaleuca leucadendron* and 160 of *Prosopis juliflora*, totaling 600 seedlings. In addition, 298 seedlings of *Acacia mellifera* ere planted around the plantation in August, 2004. The some 50 participants in the first year were all men. In the second year, women were also present among the some 50 participants.

At Bassoul, Ndambara was decided as the planting site at a general meeting of the villagers held in July, 2003. A decision was also made to set up a nursery at Thiambraké to produce seedlings in the second year onwards for the village forest. This planting site could be extended for three years. The boundaries for the first year's plot were determined and posts and fencing netting were installed along these boundaries to prevent the planted seedlings from being eaten by domestic animals.

Planting was conducted in September, 2003, led by members of the villagers' committee for the village forest and the GPF. The seedlings for planting in the first year were obtained from the Fimela Nursery with the assistance of the DEFCCS and were transported to the village. Because of inadequate communication, however, the handling of these seedlings by the villagers was inadequate. The species and number of seedlings planted by means of mixed planting were *Eucalyptus camaldulensis* (100), *Prosopis juliflora* (200), *Melaleuca leucadendron* (70) and *Acacia mellifera* (200). The planting distance was 3 m x 3 m. At the interim evaluation stage, it was decided to erect barbed wire fencing to deter the possible invasion of animals.

In the second year, while the village nursery was set up, the quantity of seedlings supplied by this nursery was insufficient and the shortfall was met by the WAAME. The species

planted were the same as those in the first year. To be more precise, 300 *Eucalyptus camaldulensis* seedlings, 140 *Melaleuca leucadendron* seedlings and 160 *Prosopis juliflora* seedlings, totalling 600 seedlings were planted. A further 100 *Acacia mellifera* seedlings were planted around the plantation in August, 2004. The number of participants in the first year was only 23 (four men and 19 women) but increased to 58 with a considerable increase of the number of women to 53 along with five men in the second year.

(5) Activity Results

The efforts to create a village forest at Dassilamé Sérère were characterized by the experimental planting of teak which had previously only been planted in the Casamance Region in southern Senegal. As of September, 2004, 89 *Tectona grandis* seedlings (74%), 105 *Gmelina arborea* seedlings (88%) 90 *Prosopis juliflora* seedlings (75%), 45 *Acacia mellifera* seedlings (38%) and 85 *Cassia siamea* (71%) seedlings have survived. Some especially vigorous *Tectona grandis* seedlings have grown to a height of more than 2.5 m in one year.

At Bangalère, the survival rate as of September, 2004 for the seedlings planted in the first year is 87% for *Eucalyptus camaldulensis* (174 out of 200), 68% for *Melaleuca leucadendron* (34 out of 50), 82% for *Prosopis juliflora* (164 out of 200) and 94% for *Acacia mellifera* (94 out of 100). The survival rate as of September, 2004 for the seedlings planted in the second year is 73% for *Eucalyptus camaldulensis* (218 out of 300), 72% for *Melaleuca leucadendron* (101 out of 140), 94% for *Prosopis juliflora* (151 out of 160) and 87% for *Acacia mellifera* (259 out of 298).

At Bassoul, the survival rate as of September, 2004 for the seedlings planted in the first year is 76% for *Eucalyptus camaldulensis* (152 out of 200), 60% for *Melaleuca leucadendron* (30 out of 50), 0.5% for *Prosopis juliflora* (1 out of 200) and 38% for *Acacia mellifera* (38 out of 100). The survival rate as of September, 2004 for the seedlings planted in the second year is 78% for *Eucalyptus camaldulensis* (234 out of 300), 69% for *Melaleuca leucadendron* (97 out of 140), 96% for *Prosopis juliflora* (153 out of 160) and 79% for *Acacia mellifera* (248 out of 314).

(6) Implications for the Master Plan

For the creation of village forests, *Eucalyptus camaldulensis*, local species and a species new to the local areas were planted to produce firewood and building timber. As the potentially most promising species with a high survival rate is *Eucalyptus camaldulensis*, it may be a good idea to primarily plant this species with thorny *Acacia mellifera* being planted around it for protection. However, certain species are better suited to certain localities than others while there are some species, such as *Anacardium spp*. of which the nuts can earn cash income. Given this situation, it will be necessary to further study the specific conditions of each village to plant the most suitable species.

4.1.4 Production of Protective Masks for Apiculture

(1) Background

The production of protective masks for apiculture was decided at the planning workshop held in Moundé. In some honey producing areas using mangrove forests in the Saloum Delta, there is a shortage of protective gear, including masks. The production of protective masks for apiculture was selected as an activity under the Pilot Project to assist villages in these areas.

(2) Subject Village

Moundé (supervising body: UICN)

(3) Activity Plan

Holding of a training session to produce protective masks for apiculture four times a year, training 10 villagers each time.

(4) Implementation of the Plan

1) Establishment of Responsible Body

At Moundé, a heavy cloth shoes, gloves and mask committee was established under the village development committee.

2) Details of Activities

In both the first year and second year, a training session on the production technique was held four times. The participants were predominantly members of the committee to start with but other villagers gradually began to participate. These participants quickly mastered the necessary technique and even applied their own ideas, including the introduction of double bellows to the lower part of the mask to reduce the feeling of choking and the use of a baseball cap as part of the protective mask. By the time of the completion of the fourth training session, activities became more spontaneous as several improvement measures were proposed by the villagers based on the results of the trial use of the earlier products.

(5) Activity Results

At the training sessions designed to produce protective masks for apiculture and heavy cloth shoes and gloves for shellfish collection, 16 masks and 17 masks were produced in the first year and second year respectively. More masks were, in fact, voluntarily produced by the villagers and were actually used.

Based on the experience of the initially produced masks not entirely preventing bee stings, the Moundé model of a protective outfit with a mask forming an integral part of the protective clothing (with heavy cloth shoes and gloves) was invented.

(6) Implications for the Master Plan

The villagers of Moundé have mastered the necessary technique to produce a protective mask for apiculture and are now capable of continuing production without external assistance. Those villagers with suitable skills can even teach them to people of other villagers.

4.2 Fisheries

4.2.1 Introduction of an Improved Type of Smoking Furnace

(1) Background

Mangrove trees are used for firewood to smoke ethmalose in Saloum Delta. It is necessary to reduce mangrove firewood consumption because, if demand for mangrove firewood increases more than dead tree generation, it encourages live tree cutting. A measure to solve the problem is to improve the heat efficiency of the present smoking furnace.

(2) Implementing Villages

1) Djirnda (UICN)
2) Bassoul (WAAME)

(3) Activity Plan

Most units of smoking furnace in Saloum Delta have various widths and lengths, and are designed to place ethmalose on the wire net with a single layer. It is necessary to improve low heat efficiency of such units of the present smoking furnace. Since they are open type models, most of the smoke generated goes out of the furnace over the open top. The ways to change the condition are as follows:

1) Improving heat efficiency by converting them from open-top to closed-up type.
2) Reducing firewood consumption by equipping them with double layers, instead of a single one, for placing fish.

To implement the two measures, we adopt a closed-up type with a ceiling and front covers, and introduce wire baskets to make it easier to handle raw fishes.

Two units of smoking furnace --- one of which is the improved type as mentioned above and another is the former type --- are constructed to compare their heat efficiency and workability. Management organizations for this activity should include community rural (CR) of Bassoul to accomplish an ideal organizational output (Details are mentioned in the sections on the organization in this paper).

(4) Implementation

1) Organization

Members of the smoking furnace management committee were chosen in July 2003 at Djirnda, and they took responsibilities to manage materials and funds. As for the pilot project of Bassoul, a smoking furnace management subcommittee under the CR environment committee does not work because all the activities proceeded only on the Bassoul village level. A smoking furnace management subcommittee was established under the village-level management committee, and it organized both the construction/maintenance group and the processing/sales group.

2) Sequence

They constructed a set of improved and former smoking furnace each in Djirnda in February 2004, and implemented comparative processing 7 times from March to April in the same year.

A CR meeting in Bassoul in July 2003 decided the construction site at Tambaye with the participation of CR assemblymen, CR animators and village representatives. Each set of improved and former smoking furnace were constructed in February 2004, following the three comparative processing experiments from April to June 2004.

(5) Results

The experimental results showed that the amount of firewood needed to smoke 100 kg of raw fish with the old furnace is 14 kg with the improved furnace and 32 kg with the former type. In other words, firewood consumption can be reduced 57 % by using the improved type. Weight ratio on the final product to raw material is 26 % for the improved furnace and 22 % for the former type, meaning an increase of 4 % with the improved furnace.

The women carrying out the experiment pointed out the following advantages of the improved smoking furnace.

・ Better workability : Wire baskets and burning stability make the working period shorter.

- Better quality : The product is of consistently good quality and better taste.
- Better sanitation : Fish placement in the furnace without sand improves sanitation.
- Reduction of smoking pollution : The improved smoking furnace doesn't bring smoking pollution to the workers or the nearest village.
- Clean product : They can cook the final product without washing.

Burkina buyers and Guinean workers also confirm quality improvement in the product made with the improved smoking furnace.

The following problems still remain:

It is necessary to promote the improved furnace more to Guineans working in the fish smoking business by increasing the smoking product output through higher operation frequency in Djirnda. To address this issue, an easier way to obtain raw fish must be explored and found.

The improved smoking furnace did not work well during the pilot project because of the delayed organization stability and difficulty in obtaining raw fish in CR Bassoul. It is necessary to display better results to advance the management organization and sustainable activities at Bassoul village.

(6) Contribution to the Sustainable Management Plan

It is necessary to reduce mangrove cutting for firewood to promote conversion of the improved smoking furnace and to enforce the limit of a total allowable number of units of it in Saloum Delta.

4.2.2 Introduction of a New System for Mangrove Oyster Management

(1) Background

Oyster is a fisheries resource that depends greatly on the mangrove ecosystem. It is an important source of income, so fisher folk try harder every year to catch it. As a result, the fishing grounds become farther from the villages and oyster becomes smaller in size. The fisher folk have set no-fishing zones and period during the rainy season. However, such efforts in each village often fail because people out of the village violate such regulations. Therefore, it is necessary to introduce a new system for oyster management in the Sokone Fresh Oyster Association.

(2) Implementing Villages

The Sokone Fresh Oyster Association (four villages including Medina Sangako, Bambougar El Hadji, Sandicoly and Soucouta)

(3) Activity Plan

We plan to establish an oyster resource management system in which targeted fishing grounds are utilized on a rotational basis with a closed fishing season for 1.5 years. It is necessary to hold an oyster resource management conference with all the people who use the targeted fishing grounds and to forge a consensus on how to manage the mangrove oyster resource. Keeping a log on for oyster harvest operations brings the important data for managing the resource.

(4) Implementation

1) Organization

An executive committee under the association is responsible for all the activities concerned. The natural oyster management committee under the association communicates and coordinates among association members and non-members.

2) Sequence

The four villages decided the target fishing grounds and identified all the user villages of them at meetings in each village. Based on the results, the following agenda was discussed at the oyster resource management conference in October 2003:

- Report on the result of meetings in each village.
- Discussion on and approval of the target fishing grounds.
- Decision on the closed fishing grounds for 2003-2005.
- Confirmation on the procedure of a petition for closed fishing grounds to the authority
- Tentative countermeasures until the procedure of the petition will have completed.

They decided four fishing grounds to close from January 30, 2003 to April 30, 2005. Further oyster resource management conferences were held in January and June 2004 to confirm the ongoing and next closed fishing grounds after May 1, 2005.

(5) Result

The ten target fishing grounds are shown in the table 4.2-1.

Table 4.2-1 Targeted management oyster fishing grounds

Village Names	Targeted Fishing Grounds	The Fishing Ground User's Village
M dina Sanghako	Nakhel	Sandicoly, M dina Sanghako)
	FI Ngalin	Soucouta, Medina Sanghako
	Djil ne	
Bambougar El Hadji)	Ansou Kodou	Bambougar El Hadji
	Ndinring	
	Kal Baak o Mb thiand	
Sandicoly	Nakhel N° 2	Sandicoly, M dina Sanghako)
	Mbin Sambel	Sandicoly, Santhie Taba, Sokone, Santhie Berra, Diagl , Djokholo, Sadioicounda
	Kal Konkar	Sandicoly, Soungar
Soucouta	Koko	Soucouta
	FI Ngalin	Soucouta, M dina Sanghako)
	Djil ne N° 2	

※1 Nakhel and Nakhel N° 2 are the same fishing ground.
※2 Djilene and Djilene N° 2 are the same fishing ground.

IUCNtakes charge of legal procedures for the closed fishing grounds. All the procedures have been completed except the governor's signature. Although several violators stole oysters in the closed fishing grounds at the beginning, there have been no more violators since signs indicating the closure were placed in each fishing ground.

The following are difficulties for the activity.

- It was difficult to fill in the operation log in the two villages though people in the other two villages filled it in. Details and measures on disclosure of their harvesting activities should be considered.

- The legal procedures must be renewed in May 2005 when the closed fishing grounds switch to the others in the rotation system. It will be a step in the right direction if this kind of management system operates well in the area.

(6) Contribution to the Sustainable Management Plan

We are planning to spread this oyster resource management system to the other areas in Saloum Delta if it proves successful in Sokone.

4.2.3 Extension of Mangrove Oyster Culture

(1) Background

The Joal Fresh Oyster Association has succeeded in switching from natural oyster collection to oyster culture due to the natural oyster deterioration, while Sokone Fresh Oyster Association has

not done the same because there have been rich mangrove oyster resources in Saloum Delta. However, in these days in Saloum Delta, natural oyster fishing grounds have been getting farther and oysters have become smaller in size. For sustainable utilization of natural oyster resources, it is necessary to promote the simple oyster culture that the local people can manage easily.

(2) Implementing Villages

The Sokone Fresh Oyster Association

(3) Activity Plan

We conducted experiments of both ways in natural juvenile collection with *guirlandes*/slate boards and oyster cultures by scattering young oysters on the ground in the park. At the same time, we offer a part of the park to the local people where they can try to culture the oysters as well as opportunities for the people to receive advice from oyster culture specialists occasionally. The experiments aim to find obstacles in the following aspects of oyster culture.

1) To scatter oyster shells on the ground.
2) To keep oysters avoiding from sunlight.
3) To segregate oysters from predators.

It is our intention to find out influences from characteristics of the bottom, sunlight and its heat, and predators during the process of oyster culture through observation on the mortality and growth rate.

(4) Implementation

1) Organization

The executive committee manages all the activities at the association. An oyster culture management subcommittee at the village level under the oyster culture management committee of the association is responsible for the oyster culture, particularly constant monitoring of the sites. These subcommittees were established in Bambougar El Hadji and Medina Sanghako in the first year, and Sandicoy and Soukouta in the second year.

2) Sequence

In the first year, oyster culture parks were constructed in Bambougar El Hadji and Medina Sanghako, then a expert from IUCNand responsible people from the association carried out young oyster scattering at the parks, and natural juvenile collections by means of *guirlandes* and slate board in the two villages mentioned. In the second year, two oyster culture parks

were constructed in Sandicoly and Soukouta villages, and then they collected natural juveniles by means of *guirlandes* and slate board in the four villages.

According to the results of the measures, oyster juveniles grew by 3.3 to 5.8 mm in 20 days after the scattering of young shells at the parks, showing a good growth rate. In case of the *guirlandes*, five juveniles were attached on a shell on average, and grew by 20 to 30mm in 1.5 to 2 months after the attachment. Slate boards showed 190 to 250 juveniles a board, and juveniles grew by 30 to 45mm in 1.5 to 2 months after the attachment.

(5) Result

The oyster culture experiment uncovered the following facts:

- Juveniles collected by the *guirlandes* (5,000 pcs. in Medina Sanghako, and 7,000pcs. in Bambougar El Hadji) have been growing without fail.
- Most juveniles collected by the slate boards (4,800pcs. in Medina Sanghako, and 6,000pcs. in Bambougar El Hadji) have died due to sunlight heat and predators.
- For attachment and growth of juveniles, the depth of 15 to 65cm from the bottom is suitable.
- It makes much sense to avoid sunlight heat for the sites without shade showed high mortality.
- The scattering method is suitable for oyster culture at the sites with a weak current.
- It is necessary to harden the ground with shells before scattering young oysters on the bottom.
- Predators' influences vary depending on sites.

(6) Contribution to the Sustainable Management Plan

Guirlandes is the most successful way among the 3 methods of scattering on the ground, *guirlandes* and slate boards. The local people have begun to trust the *guirlandes* method, which may spread in the near future. It is necessary to have the local people by themselves spread this method to other areas in Saloum Delta.

4.2.4 Value Added Shellfish Processing

(1) Background

Shellfishes such as ark, oyster, giant hairy melongena and volutes are the fisheries resources that depend much on mangrove forest throughout their life. Important economic activities for women in the islets of Saloum Delta are to collect, process and sell these shellfishes. Those women collect and sell the shellfishes after processing procedures such as boiling, fermentation and drying. The products are sold at low prices in spite of labor costs. In this plan, we aim to gain

additional value on the processed products though quality improvements and expanded distribution. Women's labor burden and catching efforts to the shellfish resources are to be reduced through the structural conversion from quantity- to quality-oriented business standards. In addition, environment funds will come from a part of the business profit, which will be used for planting village forests as a substitute of mangrove firewood.

(2) Implementing Villages

Mounde

(3) Activity Plan

We aim to produce and sell value-added products such as purified processed ark and smoked oyster by means of apparatus such as purification platform, drying platform and smoking box.

(4) Implementation

1) Organization

A fishery product processing committee was established under the village development committee at Mounde.

2) Sequence

The activities include processing equipments, shellfish processing improvements, commodity production and sales of the products. The village meeting named Nindor as the activity site and equipped purification platform, drying platform and smoking box at the site in January to February 2004. The following items are produced with these equipments.

① Purified processed ark

It is possible to eliminate mud inside the ark meat by conducting the purification process, and sand outside the ark meat by avoiding sand in the wind during the drying process on the improved drying platform.

② Smoked oyster

Smoked oyster is a new product with good smell, appearance and taste, which can be produced by means of the smoking box.

(5) Result

The committee was able to sell the purified processed ark at 25 g, 50 g and 100 g packing with promotion labels at the Tiaroye market. 15 kgs in total were sold at 1,000 Fcfa/kg, meaning that

value adding was successful (formally the product was sold at 750 Fcfa/kg). It will be possible to add more value with further sales promotions. The new products have completely removed sand and mud out of the meat, and consumers approved the quality. The smoked oyster has not come to the sales stage although it has turned out to be a new product with good appearance, smell and taste.

So far, people have acquired the skills to produce the new processed shellfish products though they cannot manage packing, labeling and sales promotion. It is necessary for the people to develop their skills in sale and to exploit new sales distribution networks.

(6) Contribution to the Sustainable Management Plan

Once this activity succeeds in adding the value on the shellfish processing products, it should be spread to other areas in Saloum Delta.

4.2.5 Self-Production of Shellfish Harvest Protectors (Gloves and Boots)

(1) Background

Many women harvest oyster in many villages in the delta. They hurt their hands and feet with the sharp tips of shells. They used to have used cloths around their hands and used socks on their feet bound with strings, but couldn't prevent injuries. Therefore they were likely to cut mangrove roots to collect oysters. This pilot project taught people how to make protectors such as gloves and boots with accessible materials at low prices. Gloves are the mitten type easily made using a thicker cloth on the palm. The boots making process involves cutting used cloths or rise sack, sewing it into beach sandals, and then attaching several strings. These protectors expedite the conservation of mangrove trees because people can harvest oysters without any fear of getting injured.

(2) Implementing Villages

1) Mounde
2) Sokone Fresh Oyster Association

(3) Activity Plan

The pilot project prepared to hold 4 training sessions on how to fabricate gloves and boots for 10 trainees at a time in 2 years.

(4) Implementation

1) Organization

The gloves and boots fabrication committee was established under the Mounde village development committee. The Sokone Fresh Oyster Association appointed responsible persons for the activity who taught people how to make them.

2) Sequence

The project offered 4 training sessions both in the first and second years for the people of Mounde. The trainees made 11 pairs of glove and 31 pairs of boots in the first year, and 31 pairs of gloves and 49 pairs of boots in the second year.

The project also offered 4 training sessions both in the first and second years to the Sokone Fresh Oyster Association. Trainees in the first year were only the members of the association. However, trainees in the second year included both members and non-members of the association.

(5) Result

In Mounde village, the trainees by themselves modified the protectors into many varieties such as an integrated type of trouser and sandal to be used in deep mud, conversion from beach sandal to wooden board or tire to strengthen soles, and from mitten type to the five-fingers-type of glove. They begin to fabricate protectors by their own materials so that they can use them not only for oyster collection but also for their other field works. It seems that these protectors have taken a firm hold on their life.

Meanwhile at the Sokone Fresh Oyster Association, further modification is necessary to strengthen the sole or to change materials on it, as well as to improve how to tie the strings to secure the heel in deep mud. A solution would be to introduce the integrated type of trouser and sandal devised in Mounde. Nevertheless, the introduced protectors are more suitable for oyster collection than other protectors available in the markets. The gloves available in the markets do not last more than 2 days and it is difficult to walk with the same boots once they are filled with water.

(6) Contribution to the Sustainable Management Plan

The introduced protectors will be more suitable for field use once modifications by the people have earned a good reputation. Some have already mastered techniques how to fabricate them in Mounde and the Sokone Fresh Oyster Association. From now on, those people should work as local lecturers and provide their know-how to others who collect oysters in the delta. Local

people with the protectors can apply in mangrove conservation the knowledge they acquired in environmental education because now they can harvest suitable oysters with their protectors.

4.2.6 Life Jacket Workshop Establishment

(1) Background

In the inlands of Saloum Delta, regulations by the local authorities such as the closed season and fine mesh size have failed to stop illegal shrimp fishing. A main reason is that there are no other occupations in the area during the dry season. We have tried to get local people to produce life jackets to promote economic activities in villages during the dry season. Life jackets are a necessity for village people because sea accidents in shrimp fishing operations are common. We held life jacket workshops to promote the production of life jackets during the dry season, help enforce the shrimp fishing regulations of the local authorities, and to contribute to mangrove conservation through the environment funds.

(2) Implementing Villages

1) Mbam
2) Kamatane Bambara

(3) Activity Plan

The pilot project produced 200 life jackets for 2 years in each village and tried to sell them (100 life jackets per year per village).

(4) Implementation

1) Organization

In Mbam, the management committee didn't work well at first. It was thus restructured twice and a production subcommittee, a quality control/inspection subcommittee and a sales subcommittee have come to take charge of the respective activity. In Kamatane Bambara, a management committee composed of representatives from fishermen, women's group, youth group and tailors is responsible for production and sales.

2) Sequence

In inland villages, there are usually several tailors who make cloths for village people. We established life jacket workshop groups with such tailors as core staff in Mbam and Kamatane Bambara. Some village youths received on-the-job training during the pilot project.

Life jacket materials should be purchased around the project sites if at all possible. However, there are a few materials that can be obtained only in Dakar. Therefore it is necessary for the village workshops to secure access to the suppliers at Dakar, and to establish life jacket sales networks as well.

In the first year in Kamatane Bambara, they made 100 life jackets and sold 91 of them. 62 life jackets have already been paid for but 29 have not been, while 9 life remain in stock. The main reason why they couldn't receive the payment is that fishermen faced bad luck in the shrimp fishing at the year.

At the first year in Mbam, they made 111 life jackets and sold 59 at 5,000 Fcfa/pc. Among them, 54 life jackets have been paid for and 5 have not been, while 52 remain in stock. The reason why there remains a lot of stock is that the shrimp season was over before the formation of life jacket workshops due to poor communications among the members as well as other village organizations.

In the second year, both village people modified their life jackets by using elastic float material at their initiative. As of the final evaluation, the management committee in Kamatane Bambara made 50 life jackets (balance 50 pcs.) and sold 7 pcs. at 7,000 Fcfa/pc. Meanwhile, the management committee in Mbam made 17 life jackets (balance 83 pcs.) and sold 17 at 7,000 Fcfa/pc.

(5) Result

The village people solved problems that the former life jackets were short of buoyancy and the float material broke easily. They said before that they could not sell their products with confidence, but after the modification they are proud to produce and sell them. Shrimp fishermen rate the quality of the life jackets as on par with an imported one.

The management committee in Kamatane Bambara has deposited business profits to a small-scale financial institution in the area while keeping records on income and expenditure. Committee members have steadily improved their basic administrative and management skills. Meanwhile, people in Mbam set up a new executive committee under the management committee of the pilot project in August 2004, which is the 3rd executive committee since the beginning. The new committee has a policy of promoting sales in partnership with other village organizations.

The accountant of the committee in Mbam manages the business profits and deposits them to the credit mutual in Djilor. However, she has to keep track of everything including income and expenditure because management staff members have a high turnover rate and the handover

process seems to be insufficient. The committee needs to solve this problem and do its best in the sales activity.

It is necessary for the management committee in Kamatane Bambara to maintain a balance between the concept of the pilot project and the business activity by establishing an environment fund from the business profits.

(6) Contribution to the Sustainable Management Pan

We expect that the business activities in the two villages will grow into the economic activity group (GIE) in the near future without any spread of similar activities to any other village.

4.2.7 Fish Aggregating Device (FAD) Introduction

(1) Background

Inland waters in Saloum Delta where mangrove forests have disappeared are poor in plant organic matters and have often incurred an increase in water temperature by a lack of shade from sunlight. This is a very severe water environment for aquatic lives. Efforts toward fishing ground environmental improvement are needed for sustainable utilization of fisheries resources in this area.

Mangrove plantation means long-term fishing ground preparation through supplying plant organic matters and shade as mangrove trees grow. The fish aggregating device (FAD) can be a partial substitute to mangrove forests for temporary improvement in fishing ground environmental until the planted mangrove trees have grown. At the same time, one can constantly harvest fishes around the FAD. The pilot project offers an opportunity to remind residents of tight and vital connections between mangrove forests and fisheries resources.

(2) Implementing Villages

Gague Cherif

(3) Activity Plan

The FAD is a pair of bound brunches with anchors in the water, where it should stay in the closed fishing season for a certain period such as the rainy season. That way, the same season can work as the spawning season for conservation of fish juveniles. Barriers should be built around the FAD to keep fishermen from operating in the area. After the closed fishing season, people catch fishes around the FAD with the regulated mesh-sized nets for juvenile protection.

(4) Implementation

1) Organization

The management committee carried out all the work for FAD implementation.

2) Sequence

The activities include FAD production, installation and monitoring. A village meeting in July 2004 decided the site to be in Yaay (northern channel from the village, beside the *avicenia* plantation site) and Sangue (southern channel from the village, about 40 minutes from the village on foot). The residents and WAAME members installed the FAD in Sangue in August 2004, and on the following day in Yaay. They added some branches on the FAD 4 times during the project period to maintain effectiveness.

They implemented the experimental operation to study the FAD effectiveness on the adult fish in Sangue in March and in Yaay in June 2004. The test operations were done at three sites: around FAD, near mangrove trees and without the FAD or mangrove with beachseine (210d/12, 2 inches stretched mesh, 200 m in length).

They also implemented a test operation on juvenile nursery effect at both sites in August to September 2004 with a fishing gear called *killi* (1.5-inch mesh). After measuring the size and species, they released all juveniles caught.

(5) Result

In the adult fish test operation, they caught tilapia, mullet and *caranx* at the FAD site, tilapia and mullet at the mangrove site, and tilapia, mullet and slip-mouth at the site without the FAD nor mangrove. The catching weight was 3.5 kg at the FAD, 3.9 kg at the mangrove site and 2.6 kg at the site without the FAD or mangrove.

In the juvenile test operation, they caught tilapia (32 of them, 3.6 to 6.0cm) and ethmalose (2 of them, 6.5 to 7.0cm) in Yaay, and slip-mouth (18 of them. 6.5 to 8.5cm) and ethmalose (6 of them, 7.0 to 8.5cm) in Sangue.

The adult fish test operation showed that the sites with mangrove or the FAD attract fish better than the site without them. According to residents' monitoring, the FAD attracts large fish throughout the year even though fishes disappear in other waters. In particular in Sangue, there are large carp, mullet and tilapia. Meanwhile, we observed many young fishes going through the net meshes and we caught adult tilapia breeding in the mouth during adult fish test operations in Yaay. It is obvious that the FAD has a positive effect for juvenile nursery.

The committee has taken the legal procedure at the prefectural office to use the FAD to restrict fishing, while outside fishermen continue to violate fisheries regulations around the FAD. This phenomenon is a cause for a concern: without any controls or mangrove plantation activities, the FAD's effect in attracting fish may bring about negative impacts on mangrove plantation.

(6) Contribution to the Sustainable Management Plan

It is obvious that the FAD has impressive effect in attracting fishes as much as mangrove trees. However, it requires many branches on the land trees to construct and it is difficult to prevent violations of fisheries regulations. As the FAD may cause deterioration of land trees and fisheries resources without bringing about mangrove tree recovery, it should be taken away as soon as the measuring activity at the pilot project is terminated.

4.3 Ecotourism

4.3.1 Ecotourism

(1) Background

The mangrove in the Saloum Delta is a precious ecosystem, which maintains biodiversity, and it has recently raised interests among tourists. Under the sustainable mangrove preservation program, in addition to forestry, fishery and the improvement of living standards of local residents, tourism promotion has been contemplated and as a result, eco-tourism activity was carried out in the pilot project.

It is conceivable to build a guest house as the first step of ecotourism activities. But, it takes considerable initial investment, and a professional administrator is required for management and marketing or maintenance. Further, considering an average room occupancy of the hotels in Fatick stays below 20%, it would be more sensible for a community in the Delta to initiate an eco-route by combining existing tourism assets rather than the establishment of physical facilities, which might damage environment.

On the eco-route of each village, traditional transportation means, such as a horse carriage will be employed rather than those with emission-rich engines. And the locally produced equipment will be given priority over imports. Further, in Eco-route, the traditional product of each village will be included as a souvenir article, and eco-guides drawn from the village population will guide the tourists. Some earnings from eco-tourism will be retained for environmental preservation.

Although hotels and travel lodges in the Saloum Delta offer day excursions, including visits to the island of birds, tourism assets in the villages of the Delta have been little recognized. By

launching and promoting ecotourism, more tourist will be solicited, fresh demand for the tourism assets will be created and local residents will directly receive benefits from it.

Tourists on a group tour follow a predetermined itinerary without much room for extra excursions whereas sejour-type tourists arrange activities upon arrival. The latter is a major target of ecotourism.

(2) Eco-villages

1) Dassilamé Sérère

2) Moundé

Have been selected as eco-villages.

(3) Planning activities for ecotourism

The following activities were planned to commence ecotourism:

- Establish an eco-route by combining such tourism assets as mangrove forests, historic remains, nature for 2-to-3 hour trip
- Employ environment-friendly and locally-manufactured means of transport on the eco-route such as a horse carriage, pirogue, kayak
- Train some of local residents as eco-guide
- Select one of traditional articraft as a souvenir article and include it in an ecotourism package as additional income to the village people, and
- Produce a brochure and distribute its copies to hotels, travel agents, Tourism Ministry and the National Park Department

Ecotourism commenced once the activities above were completed.

(4) Implementation

1) Organizational setup

A Comité Ecotourisme has been established in each village to put ecotourism in operation Dassilamé Sérère and Moundé. A Comité Villageois de Développement has been also set up to administer all activities including ecotourism.

2) Implementation of ecotourism

① Establishment of an eco-route and safety issues

After safety issues have been resolved, a single eco-route has been selected for Dassilamé Sérère, which starts from a village plaza on a horse carriage, ride on a boat on the shoal - navigation through small and large bolons - Drop at monkey habitat - disembark at a village landing site.

Among a few alternative routes for Moundé, it has been agreed, upon consultation with concerned offices and village people regarding tourists safety and time requirements, that its eco-route comprises the original village settlement, village historic spots, shell mound, old meeting place, landing place in a small inlet - by boat - village landing site.

Upon receipt of more kayaks, both villages will be able to let tourists ride on them, but for the time being, these set routes will be adhered to.

② Training of eco-guides

UICN held an intensive training seminar for eco-guides at Dassilamé Sérère in September 2003. The participants from the two villages totaled 8 persons (6 male, 2 female). Lecture contents are described elsewhere in this report. For the second year, a follow-up seminar was held at Moundé in July 2004.

③ Equipment

Minimum provision of equipment required to start ecotourism has been introduced. Major equipment constitutes a horse and carriage, one pirogue, one single-seat kayak and one unit of mobile phone. To ensure the safety of tourists, a certain number of life vests, which were manufactured by another pilot project villages, have been provided. In addition, the villages have been urged to fabricate protection boots by themselves, of which prototype was produced by Moundé and Sokone.

④ Pricing of the eco-tour

Upon consultation with UICN and the Comité Ecotourisme, both villages have set the price of their eco-tour at FCFA 5,000 per person. Hotels and travel agents will, reflecting their own costs and overhaed, decide their prices to be offered to their clients.

⑤ Brochure

UICN is to print an eco-tour brochure and to distribute copies to hotels and others. The brochure summarizes philosophy of the ecotourism, presents Senegal and Saloum Delta, introduces points of interest on the eco-routes with pictures, contains the package price and contact phone numbers. One thousand five hundred copies have been printed with A-4 type color print, and the same numbers will be printed soon.

⑥ Souvenir

It is expected that dyed fabrics will be manufactured by village women as a souvenir and test run has been successfully completed. They will procure materials by themselves without the assistance of the Project. The souvenir is included in the eco-tour package, but it is very important to not deteriorate the quality.

(5) Achievements To Date

The objective of this exercise is for village people to initiate tourism activities in a typical, remote village, which has been traditionally long engaged in agriculture and fisheries. As such, more constraints and problems have been encountered than originally expected, which has delayed the implementation of the project. However, as it has shown some progress, committee members and eco-guides have become keener on it and shown higher level of participation.

The equipment has arrived as planned; horse carriages were produced in Foundiougne, and kayaks were fabricated by village carpenters. Life vests were manufactured by other villages and have been duly distributed. Sample souvenir products have been tested. The price of the eco-route has been set at FCFA5,000 (or about Euro 8.00) at both villages.

One eco-guide in Dassilamé Sérère voluntarily accompanies a tour guide from a nearby hotel to refine his guiding skills. In Moundé, hoteliers have expressed concerns about the deteriorated conditions of the main bridge on the last leg of the eco-route. Village representatives asked for additional assistance for it, but eventually they agreed to repair the bridge by themselves.

The two villages held the launching ceremony of the eco-route in March 2004, but it was already in off-season. Dassilamé Sérère have received less than 20 tourists and Moundé a few only. As the tourism season for 2004-05 is to start soon, more tourists are expected to arrive.

(6) Sustainable management plan

As the provision of required equipment and transfer of knowledge and know-how for ecotourism have been put into place through pilot projects, the village people are considered fully prepared for sustainable operations on their own.

Eco-tourism is not to replace the existing industry, rather it intends to identify a new market. Considering the absorptive capacity of the eco-villages, it is possible and conceivable to transplant the idea to other villages in the Saloum Delta.

4.4 Dissemination, Empowerment, and Environmental Education

4.4.1 Implementation of Management Plans by CR

(1) Purpose

As part of empowerment activities, a seminar is to be held in cooperation with the rural communities (CR) that can be the main implementing agencies of natural resource management. The seminar is aimed at gaining understanding and agreement of CVR legislators and the village leadership on the "Sustainable Management Plan for Mangrove Forests". In addition, as an example of natural resource management by CR, improved furnace for smoking ethmalose is to be introduced and managed. Such furnace is expected to reduce consumption of mangrove firewood. A pilot project is to be held in CR Bassoul, a CR with 5 villages that are located entirely in mangrove areas.

(2) Implementing CR

Bassoul (by WAAME)

(3) Action plan

1) A seminar is to be held once a year in 2003 and 2004, respectively, to gain understanding and agreement of CR legislators and the county and village leadership on the "Sustainable Management Plan for Mangrove Forests".

2) As an example of natural resource management by CR, draft plans are to be formulated for building, operating and maintaining improved furnace for smoking fish, and setting up a management system as well as an operating system to allot earnings from furnace sales to the implementation of the "Sustainable Management Plan for Mangrove Forests".

(4) Plan implementation

1) Implementing agencies

The following organizations for operation and management are to be established:

- At the village level, the Village Resident Committee for Smoking Furnace Management (CVGFF) is to be set up for operating and managing smoking furnace to be built in each of the four villages under the pilot project and the Mangrove Project by EU/WAAME.

- At the CR level, the Council for Smoking Furnace Management (SCGFF) is to be set up under the Environment Commission to administer CVGFF in each village.

- Moreover, an environment fund is to be set up under the Environment Commission. This fund is to be based on part of earnings from sales of smoked fish and allotted for implementation of natural resource management activities.

CVGFF was set up in the village of Bassoul where two types of furnace --- one is conventional and the other the improved version ---- are to be built, but the other three villages have no such organization. Consequently, SCGFF is at the CR level is in name only. In reality, the CR vice chairman takes charge of SCGFF, and a group made up of legislators who deal with smoking work issues and CVGFF run its day-to-day affairs.

2) Activities so far

In both August 2003 and July 2004, a seminar was held in CR Bassoul with the participation of CR legislators, representatives of Bassoul village, fish smoking workers, and staff members of the Forest and Fisheries Bureaus. The numbers of participants were 41 in the 2003 seminar and 18 in the 2004 one, respectively. In the seminars, the following items were discussed and approved:

① Consistency between pilot project activities and the Local Development Plan (PLD)
② Establishment of a CR-centered system for construction, operation, maintenance and management of smoking furnace
③ Establishment of an environment fund

In 2004, the de facto furnace operation and management group took the lead in carrying out three comparison tests of furnace and selling of smoked fish. An account has already been established to pool necessary funds for fish smoking, and there is money to finance fish smoking work for the next term. However, due to reasons such as lack of fish to be smoked, no CR- or CVGFF-led fish smoking has been done, and the fund operating system is not

functioning either. There is a plan to establish additional accounts for a furnace maintenance and management fund and an environment fund, but it has not been put into practice.

(5) Results of activities

In terms of organization, SCGFF, which was planned to be established at the CR level, is not working in reality. However, CR legislators and CVGFF of Bassoul village are in charge of the operation and management of furnace. SCGFF is not functioning because the construction of smoking furnace in three other villages under the "Mangrove Project" has not begun and there is no CVGF except in Bassoul village. It has been confirmed with CR representatives that, at this point, there is little need to set up SCGFF, and management of activities by CVGFF of Bassoul village and the CR Environment Commission is simple and workable.

As a result of three comparison tests, CR stakeholders and fish smoking workers in Bassoul village have come to recognize many advantages of the improved smoking furnace. It has also been confirmed that, from now on, CR is to take the lead in replacing conventional furnace with the improved one to reduce consumption of mangrove firewood. However, no specific procedures have been set.

A system to allot a part of sales revenues to an environment fund has not been tries yet as the new furnace built in the project has not been used except in the comparison tests. The environment fund was set up when the fish smoking work of the fiscal year 2004/ 2005 began and generated sales revenues. The establishment of a maintenance and operation fund by CR is also planned for the next fiscal year, and the source of the fund is 10 % of the construction portion of the CR budget. With regard to management and operation of the environment fund, capacity building of the Environment Commission is needed in terms of expansion of sources of funds and usage of funds.

The top priority of Bassoul, the pilot CR, and other CR, is infrastructure development that leads to improvement of educational and healthcare services and production activities. Consequently, CR have not extensively dealt with natural resource management activities including mangrove preservation. PLD refers to mangrove resource preservation activities such as planting and reduction of consumption, but CR-led activities are limited to just a few such as planting on land. Entities such as CR need to keep up empowerment and educational activities toward decision makers at the county and national levels in a patient manner.

(6) Reflection of activities on sustainable management plans

In consideration of the trend of decentralization, CR, which are the municipalities closest to residents, are to be designated as the main implementing agency of natural resource management,

and long-term support is needed toward capacity building in project planning and implementation. Such support is to be in the form of seminars and empowerment activities toward leaders of CR and villages. Specific CR activities may include, based upon the result of a pilot project, restriction on the total number of smoking furnace units and establishment as well as operation of an environment fund. In light of the current state of CR legislators, implementation of such activities will need support to the formulation and implementation of an activity plan of CR (Environment Commission in particular).

4.4.2 Visits to Pilot Project Villages

(1) Purpose

The two target villages have been chosen as centers of technique dissemination for the following reasons: they are not only making, as pilot project, improved furnace for households, protective masks, footwear and gloves, but also introduced activities that can be extended to villages in vicinity; have struck a proper balance between natural resource management activities and production activities, both of which are led by residents and centered around mangrove. By having residents of villages nearby visit the target villages, specific examples of mangrove resource conservation activities and pilot project activities are to be disseminated and publicized.

(2) Implementing villages

1) Moundé (by UICN)
2) Mbam (by WAAME)

(3) Action plan

Each of the villages is to receive residents of villages in vicinity once a year for the following activities:

1) Introduction by residents of pilot project activities and other natural resource management activities.
2) A small seminar to exchange experiences in mangrove conservation activities.
3) Short training sessions on how to make improved furnace for households, protective masks, footwear and gloves.

(4) Plan implementation

1) Implementing agencies

The Visitor Receiving Committee under the Village Development Committee in Moundé village, and the (Visit) Organizing Committee under the Management Committee in Mbam

village, respectively, took the lead in organizing visits. All residents worked together and assigned themselves different tasks such as putting together arrangements for meals (accommodation), introduction of activities, and short technical training.

2) Activities so far

Mbam village received 36 visitors from 8 villages in 3 visits in total; and Moundé village, 30 visitors from 5 villages in 2 visits in total, respectively. In addition to the pilot activities in both villages, environmental protection activities in the villages were also introduced to visitors from other villages. Resident lecturers in Mbam village carried out short training on the making of improved furnace for cooking, and their counterparts in Moundé village implemented training on the making of protective masks, footwear and gloves for beekeeping, respectively. Residents of the implementing villages explained the purpose of each of the activities in connection with mangrove preservation, and they were also thoroughly educated on the importance and value of mangrove in everyday life and economic activities. Taking advantage of the visits of other villages' residents, the two villages promoted participation of their own residents with little knowledge of the pilot projects and carried out the introduction and dissemination of activities within the villages to them as both villages are large ones with more than 1,000 residents each.

(5) Results of activities

Through the visits, ties with villages in vicinity were strengthened and information exchange among villages was promoted. Residents of the receiving villages took increased pride and confidence their own villages and activities by presenting the activities. On the other hand, the invited residents of other villages had an opportunity to observe and experience new mangrove preservation activities such as *Avicennia* planting, and new economic activities utilizing mangrove resources such as beekeeping and shellfish processing. As a result, all the invited villages requested the implementing villages and the responsible NGOs for training on the making of improved furnace, protective masks, footwear and gloves for beekeeping, and there were technical inquiries from several villages on *Avicennia* planting and formation of community forests. At the request of the invited villages, resident lecturers of Mbam village carried out training on the making of improved furnace in 3 villages and 50 units of such furnace were already built. Likewise, resident lecturers of Moundé village are performing follow-up training for 9 people in 4 villages. The skills and know-how from the training are expected to be disseminated among residents for shellfish gathering in the next season.

Residents of both Mbam and Moundé villages are very positive about receiving visits of people from other villages and transferring learned skills to others. They have also acquired needed know-how for such activities.

(6) Reflection of activities on sustainable management plans

The management plan is to designate both Mbam and Moundé villages as "Model Villages for Sustainable Management of Mangrove Forests" and have these villages receive visitors from outside to publicize their activities. Visitors may include stakeholders from government, donors, NGOs and CRs, all of whom may set policies and provide funding, and representatives of resident organizations who are engaged in similar activities.

Through the short training carried out during the visits, Mbam and Moundé villages have gained recognition from villagers in vicinity as "the village of improved cooking furnace making" and "the village of the making of protective masks, footwear and gloves for beekeeping". Accordingly, resident lecturers of both villages are to help transfer technologies to villages nearby.

4.4.3 Dissemination of Improved Household Furnace by Resident Lecturers

(1) Purpose

To introduce and disseminate improved household furnace in villages that use mangrove trees as household fuel, and decrease consumption of mangrove trees.

(2) Implementing village

Bangalère (by WAAME)

(3) Action plan

A dissemination strategy with the following three steps is to be formulated:

1) Training of resident lecturers

Residents of Mbam and Mar Fafaco villages where units of improved household furnace have been disseminated to a certain extent are to be trained as lecturers. Meanwhile, based on the improved furnace of these villages, a new "conventional" version of furnace is to be developed.

2) Dissemination to target villages and training of resident lecturers

In Bangalère village, training for both resident lecturers of the two villages above and the making of a new "conventional" version of furnace is to be carried out in a hands-on fashion. After the training, resident lecturers of Mbam village and the responsible NGO

carry out monitoring on a regular basis, and train resident lecturers in Bangalère village as well.

3) Dissemination to villages in vicinity

Resident lecturers of Bangalère and Mbam villages carry out training for dissemination to villages in their vicinity and monitoring.

(4) Plan implementation

1) Implementing agency

The Management Committee that was set up in Bangalère village for the pilot project is implementing project activities with the support of GPF, an existing women's group.

2) Activities so far

Near the target villages, introduction and dissemination of improved household furnace have been attempted but proved so far unsuccessful for the following reasons:

① The number of people per village who acquire the needed skills is small.
② There is no follow-up on the training (especially after the rainy season).
③ Reproduction of furnace is difficult as their structure is complicated and casting molds are needed.

In light of the factors above, it has been decided to try to disseminate 2 to 3 types of furnace with relatively simple designs toward 15 to 20 people per village and strengthen follow-up efforts after dissemination.

The training in December 2003 on resident lecturers and improved furnace dissemination produced 3 resident lecturers each in Mbam and Mar Fafaco, and spread the Mar Fafaco-type furnace (with a metal pole) to residents of Mbam village. Subsequently, the resident lecturers of both villages carried out furnace dissemination training in Banglère village; after the training, resident lecturers of Mbam village and the NGO in charge implemented regular monitoring. In the training sessions, the significance of the introduction of improved furnace was explained in connection with preservation of mangrove resources. Such training sessions are also empowering activities for residents, especially women who happen to be training participants.

After dissemination in Banglère and Mbam villages, based on the ideas of furnace users and the responsible NGOs, it was decided that three types of furnace, i.e. one with a metal pole, one without, and one with three-point pole, are to be new conventional prototypes, and

methods of strengthening the fire door with accessible materials such as cans are also to be taught in training. From April 2004, resident lecturers of both Mbam and Banglère villages carried out dissemination training in the five neighboring villages of Gagué Chérif, Mbam Toucouleur, Sape, Lérane Coly, and Keur Aloui.

(5) Results of activities

By the end of June 2004, 140 women from 7 villages took part in the training, and 107 units of furnace were constructed in the meantime. Dissemination activities by residents continue after the training as well and 158 additional units of furnace were built. In total, 265 units of furnace were built in 7 villages. By the end of August, 20 units of furnace were damaged by storms in the rainy season.

According to users, the improved type of furnace has many advantages including the following: (1) Reduction of firewood consumption; (2) Shortened cooking time; (3) Reduction of smoke; (4) Kitchens have become cleaner and safer; and (5) They make it possible to make charcoal. With regard to firewood consumption in (1), comparison tests between the improved furnace and the old, three-stone one showed that the improved type of furnace reduces firewood consumption by 30 %. In interviews with women who use furnace, many stated that firewood consumption became one third or one half of what it had been. In other words, users feel that firewood consumption decreased more than it actually did, and such impression accelerate the dissemination of improved furnace.

Many villages want the same training on the making of improved furnace. More than 20 villages --- including islands --- such as Bassoul and Djirnda requested for training from residents of the implementing villages and the NGOs in charge.

(6) Reflection of activities on sustainable management plans

The pilot projects have proven that, for technical transfer in manufacturing that does not require large inputs, is based on the residents' needs, and can be addressed with technologies that residents already possess, the formation of a dissemination core with resident lecturers at the center as well as the dissemination to vicinities by resident lecturers are highly effective. In the management plans, the improved household furnaces are to be disseminated by resident lecturers.

4.4.4 Implementation of Empowerment Activities in Partnership with Local Sports and Cultural Activities

(1) Purpose

As inexpensive and effective means of empowering the general public, activities in partnership with local events and utilization of folklore performing arts are to be carried out on an experimental basis. A pilot project is to verify (1) whether utilization of local events such as football and traditional wrestling matches that attract many in and out of the village can expand empowerment effects in a geographical fashion and (2) whether folklore performing arts such as theater, dance and songs are useful means to get messages across to all people regardless of age and ethnic background.

(2) Implementing villages

1) Mar Fafako (by UICN)
2) Sokone Oyster Association (by UICN)
3) Gague Cherif (by WAAME)

(3) Action plan

In partnership with local events, the following empowerment activities are to be carried out once a year in each of the implementing villages.

1) Empowerment activities on the importance of mangrove resources and the need for conservation activities
2) Presentation on pilot project activities and other natural resource management activities in the implementing villages
3) Mangrove conservation activities by promoting organizations such as ASC

(4) Plan implementation

1) Implementing agencies

The Management Committees in the implementing villages and relevant organizations prepared and managed activities in cooperation with ASC and the Wrestling Committee in each village.

2) Activities so far

The empowerment activities as shown in the table below were carried out.

Target village /organization	Date	Event	Contents	Participants
Mar Fafako	6 Feb. 2003	Wrestling match	Importance of mangrove was stressed at awarding ceremony, and through theater, songs, and dance.	Several thousand including many from vicinities
	26 Aug. 2004	Football match		500, mostly Mar Fafaco residents
Gague Cherif	8 May 2004	"Mangrove evening"	In addition to contents above, introduction of pilot activities in the village and vicinity	600, including residents of 25 other villages
	27 Aug. 2004	Football match (4 villages participating)		900, including residents of 35 other villages
Sokone Oyster Association	28 Aug. 2003	Football match (4 villages participating)	Through folklore performing arts and awarding ceremony, importance of mangrove and oyster stock was stressed and activities were introduced.	300, including vicinity residents
	28 Aug. 2004	Football match (4 villages participating)		350, including vicinity residents

(5) Results of activities

From such factors as the number of participants, their diversity in terms of age and place of residence, and empowerment themes becoming household conversational topics even after the activities, it has been confirmed that the message on mangrove and environmental conservation has been widely and adequately disseminated.

Both Mar Fafako and Gague Cherif take note of the fact that the number of young people participating in environmental conservation activities has significantly increased since the empowerment activities. Signs of improvement in residents' awareness on environmental conservation include mangrove planting (by individuals as well as a village as a whole) and formation of community forests that are being done at the initiative of residents, not as part of pilot project activities. In addition, from residents in vicinity who took part in the training, there have been inquiries on (fish) pickles (Gague Cherif village) and Rhizophora planting technique (Mar Fafaco village). Mangrove planting is being carried out in 3 villages around Mar Fafaco with the support of its residents. Each village is holding wrestling and football matches on its own or in cooperation with other villages, and plans, from now on, to implement empowerment activities on environmental protection at sporting events.

The Sokone Oyster Association held football matches among the 4 participating villages and empowerment activities at the same time, strengthening ties between the Association and the

ASC in each village. In Sandy Coly village where the events took place, young people took the lead in Rhizophora planting, and residents' behavior toward mangrove has also reportedly changed.

It had been originally planned that the theater company in Mbam village was to be utilized in the first year and another of its own was to be utilized or formed in the second year for the purpose of empowerment activities. However, no theater company has been formed in Mar Fafaco and Sandy Coly although residents of both villages wish to have one.

(6) Reflection of activities on sustainable management plans

It has been confirmed that the combination of partnership with local events and utilization of folklore performing arts enables empowerment and introduction of technique to the general public, and results of empowerment such as change in behavior of residents and dissemination of technique have also been observed. Some villages have requested NGOs in charge for implementation of empowerment activities by such means. Pilot projects have confirmed that partnership with football matches is effective in getting youth involved in natural resource management activities.

Sustainable management plans are to solicit villages and government agencies that ask for implementation of empowerment activities, and use football matches in villages and CR as occasions to motivate youth for planting activities.

4.5 Pilot Project Implementation System

For the successful implementation of the Master Plan, the establishment of a system designed to ensure the smooth functioning of village (villagers') organizations will be essential to achieve the sustainability of various activities.

The following two approaches regarding the establishment of the implementation system were tried under the Pilot Project.

- Village-based implementation system (tried in villages other than those in RC Bassoul)
- RC-based implementation system (tried in RC Bassoul)

The village-based implementation system was based on the idea of securing the sustainability of activities by means of setting up the said system in each village for the time being given the fact that RCs did not yet have a sufficient management system (and capability). The linkage of this village-based system to RC organizations in accordance with the development of the management system in each RC in the future was intended. The expected results of this approach under the Pilot

Project was the development and actual functioning of a system/mechanism with which villagers' organizations would play a central role in the implementation of the planned activities.

Meanwhile, the RC-based implementation system intended the use of the section of the RC responsible for the management of natural resources which is the smallest unit of the local public body. As the administrative authority has already been transferred to this section, the trial sustainable management of mangrove forests under this system was in line with the ongoing decentralization policy of the Government of Senegal. The expected result of this approach was the development and functioning of a management system/mechanism by the RC in question.

(1) Village-Based Implementation System

1) Implementation Body Based on Village as Unit

Under the Pilot Project, a villagers' organization was established in each village, assuming the project implementation system shown in the conceptual diagramme in Fig. 4.5-1. The establishment of these organizations was decided at a general meeting of villagers with the assistance of a NGO except in the case of GIE Sokone which already existed. Although the nature of the organization varies from one village to another, there are common features for all organizations in that they reflect the initiative shown by villagers and that groups and/or persons in charge of specific activities are introduced under a body which controls all activities.

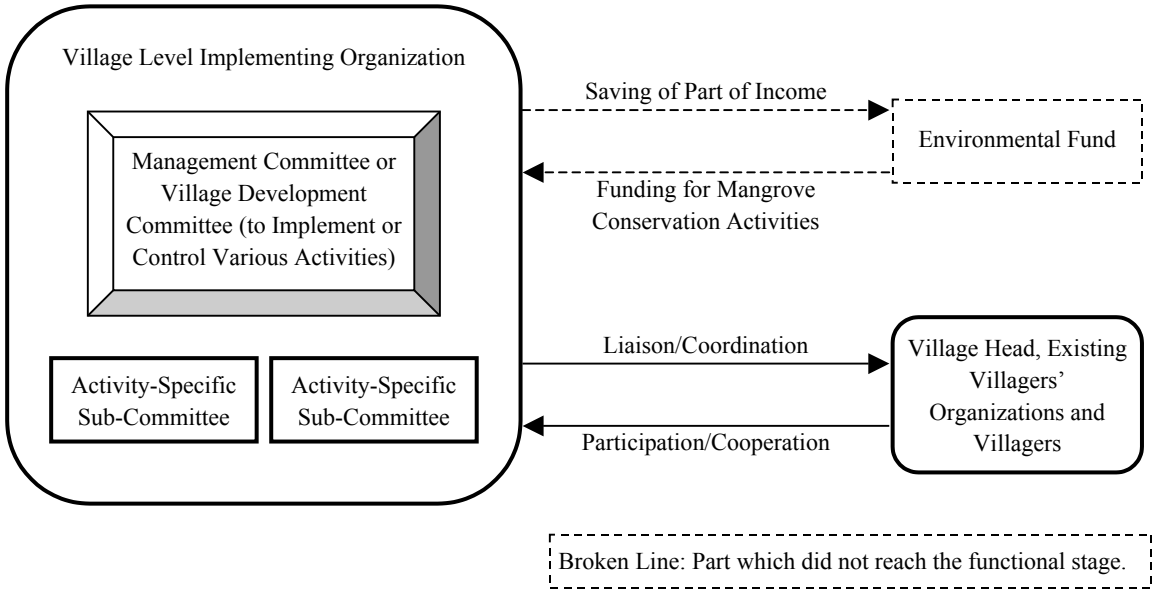

Fig. 4.5-1 Conceptual Drawing of Presupposed Implementation System at Village Level

The organizations established in each village for the Pilot Project, including those at Bassoul, are shown in Table 4.5-1.

Table 4.5-1 Villagers' Organizations Established in Target Villages of Pilot Project

Village	Controlling Body	Activity-Specific Organization	Remarks
Bangalère	Management Committee (MC or CG in French)	・ Rhizophora Planting Committee ・ Village Forest Creation Committee ・ Improved Domestic Oven Management Committee	
Dassilamé Sérère	Village Development Committee (VDC or CVD in French)	・ Planting committee ・ Environment committee ・ Eco-tourism committee	
Djirnda	VDC	・ Planting committee ・ Smoking kiln management committee	
Gagué Chérif	MC	・ Person in charge of planting of Avicennia ・ Person in charge of brush shelter fishing ・ Person in charge of assisting sporting and cultural activities	Persons in charge of specific activities were appointed instead of groups.
GIE Sokone	Executive Committee of existing union	・ Natural Oyster Management committee (NOMC) ・ Oyster Farm Management Committee (OFMC) (Oyster Farm Management Sub-Committee in each participating village) ・ Person in charge of the production of heavy cloth shoses and groves	The NOMC and OFMC were newly established as subordinate committees of the Union; appointment of a person in charge of the production of heavy cloth shoes and gloves.
Kamatane Bambara	MC		Only the MC was established as the production of life jackets was the sole activity.
Mar Fafako	VDC	・ Planting Committee ・ Wrestling Committee ・ Football Committee	
Mbam	MC	・ Marketing Committee ・ Inspection and Quality Control Committee ・ Life Jacket Production Committee ・ Visitor Reception Committee	
Moundé	VCD	・ Shoes, Gloves and Mask Production Committee ・ Shellfish Processing Committee ・ Eco-Tourism Committee ・ Study Visit Coordinating Committee	
Bassoul	MC	・ Village Forest Management Committee ・ Smoking Kiln Management Committee	

2) Problems of Village-Based Implementation System

The villagers' organizations established in the target villages conducted their respective activities with the assistance of a NGO, the DEFCCS and/or DOPM and are generally

evaluated as performing their functions even though the performance level varies from one village to another. The participating villagers learned the necessary techniques/skills and know-how to a certain extent and appear to have acquired the necessary basic capability even though there is room for organizational improvement in regard to communication with other villagers, mobilization of villagers and recording of activities, etc. However, a self-reliant system has not yet been established in terms of funding which is the key to the sustainability of activities. One reason for this is that the feasibility of economic activities to generate income was only confirmed towards the end of the Pilot Project period.

3) Future Course of Action

The desirable future course of action is to set up a system whereby economic activities and natural resources management activities are combined in an efficient as well as effective manner in each village so that the necessary cost of the latter can be financed by part of the income from the former. The core facility for this system/mechanism is an environment fund.

From now onwards, the establishment of an environment fund as a concrete mechanism to link economic activities to natural resources management activities should be planned from the very start so that villagers' organizations can conduct activities in a self-reliant and sustainable manner using this fund.

(2) RC-Based Management System (RC Bassoul)

1) Functions of RC

As the smallest unit of the local public body, each rural community has its own rural council which acts as an assembly rather than an executive organ. This rural council consists of rural councilors who are elected as village representatives for a term of five years and plays such roles as (i) formulation of a local development plan for those fields for which the executive authority has been transferred to the RC, (ii) decisions on budget allocation for various activities based on the plan, (iii) appointment of implementing units (villagers' groups, etc.) which actually implement the activities and (iv) monitoring of the implementation situation of activities.

If local residents consider some activities to be necessary after the formulation of the local development plan, they refer the matter to the rural council via their village representative. When a motion to conduct such activities is passed by the rural council, the rural council provides the budget to cover only the maintenance cost of such activities.

There are several funding sources for the RC. These own revenue sources are a grant from the central government, a special grant (ad hoc grant provided when the Department of Local Public Bodies approves a relevant request made by the chairman of the rural council), rural tax (in principle, everyone older than 18 years but younger than 65 years pays 1,000 FCFA/year), other local taxes (taxes other than the rural tax, such as the land occupancy tax imposed by each RC), 70% of fines and 70% of the electricity tax. When a project of some type is in progress, the project fund is used for the development of the RC(s) involved. However, this does not constitute an own revenue source of the RC.

2) Implementation of Activities and Management Organizations in RC Bassoul

In RC Bassoul, Pilot Project-related activities were only implemented in the village of Bassoul which is the seat of the RC among the five related villages while assuming the management system shown in Fig. 4.5-2. While RC Bassoul has five commissions, only two commissions, i.e. the Land Commission and the Environment Commission, have any connection to the Pilot Project. The former has the role of authorizing the allocation of land for the creation of village forests and the construction of smoking kilns while the latter is responsible for decisions on and the monitoring of various activities relating to the environment and natural resources management.

A management committee was established in the village of Bassoul to control various activities with such subordinate organizations as the Committee of Villagers for Management of Smoking Kilns (CVMSK or CVGFF in French) and the Committee of Villagers for Village Forest Management (CVVFM or CVGBV in French). Under the CVMSK, the construction and maintenance unit responsible for the actual construction and maintenance of smoking kilns and the processing and marketing unit responsible for the processing and marketing of smoked products were established.

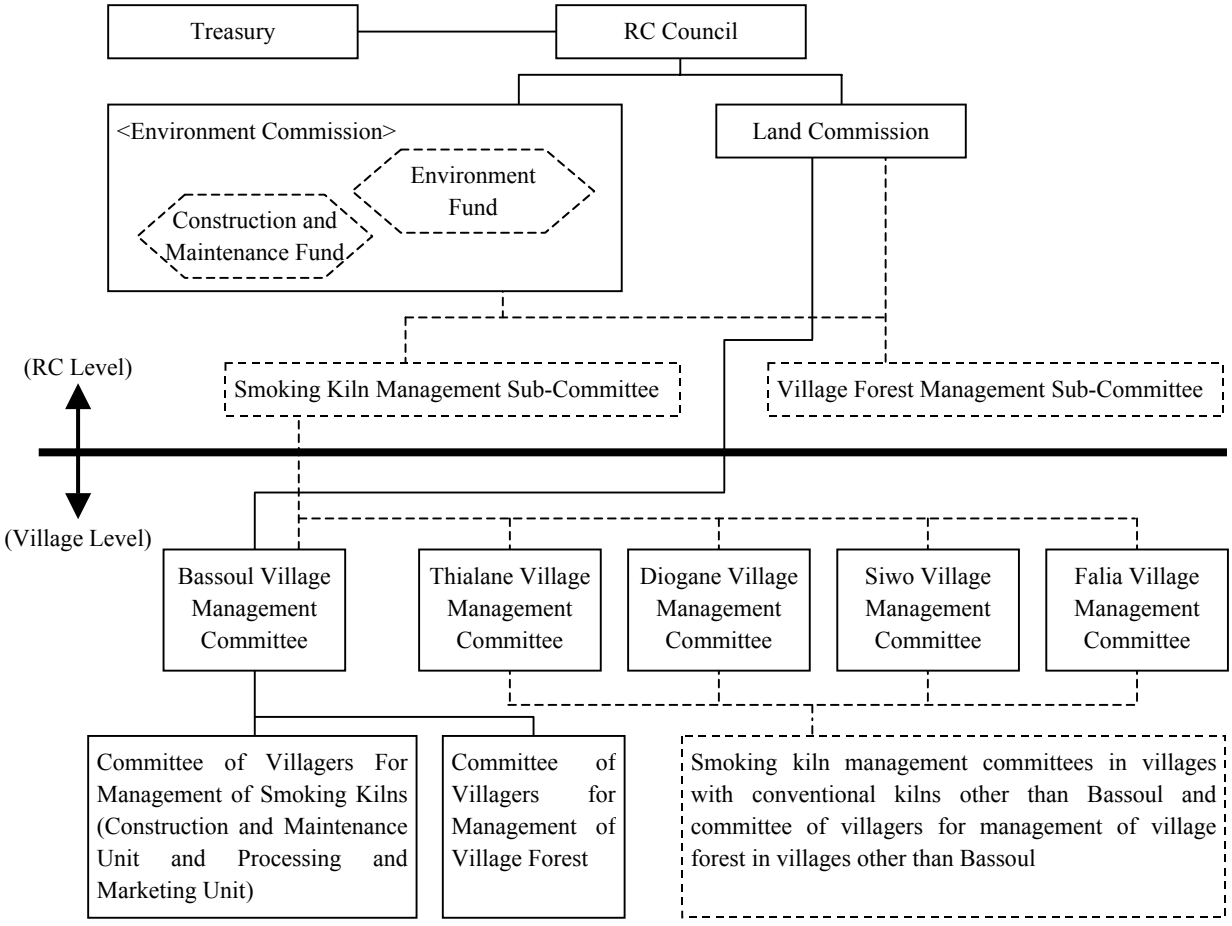

Fig. 4.5-2 Conceptual Drawing of Originally Assumed RC-Based Management System

3) Problems of RC-Based Management at RC Bassoul

The various villagers' organizations in Bassoul functioned to a certain extent despite some problems, including a substantial delay of the start of the intended activities. RC Bassoul was only involved in the creation of a village forest and the allocation of land for the installation of smoking kilns. Only several members of the RC Council participated in some activities as individuals.

For the implementation of the Pilot Project, the Smoking Kiln Management Sub-Committee (SKMSC or SCGFF in French) and the Village Forest Management Sub-Committee (VFMSC or SCGBV in French) were set up at the RC level under the Environment Committee as shown in Fig. 4.5-2. As these activities were only conducted in Bassoul, neither a management committee nor committees responsible for these activities were formed in other villages. As a result, village representatives were appointed as members of

these committees in villages other than Bassoul and no village level committee actually functioned.

In regard to the environment fund, the delayed movement of ethomarose upstream meant a delay of smoking activities. As a result, sufficient income to be saved in the form of an environment fund was not obtained. The assumed possibility of obtaining a grant from the RC budget as the original capital for the environment fund proved to be in vain as the RC itself was struggling to raise sufficient funds for its own operation.

The main reasons for the failure to establish a system managed by the RC in the trial in RC Bassoul are believed to be those described below.

① Implementation of activities only in one village

As the activities were only conducted in one village among several villages of the RC, the councilors of villages other than Bassoul had little incentive to cooperate with or participate in the activities. As this was anticipated from the beginning, the course of action whereby the activities would be gradually extended to other villages was clearly indicated before the commencement of the Pilot Project. However, because of the delayed start of the activities in Bassoul, the villagers and councilors of other villages were only able to perceive the future benefits of the activities towards the end of the Pilot Project period.

② Insufficient own financial resources

The main own financial sources of the RC are the rural tax and such local taxes as the land occupation tax, business tax and product tax. Although RC Bassoul is actively trying to expand the base for local taxes, it cannot expect to earn much higher tax revenues because of the limited scope of economic activities. Even if increased revenue is achieved, spending tends to be directed towards improvement of the local socioeconomic infrastructure rather than activities for natural resources management, including the conservation of mangrove forests, because of the general nature of such revenue.

③ Virtual non-existence of executing staff at the RC Council

From the legal point of view, the Chairman of the RC Council acts as the executive organ of the RC and can entrust some of his duties to the vice-chairman, councilors, secretary, staff members of technical administrative organizations and staff members of the RC on contract (Law Concerning Local Public Bodies, Law No. 96-06 enacted on

22nd March, 1996). In reality, however, it is difficult for the RC to employ executing staff using its own financial resources.

Points ② and ③ above were anticipated at the beginning and conscious educational efforts were made within the framework of the Pilot Project to make councilors aware of the importance of natural resources management through seminars for councilors and other means. However, these educational efforts were not enough to compensate for the lack of physical means and the fundamental solving of these problems within the framework of a plan for natural resources management is extremely difficult. The capacity building of the RC should be sought within the framework of integrated village development, such as that adopted by the PROCR.

4) Future Direction for Management by RC

From the viewpoint of promoting decentralization, the stance of presupposing that the RC should be at the core of management activities for local natural resources is basically correct. Given the current situation where the decentralization process is at the transitional stage with the priority placed on improvement of the socioeconomic infrastructure for local residents, however, it is unrealistic to expect the RC to play a leading role in natural resources management, including the conservation of mangrove forests.

Based on the experience of the Pilot Project, the concept of the RC-based management system shown in Fig. 4.5-2 should be modified from several aspects.

Firstly, the planned establishment of sub-committees at the RC level should be withdrawn based on the lesson learned that the management system should be as simple as possible.

Efforts should be made to realize a village-based independent cycle of activities in several villages of the RC while making the stance of natural resources management being dealt with by the entire RC in the future clear. To be more precise, economic activities as well as natural resources management activities should simultaneously commence in several villages of the RC and the financial management of economic activities and the establishment and management of the environment fund for natural resources management should be assigned to a controlling body at the village level. The functions of the environment committee of the RC will only consist of the monitoring of village level activities to start with.

The next step is the establishment of an environment reserve fund at the RC level by charging a levy at a certain rate on the environment fund in those villages which have

achieved an independent cycle of activities. This reserve fund will be used when natural resources management activities stagnate in these villages for one reason or another or when other member villages of the same RC plan to start natural resources management activities. The RC will be able to not only monitor the natural resources management activities of its member villages but also exert its influence on such activities by means of financial assistance while coordinating the activities throughout the entire RC. In this manner, the sustainability of activities in the entire RC can be secured. The creation of this mechanism, however, will require the consent of those villages which have realized an independent cycle of activities. To obtain such consent, repeated education on the necessity to conduct natural resources management not only on an individual village basis but also on a RC basis will be essential so that the villagers and village councils constituting the RC are fully convinced of the advantages of various activities.

5. Final Evaluation

(1) Final Evaluation Workshops

A series of final evaluation workshops was held in those villages where the Pilot Project was implemented in the period from 16th to 26th September, 2004. The purposes of these workshops were firstly to check the results of the Pilot Project and, secondly, to clarify the relevance of the planning items for the sustainable management of mangrove forests to be conducted mainly by local residents in the coming years, problems of implementing such a plan and possible measures to deal with the problems based on these results.

For the purpose of final evaluation, the implementation situation of the Pilot Project was surveyed in advance to confirm the actual performance of the activities under the Pilot Project. The survey findings on the performance are shown in Attached Table A-1.

The final evaluation items at the workshops were the level of achievement of each activity, villagers' organizations established, impacts, effectiveness (i.e. effective as well as relevant to the target of the Pilot Project: "facilitation of the restoration/conservation of mangrove forests/ecosystem"), necessity, willingness to continue and feasibility. The findings of these workshops are compiled in Table 5-1.

Table 5-1 Results of Final Evaluation Workshop by Village

Evaluation Item		Djirnda		Summary (Opinions of the Study Team)
		Opinions of Villagers		
		Rhizophora	Improved Smoking Kiln	
Opinions of Villagers	1) Degree of achievement	・ First Year: 10,000 seedlings were planted with a planting distance of 25 cm x 25 cm while another 10,000 were planted with a planting distance of 50 cm x 50 cm. ・ Second Year: The same quantities of seedlings as in the first year were planted. ・ Most have survived.	・ Kilns were constructed as planned. ・ The processed and sales volumes were some 30% of the original plan.	Although the processing and sales volumes by the improved smoking kilns were lower than the planned volumes, they were mostly caused by the changing circumstances of the natural conditions, including fewer fish traveling upstream. The planting of *Rhizophora* was conducted as planned.
	2) Villagers' organizations	Both the CVD and village committee fully functioned and all of the techniques for scheduling, seed collection and planting were mastered.	All of the related organizations actively participated and fully functioned. The construction, processing and marketing techniques were mostly mastered. An environment fund has not yet been established although it is planned.	The organizations are functioning sufficiently. The next task is to divert part of the income from the improved smoking kilns to an environment fund so that all activities can be run by the village itself.
	3) Impacts	The activity was useful for mutual understanding, solidarity and harmony among the women, resulting in the self-reliant planting of *Rhizophora*.	The consumption of firewood was reduced and the quality of the smoked fish improved together with the work efficiency. Firewood can be purchased using the income from smoked fish and the kilns can be used next year.	The strengthened sense of solidarity has stimulated self-reliant planting while reduction of the firewood consumption and alleviation of the burden of smoking work has improved the preparedness to actively participate in smoking activities.
	4) Effectiveness (effective and suitable to achieve pilot project target)	Effective: Directly leads to the protection of mangrove forests	Effective: Reduction of the consumption of mangrove firewood ensures the better growth of mangrove, protecting mangrove forests.	The expansion of mangrove forests with the reduced consumption of mangrove firewood is the very purpose of mangrove conservation.
	5) Necessity	Necessary: Marine resources rely on mangrove forests.	Necessary: Source of income and protection of mangrove forests	Necessary: Direct and indirect contribution to the conservation of mangrove forests
	6) Willingness to continue and possibility	Yes/Willing to continue using own ideas even without external assistance.	Yes/The available funds are insufficient and further practice is necessary to master the smoking techniques.	There is a strong willingness to continue. The establishment of a reliable management system for the kilns is necessary.
	7) Future tasks	Collection of seeds at an appropriate time and selection of suitable sites	Development of markets for the products	Securing of raw fish for smoking and the development of markets are necessary. The women's group has requested a boat and an outboard engine.
Opinions of the Study Team		Can be continued by the villagers	One problem is the unstable purchase of raw fish. Even though the villages say that they cannot do it by themselves, there is a high likelihood that they will conduct this activity on their own. A long time is required for the operation and management system to be on track.	The creation of a village forest should be included in the plan to provide an alternative source of firewood to mangrove forests for the smoking of fish using the improved kilns.

Evaluation Item		Dassilame Serere			Summary (Opinions of the Study Team)
		Opinions of Villagers			
		Avicennia	Village Forest	Eco-Tourism	
Opinions of Villagers	1) Degree of achievement	・ First Year: The planned quantity of seedlings was produced and planted. The survival rate was some 60%. ・ Second Year: The planned quantity of seedlings was produced and planted. The survival rate will be determined in the future. ・ Possibility of nearly achieving the target	・ First Year: Planting took place as planned, achieving some 80% of the target village forest size. ・ Second Year: Planting took place as planned.	Implemented almost as planned in both the first year and second year	Implemented almost as planned
	2) Villagers' organizations	Both the CVD and environment committee fully functioned. The expertise to determine the timing for transplanting and the selection of suitable sites is not sufficient.	Both the CVD and the environment committee fully functioned and the techniques were fully mastered.	・ While the organizations functioned well, such technical aspects as the training of eco-guides were insufficient. ・ The distribution share of the income has been decided and an environment fund has been set up.	Both the CVD and the environment committee are fully functioning. The next task is to direct part of the income from eco-tourism to the environment fund so that all activities can be run by the village itself.
	3) Impacts	A sense of solidarity among the villagers has emerged and the techniques and knowledge have been mastered through active participation in the activity.	This activity has strengthened the sense of solidarity and the technique expertise of the villagers, making the village forest a possible future source of firewood, construction timber and income.	Participation has consolidated the solidarity of the village and new knowledge has been obtained.	The strengthened solidarity of the village and newly obtained knowledge has encouraged the emergence of a spirit of self-reliance.
	4) Effectiveness (effective and suitable to achieve pilot project target)	Effective: If there is no *Avicennia*, there will be no *Rhizophora*.	Effective: The use of the trees in the village forest to produce firewood and construction timber will preserve mangrove forests.	Effective: Introduction of eco-routes along mangrove forests will raise awareness of the necessity to conserve mangrove forests.	Effective: All of the activities are linked to the conservation of mangrove forests.
	5) Necessity	Necessary: In a bad farming year, fisheries can compensate. Mangrove forests rear fisheries resources.	Necessary: Possible source of income for the village	Necessary: Eco-tourism can create employment opportunities, leading to village development.	Necessary: All of the activities are necessary as they can improve the livelihood of the villagers.
	6) Willingness to continue and possibility	Yes/Funding is difficult. Dependence on the environment fund is necessary but the fund is still very small.	Yes/Continued activities are difficult because of the shortage of funds.	Yes/It is necessary for eco-guides to acquire further knowledge, etc.	Yes/As the villagers have a strong willingness to continue, assistance should be provided by the DEFCCS, etc. so that the villagers can eventually establish a self-reliant system to continue the activities.
	7) Future tasks	As the timing of the planting work overlaps with the busy farming season, it is difficult to gather people.	The shortage of land means a lack of available land for future village forests. Planting on individually owned land should continue.	Marketing activities to attract eco-tourists are required.	It is important to secure income from eco-tourism to support other activities.
Opinions of the Study Team		Possible to implement with the assistance of the DEFCCS	Difficult without funds	Possibility of the continuation of activities by the villagers.	Strengthening of the organization and operation of the environment fund are required.

Evaluation Item		Mar Fafako		Summary (Opinions of the Study Team)
		Opinions of Villagers		
		Rhizophora	Extension by Supporting ASC Activities	
Opinions of Villagers	1) Degree of achievement	・ First Year: 10,000 seedlings were planted with a planting distance of 25 cm x 25 cm while another 10,000 were planted with a planting distance of 50 cm x 50 cm. ・ Second Year: The same quantities of seedlings as in the first year were planted. ・ Most have survived.	・ An educational play was performed at a sporting event. ・ The change of awareness of the villagers was concretely demonstrated. ・ Enquiries about the activities were made by residents of other villages.	Both of the activities were implemented as planned.
	2) Villagers' organizations	Both the CVD and the relevant committee fully functioned and the techniques were mastered.	The organizations fully functioned and the techniques were mastered.	The organizations fully functioned and the techniques were mastered.
	3) Impacts	The school in Mar Fafako has become the base for extension to other villages.	There has been a move to establish a theatrical troupe at the school, indicating improved awareness of the necessity for the conservation of mangrove forests.	The dense planting of *Rhizophora* creates good green scenery, providing an incentive for the villagers to plant more *Rhizophora* seedlings. The move to establish a theatrical troupe originates from the improved awareness of the necessity for the conservation of mangrove forests.
	4) Effectiveness (effective and suitable to achieve pilot project target)	Effective: Restoration of mangrove forests which once existed	Effective: The extension activities in the first year led to the increased participation of young people in planting in the second year.	Effective: Planting directly restores mangrove forests while extension activities improve awareness of the necessity for the conservation of mangrove forests.
	5) Necessity	Necessary: Marine resources can return with the possibility of the revival of apiculture in the future.	Necessary: The necessity for the planting of mangrove seedlings is widely understood and the protection of mangrove forests leads to the restoration of marine resources.	Necessary: These activities are necessary to enhance the sense of solidarity among the villagers and to restore marine resources.
	6) Willingness to continue and possibility	Yes/Can be continued without external assistance.	Yes/Can be continued without external assistance.	Yes/Given the strong willingness to continue and the well-established organization, the activities can be conducted without external assistance.
	7) Future tasks	The scope of planting can be expanded if a pirogue(s) with an outboard engine is available.	None	None
Opinions of the Study Team		The activities can be continued by the villagers.	The activities can be continued by the villagers.	Both activities can be continued by the villagers.

Evaluation Item		Mounde					Summary (Opinions of the Study Team)
		Opinions of Villagers					
		Face Masks for Apiculture	Heavy Cloth Shoes and Gloves	Processing of Shellfish	Eco-Tourism	Study Visits to the Village	
Opinions of Villagers	1) Degree of achievement	Production was conducted as planned in both the first and second years.	Production was conducted as planned in both the first and second years.	・ Facilities to improve processing were put in place. ・ Improved processed products were made using these facilities. ・ The products were sold, generating cash income.	・ Eco-routes were set up. ・ An environment-friendly mode of transport was introduced. ・ Eco-guides were trained. ・ Local souvenirs were made. ・ An eco-tour was started to receive tourists. ・ Cash income was generated and deposited.	Some villagers acted as lecturers to introduce the activities to visitors from other villages.	All of the activities were implemented roughly as planned.
	2) Villagers' organizations	Both the CVD and relevant committee fully functioned and the techniques were mastered.	Both the CVD and relevant committee fully functioned and the techniques were mastered.	While the CVD and relevant committee are fully functioning, the development of buyers is necessary.	While the CVD and relevant committee are fully functioning, the re-training of eco-guides, etc. is necessary.	Both the CVD and relevant committee fully functioned and the techniques were mastered.	The organizations are fully functioning.
	3) Impacts	As bee stings can be avoided, honey can be collected at any time.	The number of injuries during shellfish collection work has been reduced. The use of these shoes and gloves for farming is becoming popular.	The solidarity among women has been strengthened and cash income has been generated.	In addition to the learning of new knowledge by eco-guides, the future direction for the village has become clear.	Extension of techniques to visitors and the emergence of friendship	The acquisition of new knowledge allows the villagers to improve the activities based on their own ideas.
	4) Effectiveness (effective and suitable to achieve pilot project target)	Effective: As outsiders do not approach mangrove forests which have wooden beehives, these forests are protected.	Effective: It is unnecessary to cut into a mangrove forest to collect oysters and firewood.	Effective: Oysters and other shellfish cannot grow without mangrove forests.	Effective: Rich mangrove forests attract tourists, increasing the village's cash income. Eco-tourism also leads to activities to protect mangrove forests.	Effective: Heavy cloth shoes and gloves are useful for the conservation of mangrove forests and the depletion of mangrove forests leads to a decline of fish and shellfish resources.	Effective: All of the activities are linked to the conservation of mangrove forests.
	5) Necessity	Necessary: A face mask is required for the production of honey.	Necessary: To protect the hands and feet and also mangrove trees	Necessary: To generate cash income	Necessary: The solidarity of the village has been strengthened and the future direction for the village has become clear.	Necessary: To conserve mangrove forests	Necessary: As the future direction for the village has become clear with the availability of cash income sources, continuation of the activities is required.
	6) Willingness to continue and possibility	Yes/Can be continued without external assistance.	Yes/Can be continued without external assistance.	Yes/External assistance is required.	Yes/Can be continued without external assistance.	Yes/Difficult to continue without external assistance	Yes/The continuation of the activities on a self-reliant basis is possible (except for the processing of shellfish and study visits to the village).
	7) Future tasks	None	None	・ Development of new buyers/markets ・ Packaging of the products	Assistance for the re-training of guides and the cost of the bait should be sufficient.	No funding capacity to cover the traveling cost to Mounde.	Future tasks should include the self-reliant repair of bridges and adequate management, including the injection of some of the income to an environment fund.
Opinions of the Study Team		Can be continued on a self-reliant basis.	Can be continued on a self-reliant basis.	External assistance is required.	Can be continued on a self-reliant basis.	External assistance is required.	The continuation of the activities on a self-reliant basis is possible (except for the processing of shellfish and study visits to the village). The creation of a firewood forest is necessary at the site allocated for the women's group which uses firewood for the processing of shellfish.

Evaluation Item		Sokone				Summary (Opinions of the Study Team)
		Opinions of Villagers				
		Resources Conference	Oyster Culture	Heavy Cloth Shoes and Gloves	Extension by Supporting ASC Activities	
Opinions of Villagers	1) Degree of achievement	・ A natural oyster resources conference was held in both years. ・ Fishing grounds subject to the temporary suspension of fishing were decided at these conferences. ・ A decree of the departmental government is under application to the ministry. ・ The temporary suspension of fishing was observed.	・ Three modes of oyster culture were experimented. ・ The technical feasibility of oyster culture was clarified (the best was Guirlandes).	Protective heavy cloth shoes and gloves were produced and use.	・ An educational play was performed at a sporting event. ・ The change of awareness of the villagers was concretely demonstrated. Enquiries about the activities were made by residents of other villages.	All of the activities were implemented almost as planned.
	2) Villagers' organizations	The organization fully functioned and the techniques were mastered.	The organization fully functioned but some techniques have not yet been sufficiently mastered.	The organization fully functioned and the GIE members and those engaged in apiculture attended a seminar.	The organization fully functioned and the techniques to organize an event were mastered.	The organization fully functioned but some techniques have not yet been sufficiently mastered.
	3) Impacts	Appropriate techniques for the collection of oysters have been spread.	Oyster resources are being managed for their recovery.	The relationship between people of different villages has been strengthened and the purchase of gloves to foster further friendship is unnecessary.	Since the play, no-one has dared to cut mangrove trees and some villages have started planting on their own initiative.	Cooperation between the GIE and villages has progressed, suggesting a bright future for the conservation and recovery of oyster resources.
	4) Effectiveness (effective and suitable to achieve pilot project target)	Effective: The suspension of fishing helps oysters to grow in size. As the roots of mangrove are not cut, mangrove forests can be restored.	Effective: As people do not go to the installation sites of Guirlandes, mangrove forests are protected.	Effective: Injuries to the hands and feet are avoided when collecting oysters and mangrove forests are also protected.	Effective: Mangrove forests are protected because of the non-cutting of mangrove trees and the voluntary planting of seedlings.	Effective: Oysters can be collected without cutting into mangrove forests and oyster resources are also protected.
	5) Necessity	Necessary: Oyster resources are protected.	Necessary: Oyster resources are sustained.	Necessary: For protection of the hands and feet as well as mangrove forests	Necessary:	Necessary: Oyster resources are protected.
	6) Willingness to continue and possibility	Yes/A pirogue(s) with an outboard engine and others is required.	Yes/ Guirlandes are made within the capacity of the village.	Yes/Can be continued.	Yes/Use of wrestling meetings, etc. as opportunities	Yes/There is a willingness to continue on the part of the villagers.
	7) Future tasks	While a pirogue(s) with an outboard engine is required to monitor the water channels subject to the temporary suspension of fishing, monitoring by the participating villagers is possible.	Shortage of funds and materials	None	None	Although the villagers want assistance involving the supply of equipment, the GIE itself is capable of doing so.
Opinions of the Study Team		The GIE can continue the activities.	The GIE can continue the activities.	The GIE is capable of continuing and extending the activities.	The GIE can continue the activities.	The GIE can continue the activities.

Evaluation Item		Bangalère Opinions of Villagers *Rhizaphora*	Village Forest	Domestic Ovens	Summary (Opinions of the Study Team)
Opinions of Villagers	1) Degree of achievement	・ In the first year, some 10% of the planned quantity was planted with a survival rate of only 5% of the target. ・ In the second year, the quantity planted exceeded the plan but the survival rate has not yet been determined. ・ Difficult to achieve the target.	In the first year, planting was conducted as planned, creating a village forest of some 80% of the target size. In the second year, planting was conducted as planned.	Achieved 1.5 times the planned target.	The planted quantity of *Rhizophora* in the first year was approximately half of the planned quantity. In the second year, the planned quantity was exceeded. The village forest was as planned while domestic ovens exceeded the plan.
	2) Villagers' organizations	The CG and relevant committee functioned well and all of the techniques, excepting the selection of suitable sites, were mastered.	The CG and relevant committee functioned well and the techniques ere mastered.	The CG and relevant committee functioned well and the relevant techniques were mastered. In addition, extension capability was developed.	All of the organizations functioned well, the techniques were mastered and extension capability was developed.
	3) Impacts	The recovery of marine resources may be possible.	The development of future sources of firewood and building timber and income sources will be possible.	Reduction of firewood consumption, the cooking time and smoke; improvement of the domestic environment	Positive impacts were achieved to enhance the knowledge and willingness for improvement of villagers involved in various activities. In addition to the conservation of mangrove forests due to the reduced cooking time, the burden of domestic chores on women was reduced.
	4) Effectiveness (effective and suitable to achieve pilot project target)	Effective: Recovery of mangrove forests	Effective: Alternative to mangrove wood	Effective: Reduction of firewood consumption	Effective: Increase of mangrove forests, creation of alternative forests and reduction of firewood consumption
	5) Necessity	Necessary: Recovery of marine resources and apiculture	Necessary: Production of building timber and firewood, etc.	Necessary: Cooking with less firewood; improvement of the lives of women	Necessary: Sense of expectation for the recovery of marine resources and improvement of the lives of women
	6) Willingness to continue and possibility	Yes/Possibility of self-reliant continuation using own ideas	Yes/Lack of funds; there are plans to create a village farm to use its profits and to plant cashew trees to use the profits from these trees.	Yes/Continued activities by villagers are possible but extension to other villages will require external financial assistance.	Yes/There is strong willingness to continue with a strong sense of self-improvement as evidenced by the proposal of possible funding sources.
	7) Future tasks	Collection of seeds at an appropriate time and selection of suitable sites	Promotion of a village farm and planting on private land because of the shortage of land	None	Creation of an income source to maintain activities
Opinions of the Study Team		Can be continued by villagers	Difficult without funding	Can be continued by villagers	The creation of a village farm and the planting of cashew trees as income sources are likely to create an environment fund; support until that time will be required.

Evaluation Item		Gagué Chérif Opinions of Villagers *Avicennia*	Brush Shelters	Support for ASC	Summary (Opinions of the Study Team)
Opinions of Villagers	1) Degree of achievement	・ In the first year, some 85% of the planned seeds were collected and 1% of the planned seedlings were produced. ・ In the second year, some 65% of the planned seeds were collected. ・ Difficult to achieve the target.	Conducted as planned except for the administrative procedure	The shortfall in the first year was compensated in the second year, achieving the target.	The planned quantity of *Avicennia* was slightly lower than the planned quantity in both years. Others were completed as planned.
	2) Villagers' organizations	The CG functioned well and techniques other than the selection of suitable sites were mastered.	The CG functioned well and the brush shelter fishing technique was mastered.	The CG functioned well as the techniques were mastered; extension capability was developed.	The CG and persons in charge functioned well, the techniques were mastered and extension capability was developed.
	3) Impacts	The recovery of marine sources may be possible.	At the brush shelter site, while the types and quantity of the fish increased in the short term, the negative impact in the form of abandoning mangrove planting may occur.	Increased participation of young people in mangrove planting and planting at village forest	Improved awareness of the necessity for the conservation of mangrove forests among young people and expectation for the recovery of mangrove forests
	4) Effectiveness (effective and suitable to achieve pilot project target)	Effective: Recovery and conservation of mangrove forests	Effective: A brush shelter has a similar function to mangrove trees, producing an educational effect for mangrove planting.	Effective: Educational activities were conducted with many participants, particularly young people.	Effective: Although a brush shelter is not required once a mangrove forest has been restored, it is effective to enhance awareness of the current necessary for the conservation of mangrove forests. Other activities are directly effective for mangrove conservation.
	5) Necessity	Necessary: An increase of *Avicennia* trees means an increase of marine resources.	Necessary: Obtaining of marine resources in a stable manner	Necessary: The participation of young people was encouraging as the future of the village depends on these young people.	Effective: These activities are particularly effective to increase the awareness of young people.
	6) Willingness to continue and possibility	Yes/Possible with the assistance of the DEFCCS	Yes/Support is necessary to invoke the administrative procedure to prohibit fishing but all others can be conducted on a self-help basis.	Yes/Possible by villagers	Strong will to continue among villagers
	7) Future tasks	Adequate response to such changes of the natural conditions as the salinity and rise of the sea water temperature	Administrative procedure	None	Although the growth conditions for *Avicennia* are harsh, dense planting can create a habitat for *Avicennia*. Protection from fishing by people of other villages is a task to be met for successful brush shelters.
Opinions of the Study Team		Possible with the support of the DEFCCS	Possible with the support of the DEFCCS and DOPM	Can be continued by villagers	Brush shelters should be combined with the planting of *Avicennia*/*Rhizophora*

Evaluation Item		Kamatane Bambara Opinions of Villagers Life Jackets	Summary (Opinions of the Study Team)
Opinions of Villagers	1) Degree of achievement	Life Jackets Planned / Produced / Sold / In Stock First Year: 100 / 100 / 91 / 57 Second Year: 100 / 50 / 0 / 50 50 (purchase of materials planned)	The activity was completed almost as planned. The life jackets in stock will be marketed in the next prawn season.
	2) Villagers' organizations	The organization is functioning well. Tailors mastered the necessary skills. A bank account to handle the money for this activity has been set up. The creation of an environment fund is planned and the income distribution shares have been decided. As yet, no bank account has been set up.	The organization is functioning well. In the future, the management system should be consolidated to set up an environment fund account to utilize the mangrove conservation funds.
	3) Impacts	It is hoped that disasters at sea will be eliminated and that the production of life jackets will vitalize the economy of the village.	A major impact in terms of a change of awareness of the villagers was achieved. While the villagers harbour an over-ambitious dream of establishing a life jacket factory, steady marketing efforts will be essential.
	4) Effectiveness (effective and suitable to achieve pilot project target)	Effective: The planting of mangrove through the establishment of an environment fund will restore mangrove forests.	Effective: There is a possibility of the restoring mangrove forests through the voluntary planting of mangrove by villagers through the establishment of an environment fund.
	5) Necessity	Necessary: As funding, materials and technical capability are available for the production of high quality life jackets, it is hoped to establish a large factory.	Necessary: Necessary to establish an environment fund
	6) Willingness to continue and possibility	Yes/If the funding is insufficient, loans can be obtained against deposits at the Credit Mutual; a plan can be submitted to various ministries with a view to obtaining a grant.	Yes/There is a strong will to proceed without relying on external assistance.
	7) Future tasks	To secure marketing routes, to obtain materials for floats in a stable manner and to apply for a government grant	To secure marketing routes and to obtain materials in a stable manner
Opinions of the Study Team		Can be continued by villagers	Can be continued by villagers

Evaluation Item		Mbam Opinions of Villagers Life Jackets	Acceptance of Visitors from Other Villages	Summary (Opinions of the Study Team)
Opinions of Villagers	1) Degree of achievement	Production of Life Jackets Planned / Produced / Sold / In Stock First Year 100 / 111 / 54 / 57 Second Year 100 / 30 / 17 / 13 20 (materials in possession) 50 (purchase of materials planned)	Villagers acted as instructors to introduce the activities to visitors from other villages.	The activities were conducted almost as planned. The life jackets in stock will be marketed in the next prawn season.
	2) Villagers' organizations	The CG and relevant committee functioned well and tailors mastered the required skills. An environment fund has not been set up and despots have been made into an existing account.	The CG and relevant committee functioned well and the techniques to organize visits by people from other villages were mastered.	While the organizations have begun to function, a future task is to channel the funds from income generating activities to nature conservation activities via an environment fund.
	3) Impacts	Safe fishing at sea has been secured, employment has been promoted and income has been generated.	Several villages plan to apply the techniques introduced during their visit.	The sense of safety while fishing by wearing a life jacket has been a major impact.
	4) Effectiveness (effective and suitable to achieve pilot project target)	Effective: The planting of mangrove through the establishment of an environment fund will lead to the restoration of mangrove forests.	Effective: Introduction of techniques to conserve mangrove forests to other villages	Effective: An environment fund as a revolving fund will facilitate the conservation of mangrove forests.
	5) Necessity	Necessary: Income generation and establishment of an environment fund	Necessary: Closer relationship between villages	Necessary: Income generation and closer inter-village relationships are important for the promotion of mangrove conservation activities.
	6) Willingness to continue and possibility	Yes/If the funding is insufficient, ethnic dancing and sporting events will be considered to raise funds.	Yes/While funding is necessary, this activity will continue within the capability of the village.	Yes/While funding is necessary to continue the activities, it is important not to over-stretch the capability of the villagers, including the search for funding sources.
	7) Future tasks	The role(s) of each organization must be clarified.	Means to pay for transport and meals and to move about in the village	As the members of the organizations have changed, consolidation of the organizations is required.
Opinions of the Study Team		Can be continued with the support of the DEFCCS and DOPM	Can be continued by villagers; no active invitations will be extended while welcoming visitors	Can be continued by villagers

Evaluation Item		Bassoul			Summary (Opinions of the Study Team)
		Opinions of Villagers			
		Village Forest	Improved Kilns	Councilor Seminar	
Opinions of Villagers	1) Degree of achievement	In the first year, planting was conducted as planned and a village forest achieving some 70% of the originally planned scale was created. In the second year, planting was conducted as planned.	Smoking kilns were constructed as planned. Processing and marketing achieved some 30% of the originally planned quantity.	Held as planned	The village forest and RC seminar were implemented as planned. The processing and marketing quantities using the improved kilns under-achieved the plan, mainly because of the adverse natural conditions, including fewer fish traveling upstream.
	2) Villagers' organizations	The organization did not fully function as the participating members were limited.	Only the members of the organization participated in construction and the processing and marketing techniques were mostly mastered. The establishment of an environment fund was planned but did not materialise.	Insufficient communication led to the failure of councilors from some villages to participate, suggesting insufficient functioning of the organization.	The organization did not function sufficiently. One future task is the transfer some of the income from the improved kilns to an environment fund for its management by the RC.
	3) Impacts	Learning of new knowledge and techniques	Reduction of firewood consumption, higher quality of smoked fish and improvement of the work efficiency	The awareness of the importance of mangrove conservation was much improved.	Although the villagers mentioned a change of their awareness regarding mangrove conservation, the significance of the relevant activities is not yet fully understood. The less availability of raw fish led to conflict among women regarding the purchase of fish and the activity was not yet able to solve such conflict.
	4) Effectiveness (effective and suitable to achieve pilot project target)	Yes: Availability of an alternative to mangrove will reduce or eliminate the cutting of mangrove.	Yes: Reduction of firewood consumption	Yes: Understanding of the necessity for mangrove conservation	Yes: The achievement of reduced firewood consumption makes the villagers gradually understand the necessity for mangrove conservation.
	5) Necessity	Necessary: Used to cut a lot of mangrove trees; a village forest is necessary as an alternative.	Necessary: Fishing is the main livelihood of the village and smoking is necessary to preserve the fish.	Necessary: Fishing is the livelihood of the village and mangrove conservation is necessary to secure marine resources.	Necessary: Mangrove conservation is necessary to secure marine resources for the village and the RC.
	6) Willingness to continue and possibility	Yes/Difficult without external assistance	Yes/Can be continued by villagers	Yes/Difficult to continue without budget allocation or assistance to cover the traveling and other expenses	Yes/While the villagers say that they can continue the construction and use of improved kilns, it is not easy to secure a sufficient supply of raw fish. The processing technology is insufficient. Continuation of the activities will be difficult without budget allocation by the RC or external assistance to cover the kiln maintenance cost and seminar cost, etc.
	7) Future tasks	None	Development of new markets	None	Establishment of a RC system to create an environment fund using the profits from kilns in Bassoul to construct and operate new kilns in other villages as decided at the seminar
Opinions of the Study Team		Although the coherence of the village requires improvement, things appear to be moving in the right direction. The RC should be in charge.	Although the villagers say that they can continue, the system for the RC to manage part of the profits is not functioning. Assistance for operation and management is required.	The organization of a seminar is possible if the RC provides the necessary funding.	The stage of management by the RC has not yet been reached. However, the RC has a strong will in this regard and is planning to provide the budget to meet the kiln maintenance cost. Assistance for the operational aspects will enable the continuation of activities.

(2) Evaluation of the Pilot Project Itself

Based on the findings of the final evaluation workshops held with local residents, evaluation of the Pilot Project itself was conducted on 6th October, 2004 at the DEFCCS with the working group members. The results are shown in Table 5-2 and are also described in more detail below.

In regard to the achievement level, the individual activities are classified as those which achieved more than the target figure, those which achieved the target figure and those which failed to achieve the target figure. As the purpose of the Pilot Project was to verify the feasibility of the implementation of various activities by local residents, what is important is not whether or not the target figure was achieved but whether or not local residents were able to implement the planned activities by themselves. The evaluation findings suggest that all of the planned activities under the Pilot Project can be conducted by local residents.

Almost all of the impacts of the activities are positive and one common impact to all of the participating villages is that "the coherence of the village has been strengthened". This coherence of a village is an important element for the successful implementation of activities and is strengthening is a positive sign for continued activities by local residents. In regard to the planting of *Rhizophora* and *Avicennia*, many of the participants mentioned the return of fish. This opinion indicates that local residents are aware of the importance of mangrove forests in connection with fishery resources.

In regard to the effectiveness, relevance of the activities to the targets of the Pilot Project and the necessity for activities by local residents, such effectiveness, relevance and necessity of each activity were reconfirmed. However, opinions varied on whether or not the introduction of brush shelter fishing is relevant to achieve the target of "facilitating the restoration/conservation of mangrove forests/ecosystem". While some people argued that brush shelter fishing is an alternative way of illustrating the function of mangrove forests of rearing marine resources, others argued that there is a high risk of local people using brush shelter fishing simply as an efficient fishing method based on their knowledge of the effectiveness of this method to attract fish. It was pointed out that the implementation of brush shelter fishing without combining it with the planting of mangrove trees would necessarily lead to the restoration or conservation of mangrove forests. Having taken these opinions into consideration, it has been decided that brush shelter fishing should remain a Pilot Project activity and should not be included in the Master Plan.

In regard to the continuity of activities, local residents expressed their willingness to continue all of the activities. However, the actual prospect of continued activities from the viewpoints of

organization, skill and funding varies from one village to another as well as from one activity to another.

In terms of activities, local residents can continue the production of protective heavy cloth shoes and gloves, face masks for apiculture and life jackets as the organizations or persons in charge of these activities have fully mastered the necessary skills. Local residents have also mastered the know-how to educate people on the environment and other issues through sporting and cultural activities. It is, therefore, possible to leave educational activities to villagers' organizations in each village.

In terms of villages, the members of the relevant village organization and other villagers in Mar Fafako have a strong willingness to plant *Rhizophora*, have acquired sufficient skill and are capable of raising the necessary funds by themselves. The planting of *Rhizophora* can, therefore, continue in this village without external assistance. In the case of life jacket product in Kamatane Bambara, the members of the management committee, including the chairman, are very enthusiastic and have acquired the necessary skills. The potential for self-reliant development is very high with a well-established fund management capacity. It is, therefore, possible to leave this activity to the initiative of local residents. In Mbam, the newly elected members of the villagers' organization show a high level of commitment and the organization is functioning well. As such, not only the production of life jackets but also extension activities can be left to local residents. Meanwhile, despite the funding capacity and possession of natural oyster management skills as well as oyster culture skills, there are strong expectations among the GIE Sokone members for external assistance in terms of funding and materials. In this case, the continuity of activities can be better secured by withdrawing external assistance to enhance the spirit of self-reliance of the union. In other villages, some problems remain in terms of organization, skill and/or funding. There are cases where external financial assistance is required until activities designed to generate income commence along the right lines provided that local residents request such assistance. In the future, the organizational capacity, including the fund management capacity, should be strengthened together with the establishment of self-reliance, including self-reliant funding, and assistance in terms of techniques and materials for various activities with a view to solving the remaining problems.

Table 5-2 Overall Evaluation of the Pilot Project

Village	Activity	Final Evaluation Workshop by NGO		Final Evaluation by Study Team, DEFCCS and Working Group
		Willingness of Local Residents to Continue	Necessity to Continue	
1. Djirnda	Planting of *Rhizophora*	Yes	Yes	To be included in the planning items
	Introduction of improved smoking kilns			
2. Dassilamé Sérère	Planting of *Avicennia*	Yes	Yes	To be included in the planning items
	Creation of village forest			
	Introduction of eco-tourism			
3. Mar Fafako	Planting of *Rhizophora*	Yes	Yes	To be included in the planning items
	Education with ASC assistance			
4. Moundé	Production of protective masks	Yes	Yes	To be included in the planning items
	Production of heavy cloth shoes and gloves			
	Improvement and sale of processed shellfish products			
	Introduction of eco-tourism			
	Acceptance of study visits from other villages			
5. GIE Ostreicole Sokone	Management of natural oyster resources	Yes	Yes	To be included in the planning items
	Culture of oysters			
	Production of heavy cloth shoes and gloves			
	Education with GIF assistance			
6. Bangalère	Planting of *Rhizophora*	Yes	Yes	To be included in the planning items
	Creation of village forest			
	Diffusion of improved ovens for domestic use			
7. Gagué Chérif	Planting of *Rhizophora*	Yes	Yes	To be included in the planning items. However, brush shelter fishing will be to gather data and not extended to other areas. After the gathering of data, the facility will be withdrawn.
	Introduction of brush shelters (fishing)			
	Education with ASC assistance			
8. Mbam	Production of life jackets	Yes	Yes	To be included in the planning items
	Acceptance of study visits from other villagers			
9. Kamatane Bambara	Production of life jackets	Yes	Yes	To be included in the planning items
10. Bassoul	Creation of village forest	Yes	Yes	To be included in the planning items
	Introduction and management of improved smoking kilns led by the RC			
	Seminar (sponsored by the RC)			

ATTACHED TABLE

ATTACHED TABLE 1 PERFORMANCE OF ACTIVITIES

(IN VILLAGES SUPERVISED BY THE UICN)

ATTACHED TABLE 1 PERFORMANCE OF ACTIVITIES (IN VILLAGES SUPERVISED BY THE UICN)

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Djirnda

Activity : Planting of *Rhizophora*
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Increase of the area of mangrove forests
Expected Output : Creation and maintenance of *Rhizophora* forest

Work	Confirmation of Results		Factors Affecting Work Results			
			Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Collection of seeds in the first year	Planned number of seeds: 20,000 Number of collected seeds: 20,000 (the seeds were collected from 19th to 21st Aug., 2003 and were immediately planted)		Participants : 30 (all women)	Prior technical training on seed collection: Yes	Was a fuel cost incurred? Yes Who paid? UICN	The timing of collection was correct. Many seeds were available nearby.
2) Planting of 20,000 in the first year	Number planted: 25cm x 25cm 10,000 50cm x 50cm 10,000	Present number: 25cm 8,100 50cm 9,500	Participants : 45 (all women)	Prior technical training on planting? Yes	Was a fuel cost incurred? Yes Who paid? UICN	The work was hard; a period of low tide should be chosen for planting; good growth with vigorosity; crown closure soon; muddy soil; crossing of a channel
3) Monitoring of the planted seedlings in the first year	Frequency and timing of monitoring: every three months (Nov., 2003, Feb., May and Aug., 2004)		Participants : 2 (both women)	Prior technical training on the monitoring method: Yes	Was a fuel cost incurred? Yes Who paid? UICN	It is difficult to measure the planted seedlings through monitoring because local women are illiterate.
4) Collection of seeds in the second year	Planned number of seeds: 20,000 Number of collected seeds: 20,000 (25th and 26th Aug., 2004)		Participants : 35 (all women)	Prior technical training on seed collection: Yes	Was a fuel cost incurred? Yes Who paid? UICN	The timing of collection was correct. Many seeds were available nearby.
5) Planting of 20,000 in the second year	Number planted: 25cm x 25cm 10,000 50cm x 50 cm 10,000	Present number: all surviving (planted on 25th and 26th Aug., 2004)	Participants : 65 (all women)	Prior technical training on planting: Yes	Was a fuel cost incurred? Yes Who paid? UICN	The work was hard; a period of low tide should be chosen for planting; muddy soil; crossing of a channel

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Djrinda

Activity : Introduction of improved smoking kilns
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Reduction of mangrove consumption as firewood
Expected Output : Construction of improved kilns and conventional kilns for smoking of Etomatose to clarify the advantages of the former through comparison; marketing of smoked fish to save some of the profits for an environment fund

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Construction of kilns (improved and conventional) in the first year	(Improved type) Construction start: Nov., 2003 Construction end: Jan., 2004 (Conventional type) Construction start: Nov., 2003 Construction end: Jan., 2004	Plasterers : 4 Assisting villagers : 7	From the technical point of view, can the construction of improved kilns be conducted by villagers? Yes. If not, what are the reasons? Wire baskets and iron frames cannot be made because the village does not have a blacksmith.	What were the costs? Payment to a blacksmith in Foundiougne and the cost of other materials. Who paid? UICN	Were all of the materials procured in the village or nearby? Impossible Were the improved kilns accepted by the villagers? The concept of improved kilns was well received by the villagers.
2) Comparative test	Number of tests conducted (or dates) 28th and 30th March, 5th, 6th, 8th, 21st and 22nd April, 2004 (seven times)	Participants : 10	Prior technical training on the measuring method: Yes	What were the costs? Payment for a balance, etc. Who paid? UICN	What are the advantages of an improved kiln? Improved yield by 16%; reduction of firewood consumption by 56%; less smoke damage; stable product quality; better workability; non-requirement of constant monitoring because of stable burning
3) Product sales	Sales records: Yes 1) 554 kg, 290 F/kg 160,660 F 2) 286 kg, 300 F/kg 85,800 F	Participants : 2	Prior training on the sales method: Yes	What were the costs? Personnel cost for packing Who paid? UICN Was the sales income recorded? Yes	Were the products accepted by buyers? 1) A buyer from Burkina Faso praised the quality of the products and bought them. 2) A Guinean working in Djirnda praised the quality and came to watch the work many times.
4) Maintenance and improvement of kilns in the second year	Maintenance and improvements made Improved type: attachment of a galvanized sheet on the upper lid Conventional type: cutting of the mesh	Participants : 4	Prior technical training on maintenance and improvement: Yes	What were the costs? Payment for the galvanized sheet, etc. Who paid? UICN	

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Dassilamé Sérère

Activity : Planting of *Avicennia*
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Increase of the area of mangrove forests
Expected Output : Creation and maintenance of *Avicennia* forest

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Collection of seeds in the first year	Planned number of seeds: 6,000 First: 6,000 (washed away) Second: 6,000 (washed away) Third: 6,000 (successful)	Participants : 100 (both sexes)	Prior technical training on seed collection: Yes	Was a fuel cost incurred? UICN staff collected seeds at Somone Who paid?	The timing of collection was correct. Seeds were available locally but were all washed away twice. The final 6,000 came from local areas (4,800) and Somone (1,200).
2) Production of seedlings in the first year	Planned number of seedlings to be produced: 6,000 Number of produced seedlings: 6,000 Planted in pots on 17th Aug., 2003	Participants in filling pots with soil: 100 Participants in seeding: 100 (slightly more women than men)	Prior technical training on nursing: Yes The idea of fixing the wooden frames used in the nursery came from villagers.	Who provided the pots? Purchased by the UICN	
3) Planting of 5,000 seedlings in the first year	Number planted: 6,000 (Planting distance of 1m x 1m) The present number is as of early Sept., 2004; the surviving seedlings are vigorous. Present number: 3,420 (57%)	Participants : 35 x three times Twice in Dec., 2003 Once in Jan., 2004	Prior technical training on planting? Yes	Was a fuel cost incurred? No Who paid?	The work was hard because the villagers had no planting skills in the first year. The growth of *Avicennia* appeared poor to start with but became vigorous once the rainy season started.
4) Monitoring of the planted seedlings in the first year	Frequency and timing of monitoring: Every three months (Mar., Jun., and Sept., 2004)	Participants : 2	Prior technical training on the monitoring method: Yes	Was a fuel cost incurred? No Who paid?	The monitoring method is easy to understand. The villagers became capable of measuring the seedlings.
5) Collection of seeds in the second year	Planned number of seeds to be collected: 6,000 Number of collected seeds: 6,000+ (18th through 21st Jul., 2004)	Participants : 17	Prior technical training on seed collection: Yes	Was a fuel cost incurred? No, except for the cost of meals Who paid? UICN	The timing of collection was correct. The seeds were collected locally in the second year.
6) Production of seedlings in the second year	Planned number of seedlings to be produced: 6,000 Number of seedlings produced: 6,000 Potted on 23rd Jul., 2004	Participants in filling pots with soil: 35 Participants in sowing: 5	Prior technical training on nursing: Yes	Who provided the pots? UICN	
7) Planting of 5,000 seedlings in the second year	Number of seedlings to be planted: 6,000 3,000 were planted on 10th and 11th Sept., 2004. 3,000 were planted on 10th and 11th September, 2004. 3,000 are to be planted on 12th and 13th Sept., 2004 (planting distance of 50 cm x 50 cm)	Participants : 72 (54 men and 18 women)	Prior technical training on planting: Yes	Was a fuel cost incurred? No Who paid?	The work was easier than the first year. The villagers wee able to set up ropes, etc. It was difficult to determine the low tide and to gather the villagers at the right time, particularly on the 10th and 11th Sept. when the low tide occurred around 2 o'clock in the afternoon after lunch.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Dassilamé Sérère

Activity : Creation of village forest
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Reduction of the use of mangrove forests
Expected Output : Alternative wood to mangrove wood will be supplied from the village forest. Some of the profits from sales will be saved in an environment fund.

Work	Confirmation of Results		Factors Affecting Work Results			
			Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Planting in the first year	Number of planted seedlings: *Tectona grandis* : 120 *Gmelina arborea* : 120 *Acacia mellifera* : 120 *Prosopis juliflora* : 120 *Cassia siamea* : 120 (Planted on 11th through 17th Aug., 2003)	Present number: *T* : *89* *G* : *105* *A* : *45* *P* : *90* *C* : *85*	Participants: 100 (slightly more men than women)	Prior technical training on planting: Yes *T. grandis* and *G. arborea* were provided by the DEFCCS from Ziguinchor	What was the cost? Transportation cost of the seedlings Who paid? UICN	As the villagers had experience of planting eucalyptus, the planting work was easy.
2) Monitoring	Frequency of monitoring (or dates): Every three months		Participants: 2	Prior technical training on monitoring method: Yes	What was the cost? None Who paid?	Recording of the growth situation: The villagers are continuing to record as the monitoring work is easy.
3) Production of seedlings for planting in the second year	Number of seedlings produced: *T. grandis* : 23 *G. arborea* : 13 *C. siamea* : 120 Seeds of *A. mellifera* and *P. juliflora* were not obtained.		Participants: 8	Prior technical training on nursing: Yes	What was the cost? Cost of the seeds, pots and nursery construction Who paid? UICN	Germination rate by species: Only a few seeds germinated except for *C. siamea*, indicating the difficulty of germination without pre-treatment.
4) Planting in the second year	Number of planted seedlings: *T. grandis* : 120 *G. arborea* : 120 *E. camaldulensis* : 120 *P. juliflora* : 120 *C. siamea* : 120 (Planted on 18th through 20th Aug., 2004)	Present number: All surviving as of 11th Sept., 2004	Participants: 25	Prior technical training on planting: Yes	What was the cost? Cost of meals and transportation of the seedlings Who paid? UICN	The shortfall in the number of seedlings was met by the WAAME.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Dassilamé Sérère

Activity : Introduction of eco-tourism
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Increased use of non-wood products from mangrove forests/ecosystem
Expected Output : Implementation of eco-tourism and some of the profits will be saved in an environment fund

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Setting up of an eco-route	Period required to set up an eco-route: 3 months	Participants : 40			The setting up of an eco-route was not difficult.
2) Development of an environment-friendly means of transport	Horse-drawn carriage Order date : Oct., 2003 Delivery date : Jan., 2004 Kayak Order date : Nov., 2003 Delivery date : Jan., 2004		Can they be manufactured locally? Yes Carriage: Foundiougne Kayak: Moundé	What was the cost? Manufacturing cost of the carriage and kayak Who paid? UICN	One canoe and kayak for the second year were delivered on 11th Sept., 2004 from Moundé.
3) Training of eco-guides	Training period: approx. 2 weeks in the first year (13th to 25th Sept., 2003); approx. one week in the second year (1st to 7th Jul., 2004)	Participants : 5 (4 men and one woman)	Outline of training: basic concept of eco-tourism; safety measures; ecosystem in the delta; names of animals and plants; practical work of guides; money management; analysis of the eco-route, etc.	What was the cost? Training expenses Who paid? UICN	Training in the first year took place in Dassilamé Sérère by a former guide from Moundé. Training in the second year took place in Moundé by an eco-guide from Dassilamé Sérère.
4) Production of souvenirs	Types and prices: As dyeing could not be conducted, dried bissap leaves or baobab fruits were given to tourists. While these were included in the eco-tour fee, the cost of souvenirs alone was some 1,500 CFA	Participants : 8	Do the villagers have the required skills? Yes	What was the cost? Cost of dyeing agents, tools, washtubs, cloths, needles and thread; remuneration for the instructor Who paid? UICN	Are the materials available locally? Dyeing agents can be procured in Dhakar while others can be procured locally. 30 cm wide cloth was dyed. A large item, such as a tablecloth, was given to tourists visiting as a group while a smaller item was given to individual tourists.
5) Official opening of the eco-route	Date of official start: 23rd Mar., 2004	Participants in the ceremony: approx. 250			Comments by outsiders concerned: very satisfied
6) Business situation of the eco-route	Total number of visitors on tours up to the end of Aug., 2004: 19	Number of eco-tourism committee members: 8 Aggregate number of eco-guides working up to the end of Aug., 2004: 5	Did the eco-guides master the necessary skills? Yes. A guide is available at any time for anyone.		
7) Communication system and situation of publicity	Relationship with hotels; pamphlets; PR activities				Pamphlets were distributed to 13 hotels between Djifer and Ndangane and also to 20 travel agents.
8) Improvement of the eco-route	Although there is no special need for improvement, it is hoped to include an improved smoking kiln for shellfish on the route for sampling of the products (UICN).				

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Mar Fafako

Activity : Planting of *Rhizophora*
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Increase of the area of mangrove forests
Expected Output : Creation and maintenance of *Rhizophora* forest

Work	Confirmation of Results		Factors Affecting Work Results			
			Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Collection of seeds in the first year	Planned number of seeds: 20,000 Number of seeds collected: 20,000 (collection and immediate planting on 24th and 25th Aug., 2003)		Participants : 35 (both sexes with 80% women)	Prior technical training on seed collection: yes	Was a fuel cost incurred? Yes Who paid? UICN	The timing of collection was correct. Because of the scarcity of seeds around the village, the seeds were collected around Djirnda.
2) Planting of 20,000 in the first year	Number planted: 25cm x 25cm 10,000 50cm x 50cm 10,000	Present number: 25cm 9,800 50cm 7,400	Participants : 166 (16 men and 100 women)	Prior technical training on planting? Yes	Was a fuel cost incurred? No Who paid?	The work volume was large and the work was hard; good growth with vigorosity; crown closure soon; dense planting at a sandy site; a period of low tide should be chosen for planting
3) Monitoring of the planted seedlings in the first year	Frequency and timing of monitoring: every three months (Nov., 2003, Feb., May and Aug., 2004) The villagers monitored every day and conducted supplementary planting to immediately replace dead seedlings.		Participants : 2	Prior technical training on the monitoring method: Yes	Was a fuel cost incurred? No Who paid?	Monitoring can be sufficiently conducted by the villagers.
4) Collection of seeds in the second year	Planned number of seeds: 20,000 Number of collected seeds: 20,000 (on 21st through 24th Aug., 2004)		Participants : 43 (both sexes with 80% women)	Prior technical training on seed collection: Yes	Was a fuel cost incurred? Yes Who paid? UICN	The timing of collection was correct. Because of the scarcity of seeds around the village, the seeds were collected around Djirnda.
5) Planting of 20,000 in the second year	Number planted: 25cm x 25cm 10,000 50cm x 50cm 10,000	Present number: all surviving (planted on 25th Aug., 2004)	Participants : 187 (120 men and 67 women) The number of young participants increased.	Prior technical training on planting: Yes	Was a fuel cost incurred? No Who paid?	Because of familiarity, the work was easier than in the first year. A period of low tide should be chosen for planting.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Mar Fafako

Activity : Extension linked to assistance for sporting/cultural activities
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Development of awareness for mangrove forest conservation
Expected Output : Spread of activities to other villages; spending of some of the event profits for natural resources management activities

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Performance of educational plays The prizes in the first year were the Mangrove Cup and the Championship Flag	First year : 6th Feb., 2003 Second year : 26th Aug., 2004 A play was performed after a wrestling meeting in the first year and a football tournament in the second year.	Audience First year : Several thousand Second year : Five hundred	Preparations: No problems A generator was provided by the village. In both the first and second years, a theatrical group from Mbam was invited.	What were the costs? Cost of lighting equipment and seating Who paid? Village	What was the response of the audience? Metaphors were used in the play to appeal the importance of mangrove forests (village life supported by people, childbirth and marriage). Many villagers talked about the contents of the play and the increase of people planting *Rhizophora* in the aftermath suggests the spread of the intended message.
2) Evaluation workshops	Date First year : 7th Feb., 2003 Second year : 27th Aug., 2004	Participants in workshop First year : 0 Second year : 20 Members of the committee and those in charge of events	Did the villagers learn how to organize a workshop? The villagers understood how to organize events and are able to continue without external assistance.	What were the costs? None Who paid?	What are the improvement points? In the first year, the timing coincided with the Sheep Festival and people from entire Mar Island came to see the play. In the second year, only people from Mar Fafako saw the play. The audience base should be extended to the entire island. It would be good for Mar Fafako to have its own theatrical troop.
3) Enquiries regarding post-event activities	Number of enquiries: 2 Contents: Requests from Mar Ledji and Fimla to educate local residents through a football tournament and a theatrical play	What was the response to these enquiries? The UICN is currently examining an appropriate response.		What were the costs? None	An enquiry from Mar Ladji was made to the village committee while an enquiry from Fimla was made to the UICN.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Moundé

Activity : Making of protective face mask for apiculture
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Increased use of non-wood products from mangrove forests/ecosystem
Expected Output : Promotion of apiculture and saving of some of the profits in an environment fund

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Technical training course	Number of courses in the first year: 4 Number of courses in the second year: 4	Aggregate participants in the first year : 40 Aggregate participants in the second year : 40	Were the techniques mastered? Yes Can the mastered techniques be extended to other villages? Yes	What were the costs? Cost of materials Who paid? UICN	Can the materials be easily obtained? Yes. The UICN prepared materials for all of the courses. From the second course onwards, the villagers began to bring their own materials.
2) Making of masks	Number of masks made First year : 16 Second Year : 17	Number of people involved in the work: : 40 Number of users : 30	Villagers' proposal for improvement: The Moundé model integrating a mask with protective clothing (with heavy cloth shoes and gloves) was developed as the wearing of only a mask to start with was not enough to prevent bee stings.		To start with, mosquito netting was used. Subsequent improvement involved the use of mosquito netting for windows which can be bought in Foundiougne.
3) Usage	Average usage: Twice/month	Number of users : 30			How do the villagers evaluate their own product? The product is popular among the villagers who are proud of developing the Moundé model.
4) Sale of honey	Was the honey sold? Yes. Bottled honey with a label has been sold inside and outside the village under the guidance of the UICN as part of its biological diversity conservation programme.			Are the proceeds from sales managed (is there a special account)? No Has an environment fund been set up? No. (The Pilot Project did not plan that far, UICN)	The production volume of honey has increased. Although the UICN assists apiculture under its biological diversity conservation programme, its assistance does not include the aspect of financial management.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Moundé

Activity : Making of protective heavy cloth shoes and gloves
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Reduction of damage to mangrove forests
Expected Output : Non-cutting of spur roots when collecting natural oysters; reduction of injuries during shellfish collection work

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Technical training course	Number of courses in the first year: 4 Number of courses in the second year: 4	Aggregate participants in the first year : 40 Aggregate participants in the second year : 40	Were the techniques mastered? Yes Can the villagers extend the techniques to other villages? In the first year, the UICN provided guidance. In the second year, the villagers relied on themselves. The activities were extended to five neighbouring villages.	What were the costs? Cost of the materials Who paid? UICN	Can the materials be easily obtained? Most of the materials are available at the regular market in Sokone. While the tyres used for the improved heavy cloth shoes are not available in the village, the making of these products cannot be described as difficult because of such unavailability.
2) Making of shoes and gloves	Number of shoes and gloves made: Gloves Shoes First year: 11 31 Second year: 31 49 (The actual number far exceeded the above as people who did not attend the course also made the items.)	Number of people involved in the work : 40	Villagers' proposals for improvement Shoes: New type where the shoe is directly connected to the trousers with a piece of tyre or wood used for the sole Gloves: From the mitten type to the five finger type	Was there a material cost? Yes Who paid? UICN	
3) Usage	Average usage: Always used when working at sea. The scope of application has expanded beyond shellfish collection.	Number of users: More than 20 All of the participants at a meeting held on 9th Sept., 2004 use them. Many more villagers also use them.			How do the villagers evaluate their own products? One person has made more than 10 pairs of heavy cloth shoes for use by her husband and children for farming work.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Moundé

Activity : Development of processed shellfish products
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Sustainable use of marine resources in mangrove forests/ecosystem
Expected Output : Increased added value to processed shellfish products and saving of some of the profits in an environment fund

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Installation of shellfish processing equipment	Date of installation Washing table: Jan., 2004 Drying table: Jan., 2004 Smoking kiln: Jan., 2004	Number of shellfish processing operations: 4 Number of workers: 30	Was the equipment made in the village? The smoking kiln was made by an ironworks in Foundiougne. Other equipment was made in the village.	What were the costs? Cost of making the washing table, drying table and smoking kiln	Advantages of new equipment Washing table: keeping products clean Drying table: easy preservation Smoking kiln: high quality
2) Development of merchandise using processing equipment	What merchandise was developed? Packaged senila sanilis; smoked oysters	Number of workers: 30	Were the techniques for improved processing fully mastered? Yes	What were the costs? Cost of vinyl bags and a balance, etc. Who paid? UICN	The products are very hygienic. (The test on the ingredients and hygiene proved that the products are hygienic. The ingredients are indicated on the label.)
3) Marketing of new merchandise	How and how often have the new merchandise been marketed? Improved and conventional senila sanilis products are sold in the market near Dhakar at a price of 1,000 FCFA/kg and 750 FCFA /kg respectively. Customers prefer the improved product.	Participants in sale: 2		What were the costs? Transport cost Who paid? UICN	

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Moundé

Activity : Introduction of eco-tourism
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Increased use of non-wood products from mangrove forests/ecosystem
Expected Output : Implementation of eco-tourism and some of the profits will be saved in an environment fund

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Setting up of an eco-route	Period required to set up an eco-route: 3 months	Participants: 50			The setting up of an eco-route was not particularly difficult.
2) Development of an environment-friendly means of transport	Horse-drawn carriage Order date: Oct., 2003 Delivery date: Jan., 2004 Kayak Order date: Nov., 2003 Delivery date: Jan., 2004		Can they be manufactured locally? Yes Carriage: Foundiougne Kayak: Moundé	What was the cost? Manufacturing cost of carriages and kayaks Who paid? UICN	One canoe and kayak for the second year were delivered on 10th Sept., 2004 (manufactured in Moundé).
3) Training of eco-guides	Training period: approx. 2 weeks in the first year (13th to 25th Sept., 2003) and approx. one week in the second year (1st to 7th Jul., 2004)	Participants: First year: 3 Second year: 5 (4 men and one woman) (2 persons in the second year also attended in the first year.)	Outline of training: basic concept of eco-tourism; safety measures; ecosystem in the delta; names of animals and plants; practical work of guides; money management; analysis of the eco-route, etc.	What was the cost? Training expenses Who paid? UICN	Training in the first year took place in Dassilamé Sérère by a former guide from Moundé. Training in the second year took place in Moundé by an eco-guide from Dassilamé Sérère.
4) Production of souvenirs	Types and prices: As the person in charge of dyeing would not conduct the work because of family circumstances, dyed products made in advance were given to the tourists. While these are included in the eco-tour fee, the cost of souvenirs alone was approximately 1,500 CFA. It is planned to make model ships as an alternative to dyed cloth.	Participants:	Do the villagers have the required skills? Yes	What was the cost? Cost of dyeing agents and cloth, etc. In the case of model ships, the wood will be free as chips from carpentry work will be used. Glue and paint costs will arise. Who paid?	Are the materials available locally? Dyeing agents can be procured in Dhakar while others can be procured locally.
5) Official opening of the eco-route	Date of official start: 23rd Mar., 2003	Participants in the ceremony: 150			Comments by outsiders concerned: Satisfied
6) Business situation of the eco-route	Total number of visitors on tours up to the end of Aug., 2004: 4 (only once (on 9th May, 2004)	Number of eco-tourism committee members: 4 Aggregate number of eco-guides working up to the end of Aug., 2004: 2	Did the eco-guides master the necessary skills? Yes. Two are alright. Three new guides required more training which is being provided by the other two.		In response to a request by hoteliers for repair of a bridge, while the UICN has the required budget, the work has not yet been conducted because the document of request by the village is not in proper order.
7) Communication system and situation of publicity	Relationship with hotels: Pamphlets: PR activities:				Pamphlets were distributed to 13 hotels between Djifer and Ndangane and also to 20 travel agents.
8) Improvement of the eco-route	Improvement is necessary. Contents: There is a large baobab. The villagers have no objection to its showing and, in fact, would like to show it to tourists. It is hoped to serve products from the improved smoking kiln to tourists for sampling.				

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Moundé

Activity : Acceptance of visitors from other villages as a model village
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Extension of activities to other villages
Expected Output : Start of activities in other villages

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Acceptance of visitors from other villages	Date: 25th May, 2004 23rd to 24th Aug., 2004	Participants of the village: 30 Visitors: 15 (Faria, Bassoul, Jogane, Siwo and Ngaiohl)	Did the villagers master the know-how to deal with visitors? Yes	What were the costs? Cost of fuel, meals and transport Who paid? UICN	
	Activities explained: Eco-tourism; GEC; shellfish processing; making of masks, heavy cloth shoes and gloves; planting; apiculture		Have the villagers mastered the techniques relating to the activities explained? Yes		
2) Evaluation meeting	Was an evaluation meeting held after the visit? Date: 25th May, 2004	Participants: 5 (Rather small number) (Those points which did not go particularly well were discussed. The minutes of the meeting were recorded.)		What were the costs? None	What are the points to be improved or reviewed? Because of the opinion that a one day visit was too short, the second visit lasted for two days.
3) Enquiries from other villages	Number of enquiries from other villages: 5 Eco-tourism: Ngajohl, Bassoul, Djirnda and Diogan Heavy cloth shoes and gloves: Diogam, Faria and Siwo	How are the enquiries dealt with? The UICN is currently examining how to respond.			Contents of enquiries: Eco-tourism and heavy cloth shoes and gloves Although Djirnda was not invited, an enquiry was made by the head of the RC.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): GIE Ostréicole Sokone

Activity : Introduction of natural mangrove oyster resources management techniques
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Sustainable use of marine resources in mangrove forests/ecosystem
Expected Output : Introduction and implementation of natural mangrove oyster resources management techniques and saving of some of the profits from the sale of natural mangrove oysters in an environment fund

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Oyster resources meeting in the first year	Date: 17th Oct., 2003 Names of fishing grounds to be temporarily closed - Banbougar EH (Bakon Becane) - Sandicoly (Konkare) - Medina (Nakhel) - Soukouta (Koko)	Participants: 47	Were the management techniques fully mastered? Yes (under the guidance of the UICN)	What were the costs? Meals and transport for the participants and a daily allowance for the person in charge Who paid? UICN	The fishing grounds for temporary closure were officially approved by a decree of the governor (date of application for the governor and enforcement of the decree). An official application has been submitted and is now awaiting the governor's signature.
2) Observation of closed fishing grounds	Actual date of closure: 30th Nov., 2003 Date of re-opening: 30th Apr., 2004	Can the cooperative members record the operation log? Yes in Soukouta and Medina. In other villages, a suitable method must be examined in the future.	Notice boards have been erected at closed fishing grounds and their positive effects have been felt.		Is the prohibition of fishing properly observed? No-one has broken the rule because of the positive effects of education and the notice boards. Was the size of the oysters collected at the fishing grounds after re-opening larger than before? The report by the UICN is awaited.
3) Oyster resources meetings in the second year	Dates: 13th Jan., and 20th June, 2004 Names of fishing grounds to be temporarily closed - Banbougar EH (N. Dining) - Sandicoly (Nakhel No. 2) - Medina/Soukouta (Djilene)	Participants 13/01/2004: 45 20/06/2004: 30	Have the villagers fully mastered the relevant techniques? After the Pilot Project, the cooperative members will continue the system in a manner in which they are able.	What were the costs? Meals and transport for the participants and a daily allowance for the person in charge	Opinions of the Study Team The continuation of this practice is highly desirable while adhering to the following points. 1) Longer temporary closure (1.5 - 2 years) 2) Consensus of all users

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): GIE Ostréicole Sokone

Activity : Extension of oyster culture
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Sustainable use of marine resources in mangrove forests/ecosystem
Expected Output : Increased production volume of cultured oysters due to the extension of oyster culture and saving of some of the profits from the sale of cultured oysters in an environment fund

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Introduction of culture sites with simple direct seeding	Sites in the first year: Banbougar EH; Medina Sangako Sites in the second year: Sandicoly; Soukouta Results: At the trial and error stage	Participants in the work: 10	What are the technical problems of the direct seeding method? Scattering by the current and coverage due to sand sedimentation. Are there any remedial measures? Yes. The actual measure varies depending on the site.	Who paid the cost of materials? UICN	Experiment results 1) The laying of shells is highly effective. 2) Sites with a strong current should be avoided. 3) Shading by a roof is highly effective.
2) Culture by the ? method	Number of installations and results in the first year: Two chains each at Medina and Banbougar; most success in the last 20 years Installation sites in the second year: Medina; Banbougar; Soukouta; Sandicoly (preparations are currently in progress at these sites)	Participants in the work: 10	What are the technical problems of this method? Installation of Guirlandes in the precise spawning season (midway through to the end of the rainy season	Who paid the cost of materials? UICN	Experiment results 1) Good growth at 15 - 65 cm above the ground 2) The installation of Guirlandes at this height is preferable for full-scale operation at a site of simple culture
3) Culture using plastered slate plate	Number of installations and results in the first year: Banbougar and Medina; while the spat collection efficiency was high, many subsequently died Installation sites in the second year: Preparations are currently in progress in four villages.	Participants in the work: 10	What are the technical problems of this method: How to prevent eating of the spats by crabs and death due to heat. Possible measures are to move the spats after collection and to erect protective netting.	Who paid the costs? UICN	Experiment results 1) The spat collection efficiency is high. 2) Loss due to eating by crabs and heat occurs during the growth period. 3) These problems can be solved by relocating the slate plates.
4) Monitoring	Frequency of monitoring (or dates): Weekly	Participants: 2	Have the villagers mastered the monitoring method? Yes	What were the costs? None	Records of growth situation: Yes

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): GIE Ostréicole Sokone

Activity : Making of protective heavy cloth shoes and gloves
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Reduction of damage to mangrove forests
Expected Output : Non-cutting of spur roots when collecting natural oysters; reduction of injuries during shellfish collection work

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Technical training course	Number of courses in the first year: 4 Number of courses in the second year: 4	Aggregate participants in the first year: 20 Aggregate participants in the second year: 20	Were the techniques mastered? Yes Can the villagers extend the techniques to other villages? Yes	What were the costs? Cost of the materials Who paid? UICN	Can the materials be easily obtained? All of the materials can basically be obtained in and around the village.
2) Making of shoes and gloves	Number of shoes and gloves made First year: Shoes: 40 Gloves: 12 Second year: Shoes: 45 Gloves: 18	Number of people involved in the work: 20	Villagers' proposals for improvement: Replacement of the rubber sole with a piece of tyre to reinforce the sole	Was there a material cost? Cost of the tyres Who paid? Villagers	
3) Usage	Average usage: Twice/week	Number of users: 15	Because of the deep mud, the feet easily come out of the shoes at the heel. Remedial measures are (i) reinforcement or use of a different material for the sole and (ii) proper tying of the shoe laces.		How do the villagers evaluate their own products? The common gloves only last for two times of use. Boots are heavy and awkward when water gets inside them. The heavy cloth shoes and gloves made under the Pilot Project are much more suitable for the work. With some further improvement, they will be totally practical.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): GIE Ostréicole Sokone

Activity : Extension linked to assistance for sporting/cultural activities
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Development of awareness for mangrove forest conservation
Expected Output : Spread of activities to other villages; spending of some of the event profits for natural resources management activities

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Performance of educational plays	First year: 28th Aug., 2003 Second year: 28th Aug., 2004 (A play was performed after a football tournament in both years. The prizes in the second year were uniforms and one ball for the champions, uniforms for the runner-up and 50 mangrove conservation T-shirts for members of the cooperative.)	Audience First year: 300 Second year: 500 People came from 3-5 villages	In both years, the play was performed by a theatrical troop from Mbam. It is planned to set up a troop in Sandicoly but this has not yet materialized.	What were the costs? Fee and traveling cost of the troop and cost of the prizes Who paid? UICN	What was the response of the audience? Good. The messages of the play were: 1) Planting of mangrove 2) Roles of the mangrove ecosystem 3) Necessity to protect mangrove forests Positive effects have subsequently taken place.
2) Evaluation workshops	Date First year: Nov., 2003 Second year: 29th Aug., 2004	Participants in workshop First year: 10 Second year: 10	Did the villagers learn how to organize a workshop? Yes. The purpose of the football tournament and the championship match was explained to the audience together with the importance of protecting resources.	What were the costs? Cost of meals, etc. Who paid? UICN	What are the improvement points? The venue should be rotated although the events in these two years were all held in Sandicoly.
3) Enquiries regarding post-event activities	Number of enquiries: 4 Contents: Educational activities in conjunction with a football match	What was the response to these enquiries? Planning is necessary to proceed to Phase II.		What were the costs? None	Outputs of educational activities: 1) All of the villagers understand the purpose of PR activities. 2) The interest of villagers in educational activities has increased.

ATTACHED TABLE

ATTACHED TABLE 2　PERFORMANCE OF ACTIVITIES

(IN VILLAGES SUPERVISED BY THE WAAME)

ATTACHED TABLE 2 PERFORMANCE OF ACTIVITIES (IN VILLAGES SUPERVISED BY THE WAAME)

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Bangalère

Activity : Planting of *Rhizophora*
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Increase of the area of mangrove forests
Expected Output : Creation and maintenance of *Rhizophora* forest

Work	Confirmation of Results		Factors Affecting Work Results			
			Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Collection of seeds in the first year	Planned number of seeds: 20,000 Number of collected seeds: 8,600 First: 7,000 (31st Aug., to 1st Sept., 2003) Second: 1,600 (15th Nov., 2003)		Participants: No participation of villagers Because of the lack of seeds in the local area, WAAME staff collected seeds in other areas.	Prior technical training on seed collection: Yes	Was a fuel cost incurred? Fuel cost to cover the traveling of WAAME staff to collect seeds at Bagadaji Who paid? WAAME	The timing of collection was delayed; the seed quality was poor; no seeds nearby
2) Planting of 20,000 in the first year	Number planted: First 50cm x 50cm 7,000 Second 25cm x 25cm 1,600 (the surviving seedlings as of 10th Sept., 2004 are vigorous)	Present number: 25 cm 253 50cm 502 (10th Sept., 2004)	Participants: First 85 (40 men, 29 women and 16 young people) Second 20 (10 men and 10 women)	Prior technical training on planting? No	Was a fuel cost incurred? No; no meals provided Who paid?	The work was fairly easy (because the site was not muddy). The vigorosity of the surviving seedlings is better than that of areas with a high salinity but the seed quality was poor. The survival rate is rather low due to the sandy site and slightly high elevation of the ground
3) Monitoring of the planted seedlings in the first year	Frequency and timing of monitoring: every 45 days		Participants: 1 WAAME staff instructed the villager in charge	Prior technical training on the monitoring method: Yes	Was a fuel cost incurred? No Who paid?	Ease or difficulty of understanding the monitoring method (Monitoring of growth situation) The villager in charge quickly learned how to use the calipers and the measure.
4) Collection of seeds in the second year	Planned number of seeds: 20,000 Number of collected seeds: 7,000 Because of seed collection at a site slightly distant from the village, the number of collected seeds was insufficient (30th Aug., 2004)		Participants: 19 (17 men and 2 women)	Prior technical training on seed collection: Yes	Was a fuel cost incurred? No although a boat was rented Who paid? WAAME	The timing of collection was correct. No seeds were available nearby.
5) Planting of 20,000 in the second year	Number planted: 25cm x 25cm 16,000 (18th and 19th Sept., 2004) 50cm x 50cm 7,000 (31st Aug., 2004)	Present number: 7,000	Participants: 56 (31 men and 25 women)	Prior technical training on planting: Yes	Was a fuel cost incurred? No Who paid?	The worker was harder than the first year because of planting at a slightly deeper depth in muddy soil.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Bangalère

Activity : Creation of village forest
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Reduction of the use of mangrove forests
Expected Output : Alternative wood to mangrove wood will be supplied from the village forest. Some of the profits from sales will be saved in an environment fund.

Work	Confirmation of Results		Factors Affecting Work Results			
			Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Planting in the first year	Number of planted seedlings: *Eucalyptus*: 200 *Acacia mellifera*: 100 *Prosopis juliflora*: 200 *Melaleuca leucadendron*: 50 (Planted in late Aug., 2003; supplementary planting of *Eucalyptus* seedlings provided by the WAAME on 9th Aug., and 2nd Sept., 2004)	Present number: E: 174 A: 94 P: 164 M: 34 (2nd Sept., 2004)	Participants: 46	Prior technical training on planting: Yes, by an engineer of the DEFCCS	What was the cost? (The seedlings were provided by the DEFCCS.) Materials (fencing netting and posts, etc. around the nursery) Who paid? WAAME	Although the *P. juliflora* seedlings appeared to have died, they revived once the rainy season started.
2) Monitoring	Frequency of monitoring (or dates): Every 45 days		Participants: 3 (management committee members)	Prior technical training on monitoring method: Yes	What was the cost? None Who paid?	Recording of the growth situation: Yes
3) Production of seedlings for planting in the second year	Number of seedlings produced: E: 185 A: 160 P: 155 M: 85		Participants: All women cultivating vegetables at the site (approx. 25)	Prior technical training on nursing: Yes	What was the cost? Cost of the seeds and pots, etc. Who paid? WAAME	Germination rate by species: E: 61% A: 51% P: 96% M: 60%
4) Planting in the second year	Number of planted seedlings: E: 300 A: 298 P: 160 M: 140 (Planted on 2nd Aug., 2004; supplementary planting of *Eucalyptus* seedlings provided by the WAAME on 2nd and 11th Sept.)	Present number: E: 218 A: 259 P: 151 M: 101 (31st Aug., 2004)	Participants: 46 (13 men, 28 women and 5 young people)	Prior technical training on planting: Yes	What was the cost? Cost of the equipment and meals Who paid? WAAME	Weeding was conducted in lines and also around the planted seedlings.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Bangalère

Activity : Extension of improved domestic ovens
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Reduction of the use of mangrove wood
Expected Output : Reduced firewood consumption and improvement of the lives of villagers

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Construction and extension Training: 26th - 29th Dec., 2003 Retraining: 13th May, 2004	How many of the planned 20 were made? 61	Participants: 40 Five village instructors taught for two days in each village.	How was the technical training by the village instructors? Good Did the villagers master the construction techniques? Ovens have recently been constructed by the villagers and the techniques have been extended to Keur Aliou and Lerane Coly.	What were the costs? 10 sieves, 70 metal frames, small buckets, meals and remuneration for the instructors Who paid? WAAME	Has the system of extension to other villages been established? The system to extend improved ovens to other villages has been strengthened.
	How many ovens were constructed in neighbouring villages? Five villages constructed improved ovens: Aliou (15) Lerane Coly (16) G. Chérif (17) Saap (19) Mbam Toucouleur (15)	The extension work in Aliou and Lerane Coly was conducted by villagers from Bangalère while the work in the other three villages was conducted by villagers from Mbam.		What wee the costs? 60 metal supports and remuneration for the instructors Who paid? WAAME	Advantages of the improved ovens 1) Reduction of the firewood consumption by more than 50%; 2) Better safety and fewer incidents of fire; 3) Easy cooking on windy days; 4) Shorter cooking time; 5) Cooking with smaller logs (large logs were previously required)
2) Villagers' proposals for improvement			What proposals were made by the villagers to improve the ovens? Use of an old 2 kg tomato can with a reinforced opening; larger smoke hole; non-mixture of ash with clay (ash prevents clay from solidifying) (all proposed by women); the non-mixture of ash was successful at Saap and Gagué Chérif.		

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Gagué Chérif

Activity : Planting of *Avicennia*
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Increase of the area of mangrove forests
Expected Output : Creation and maintenance of *Avicennia* forest

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Collection of seeds in the first year	Planned number of seeds: 20,000 First: 4,000 (7th Nov., 2003) Second: 1,000 (12th Nov., 2003)	Participants: No participants from Gagué Chérif. 10 villagers from Bagadaji collected the seeds and the WAAME transported them.	Prior technical training on seed collection: No	Was a fuel cost incurred? Yes Who paid? WAAME	The timing of collection was delayed as no seeds were available locally. The collection of seeds at Bagadaji was easy because of an abundance of seeds in the area.
2) Production of seedlings in the first year	Planned number of seedlings to be produced: 6,000 Number of seedlings produced: 43 (7th Sept.) The delayed collection of the seeds meant failure to collect good seeds and most of the seeds died due to the high salinity of the area.	Participants in filling pots with soil: 20 Participants in seeding: 20	Prior technical training on nursing: Yes	Who provided the pots? WAAME	As the potting of the muddy soil was difficult, soil from the neighbouring area was used.
3) Planting of 5,000 seedlings in the first year	Number planted: Present number: Not yet planted but to be planted using the seedlings produced in the second year.	Participants: - 7 participated in the planting of the seedlings brought in by the WAAME from Bagadaji.	Prior technical training on planting? Yes	Was a fuel cost incurred? No Who paid?	The WAAME brought in seedlings from Bagadaji for planting by the villagers. Planting was easy because of the small number of seedlings.
4) Monitoring of the planted seedlings in the first year	Frequency and timing of monitoring: Every 45 days	Participants: 2	Prior technical training on the monitoring method: Yes	Was a fuel cost incurred? No Who paid?	It was difficult to conduct monitoring every 45 days without fail. This requirement became a burden because the villagers had many things to do.
5) Collection of seeds in the second year	Planned number of seeds to be collected: 6,000 Number of seeds collected: 3,576 12th Aug: 2,576 weighing some 25 kg near Djogane 19th Aug: 1,000 locally	Participants: 10 8 villagers, one from Mbam and one WAAME adviser	Prior technical training on seed collection: Yes	Was a fuel cost incurred? Yes Who paid? WAAME	The timing of collection was correct. No seeds were available locally.
6) Production of seedlings in the second year	Planned number of seedlings to be produced: 6,000 Number of seedlings produced: 3,576 18th Aug: 2,576 sown 1st Sept: some 1,000 sown with pre-treatment for 4 - 6 days	Participants in filling pots with soil: 21 Participants in sowing: 28	Prior technical training on nursing: Yes	Who provided the pots? Purchased by the WAAME	The work went much more smoothly than the first year because of familiarity.
7) Planting of 5,000 seedlings in the second year	Number of seedlings to be planted: Planting in mid-October is planned.	Participants:	Prior technical training on planting: Planned	Was a fuel cost incurred? Not yet known Who paid?	Not yet known

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Gagué Chérif

Activity : Introduction of brush shelters (fish traps)
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Understanding of the marine resources culture function of mangrove forests by villagers
Expected Output : Fish gather around a brush shelter to spawn; introduction of a closed season to be observed by villagers; sustainable use of marine resources

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Brush shelters in the first year	Sinking sites Yaay: 1 Sangué: 1 Additional brush placement Yaay: 3 times Sangué: 3 times	Participants: 10	Prior technical training on the making of brush shelters: Yes Prior technical training on the sinking technique for brush shelters: Yes The villagers mastered how to make and sink brush shelters.	What were the costs Material cost (rope) Who paid? WAAME	Are all of the materials available near the village? Yes, except for rope. It will be necessary for the villagers to seek an alternative material to rope in the future.
2) Experimental fishing in the first year	Number of experiments (or dates) Adult fish gathering demonstration experiment: 4th Mar., and 10th June, 2004	Participants: 2	Prior technical training on the experiment method: Yes	What were the costs? Fishing nets, meals and transportation Who paid? WAAME	Experiment results: No significant effects were observed at both sites in Yaye and Sangué ; the daily observation by villagers often saw large fish at Sangué and young fish a Yaay.
3) Enforcement of the Governor's Decree	Promulgation of the Governor's Decree on temporary closure of fishing grounds: An application by local residents to the governor had already been submitted. At present, this application has been returned to the district authority without further progress. Back-up activities by the WAAME, DEFCCS and DOPM are planned.				What procedure was taken? With the assistance of the WAAME, local residents submitted an application to the departmental government. Further strengthening of the collaboration between the WAAME and the DEFCCS is required.
4) Brush shelters in the second year	Additional brush placement Yaay: Once Sangué: Once Fry rearing effect demonstration experiment: 27th Aug. and 2nd Sept., 2004	Participants in brush placement: 10 (The number steady increased each time the work was organized but no new participants from outside the existing group.) Participants in the experiment: 3	Prior technical training: Yes	What were the costs? Materials and meals Who paid? WAAME	What was the response of the villagers to brush shelters (fishing)? Enquiries were made by villagers of Sadioga and Mbassis. It is planned for the WAAME to provide the necessary materials and for villagers of Gagué Chérif to teach the methods to make and sink brush shelters.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Gagué Chérif

Activity : Extension linked to assistance for sporting/cultural activities
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Development of awareness for mangrove forest conservation
Expected Output : Spread of activities to other villages; spending of some of the event profits for natural resources management activities

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Performance of educational plays Lasted from 10:00 pm to 02:00 am in the village square	First year: 8th May, 2003 Second year: 27th Aug., 2004 First year: Only the play Second year: The play was performed after a football tournament in which four teams representing the respective villages, including Gagué participated. The Gagué team won the championship and was awarded a cup and one ball in addition to 16 uniforms which were given to each team. The runner-up was given one ball.	Audience First year: 600 Second year: 900 In the first year, people were invited from 25 villages. In the second year, people were invited from 35 villages. In both years, some people came from all of the villages.	The WAAME created the story of the play and made the necessary preparations. The themes of the play on each occasion were the same, consisting of life jackets, planting of mangrove, brush shelters, prawn fishing (abiding by the off-season rule) and domestic ovens. First year: Troup from Mbam Second year: Troup from Gagué Chérif	What were the costs? Meals, sound, troupe fee, costumes and chair rental Who paid? WAAME It is hoped to continue this activity but external assistance is required.	What was the response of the audience? The audience was not satisfied with the performance being on only one day and wanted two days. The messages were well received by the audience. Some of the audience was invited onto the stage after the play to answer questions to see if they had received the messages. Although the themes were the same on both occasions, the educational effects were stronger in the second year because of the closeness of the story to people's daily lives.
2) Evaluation workshops	Date First year: 8th May, 2004 Second year: 28th Aug., 2004 The play was performed immediately after the event.	Participants in workshop First year: 15 Second year: 20 Committee members plus village volunteers (all were villagers from Gagué Chérif)	Did the villagers learn how to organize a workshop? Yes	What were the costs? None Who paid?	What are the improvement points? The starting time of the play was too late for young children to attend. The activity was generally successful.
3) Enquiries regarding post-event activities	Number of enquiries: 3 Contents: Techniques relating to nurseries for *Avicennia,* brush shelters and improved ovens (used throughout Gagué Chérif)	What was the response to these enquiries? The relevant technical aspects were explained.		What were the costs? None. Continuous activities by the village troop will require external assistance.	Extension effects: At first, none of the villagers were in favour of the Pilot Project. However, the performance of the play by local villagers made it possible to educate all of the villagers on the purpose of this PR exercise.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Kamatane Bambara

Activity : Making of life jackets
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Sustainable use of prawn resources in the mangrove ecosystem
Expected Output : Lowering of the excessive dependence on prawn fishing; elimination of the victims of accidents at sea during prawn fishing

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Making of life jackets in the first year	Quantity made: 100	Number of tailors used: 2	Did the tailors fully master the necessary techniques? Yes	What were the costs? Materials and tailoring Who paid? Materials by the WAAME; tailoring cost from the sales proceeds	Can be the materials be obtained locally? The purchase of some materials in Dhakar is necessary.
2) Sales in the first year	Quantity sold: 91 (62 in cash; 29 on credit) Cash: 316,000 FCFA Sales on credit (receivable): 139,000 FCFA Quantity in stock: 9 After payment to the tailors and for materials, etc., the cash balance is 250,305 FCFA (25th Sept., 2004)	Sales made and number of workers: Direct and indirect sale through middlemen, tailors and the CG	Was the sales know-how fully mastered? Because of the prawn fishing results, it has become difficult to recover the sales on credit, leaving something to think about in the future.	What were the costs? Bank account opening cost and transportation cost Who paid? Paid from the sales proceeds	
3) Making of life jackets in the second year	Quantity made: 50	Number of tailors used: 2 Under the guidance of the WAAME, the tailors bought the materials in Dhakar.	Did the tailors fully master the necessary techniques? Yes. Using a new float material, three types were made for trial and it was decided to use two sheets each for the front and back.	What were the costs? Cost of the materials and training Who paid? Materials by the WAAME; the tailoring cost has not yet been paid.	Can the materials be obtained locally? Some materials were purchased in Dhakar. In the future, village tailors will purchase the materials by themselves.
4) Sales in the second year	Quantity sold: 0 Unit price: 7,000 FCFA each Cash: Sales on credit (received): Sales on credit (receivable):	Sales made: When sold to a middleman or a prawn fisherman, a deposit of 50% of more of the price should be demanded. Another sales channel through the DEFCCS should be sought.	Was the sales know-how fully mastered: The sales records in the first year were properly conducted, indicating progress in terms of the practical work. Active marketing is hoped for.	What were the costs? None up to the present	In the first year, the villagers were not very confident about their product and could not sell it with confidence. In the second year, they were more confident because of the improvements made.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Mbam

Activity : Making of life jackets
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Sustainable use of prawn resources in the mangrove ecosystem
Expected Output : Lowering of the excessive dependence on prawn fishing; elimination of the victims of accidents at sea during prawn fishing

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Making of life jackets in the first year	Quantity made: 111	Number of tailors used: 2	Did the tailors fully master the necessary techniques? Yes	What were the costs? Materials Who paid? WAAME	Can be the materials be obtained locally? Yes. The purchase of some materials in Dhaka is necessary.
2) Sales in the first year	Quantity sold: 54 Cash: 273,500 FCFA Sales on credit (receivable): 17,500 FCFA Quantity in stock: 57	Sales made and number of workers: Direct and indirect sale through middlemen, tailors and the CG	Was the sales know-how fully mastered? No. Because of organizational problems, the sales system was not in place before the prawn season (suitable time for sales) finished.	What were the costs? Bank account opening cost; cost of notebook Who paid? Paid from the sales proceeds	The prawn fishing season had ended before the sales system was properly in place, leaving many life jackets unsold.
3) Making of life jackets in the second year	Quantity made: 30 All using the new floating material	Number of tailors used: 2	Did the tailors fully master the necessary techniques? Yes. As a new float material was obtained, the quality became comparable with that of imported products.	What were the costs? Materials Who paid? WAAME (The actual buying was jointly conducted by the WAAME and the tailors.)	Can the materials be obtained locally? Yes. The purchase of some materials in Dhaka is necessary. There is slight worry concerning the route to buy the new float material. The safety test was completed.
4) Sales in the second year	Quantity sold: 17 Unit price: 7,000 FCFA /jacket Income: 119,000 FCFA (expected) Sales on credit (receivable): 0 Quantity in stock: 0	Sales made: Through the CG, tailors, ASC, merchants, middlemen and marketing committee	Was the sales know-how fully mastered: The sales in the second year started well. The new management team attaches great importance to life jacket marketing activities.	What were the costs? None	The new management team was established on 16th Aug., 2004. Usman Jonne (Chairperson) Amres Jonne (Vice-Chairperson) Mamad Saar (Secretary)

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Mbam

Activity : Acceptance of visitors from other villages as a model village
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Extension of activities to other villages
Expected Output : Start of activities in other villages

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Acceptance of visitors from other villages	Date First year: 14th Jan., 2004 Second year: 2nd Aug., 2004 and 23rd Aug., 2004	Participants of the village: Visitors Mbam Others Total 14th Jan. 41 12 53 2nd Aug. 49 12 61 23rd Aug. 64 12 76	Did the villagers master the know-how to deal with visitors? Yes The ASPROVEE which was involved in all of the village activities prior to the Pilot Project organized a similar visit and the villagers knew how to organize the visits.	What were the costs? Cost of meals and travelling Who paid? WAAME	The invited villages (Saap and Gagué Mody) conducted some of the activities (village forest and improved oven). Other villages want to commence activities but lack sufficient funds. Villages invited: 1st Gagué Modi; Gagué Bocar; Saap; Mbam Toucouleur 2nd Mbassis; Gagué Modi; Tiare 3rd Mbassis; Gagué Chérif; Sojoga; Soum
	Activities explained: Village forest; improved oven; seawalls; *Avicennia* nursery; *Rhizophora* plantation; life jacket workshop		Have the villagers mastered the techniques relating to the activities explained? The visiting villagers generally mastered the techniques involved in the construction of an improved oven and the creation of a village forest and some villages have started these activities.		
2) Evaluation meeting	Was an evaluation meeting held after the visit? Date: 1) 15th Jan., 2004 2) 2nd Aug., 2004 3) 23rd Aug., 2004	Participants: Committee members on each occasion		What were the costs? None	What are the points to be improved or reviewed? It will be necessary to invite villages lying beyond the neighbourhood of Mbam. Training on activities for villagers from invited villages will be necessary, followed by monthly monitoring at these villages.
3) Enquiries from other villages	Number of enquiries from other villages: Improved ovens, village forests, seawalls and *Avicennia* nursery	How are the enquiries dealt with? The techniques involved and the possibility of obtaining assistance for these activities were explained. Extension activities on improved ovens were conducted in two villages (Saam and Gagué Chérif).			Contents of enquiries: Nursery; planting techniques; marketing method for life jackets in participating villages; *Avicennia* test method; ways to distinguish mature and viviparous *Avicennia* seeds; fund raising methods

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Bassoul

Activity : Creation of village forest
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Reduction of the use of mangrove forests
Expected Output : Alternative wood to mangrove wood will be supplied from the village forest. Some of the profits from sales will be saved in an environment fund.

Work	Confirmation of Results		Factors Affecting Work Results			
			Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Planting in the first year	Number of planted seedlings: *E. camaldulensis*: 200 *A. mellifera*: 100 *P. juliflora*: 200 *M. leucadendron*: 50 (Planted on 10th and 11th Sept., 2003)	Present number: E: 152 A: 38 P: 1 M: 30	Participants: 23 (4 men and 19 women)	Prior technical training on planting: Yes	What was the cost? (The seedlings were provided by the DEFCCS.) Materials (fencing netting and posts around the nursery) Who paid? WAAME	Delayed delivery of materials; delayed planting; small number of men; delayed weeding; *P. juniflora* unsuitable for the soil in Bassoul
2) Monitoring	Frequency of monitoring (or dates): monthly; 10 times		Participants: 1 CVGBV (management committee member in charge of village forest)	Prior technical training on monitoring method: Yes	What was the cost? None Who paid?	Recording of the growth situation: Yes
3) Production of seedlings for planting in the second year	Number of seedlings produced: E: 10 A: 160 P: 45 M: 0	The shortfall was met by the WAAME nursery at Ndorong	Participants: 15 (all women)	Prior technical training on nursing: Yes	What was the cost? Cost of the seeds, pots and seedlings, etc. Who paid? WAAME	Germination rate by species: E: 3% A: 5% P: 20% M: 0% After transplanting from the germination beds to the pots, the seedlings were washed away by rain.
4) Planting in the second year	Number of planted seedlings: E: 300 A: 312 P: 160 M: 140 (Planted on 10th Aug., 2004)	Present number: E: 234 A: 248 P: 153 M: 97 (Monitored on 6th Sept., 2004)	Participants: 58 (5 men and 53 women)	Prior technical training on planting: Yes	What was the cost? Cost of materials and meals Who paid? WAAME	Small number of men; lack of weeding

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Bassoul

Activity : Construction and management of improved smoking kilns led by the RC
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Reduction of mangrove consumption as firewood
Expected Output : Construction of improved kilns and conventional kilns for smoking of Etomatose to clarify the advantages of the former through comparison; marketing of smoked fish to save some of the profits for an environment fund

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Construction of kilns (improved and conventional) in the first year	(Improved type) Construction start: 18th Jan. Construction end: 25th Jan. (Conventional Type) Construction start: 18th Jan. Construction end: 25th Jan.	Plasterers: 2 Assisting villagers: 2	From the technical point of view, can the construction of improved kilns be conducted by villagers? Yes. As the village has a blacksmith, it may be possible to make wire baskets and iron frames in the village in the future.	What were the costs? Payment for materials, transportation and labour. Who paid? WAAME	Were all of the materials procured in the village or nearby? No. Some of the materials were procured in Foundiougne. Were the improved kilns accepted by the villagers? The concept of improved kilns was well understood.
2) Comparative test	Number of tests conducted (or dates) Three times (17th and 27th April and 9th June)	Participants: 18 (9th June)	Prior technical training on the measuring method: Yes	What were the costs? Payment for fish and firewood Who paid? WAAME	What are the advantages of an improved kiln? Improved yield by 16%; reduced firewood consumption by 56%; less smoke; stable product quality; improved workability
3) Product sales	Sales records: Yes 1) 8.5 kg, 300 FCFA/kg 2,550 FCFA 2) 31 kg, 300 FCFA/kg 9,300 FCFA 3) 55.4 kg, 300 FCFA/kg 16,620 FCFA 1) and 2) were products using the improved kiln	Participants: 2	Prior training on the sales method: Yes	What were the costs? Packing cost and labour cost Who paid? Villagers Was the sales income recorded? Yes	Were the products accepted by buyers? Banabana in Bassoul recognized the high quality of the products. Given the instability of the Ivory Coast, it is difficult to ship the products to Burkina Faso at present. Instead, they are sold in Joal.
4) Maintenance and improvement of kilns in the second year	Maintenance and improvements made Improved type: currently in progress Conventional type: not necessary at present	Participants: 1 (WAAME: 2)	Prior technical training on maintenance and improvement: Yes ・ To make the upper lid an opening/closing type with a hinge ・ To adjust the levels of the iron framework	What were the costs? Unclear because the work is currently in progress. Possibly the cost of materials and some remuneration. Who paid? WAAME	It is planned to fix the roof section to the blocks.

Items to be Confirmed Before Evaluation Workshop (mainly with NGO but also with member of the competent committee in some cases): Bassoul

Activity : Seminar for RC councilors
Significance (Project Target) : Facilitation of restoration/conservation of mangrove forests/ecosystem
Individual Target of Activity : Better awareness of the need for the conservation of mangrove forests among RC leaders
Expected Output : Implementation of mangrove forest conservation activities led by RC; sale of products to save some of the profits in an environment fund

Work	Confirmation of Results	Factors Affecting Work Results			
		Manpower	Technology/Skill	Funding	Others (Good and Difficult Points)
1) Seminar in the first year	Date: 9th and 10th Aug., 2003	Participants: 41 RC councilors: 13 RC facilitators: 5 Others: DEFCCS (2); DOPM (1); mutual financing bank; fishermen; female marine product processors; GPF; smoking kiln owners		What were the costs? 32 page notebooks; ballpoint pens; felt-tipped markers; Padex; meals Who paid? WAAME	The councilors and facilitators fully understood the smoking kiln management system and integrated it into the RC's development plan (PLD), establishing a streamlined organizational structure. Other villages recognize that the kilns belong to the RC and there is a possibility that the use of improved kilns will spread to other villages. The non-participation of Bassar was due to the lack of communication (as replied by the WAAME).
2) Seminar in the second year	Date: 28th and 29th July, 2004	Participants: 18 RC councilors: 7 RC facilitators: 3 Others: DEFCCS (1); GPF members (4); EU Mangrove Project (1) (The DOPM official did not participate because of absence.)	Did the RC personnel master the know-how to organize a seminar? The seminar was chaired by the vice-president of the RC and a representative of the Credit Mutual and they mastered the know-how to proceed with a seminar.	What were the costs? 40 notebooks; 40 ballpoint pens; 1 glue stick; 4 felt-tipped markers; 1 Roule au Padex Who paid? WAAME	Opinions of the Study Team: The planned organization has not been functioning very well so far due to the fewer number of migrating fish than expected and deterioration of the relationship between the women's groups in the village. Through discussions on the above problems at the RC seminar in the second year, it was decided to (1) clarify the different roles expected of the participants (groups), (2) conduct more educational activities and (3) try to conclude a contract with a supplier of raw fish.

ATTACHED TABLE

ATTACHED TABLE 3 PERFORMANCE OF ACTIVITIES

(IN VILLAGES SUPERVISED BY THE UICN : FRENCH)

ATTACHED TABLE 3 PERFORMANCE OF ACTIVITIES (IN VILLAGES SUPERVISED BY THE UICN : FRENCH)

PLANNING MENSUEL ANNEE 2003

Responsables	Mois JUIN 2003																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Equipe UICN								- suivi des parcelles : somone1, 2, 3 ; Identification et délimitation des nouveaux sites pour l'année 2004 ; Suivi de la phénologies des espèces de mangrove à Somone.																						
																						- Mise en place des clôtures et des pépinières à Somone,									
Eaux et Forêts ; UICN; population																												- Octroi de gaines et rempotage à Dassilamé Sérère pour le bois villageois			
Equipe UICN																														- Piquetage des parcelles ; Suivi des de somone 1, 2 et 3.

Responsables	Mois de JUILLET 2003																														Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Equipe UICN	- Suivi des parcelles et piquetage des nouvelles parcelles (Somone 4 et 5) ;																														
Eaux et Forêts ; UICN ; populations							- Rempotage des gaines à Dassilamé Sérère ; Choix de l'emplacement du site et clôture de la parcelle à reboiser à l'aide des populations																								
UICN, populations										- Réunion générale à Marfafaco sur le reboisement de *Rhizophora mangle* ; Activités de l'ASC du village (lutte et théâtre).																				
UICN, Expert, pop.											- Réunion générale à Djirnda sur le reboisement de *Rhizophora mangle* ; Amélioration des fours de fumage.																			
UICN, Expert JICA, pop.													- Réunion générale à Moundé : Indenfication du circuit écotouristique ; Masques apicultures ; Fabrication de gants et de bottes.																		
Techniciens, populations																		- Rempotage des gaines à Somone ; Piquetage des nouvelles parcelles, suivi : phénologie des espèces												
UICN, Expert JICA, pop.																- Réunion générale à Dassilamé sur le tourisme (identification du circuit; des différentes étapes; prises de photos…)													
UICN, Expert UICN																	- Réunion générale du GIE ostréicole de Sokone (ostréiculture, bottes ; foot-ball et théâtre);												
UICN, Expert JICA, pop.																					- Mise en place du parc ostréicole à Sokone; Fabrication de bottes et de gants										
Equipe UICN																									- Collecte de graines à Somone ;						
																												Imbibition des graines à Somone ;				

PLANNING MENSUEL ANNEE 2003

Responsables	Mois d'AOUT 2003	Activités prévues
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	
Equipe UICN	- Semis des graines d'Avicennia à Somone 4 et 5 ; Suivi semis direct sur vasière et sur mottes ;	
	- Suivi des parcelles de somone 1, 2 et 3	
	- Suivi hebdomadaires des semis directs sur vasières et sur mottes à somone 4 et 5 et de leurs pépinières respectives.	
Eaux et forêts ; UICN	- Octroi de plants au village de Dassilamé Sérérère par les Eaux et Forêts pour le bois villageois;	
	- Plantation du bois villageois et collecte de semence d'Avicennia à Dassilamé sérérère ;	
Experts écoto, notables	- Formation : écoguides à Dassilamé sérérère en écotourisme par des experts; stage en gestion; Elaboration des prospectus pour Dasilamé et Moundé ;	
Ngor, populations	- Imbibition des graines d'Avicennia à Dassilamé sérérère ;	
Eaux-forêts; UICN, pop	- Semis des graines d'Avicennia à Dassilamé Sérérère ;	
Equipe UICN	- Reboisement de Rhizophora à Marfafaco ;	
	- Reboisement de Rhizophora à Djirnda ;	
UICN, population	- Réunion générale à Moundé sur la transformation des produits halieutiques, Fabrication de gants, bottes et de masques pour l'apiculture ;	
UICN, populations	- Deuxièmes séance de fabrication de bottes GIE	
	- Final foot, Théâtre GIE Sokone	
Equipe UICN	Suivi des parcelles de Somone 1,2,3,4 et 5	

Responsables	Mois de SEPTEMBRE 2003	Activités prévues
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	
Equipe UICN	- Suivi à Somone 1, 2, 3 , 4 et 5 ; Suivi des pépinières ;	
Eaux-Forêts, UICN	- Octroi de semences pour le bois villageois; Semis dans des gaines à Dassilamé pour les plants destinés à l'année 2004 (première série);	
UICN, populations	- Réunion générale à Djirnda sur les fours de fumage ;	
UICN, GIE	- Fabrication de masques, bottes, gants et d'articles artisanaux pour le village de Moundé ;	
Equipe UICN	- Transfert des plants de 1, 5 mois à Somone 4 et 5	
UICN ; Experts ; écoguides ; PDNS	- Mise en commun des acquis de la formation de Dassilamé, dégagements de perspectives pour la session de Moundé au Parc National du Delta du Saloum par les experts et les écoguides ;	
Equipe UICN	- Suivi hebdomadaire des plants de 1, 5 mois après transfert ;	
UICN, GIE	- Evaluation intermédiaire de la fabrication des bottes, gants pour le GIE de Sokone ; Distribution prospectus	

PLANNING MENSUEL ANNEE 2003

Responsables	Mois d'OCTOBRE 2003	Activités prévues
Equipe UICN	- Suivi des parcelles de somone 1 à Somone 5 (semis directs, pépinières, anciennes parcelles, suivi de la phénologie des espèces de mangrove) ;	
	- Suivi hebdomadaire des plants de 1,5 mois à Somone 4 et 5 ;	
UICN, Expert tourisme	- Livraison du matériel de transport ; fixation du prix du circuit écotouristique à Dassilamé Sérérère ;	
	- Livraison du matériel de transport ; fixation du prix du circuit écotouristique à Moundé ;	
Equipe UICN	Suivi mensuel des plants de 1,5 mois après leur transplantation ;	
UICN, Expert en transformation halieut.	- Livraison du matériel : four de fumage à Djirnda ;	
UICN, Experts en tourisme	- Formation écoguides ; stage en gestion du personnel à Moundé	
UICN, populations	- Fabrication de bottes et gants à Moundé	

Responsables	Mois de NOVEMBRE 2003	Activités prévues
Equipe UICN	- Transplantation des plants de trois mois à Somone 4 et 5 ;	
	- Suivi mensuel des plants de 1,5 mois ; suivi des pépinières de 5 et 8 mois ; suivi des anciennes parcelles de somone 1 à Somone 3 ;	
	-suivi hebdomadaire des plants de 3 mois à Somone 4 et 5;	
UICN; Experts transfor.	- Construction des fours de fumage à Djirnda ;	
Expert JICA	- Installation du matériel de transformation des fruits de mer à Moundé ;	
UICN, Populations	- Fabrication de masques, gants, bottes (4^{é} stage) et Test circuit écotouristique à Moundé	
UICN, Experts huîtres	- Biométrie des huîtres GIE;	
UICN	- Visite pépinière bois villageois ; Test du circuit écoto à Dassilamé Sérérère	

PLANNING MENSUEL ANNEE 2003

Responsables	Mois de DECEMBRE 2003																															Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Equipe UICN			- Suivi des pépinières à Somone 4 et 5 , suivi des anciennes parcelles ; semis directs, des plants de trois mois à Somone ;																													
UICN, pop, Eaux-forêts						-Transplantation des plants d' Avicennia à Dassilamé sérérère ; Evaluation du circuit écotouristique et du personnel formé;																											
UICN, GIE, pop			- Mise en œuvre du plan de gestion ostréicole par le GIE et les populations dans la zone de Sokone;																													
Equipe UICN																	- Suivi mensuel des plants de 1, 5 mois à Somone ;														
UICN, Experts																- Réception et Test des fours de fumage à Djirnda ;																
transformation halieut. populations																		- Réception du matériel de transformation des fruits de mer, et évaluation des premiers produits traités à Moundé ;														
Populations,Eaux-forêts																				- Deuxième rempotage des gaines à Dassilamé sérérèré pour le bois villageois ;													
UICN, Expert en tourisme																								- Evaluation du circuit touristique et du personnel formé à Mondé ;											
UICN ; Eaux-forêts;																																- Approvisionnement en semence pour la 2e génération de plants à Dassilamé

Activités de reboisement de *Avicennia* à Somone et de mise en œuvre du projet pilote dans les villages cibles;

PLANNING MENSUEL ANNEE 2004

Responsables	Mois de JANVIER 2004																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Equipe UICN				- Suivi des pépinières de 4 et 5 mois ; transplantation des plants de 5 mois à Somone 4 et 5 ; suivi des anciennes parcelles, sui des plants de trois mois transplantés à Somone 4 et 5; semis direct ;																												
																							- Suivi hebdomadaire des plants de 5 mois à Somone;														
UICN, Experts, pop														- Evaluation des nouveaux produits et des Activités écotouristiques à Moundé ;																	
Equipe UICN																- Sui mensuel des plants de 1, 5 mois à Somone;															
UICN, populations																									- Exposition du nouveaux produits d'arches (hôtels ; marchés) ;								
UICN, GIE																											- Evaluation intermédiaire de la mise en œuvre du plan de gestion ostréicole GIE						
																														- Biométrie des huîtres		
UICN, Expert ostréicole																														- Rédaction rapport Avicennia		

Responsables	Mois de FEVRIER 2004																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
Equipe UICN				- Suivi de somone 1 à 3 ; des plants de 3 mois ; 5 mois ; et des pépinières de 8 moisà Somone ;																											
										- Rédaction rapport sur les plantations de Avicennia au cours de l'année 2003/2004 concernant l'expérience de la Somone;																		
													- Remise du rapport sur Avicennia aux experts japonais au siège de l'UICN;																	
																- Suivi mensuel des plants de 1, 5 mois ;														
UICN, Experts transfor.																			- Evaluation des fours et de leurs résultats à Djirnda ;										
UICN ; populations																				- Réunion générale à Marfafaco (lutte et Théâtre)										
Equipe UICN																											- Evaluation 1^{ere} et 2 ^{è} phase de la pépinière de Dassilamé ;				

PLANNING MENSUEL ANNEE 2004

Responsables	Mois de MARS 2004																															Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Equipe UICN				-Suivi des anciennes parcelles ; plants de 3 mois, 5 mois, la pépinière de 8 mois et des semis directs à Somone;																														
UICN, Experts écoto.																- Evalution finale des activités touristiques à Dassilamé Séréérère ;																
Equipe UICN																	-Suivi mensuel des plants de 1.5 mois à Somone ;															
UICN, Experts écoto.																		-Evaluation des activités écotouristiques à Moundé ;														
UICN, populations																							- Evaluation fabrication bottes, gants pour le GIE de sokone ;										
UICN, poplations																												- Evaluation lutte et Théâtre à Marfafaco ;						
																													- Evaluation : qualité des articles artisanaux à Moundé ;					
UICN, Experts																															-Biométrie des huîtres ;		

Responsables	Mois d'AVRIL 2004																														Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Equipe UICN				-Suivi des anciennes parcelles ; plants de 3 et de 5 mois ; pépinières de 8 mois ; Transplantation des plants de 8 mois à Somone;																													
UICN, populations							- Réunion de préparation de la visite d'échange à Moundé ;																												
Equipe UICN																							- Suivi hebdomadaire des plants de 8 mois ;									
																	- Suivi mensuel des plants de 1.5 mois ;															
UICN, experts																			- Evaluation des fours de fumage de Djirnda ;													
																				- Bilan de la commercialisation des produits d'arches à Moundé ;												
UICN, villages cibles																						- Préparation des villages invités à la visite d'échange à organiser à Moundé ;										
UICN, GIE																											-2^{e} évaluation de la mise en œuvre du plan de gestion GIE ;						
UICN, populations																													- Evaluation de la pépinière à Dassilamé Séré;					

PLANNING MENSUEL ANNEE 2004

Responsables	Mois de MAI 2004																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
				- Suivi des parcelles de 2002/2003 et de celles de 2003/2004 à Somone ;																												
UICN, experts								- Evaluation des activités écotouristiques à Moundé ;																							
													- Evaluation des activités touristiques à Dassilamé séréréré ;																		
UICN, populations																		- Visite d'échange à Moundé ; Evaluation finale des activités écotouristiques;													
																						- Evaluation de la qualité et du prix des nouveaux produits d'arches à Moundé ;										
																															- Evaluation Bottes, gants GIE ;
UICN, experts ostréic.																															- Biométrie des huîtres ;

Responsables	Mois JUIN 2004																												Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Equipe UICN				- suivi de l'ensemble des parcelles à Somone (Somone 1, 2, 3, 4 et 5);																											
UICN, pop ; expert																	- Evaluation finale du four de Djirnda ;													
UICN, pop																															- Réunion générale reboisement Avicennia à Dassilamé ; site de rebois.
UICN, pop ; expert																						- Fabrication de gants, produits artisanaux ; Evaluation de la visite d'échange à Moundé ;									

Responsables	Mois de JUILLET 2004																														Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Equipe UICN				- suivi de l'ensemble des parcelles à Somone;																												
UICN, pop										- Réunion générale reboisement Avicennia à Djirnda ; choix site de reboisement de Rhizophora ;																			
										- Réunion générale reboisement Avicennia à Marfafaco ; choix site de reboisement de Rhizophora ;																			
																	- Réunion générale GIE ; Sokone (foot-ball, théâtre) ;													
Equipe UICN																															- Implantation parcelles et pépinières Avicennia à Dassilamé Séréréré ;
UICN, experts ostréico.																															Biométrie des huîtres

PLANNING MENSUEL ANNEE 2004

Responsables	Mois d'AOUT 2004																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Equipe UICN	▨	▨	▨	- suivi de l'ensemble des parcelles à Somone;																												
UICN, pop, Eaux-for.					▨	▨	- Plantation des deux générations de semis à Dassilamé Sérérère pour le bois villageois (deuxième phase);																										
UICN, GIE											▨	▨	- Evaluation finale de la mise en œuvre du plan de gestion GIE Sokone ;																		
Equipe UICN																		▨	▨	▨	- Reboisement de Rhizophora à Djirnda ;										
																					▨	▨	▨	- Reboisement de Rhizophora à Marfaffaco ;							
																						▨	▨	▨	- Organisation (Finale foot-ball ; théâtre) par le GIE de Sokone ;						
UICN, GIE											▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	- Finalisation du rapport d'activités du projet pilote de la JICA ;						

Responsables	Mois SEPTEMBRE 2004																												Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Equipe UICN	▨	▨	▨	- suivi de l'ensemble des parcelles à Somone;																											
UICN	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	- Finalisation du rapport d'activités du projet pilote de la JICA ;															
																▨	▨	- Remise du rapport final aux experts japonais au siège de l'UICN à Dakar (septembre 2004) ;												
UICN, Experts																													▨	▨	-Biométrie des huîtres GIE ;

▨ Activités de reboisement de *Avicennia* à Somone et de mise en œuvre du projet pilote dans les villages cibles;

ATTACHED TABLE

ATTACHED TABLE 4 PERFORMANCE OF ACTIVITIES

(IN VILLAGES SUPERVISED BY THE WAAME : FRENCH)

ATTACHED TABLE 4 PERFORMANCE OF ACTIVITIES (IN VILLAGES SUPERVISED BY THE WAAME : FRENCH)

Projet Pilote de Gestion durable de la mangrove

PLANNING MENSUEL ANNÉE 2003

Responsables	Mois de Juillet																															Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
WAAME, E & F , Population ,JA FTA											Visites parcelles Avicennia Mbam et Sadioga																				
															Délimitation et piquetage parcelle du bois de village Bangalère																
																Délimitation et piquetage parcelle reboisement Avicennia village Gagué Chérif ; visite des sites pour la mise en place des fagots de branchage																		
JAFTA, WAAME, E&F, PCR																	Rencontre JAFTA/WAAME avec le PCR sur l'introduction du plan de gestion ; délimitation parcelle bois de village														
JAFTA, WAAME, E&F ; CR et animateurs																		Rencontre JAFTA/WAAME avec conseillers ruraux, animateurs communautaires sur l'introduction du plan de gestion des fours ; fixation de la datee du séminaire														
WAAME																						Rencontre avec le comite de gestion sur l''exécution des activités										
WAAME, pop																							Livraison matériel de confection de gilets de Kamatane bambara										
WAAME, tailleurs, Kitamado																								Livraison matériel de confection de gilets de Mbam									
Pop Kitamodo, WAAME																													Livraison matériel de reboisement et clôture de la parcelle de bois de village					
WAAME, pop,																													Livraison de matériel de confection de la pêche aux fagots de branchage et approvisionnement de branches					
JAFTA, WAAME, Eaux et Forêts, Tailleurs																														Formation en technique de confection de fagots				
																															Formation confection de gilets de sauvetage à Mbam				
																																Formation confection de gilets de sauvetage à Kamatane Bambara			
JAFTA, WAAME, Eaux et Forêts, Pop																																Mise en place des fagots		

PLANNING MENSUEL ANNÉE 2003

Responsables	Mois d'Août																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
WAAME, E & F, Pop			Recherche de plants pour le bois de village de Bassoul et Bangalère ; Suivi confection et vente de gilets chaque semaine à Mbam et à Kamatane Bambara																													
					Préparation du séminaire ; livraison du matériel pour l'organisation du séminaire ; choix définitif des participants au séminaire																											
WAAME,								Elaboration du plan de construction des fours																								
WAAME						Envoi du rapport mensuel à JAFTA par WAAME																											
WAAME, E & F											Organisation du séminaire sur le plan de gestion des fours																				
Pop, WAAME, E & F																	Octroi de plants pour les bois de village de Bassoul et Bangalère; formation en t echnique de reboisement et de pépinières ; gestion des plants													
																			Plantation du bois de village de Bassoul et de Bangalère												
																															Suivi hebdomadaire des plantation s de bois de village de Bassoul et de Bangalère
WAAME																															Livraison matériel de construction des fours
E&F, WAAME, Pop					Rempotage des gaines pour les pépinières d'avicennia ; Recherche de semences pour les pépinières de Gagué Chérif																											
Pop, WAAME							Suivi de la mise en place des fagots chaque semaine																									
Pop, WAAME, E & F																	Formation en t echnique de reboisement et de pépinières ; Octroi de semences aux pop ; pré-traitement des graines d'avicennia à Gagué Chérif													
Pop, WAAME, E & F, JAFTA																	Semis des graines d'avicennia à Gagué Chérif													
Pop, AAME																Suivi confection gilets chaque semaine à Mbam et à Kamatane														
																							Suivi des pépinières d'avicennia à Gagué Chèrif chaque semaine								
Pop, WAAME, E & F, JAFTA																			Délimitation de la parcelle de Rhizophora ; collecte de propagules ; plantation des propagules à Bangalère												
Pop, WAAME, E & F																															Suivi et entretien Rhizophora chaque semaine à Bangalère

PLANNING MENSUEL ANNÉE 2003

Responsables	Mois de Septembre																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
E & F, WAAME, Pop											Suivi plantation s des bois de village de Bassoul et de Bangalère ; Suivi confection gilets de sauvetage à Mbam et à Kamatane Bambara																			
					Mise en place des comités villageois de gestion de fours et de la sous commission de l'environnement																										
E & F, WAAME, Pop,									Suivi pépinières Avicennia de Gagué Chérif																				
WAAME, Elus locaux, animateurs communautaires									Sensibilisation des acquis du séminaire aux population de la communauté rurale																				
														Suivi des fagots de branchage chaque semaine																
WAAME, pop																				Préparation de la première visite du village pilote de Mbam										
WAAME																					Livraison matériel et mise en place des fonds pour la visite du village									
WAAME, pop, E & F																										Première visite du village pilote				
WAAME						Envoi du rapport mensuel à JAFTA par WAAME																									
E & F, WAAME, Pop										Suivi reboisement de rhizophora chaque semaine																			

Responsables	Mois Octobre																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
WAAME, Pop, E & F											Suivi plantations bois de village à Bassoul et à Bangalère ; Suivi confection gilets de sauvetage à Mbam et à Kamatane																			
WAAME, Pop									Suivi pépinière Avicennia de Gagué Chérif																					
WAAME						Envoi du rapport mensuel à JAFTA																										
Pop										Approvisionnement sable , coquillage ; fabrication de briques pour les fours																				
JAFTA, WAAME, Pop																											Construction des fours			
WAAME, Pop, Eaux et Forêts					Evaluation de la première visite du village pilote ; dégagement des perspectives																										
Pop, WAAME										Suivi reboisement de rhizophora																				
WAAME, Pop															Suivi fagots de branchage chaque semaine															

PLANNING MENSUEL ANNÉE 2003

Responsables	Mois de Novembre																												Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
WAAME, Pop E & F											Suivi plantations des bois de village ; Suivi confection gilets de sauvetage à Mbam et à Kamatane																				
WAAME, Pop									Suivi pépinières Avicennia de Gagué Chérif																						
E&F, WAAME																		Suivi reboisement rhizophora												
WAAME						Envoi Rapport mensuel																									
Pop, WAAME												Suivi construction des fours chaque semaine																		
WAAME, JAFTA, Pop															Suivi mise en place des fagots de branchage chaque semaine															
WAAME, Pop																															Préparation et mise en place des fonds ; livraison matériel deuxième visite du village pilote
																															Organisation deuxième visite du village pilote
WAAME																															Rencontre avec les femmes formatrices de foyers améliorés de Mar Fafaco

Responsables	Mois de Décembre																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
E&F, WAAME, pop											Suivi plantations des bois de village ; Suivi confection gilets de sauvetage à Mbam et à Kamatane																					
									Suivi plantation Avicennia Gagué Chérif																							
WAAME							Formation des femmes de Mbam en technique de foyers améliorés																									
Populations											Suivi reboisement rhizophora																				
JAFTA, WAAME, pop															Suivi fagots de branchage															
WAAME												Octroi aux populations des fonds de roulement pour le premier essai de fumage																			
Pop, WAAME JAFTA, , E&F																Premier essai de fumage poisson															
WAAME, pop																								Suivi fumage poisson et construction de fours chaque semaine								
WAAME, Pop E&F, JAFTA																										Premier fumage de poisson par les populations						
						Evaluation deuxième visite du village pilote : bilan et perspectives																											
WAAME, Pop E&F, JAFTA											Evaluation des 100 premiers gilets : bilan et perspectives Mbam et Kamatane Bambara																				
WAAME												Livraison matériel de fabrication des foyers améliorés, choix des femmes à former																			
JAFTA, E & F WAAME, Pop																															Formation des femmes de Bangalère
WAAME, Pop,						Envoi rapport mensuel																									

PLANNING MENSUEL ANNÉE 2004

Responsables	Mois de Janvier																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Pop, E&F, WAAME		■	■					■	■	Suivi des plantation de bois de village de Bassoul et Bangalère ; Suivi confection gilets de sauvetage à Mbam et à Kamatane																					
WAAME, Pop			■							■	Suivi plantation Avicennia Gagué Chérif																				
WAAME					■	Envoi du Rapport mensuel																										
JAFTA, WAAME, Pop		■							■	Suivi reboisement Rhizophora																				
WAAME							■	Livraison matériel ; mise en place des fonds pour l'organisation de la visite de Mbam																						
WAAME, Pop				■							■	Suivi et évaluation du fumage de poisson ; Suivi et entretien des fours ; Mise en place du fonds de l'environnement																		
	■						■	Ouverture de la pêche aux fagots et suivi hebdomadaire de la pêche																						
E&F, WAAME, Pop, JAFTA											■	■	Evaluation de la plantation du bois de village de Bassoul : bilan et perspectives																
																				■	Organisation de la réunion générale de Bassoul									
Pop, WAAME	■							■	Suivi pépinières avicennia de Gagué Chérif																					
											■							■	Suivi et entretien des foyers améliorés											
Pop, WAAME																													■	Suivi Construction des fours

PLANNING MENSUEL ANNÉE 2004

Responsables	Mois de Février																											Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
WAAME, E&F											Suivi et entretien des plantations des bois de village de Bassoul et Bangalère ; Suivi confection gilets de sauvetage à Mbam et à Kamatane																		
WAAME						Envoi rapport mensuel																								
Pop, WAAME									Suivi pêche aux fagots de branchage chaque semaine																				
									Suivi plantation rhizophora																				
Pop, WAAME, E&F									Suivi pépinières Avicennia de Gaguè Chérif																				
JAFTA, WAAME, E&F, Pop																Plantation de la parcelle d'avicennia													
JAFTA, WAAME, E&F, Pop																							Suivi de la plantation d'avicennia chaque semaine							
Pop, WAAME												Suivi fumage de poissons chaque semaine ; Suivi constructions et entretien des fours																	
WAAME, E&F, Pop																				Préparation et organisation de la troisième visite : mise en place des fonds ; choix des villages à inviter ; choix des réalisations à visiter									
Pop, WAAME								Mise en œuvre du plan de gestion																					
WAAME, E&F, Pop																													Préparation et organisation de la troisième visite
JAFTA, WAAME, E&F																													Suivi et entretien des foyers améliorés
WAAME, Pop																										Recherche de semences pour le bois de village			

PLANNING MENSUEL ANNÉE 2004

Responsables	Mois de Mars																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
WAAME						Envoi rapport mensuel à JAFTA																										
E&F, WAAME, Pop											Suivi et entretien des plantations des bois de village de Bassoul et Bangalère ; Suivi reboisement de rhizophora ; Suivi confection gilets de sauvetage à Mbam et à Kamatane																				
Pop, WAAME											Suivi confection gilets de sauvetage																				
WAAME, Pop JAFTA, E&F											Suivi de la pêche aux fagots de branchage et évaluation de la commercialisation de la pêche ; suivi de la plantation d'avicennia																				
											Suivi et évaluation du fumage de poisson																				
E&F, WAAME, Pop						Evaluation de la troisième visite du village pilote																										
WAAME, E&F, Pop						Recyclage de la technique de pépinière et de reboisement ; Rempotage des gaines du bois de village de Bassoul et Bangalère																										
																						Pré-traitement des semences ; Semis des graines dans les gaines														
WAAME, Pop																														Suivi des pépinières de bois de village de Bassoul et de Bangalère						
WAAME, Pop																														Suivi et évaluation de la gestion des fours						
JAFTA, E&F, WAAME, Pop								Organisation lutte et théâtre																						
Population												Suivi et entretien des foyers améliorés																			
WAAME													Evaluation de l' organisation lutte et théâtre																		

Responsables	Mois d'Avril																												Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
JAFTA, WAAME, pop			Bilan de la confection et de la vente des gilets à Mbam et à Kamatane Bambara ; dégagements des perspectives pour la deuxième année																												
WAAME, E&F, Pop											Suivi des plantation s de bois de village et des pépinières de Bassoul et de Bangalère; suivi du reboisement de Rhizophora																				
WAAME, JAFTA, Pop,								Suivi du fumage et de la construction des fours ; suivi du fonds de l'environnement																						
Pop, WAAME								Suivi de la pêche aux fagots de branchage																						
WAAME												Livraison matériel et confection de gilets pour la deuxième année de																			
WAAME, Pop, E&F																														Suivi confection de gilets chaque semaine						
WAAME, Pop, E&F												Suivi et entretien des foyers améliorés chaque semaine																			
WAAME						Envoi rapport mensuel																									

PLANNING MENSUEL ANNÉE 2004

Responsables	Mois de Mai																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
E&F, Pop, WAAME											Suivi des plantations et pépinières du bois de village de Bassoul et de Bangalère; suivi plantation rhizophora																				
WAAME, E&F, Pop											Suivi plantation Avicennia Gagué Chérif																				
Population, Pop								Suivi confection des gilets de sauvetage de Mbam et Kamatane Bambara																							
WAAME						Envoi rapport mensuel des activités																									
WAAME, Pop								Suivi fumage poisson et du fonds de l'envi ronnement																							
Pop, WAAME, E&F									Suivi de la pêche aux fagots de branchage ; suivi de la plantation d'avicennia																					
WAAME, Pop																									Préparation de l'organisation de la quatrième visite du village pilote							
WAAME, Pop												Suivi et entretien des foyers améliorés																			
WAAME, Pop																															Organisation de la 4ème visite du village pilote

Responsables	Mois de Juin																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Population, Pop									Suivi reboisement Avicennia de Gagué Chérif ; Suivi de la pêche aux fagots de branchage																					
E&F, WAAME, Pop											Suivi plantation et pépinières bois de village ; suivi reboisement rhizophora																			
WAAME						Envoi rapport mensuel																									
WAAME, Pop																							Livraison du matériel de confection des fagots ; Approvisionnement de branches ; confection de fagots ; mise en place des fagots								
WAAME, Pop					évaluation de la 4ème visite du village pilote																										
											Suivi et entretien des foyers améliorés																			
WAAME, E&F, Pop, JAFTA																															Préparation et organisation de la formation de recyclage sur les foyers améliorés
WAAME, E&F										Suivi de la confection des gilets de sauvetage																				
WAAME, Pop																															Fermeture de de la pêche aux fagots de branchage
Pop, WAAME, E&F								Suivi fumage poisson et entretien des fours de fumage chaque semaine; suivi du fonds de l'environnement ; mise en œuvre du plan de gestion des fours																					

PLANNING MENSUEL ANNÉE 2004

Responsables	Mois de Juillet 2004																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
WAAME						Envoi rapport mensuel																										
WAAME, , Pop										Suivi confection gilets de sauvetage à Mbam et Kamatane Bambara																					
WAAME, Pop															Suivi du fumage et entretien des fours ; suivi du fonds de l'environnement																
JAFTA, WAAME, E&F, Pop												Suivi et évaluation de la technique de confection des foyers améliorés : bilan et perspectives																			
WAAME, Pop															Suivi de la vulgarisation de la technique des foyers améliorés																
WAAME ; Pop									Suivi reboisement Avicennia de Gagué Chérif ; Suivi de la mise en place des fagots																						
Pop, WAAME, JAFTA, E &F							Evaluation finale de la pêche aux fagots de branchage																								
JAFTA, E&F, WAAME, Pop						Suivi pépinières et premières plantations b ois de village de Bassoul et de Bangalère ; Evaluation des plantationa de bois de village																												
WAAME, Pop																	Livraison matériel de reboisement Avicennia ; bois de village et de rhizophora ; délimitation et clôture des parcelles													
JAFTA, WAAME, E&F, Pop												Suivi et Evaluation reboisement rhizophora																			
WAAME, Pop																										Plantations des bois de village de Bassoul et de Bangalère					
WAAME, Pop																												Livraison matériel de confection ; confection des fagots ; mise en place des fagots				
WAAME, Pop																															Organisation réunion générale de bassoul sur les fours, fin de la campagne de fumage du poisson ; livraison matériel de fumage
WAAME, Pop																					Recyclage de la formation en technique de pépinières à Gagué Chérif, Bassuol, Bangalère Recherche de semences; rempotage des gaines pour le reboisement d'avicennia											

PLANNING MENSUEL ANNÉE 2004

Responsables	Mois d'Août																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
WAAME						Envoi rapport mensuel																										
WAAME, Pop, E&F											Suivi des parcelles de bois de village ; évaluation des plantation de bois de village																				
WAAME, Pop								Suivi fumage de poisson et construction des fours, suivi du fonds de l'environnement																							
E&F, WAAME, Pop						Pré-traitement des semences d'avicennia ; Semis des graines d'avicennia dans les gaines																										
Pop, WAAME, E&F, JAFTA						Suivi première reboisement Rhizophora ; collecte des propagules ; plantations																										
Pop, WAAME									Suivi reboisement d'avicennia ; Suivi fagots de branchage																						
WAAME,										Suivi confection de gilets de sauvetage																						
E&F, JAFTA, Pop																		Evaluation finale fumage de poisson et gestion des fours														
WAAME, E&F, JAFTA, Pop																						Préparation et organisation de la cinquième visite du village pilote ; livraison du matériel ; choix des villages à inviter ; choix des réalisations à visiter										
WAAME, Pop												Suivi de la vulgarisation de la technique des foyers a améliorés																				
WAAME, JAFTA, Pop, E&F																															organisation de la cinquième visite du village pilote

PLANNING MENSUEL ANNÉE 2004

Responsables	Mois de Septembre																													Activités prévues
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
WAAME						Envoi rapport mensuel																									
WAAME, Pop									Suivi reboisement d'Avicennia ; suivi des fagots de branchage																					
WAAME, Pop								Suivi du fumage de poisson et de la construction des fours, suivi du fonds de l'environnement																					
WAAME										Suivi reboisement bois de village ; suivi reboisement rhizophora																				
WAAME, JAFTA, Pop, E&F												Suivi et évaluation des foyers améliorés : bilan et perspectives																		
WAAME, Pop															Suivi vulgarisation technique des foyers améliorés au niveau des villages															
WAAME, JAFTA, Pop, E&F																		Evaluation finale du fumage de poisson et de la gestion des fours ; préparation de la campagne prochaine												
JAFTA, WAAMe, Pop, E&F					Evaluation finale des visites du village pilote																										
Pop, WAAME										Suivi de la confection et de la vente des gilets de sauvetage																				
JAFTA, E&F, WAAME, pop																		Préparation ; organisation de la finale du tournoi de Football ; Evaluation finale des activités de l'ASC												
WAAME, E&F, Pop														Evaluation finale du premier reboisement d'Avicennia ; Plantation de la deuxième parcelle d'avicennia															
WAAME, Pop																					Suivi deuxième plantation d'avicennia									
WAAME, JAFTA, Pop, E&F																														Evaluation finale de l'ensemble des activitéss

PART II AVICENNIA NURSING AND PLANTING EXPERIMENT

PART II AVICENNIA NURSING AND PLANTING EXPERIMENT

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PART II AVICENNIA NURSING AND PLANTING EXPERIMENT

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AVICENNIA NURSING AND PLANTING EXPERIMENT

This experiment was conducted for the purpose of establishing planting techniques for *Avicennia* which can grow at sites with a higher salinity than habitats of *Rhizophora* to expand the scope of mangrove plantations. The experiment was conducted for a period of approximately two years from June, 2002 to August, 2004 by two NGOs (UICN and WAAME, both of which are active in the Study Area) who acted as subcontractors. This report compiles the results of this experiment.

1. Experiment Methods

1.1 Selection of Experiment Sites

The experiment sites were selected based on the following conditions.

① Sites where mangrove trees have declined or disappeared, requiring restoration
② Sites with a sufficient area to conduct the nursing and planting experiment
③ Sites which are unlikely to be invaded by domestic animals, etc. and where it is easy to gather monitoring data
④ At least one site in each of the eastern and western parts of the Study Area in consideration of the future extension of *Avicennia* planting throughout the Study Area

Based on these conditions, it was decided to select the tidal areas of the village of Somone in the western part and of the villages of Sadioga and Mbam in the eastern part for the experiment sites. The experiment in the western part was subcontracted to the UICN, the activities of which centre on the island area and the western part of the Study Area, while the experiment in the eastern part was subcontracted to the WAAME which is based in Foundiougne.

1.2 Selection of Experiment Plots

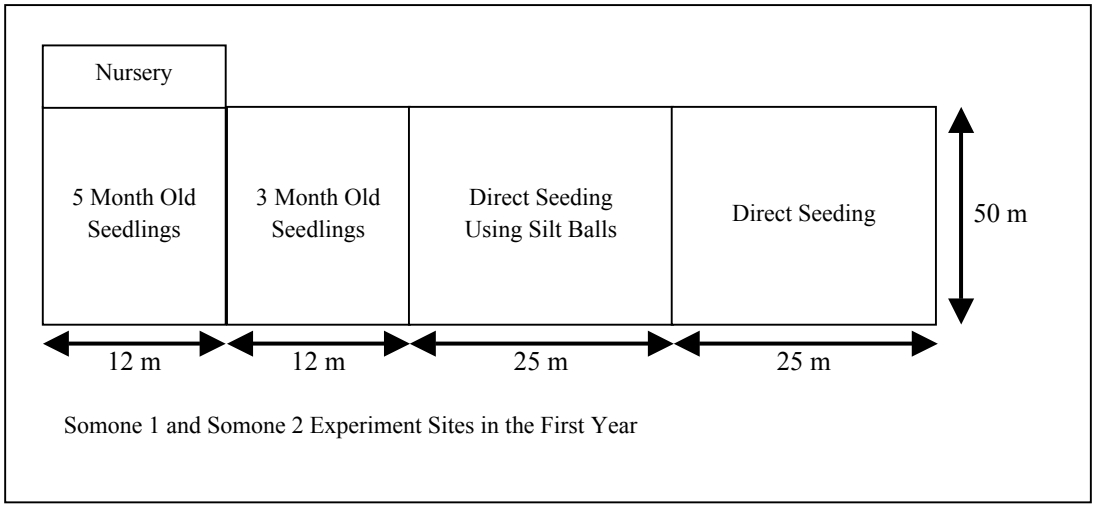
(1) Experiment in 2002/2003 (First Year Experiment)

The area of each experiment site was decided to be approximately 1 ha and experiment plots were introduced at each experiment site for direct seeding, direct seeding using silt balls, planting of three month old potted seedlings and planting of five month old potted seedlings.

Meanwhile, a nursery to produce potted seedlings was set up inside an experiment site/plot or an adjacent area where the water completely recedes at the time of low tide.

1) Shape of Experiment Sites and Experiment Plots

At Somone, two experiment sites, i.e. Somone 1 and Somone 2, were set up, taking the soil and inclination conditions, etc. into consideration while one experiment site each was set up at Sadioga and Mbam. All of the experiment sites were surrounded by net fencing to prevent the entry of animals and unauthorised local residents, etc. The shape of and outline of the experiment at each experiment site are given in Fig. 1.2-1 and Table 1.2-1.



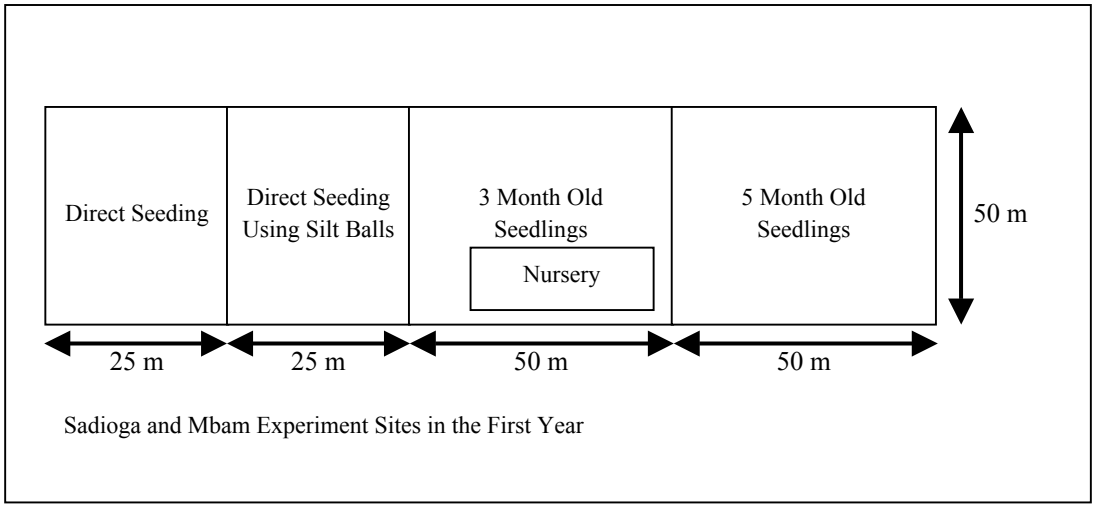


Fig. 1.2-1 Shape of Each Experiment Site in the First Year

Table 1.2-1 Outline of the Experiment (First Year)

Experiment Site	Plot No.	Date of Planting	Planting Method	Shape of Plot	Planting Distance	No. of Planting Lines	Planned Planting Qty.
Somone 1 and Somone 2	1	01/09/2002	Direct sowing (seeds)	50m x 12m	2m x 2m	25 x 7	175
	2	Same as above	Direct sowing (silt balls)	Same as above	Same as above	Same as above	Same as above
	3	01/12/2002	Planting of 3 month old potted seedlings	50m x 25m	Same as above	25 x 13	325
	4	01/02/2003	Planting of 5 month old potted seedlings	Same as above	Same as above	Same as above	Same as above
Sadioga And Mbam	1	12/09/2002	Direct sowing (seeds)	50m x 25m	2m x 2m	25 x 13	325
	2	Same as above	Direct sowing (silt balls)	Same as above	Same as above	Same as above	Same as above
	3	31/12/2002	Planting of 3 month old potted seedlings	50m x 50m	Same as above	25 x 25	625
	4	09/02/2003	Planting of 5 month old potted seedlings	Same as above	Same as above	Same as above	Same as above

Note: The date of planting for direct seeding is the date of seeding while the date of planting for potted seedlings is the date of transplanting.

2) Elevation of Experiment Sites

The elevation of each experiment site is given in Annex A-1-1. The inclination, etc. of each experiment site is given in Table 1.2-2.

Table 1.2-2 Inclination, etc. of Experiment Sites (First Year)

Experiment Site	Water Depth at Flood Tide (cm)	Inclination (%)	Type of Bed Soil
1 Somone 1	0 – 43	0.86	Sand with some clay
1 Somone 2	8 – 22	0.28	Much sand
1 Sadioga	45 – 60	0.30	Sand with some clay
1 Mbam	20 – 43	0.26	Clay

(2) Experiment in 2003/2004 (Second Year Experiment)

The experiment in the first year established such factors affecting the yield percentage and survival rate of *Avicennia* seeds/seedlings as the size of the seeds, state of rooting at the time of direct seeding, eating damage by fish, elevation, bed soil conditions and changes of the environmental conditions after transplanting (stability of the seedlings at the time of transplanting from pots to the planting site, rise of the water temperature in shallow water due to direct solar radiation and speed of the water flow).

Based on these results, the experiment sites at Somone, Sadioga and Mbam in the second year were selected in areas which were adjacent to the experiment sites in the first year and of which

the elevation is slightly lower than that of the previous year's sites. The nurseries were provided with shading to suppress a rise of the water temperature and were surrounded by nets with a smaller mesh to prevent eating damage by fish entering the sites. At Somone, the UICN independently set up the Somone 3 experiment site and the two new experiment sites were called Somone 4 and Somone 5. Somone 4 was selected in a sandy area while Somone 5 was selected in a clayey area. At Sadioga and Mbam, not only the nursery but also the entire experiment site was protected by perimeter fencing using small mesh netting.

As in the case of the experiment in the first year, the experiment in the second year involved direct seeding, direct seeding using silt balls, planting of three month old potted seedlings and planting of five month old potted seedlings. In addition, 1.5 month old seedlings and eight month old seedlings were also nursed to give variety to the nursing period. Furthermore, nursing on the ground was conducted albeit on a minor scale.

The shape of and outline of the experiment at each experiment site are given in Fig. 1.2-2 through Fig. 1.2-4 and Table 1.2-2 respectively.

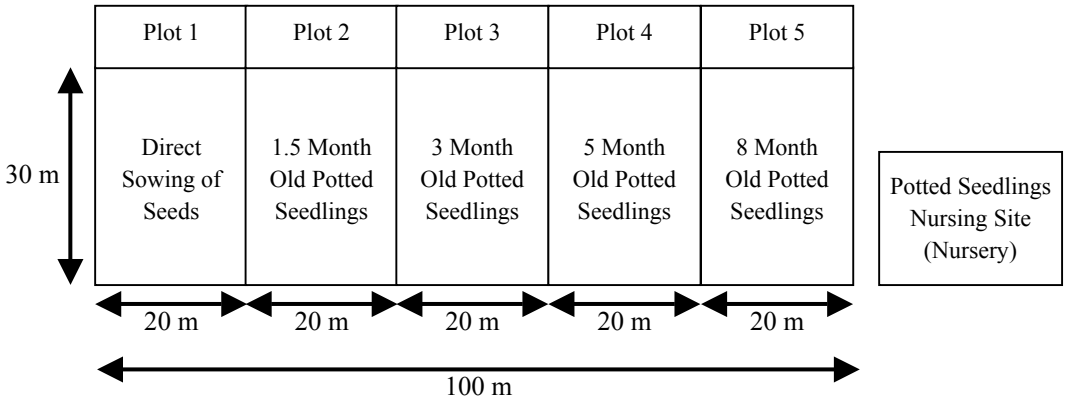


Fig. 1.2-2 Shape of Somone 4 Experiment Site

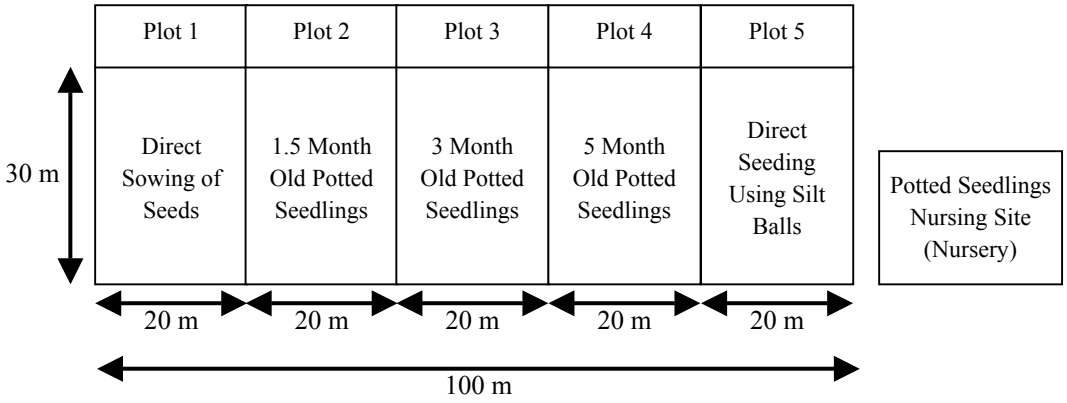


Fig. 1.2-3 Shape of Somone 5 Experiment Site

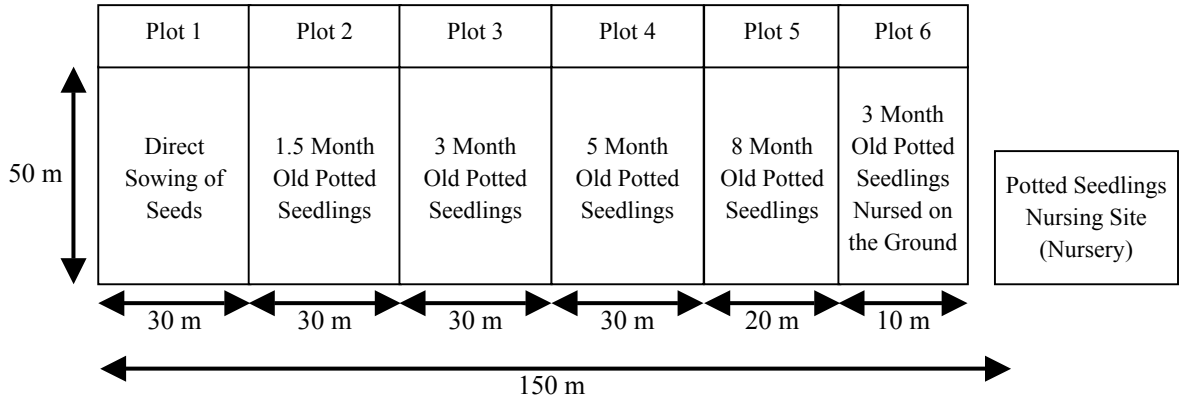


Fig. 1.2-4 Shape of Sadioga and Mbam Experiment Sites

Table 1.2-3 Outline of the Experiment (Second Year)

Experiment Site	Plot No.	Planting Method	Shape of Plot	Planting Distance	No. of Planting Lines	Planned Planting Qty.
Somone 4	1	Direct sowing (seeds)	30m x 20m	2m x 2m	15 x 10	150
	2	Planting of 1.5 month old potted seedlings	Same as above	Same as above	Same as above	Same as above
	3	Planting of 3 month old potted seedlings	Same as above	Same as above	Same as above	Same as above
	4	Planting of 5 month old potted seedlings	Same as above	Same as above	Same as above	Same as above
	5	Planting of 8 month old potted seedlings	Same as above	Same as above	Same as above	Same as above
Somone 5	1	Direct sowing (seeds)	30m x 20m	2m x 2m	15 x 10	150
	2	Planting of 1.5 month old potted seedlings	Same as above	Same as above	Same as above	Same as above
	3	Planting of 3 month old potted seedlings	Same as above	Same as above	Same as above	Same as above
	4	Planting of 5 month old potted seedlings	Same as above	Same as above	Same as above	Same as above
	5	Direct sowing (silt balls)	Same as above	Same as above	Same as above	Same as above
Sadioga and Mbam	1	Direct sowing (seeds)	50m x 30m	2m x 2m	25 x 15	375
	2	Planting of 1.5 month old potted seedlings	Same as above	Same as above	Same as above	Same as above
	3	Planting of 3 month old potted seedlings	Same as above	Same as above	Same as above	Same as above
	4	Planting of 5 month old potted seedlings	Same as above	Same as above	Same as above	Same as above
	5	Planting of 8 month old potted seedlings	50m x 20m	Same as above	25 x 10	250
	6	Planting of 3 month old potted seedlings nursed on the ground	50m x 10m	Same as above	25 x 25	125

2. Experiment Results

The general conditions of each experiment site are given in Annex A-1-2 while the monitoring results are given in Annex A-1-3.

2.1 Seeds

(1) Collection of Seeds

Avicennia seeds mature from July to November and a large quantity of seeds can be collected in August or September. At each experiment site, the seeds were collected two days before the planned sowing date. At Somone, large seeds were collected from seed trees of approximately 5 m in height. At Sadioga and Mbam, the size of the seeds was slightly smaller than those seeds collected around Somone because of the absence of large seed trees. At Somone, good quality seeds were collected in both years. In contrast, while seeds were collected near the experiment sites at Sadioga and Mbam in the first year, local seeds were hardly available in the second year, mainly because of the fact that they had been washed away by much rain. Consequently, the seeds had to be collected at other places, including Bagadaji, and the collection timing was delayed.

(2) Pre-Treatment of Seeds

In the first year, seeds which were collected from the ground and those which were collected from seed trees were immersed in water for six hours and 12 hours respectively. At both Sadioga and Mbam, the collected seeds were immersed in water for one day before the seed coat was removed. The water used was seawater diluted by approximately the same amount of fresh water.

In the second year, given the lesson learned in the first year that seeds immersed in water quickly open up catyledons and the roots start to grow, the seeds were placed in a bag which was immersed in water in a shaded mangrove forest area for four to five days to stimulate the growth of radicles with a view to sowing (inserting) those seeds with radicles into bed soil or pots to facilitate fixing of the roots.

2.2 Nursing

(1) Nursing Using Vinyl Pots

The vinyl pots used were 10 cm in diameter and 25 cm in height. In the first year, vinyl pots of 7 cm in diameter and 25 cm in height were also used for comparison purposes. The yield

percentage of seedlings was not affected by the pot size. In the second year, all of the pots used were the 10 cm diameter type.

(2) Germination Rate and Yield Percentage of Seedlings

1) Germination Rate

The germination rate of the seeds sown in pots is shown in Table 2.2-1 and Fig. 2.2-1. In the first year, three month old seedlings and five month old seedlings were produced. The germination rate was 94.5% - 98.8% at Somone, 90% at Sadioga and 70% – 75% at Mbam.

In the second year, the types of seedlings were expanded to 1.5 month old seedlings, three month old seedlings, five month old seedlings, eight month old seedlings and three month old seedlings nursed on the ground. The germination rate of 70% - 90% at Mbam was comparatively lower than the excellent 90% - 100% recorded at the other sites.

Table 2.2-1 Germination Rate of Seeds Sown in Pots

(%)

Experiment Site (Village)	1.5 Month Old Seedlings	3 Month Old Seedlings	5 Month Old Seedlings	8 Month Old Seedlings	3 Month Old Seedlings Nursed on the Ground
1 Somone 1	-	98.5	98.8	-	-
1 Somone 2	-	95.1	94.5	-	-
1 Sadioga	-	90.0	90.0	-	-
1 Mbam	-	70.0	75.0	-	-
2 Somone 4	100.0	100.0	100.0	100.0	-
2 Somone 5	100.0	100.0	99.3	-	-
2 Sadioga	91.8	100.0	90.0	100.0	92.4
2 Mbam	88.2	93.3	84.9	90.0	90.0

Note: To distinguish the first year sites from the second year sites, the prefixes 1 and 2 are added to the first year sites and second year sites respectively.

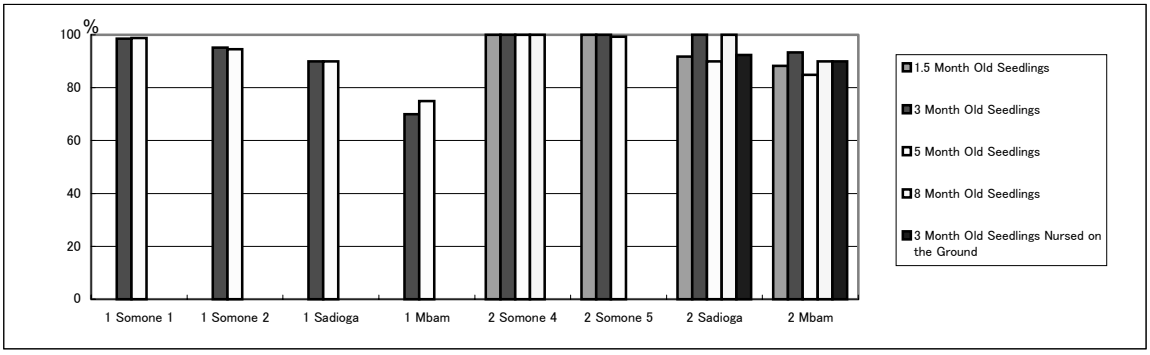


Fig. 2.2-1 Germination Rate of Seeds Sown in Pots

2) Yield Percentage of Seedlings

The yield percentage of the 1.5 month old seedlings through eight month old seedlings is shown in Table 2.2-2 and Fig. 2.2-2. In general, the yield percentage of the seedlings is high at Somone. The yield percentage of the seedlings is higher for seedlings with a shorter nursing period.

Table 2.2-2 Yield Percentage of Seedlings

(%)

Experiment Site (Village)	1.5 Month Old Seedlings	3 Month Old Seedlings	5 Month Old Seedlings	8 Month Old Seedlings	3 Month Old Seedlings Nursed on the Ground
1 Somone 1	-	72.3	80.6	-	-
1 Somone 2	-	41.8	49.8	-	-
1 Sadioga	-	77.1	55.1	-	-
1 Mbam	-	27.0	13.9	-	-
2 Somone 4	94.7	82.0	62.7	62.7	-
2 Somone 5	94.7	71.3	51.3	-	-
2 Sadioga	65.8	44.7	43.8	48.7	67.6
2 Mbam	28.2	49.9	14.4	11.1	46.7

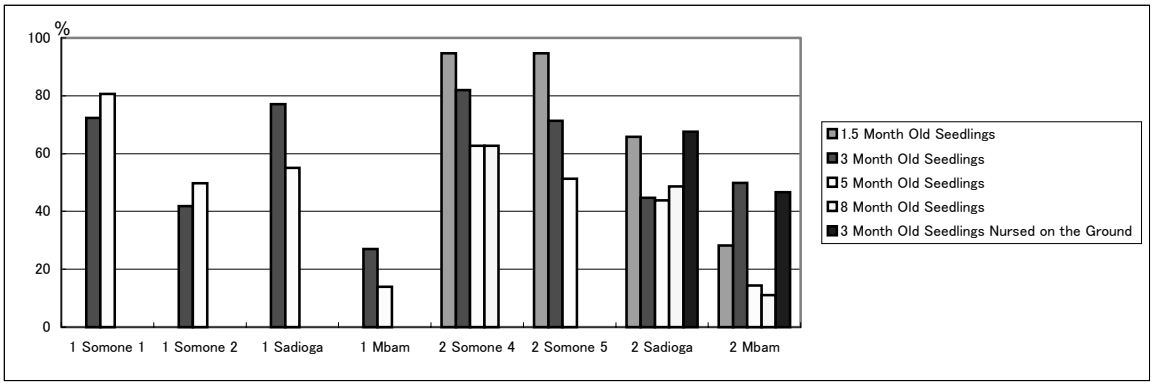


Fig. 2.2-2 Yield Percentage of Seedlings

(3) 1.5 Month Old Seedlings

1.5 month old seedlings were only used in the second year experiment.

1) Yield Percentage of Seedlings

The yield percentage of the 1.5 month old seedlings was 84.7% at Somone 4, 94.7% at Somone 5, 65.8% at Sadioga and 28.2% at Mbam. The survival rate in the nursing process in the second year is shown in Table 2.2-3 and Fig. 2.2-3.

Table 2.2-3 Survival Rate of 1.5 Month Old Seedlings in the Nursing Process

(%)

Time Passed	1 Week	2 Weeks	3 Weeks	1 Month	1.5 Months
Month,Year	-			Sept., 2003	mid-Sept., 2003
2 Somone 4	100.0	99.3	96.7	93.3	84.7
2 Somone 5	100.0	100.0	99.3	98.0	94.7
Month, Year	-			Nov., 2003	mid-Nov., 2003
2 Sadioga	91.8	88.9	84.9	76.4	65.8
2 Mbam	88.2	76.4	45.6	30.7	28.2

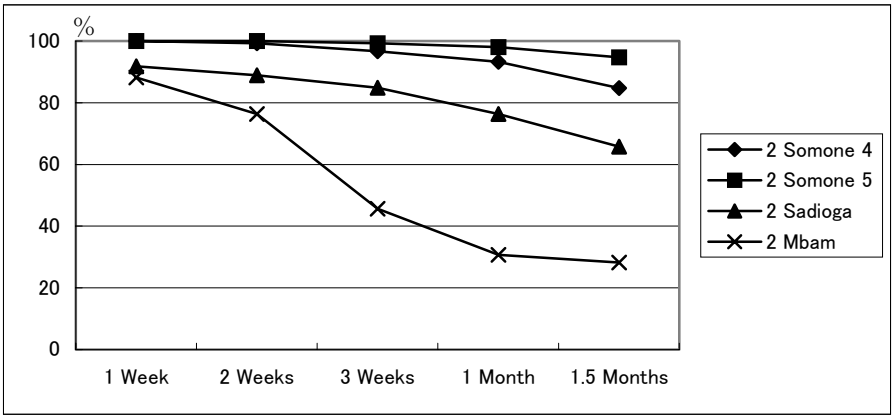


Fig. 2.2-3 Survival Rate of 1.5 Month Old Seedlings in the Nursing Process

2) Height Growth in Nursing Process

The height growth recorded for the 1.5 month old seedlings in the nursing process is shown in Table 2.2-4 and Fig. 2.2-4. The seedlings grew to 17.6 cm at Somone 4, 16.2 cm at Somone 5, 29.0 cm at Sadioga and 21.0 cm at Mbam in the 1.5 months after potting.

Table 2.2-4 Height Growth of 1.5 Month Old Seedlings in the Nursing Process

(cm)

Time Passed	1 Week	2 Weeks	3 Weeks	1 Month	1.5 Months
Month,Year	-			Sept., 2003	mid-Sept., 2003
2 Somone 4				11.9	17.6
2 Somone 5				10.3	16.2
Month, Year	-			Nov., 2003	mid-Nov., 2003
2 Sadioga	9.0	15.0	24.0	25.0	29.0
2 Mbam	8.0	14.0	15.5	18.0	21.0

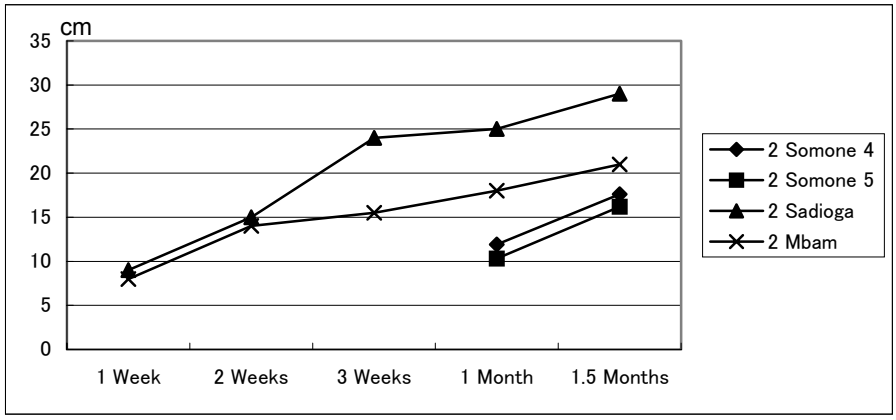


Fig. 2.2-4 Height Growth of 1.5 Month Old Seedlings in the Nursing Process

3) Base Diameter Growth in the Nursing Process

The base diameter recorded after nursing for 1.5 months was 0.43 cm at Somone 4, 0.4 cm at Somone 5, 0.5 cm at Sadioga and 0.5 cm at Mbam.

(4) Three Month Old Seedlings

1) Yield Percentage of Seedlings

The yield percentage of the seedlings in the first year was 73.3% at Somone 1, 41.8% at Somone 2, 77.1% at Sadioga and 27.0% at Mbam.

The yield percentage of the seeclings in the second year was 82.0% at Somone 4, 71.3% at Somone 5, 44.7% at Sadioga and 49.9% at Mbam. The survival rate in the nursing process is shown in Table 2.2-5 and Fig. 2.2-5.

Table 2.2-5 Survival Rate of Three Month Old Seedlings in the Nursing Process

(%)

Time Passed	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months
Month, Year	-			Oct., 2002	Nov., 2002	Dec., 2002
1 Somone 1	98.5	98.2	96.0	82.5	73.2	72.3
1 Somone 2	100.0	84.9	82.2	55.1	44.6	41.8
1 Sadioga	94.4	94.4	91.5	86.7	80.9	77.1
1 Mbam	44.8	43.8	37.5	34.4	31.3	27.0
Month, Year	-			Sept., 2003	Oct., 2003	Nov., 2003
2 Somone 4	100.0	100.0	98.7	96.0	87.3	82.0
2 Somone 5	100.0	100.0	98.7	95.3	81.3	71.3
Month, Year	-			Oct., 2003	Nov., 2003	Dec., 2003
2 Sadioga	73.3	73.3	64.4	59.1	52.9	44.7
Month, Year	-			Dec., 2003	Jan., 2004	Feb., 2004
2 Mbam	93.3	89.1	87.2	76.0	63.5	49.9

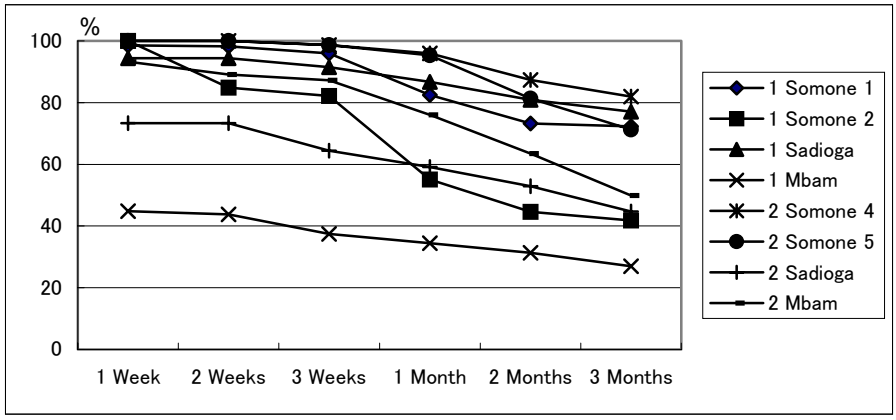


Fig. 2.2-5 Survival Rate of Three Month Old Seedlings in the Nursing Process

2) Height Growth in the Nursing Process

The height growth recorded for the three month old seedlings in the nursing process is shown in Table 2.2-6 and Fig. 2.2-6.

In the first year, the seedlings grew to 16.1 cm at Somone 1, 11.1 cm at Somone 2, 15.0 cm at Sadioga and 14.8 cm at Mbam in the three months after potting. In the second year, the seedlings grew to 28.1 cm at Somone 4, 19.6 cm at Somone 5, 33.0 cm at Sadioga and 18.0 cm at Mbam. The large difference in the height growth between the first year and the second year is due to the fact that the young buds were eaten by fish and this fact did not come to light in the early days. After the discovery of such damage, the nursery was protected by net fencing and the seedlings began to properly grow thereafter. In the second year, the height growth further improved because of the introduction of net fencing around the nursery prior to seeding in posts and also because of shading.

Table 2.2-6 Height Growth of Three Month Old Seedlings in the Nursing Process

(cm)

Time Passed	1 Month	2 Months	3 Months
Month, Year	Oct., 2002	Nov., 2002	Dec., 2002
1 Somone 1	6.8	13.0	16.1
1 Somone 2	5.5	9.4	11.1
Month, Year	Sept., 2003	Oct., 2003	Nov., 2003
2 Somone 4	13.4	23.9	28.1
2 Somone 5	7.2	13.3	19.6
Month, Year	Sept., 2003	Oct., 2003	Nov., 2003
2 Sadioga	25.0	29.0	32.0
Month, Year	Sept., 2003	Oct., 2003	Nov., 2003
2 Mbam	8.0	12.0	18.0

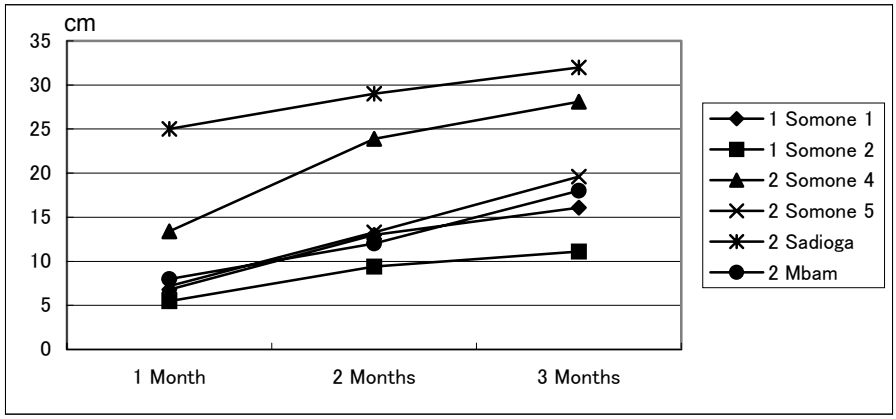


Fig. 2.2-6 Height Growth of Three Month Old Seedlings in the Nursing Process

3) Base Diameter Growth in the Nursing Period

In the first year, the base diameter recorded after nursing for three months was the same for Somone 1, Somone 2, Sadioga and Mbam at 0.5 cm. In the second year, the base diameter recorded after nursing for three months was 0.44 cm at Somone 4, 0.42 cm at Somone 5, 0.50 cm at Sadioga and 0.40 cm at Mbam.

(5) Five Month Old Seedlings

1) Yield Percentage of Seedlings

The yield percentage of the seedlings in the first year was 80.6% at Somone 1, 49.8% at Somone 2, 55.1% at Sadioga and 15.4% at Mbam.

The yield percentage of the seedlings in the second year was 62.76% at Somone 4, 51.3% at Somone 5, 43.8% at Sadioga and 14.4% at Mbam. The survival rate in the nursing process is shown in Table 2.2-7 and Fig. 2.2-7.

Table 2.2-7 Survival Rate of Five Month Old Seedlings in the Nursing Process

(%)

Time Passed	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months
Month, Year	-			Oct., 2002	Nov., 2002	Dec., 2002	Jan., 2003	Feb., 2003
1 Somone 1	98.8	97.8	96.6	93.8	85.2	82.5	81.2	80.6
1 Somone 2	99.1	94.5	85.8	73.5	63.4	53.2	50.5	49.8
1 Sadioga	68.1	59.1	59.1	59.1	59.1	55.1	55.1	55.1
1 Mbam	48.6	45.0	41.2	38.6	38.6	32.2	21.9	15.4
Month, Year	-			Sept., 2003	Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004
2 Somone 4	100.0	98.7	97.3	90.0	80.7	72.7	68.7	62.7
2 Somone 5	99.3	98.7	96.7	94.0	78.0	63.3	54.0	51.3
Month, Year	-			Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004
2 Sadioga	76.2	75.6	68.4	64.7	59.3	53.1	46.9	43.8
Month, Year	-			Dec., 003	Jan., 2004	Feb., 2004	Mar., 004	Apr., 2004
2 Mbam	84.9	56.4	55.1	52.4	43.8	31.8	27.1	14.4

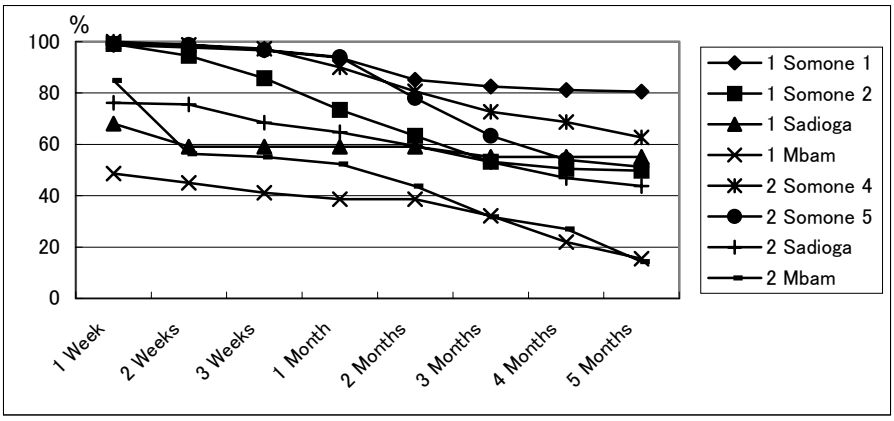


Fig. 2.2-7 Survival Rate of Five Month Old Seedlings in the Nursing Process

2) Height Growth in the Nursing Process

The height growth recorded for the five month old seedlings in the nursing process is shown in Table 2.2-8 and Fig. 2.2-8.

In the first year, the seedlings grew to 22.4 cm at Somone 1 and 21.8 cm at Somone 2 in the five months after potting. At Sadioga and Mbam, the seedling height after five months was 14.0 cm but there was virtually no growth after one month.

In the second year, the seedlings grew to 34.8 cm at Somone 4, 25.6 cm at Somone 5, 35.0 cm at Sadioga and 22.0 cm at Mbam in the five months after potting. The better growth in the second year can be attributed to the same reason given for the three month old seedlings.

Table 2.2-8 Height Growth of Five Month Old Seedlings in the Nursing Process

(cm)

Time Passed	1 Month	2 Months	3 Months	4 Months	5 Months
Month, Year	Oct., 2002	Nov., 2002	Dec., 2002	Jan., 2003	Feb., 2003
1 Somone 1	7.3	14.0	18.3	20.9	22.4
1 Somone 2	6.9	14.9	17.1	20.6	21.8
1 Sadioga	13.1	13.7	13.9	14.0	14.0
1 Mbam	13.5	14.1	14.2	14.0	14.0
Month, Year	Sept., 2003	Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004
2 Somone 4	14.4	25.2	32.0	32.0	34.8
2 Somone 5	7.3	14.3	18.5	24.8	25.6
Month, Year	Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004
2 Sadioga	27.0	30.0	32.0	33.0	35.0
Month, Year	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004
2 Mbam	16.0	19.0	19.0	21.0	22.0

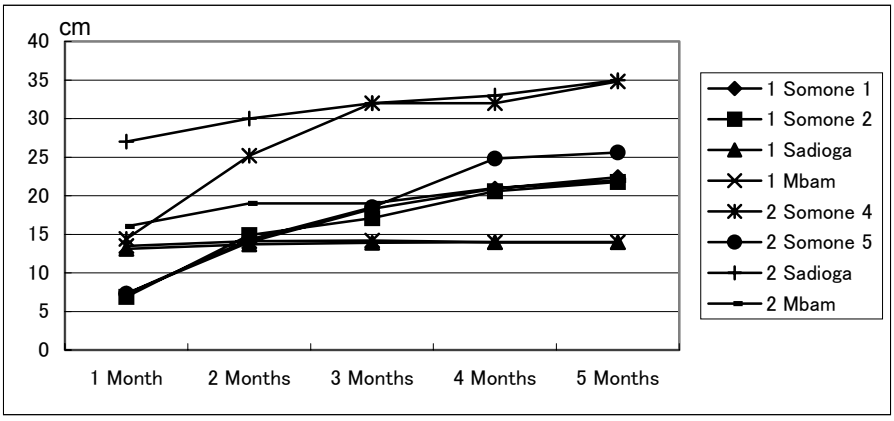


Fig. 2.2-8 Height Growth of Five Month Old Seedlings in the Nursing Process

3) Base Diameter Growth in the Nursing Process

In the first year, the base diameter recorded after nursing for five months was 0.56 cm at Somone 1, 0.53 cm at Somone 2, 0.50 cm at Sadioga and 0.40 cm at Mbam.

In the second year, the base diameter recorded after nursing for five months was 0.38 cm at Somone 4, 0.39 cm at Somone 5, 0.60 cm at Sadioga and 0.50 cm at Mbam.

(6) Eight Month Old Seedlings

1) Yield Percentage of Seedlings

Eight month old seedlings were only experimented at Somone 4, Sadioga and Mbam in the second year. The yield percentage of the eight month old potted seedlings was 62.7% at Somone 4, 48.7% at Sadioga and 11.1% at Mbam. The survival rate in the nursing process is shown in Table 2.2-9 and Fig. 2.2-9.

Table 2.2-9 Survival Rate of Eight Month Old Seedlings in the Nursing Process

(%)

Time Passed	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months	6 Months	7 Months	8 Months
Month, Year	-			Sept., 2003	Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004
2 Somone 4	100.0	99.3	97.3	89.3	70.7	66.7	65.3	64.7	63.3	62.7	62.7
Month, Year	-			Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004
2 Sadioga	95.3	92.3	86.0	81.7	78.7	70.7	62.3	58.0	51.0	48.7	46.7
Month, Year	-			Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004
2 Mbam	84.3	69.8	35.7	34.2	32.0	18.5	14.2	13.8	12.3	11.1	11.1

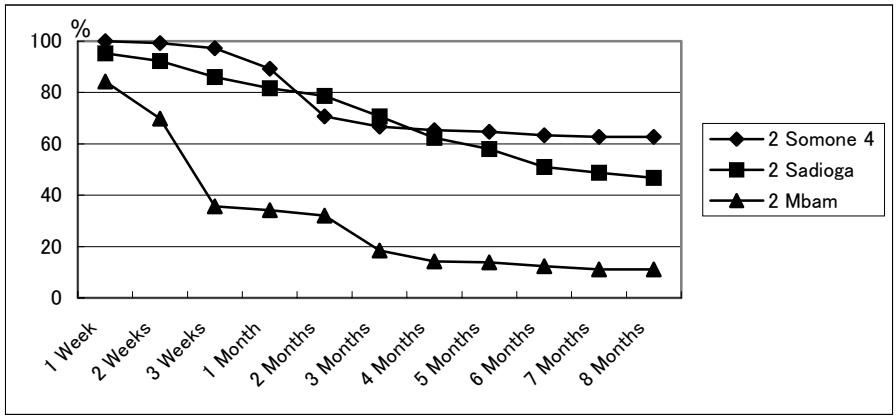


Fig. 2.2-9 Survival Rate of Eight Month Old Seedlings in the Nursing Process

2) Height Growth in the Nursing Process

The height growth recorded for the eight month old seedlings in the nursing process is shown in Table 2.2-10 and Fig. 2.2-10. After eight months, the seedlings grew to 31 cm at Somone 4, 35 cm at Sadioga and 14.5 cm at Mbam.

Table 2.2-10 Height Growth of Eight Month Old Seedlings in the Nursing Process

(cm)

Time Passed	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months	6 Months	7 Months	8 Months
Month, Year	-			Sept., 2003	Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004
2 Somone 4				10.5	20.6	27.0	28.6	28.1	31.2	30.9	31.0
Month, Year	-			Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004
2 Sadioga	8.0	12.0	18.0	18.0	20.0	24.0	26.0	28.0	32.0	35.0	35.0
Month, Year	-			Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004
2 Mbam	15.0	15.5	16.0	16.0	22.0	23.0	23.0	23.0	14.5	14.5	14.5

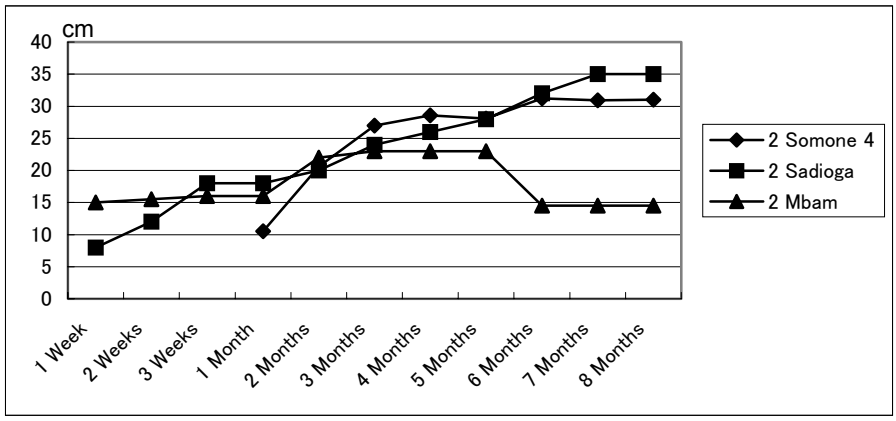


Fig. 2.2-10 Height Growth of Eight Month Old Seedlings in the Nursing Process

3) Base Diameter Growth in the Nursing Process

The base diameter recorded after nursing for eight months was 0.56 cm at Somone 4, 0.65 cm at Sadioga and 0.50 cm at Mbam.

(7) Three Month Old Seedlings Nursed in the Ground

The experiment involving three month old seedlings nursed in the ground consisted of the nursing of seedlings in the ground for two months followed by immersion in seawater at the nursery for another month for acclimatisation with the environment for subsequent transplanting as three month old seedlings. This experiment was only conducted at Sadioga and Mbam in the second year.

1) Yield Percentage of Seedlings

The yield percentage of the seedlings was 67.6% at Sadioga and 46.7% at Mbam. The survival rate in the nursing process is shown in Table 2.2-11 and Fig. 2.2-11.

Table 2.2-11 Survival Rate of Three Month Old Seedlings Nursed in the Ground in the Nursing Process

(%)

	In the Ground					Immersed
Time Passed	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months
Month, Year	-			Oct., 2003	Nov., 2003	Dec., 2003
2 Sadioga	92.4	91.8	80.0	75.1	67.6	67.6
2 Mbam	74.4	73.3	61.7	55.6	46.7	46.7

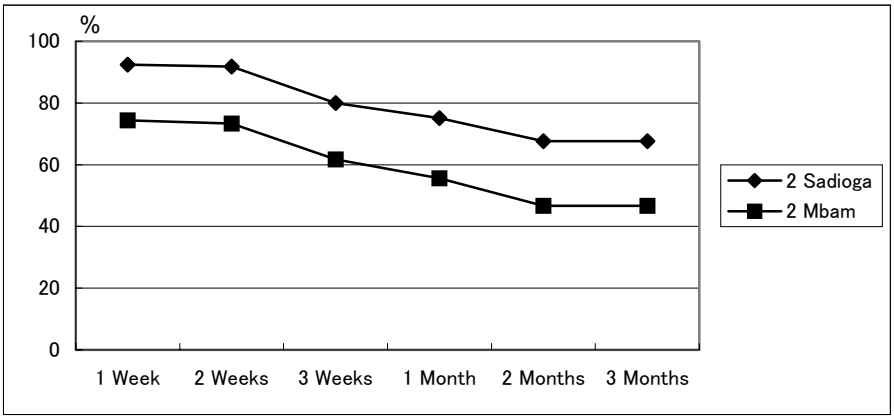


Fig. 2.2-11 Survival Rate of Three Month Old Seedlings Nursed in the Ground in the Nursing Process

2) Height Growth in the Nursing Process

The height growth of the three month old seedlings nursed in the ground in the nursing process is shown in Table 2.2-12 and Fig. 2.2-12. At the time of transplanting, the seedling height was as high as 32 cm at Sadioga and 37 cm at Mbam. While the seedlings grew during the nursing period in the ground, they stopped growing at the nursery during their acclimatisation with seawater.

Table 2.2-12 Height Growth of Three Month Old Seedlings Nursed in the Ground in the Nursing Process

(cm)

	In the Ground					Immersed
Time Passed	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months
Month, Year	-			Oct., 2003	Nov., 2003	Dec., 2003
2 Sadioga	15.0	18.0	23.0	28.0	32.0	32.0
2 Mbam	11.0	19.0	25.0	29.0	37.0	37.0

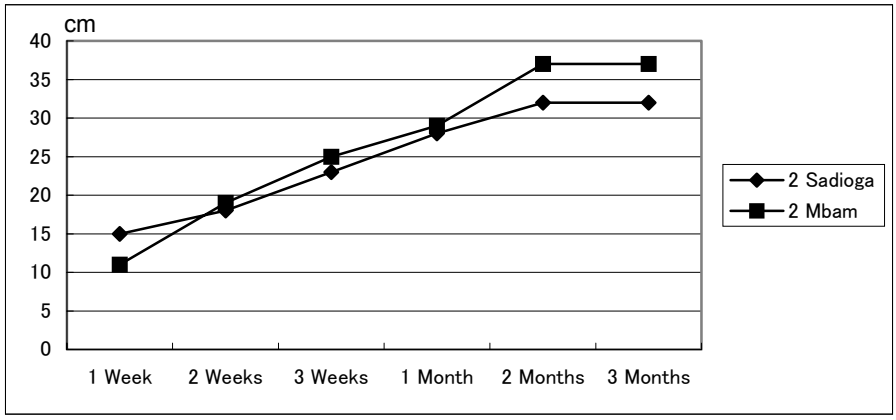


Fig. 2.2-12 Height Growth of Three Month Old Seedlings Nursed in the Ground in the Nursing Process

3) Base Diameter

The base diameter recorded after nursing for three months was 0.6 cm at Sadioga and 0.5 cm at Mbam. As in the case of the height growth, the base diameter increased during the nursing for two months in the ground but stopped increasing during the acclimatisation period of one month at the nursery.

2.3 Planting

(1) Direct Sowing

1) Number of Seeds

The number of seeds directly sown in the first year is shown in Table 2.3-1.

Table 2.3-1 Number of Seeds Directly Sown

Experiment Site		Number of Seeds
First Year	1 Somone 1	350
	1 Somone 2	350
	1 Sadioga	546
	1 Mbam	325
Second Year	2 Somone 4	150
	2 Somone 5	150
	2 Sadioga	375
	2 Mbam	375

The number of seeds sown at the two Somone sites in the first year was double the planned number as two seeds were sown at each spot. At Mbam, the number of seeds was higher

than the planned number as re-seeding was conducted at 221 spots where the sown seeds were washed away several days after sowing.

2) Germination Rate

In the case of direct seeding, a fair number of seeds were washed away but all the remaining seeds germinated.

3) Survival Rate

The survival rate of the directly sown seeds is shown in Table 2.3-2 and Fig. 2.3-1.

Table 2.3-2 Survival Rate of Sown Seeds

(%)

Time Passed	Time of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months
Month, Year	Sept., 2002	-			Oct., 2002	Nov., 2002	Dec., 2002		
1 Somone 1	100.0	43.1	31.4	26.9	11.1	0.0			
1 Somone 2	100.0	20.0	13.7	10.0	4.9	1.1	0.0		
1 Sadioga	100.0	22.9	18.1	9.2	0.0				
1 Mbam	100.0	60.0	28.3	0.0					
Month, Year	Aug., 2003	-			Sept., 2003	Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004
2 Somone 4	100.0	88.7	66.7	57.3	45.3	19.3	0.0		
2 Somone 5	100.0	94.7	80.7	70.0	53.3	28.7	26.7	24.0	23.3
Month, Year	Sept., 2003	-			Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004
2 Sadioga	100.0	84.5	75.5	68.5	62.4	47.7	36.8	5.9	3.5
Month, Year	Oct., 2003	-			Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004
2 Mbam	100.0	96.3	93.1	82.9	79.2	74.7	62.4	46.9	23.2

Time Passed	6 Months	7 Months	8 Months	9 Months	10 Months	11 Months	12 Months	13 Months
Month, Year								
1 Somone 1								
1 Somone 2								
1 Sadioga								
1 Mbam								
Month, Year	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004
2 Somone 4								
2 Somone 5	22.0	21.3	21.3	21.3	21.3	21.3	21.3	21.3
Month, Year	Mar., 2004	Apr., 2004						
2 Sadioga	0.5	0.0						
Month, Year	Apr., 2004	May, 2004	Jun., 2004					
2 Mbam	11.5	1.3	0.0					

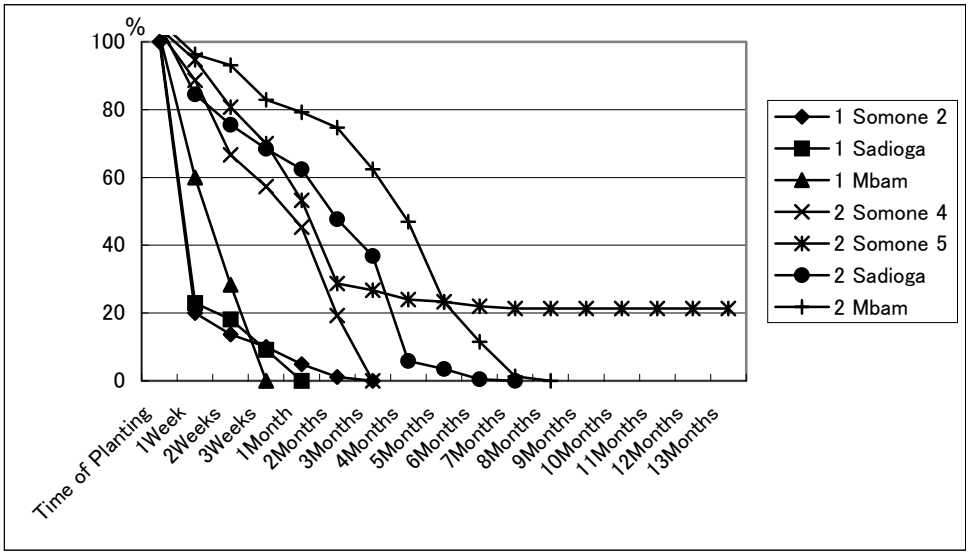


Fig. 2.3-1 Survival Rate of Sown Seeds

At Somone 2 in the first year, four of the seedlings survived for two months after sowing but none of them lasted for three months. At the Somone 1 and Sadioga sites, some 80% of the seeds were lost within one week of sowing and hardly any of the seeds survived for one month. At Mbam, the survival rate hit 0% after two weeks. Many of the sown seeds were lost due to tidal flow immediately after sowing and even the germinated seeds failed to grow and died as the sprouts were eaten by fish.

In the second year, seeds with radicles were inserted into the bed soil, having learned from the experience of the first year. At Sadioga, as the rising tide is faster than the ebb tide, the seeds were inserted into the bed soil in a manner so that the closed part of the cotyledon faced the rising tide. In view of eating damage by fish, the seeded area was protected by fine mesh netting. Although the chance of survival was believed to be reasonable at Somone 4, the seeds were eliminated in three months after sowing due to eating damage by fish. At Somone 5, the survival rate showed a rapid decline up to two months after sowing, followed by a much more gradual decline thereafter. At the end of the experiment (13 months after sowing), the survival rate was 21.3% with an average height of 50 cm, suggesting the likelihood of the survival of the remaining seedlings. All of the sown seeds had perished by the end of seven months after sowing at Sadioga and by the end of six months after sowing at Mbam.

(2) Direct Sowing using Silt Balls

1) Number of Seeds Sown

The number of seeds sown in the first and second years is shown in Table 2.3-3.

Table 2.3-3 Number of Seeds Sown in Silt Balls

Experiment Site		Number of Seeds
First Year	1 Somone 1	350
	1 Somone 2	350
	1 Sadioga	504
	1 Mbam	325
Second Year	2 Somone 5	150

As in the case of direct seeding, two seeds were sown at each spot at the two Somone sites in the first year. At Mbam, re-seeding was conducted at 179 spots where the sown seeds had been washed away several days after sowing. In the second year, because of the poor performance of the experiment of direct seeding in silt balls in the first year, the experiment was repeated only at the clayey Somone 5 site.

2) Germination Rate

As in the case of direct seeding, many of the seeds were washed away but all of the remaining seeds germinated.

3) Survival Rate

The survival rate of the directly sown seeds in silt balls is shown in Table 2.3-4 and Fig. 2.3-2.

In the first year, the survival rate hit 0% three weeks after sowing at Mbam and Sadioga, one month after sowing at Somone 2 and two months after sowing at Somone 1. Most of the seeds were washed away and, in general, the seeds sown in silt balls were lost faster than the directly sown seeds into the bed. At Somone 2, 97.7% were washed away within one week after sowing.

At Somone 5 in the second year, the survival rate rapidly declined until three months after sowing, followed by a gradual decline thereafter. At the end of the experiment (after 13 months), the survival rate stood at approximately 13%, suggesting a likelihood of some 10% of the originally sown seeds finally surviving. The reason for this modest success is assumed to be that the silt balls at Somone 5 were more resistant to tidal flow because of the clayey ground.

Table 2.3-4 Survival Rate of Directly Sown Seeds in Silt Balls

(%)

Time Passed	Time of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months
Month, Year	Sept., 2002	-			Oct., 2002	Nov., 2002	Dec., 2002		
1 Somone 1	100.0	13.1	6.3	5.7	2.6	0.0			
1 Somone 2	100.0	2.3	0.3	0.3	0.0				
1 Sadioga	100.0	19.6	4.0	0.0					
1 Mbam	100.0	49.8	15.4	0.0					
Month, Year	Aug., 2003	-			Sept., 2003	Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004
2 Somone 5	100.0	96.7	88.7	74.0	47.3	22.7	16.7	16.0	15.3

Time Passed	6 Months	7 Months	8 Months	9 Months	10 Months	11 Months	12 Months	13 Months
Month, Year	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004
2 Somone 5	15.3	14.0	14.0	13.3	13.3	12.7	12.7	12.7

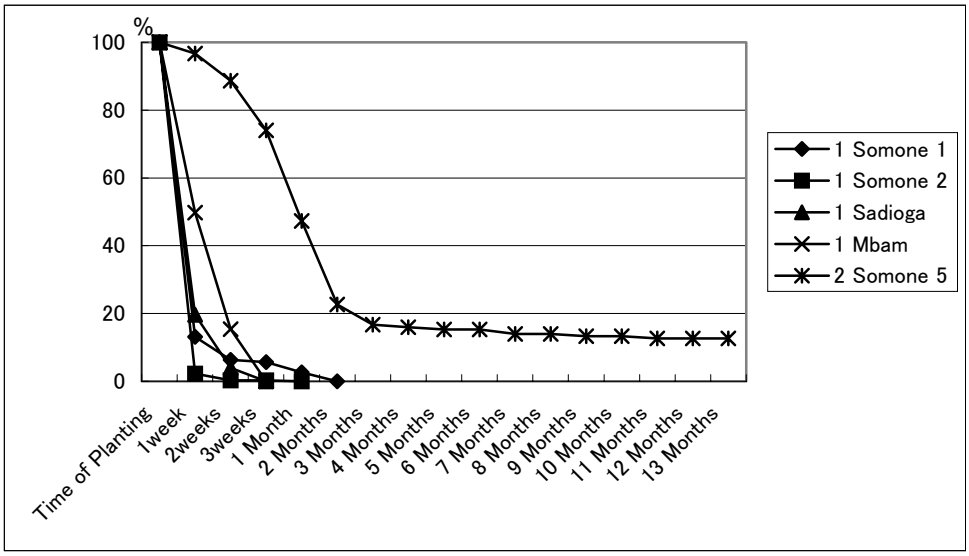


Fig. 2.3-2 Survival Rate of Directly Sown Seeds in Silt Balls

(3) 1.5 Month Old Seedlings

1) Survival Rate After Transplanting

The survival rate after transplanting of the seedlings nursed in pots for 1.5 months is shown in Table 2.3-5 and Fig. 2.3-3. At the end of the experiment, i.e. 12 months after transplanting, the survival rate was 90% at Somone 5. At Somone 4, there were mass deaths in the second month of growth due to eating damage by fish. It is inferred that the seedlings would have survived if they had not been eaten by fish. The survival rate at Sadioga and Mbam at the end of the experiment was 13.5% and 9.2% respectively. Given the fact that

the survival rate declined gradually but steadily at these two sites, the survival of the remaining seedlings in the coming months is questionable.

Table 2.3-5 Survival Rate of 1.5 Month Old Seedlings After Transplanting

(%)

Time Passed	Time of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Mounts
Month, Year	Sept., 2003	-			Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004
2 Somone 4	100	96.9	96.1	89.8	85.0	17.3	13.4	13.4
2 Somone 5	100	99.3	98.6	97.9	94.4	94.4	93.0	92.3
Month, Year	Nov., 2003	-			Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004
2 Sadioga	100	96.3	83.4	74.0	68.2	60.5	40.5	27.4
Month, Year	Dec., 2003	-			Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004
2 Mbam	100	95.0	85.0	78.3	69.2	60.0	58.3	56.7

Time Passed	5 Months	6 Months	7 Months	8 Months	9 Months	10 Months	11 Months
Month, Year	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004
2 Somone 4	10.2	7.9	7.1	7.1	7.1	7.1	
2 Somone 5	91.5	90.8	90.1	90.1	90.1	90.1	90.1
Month, Year	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004	
2 Sadioga	25.3	23.3	20.3	18.9	13.9	13.5	
Month, Year	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004		
2 Mbam	52.5	35.0	33.3	20.0	9.2		

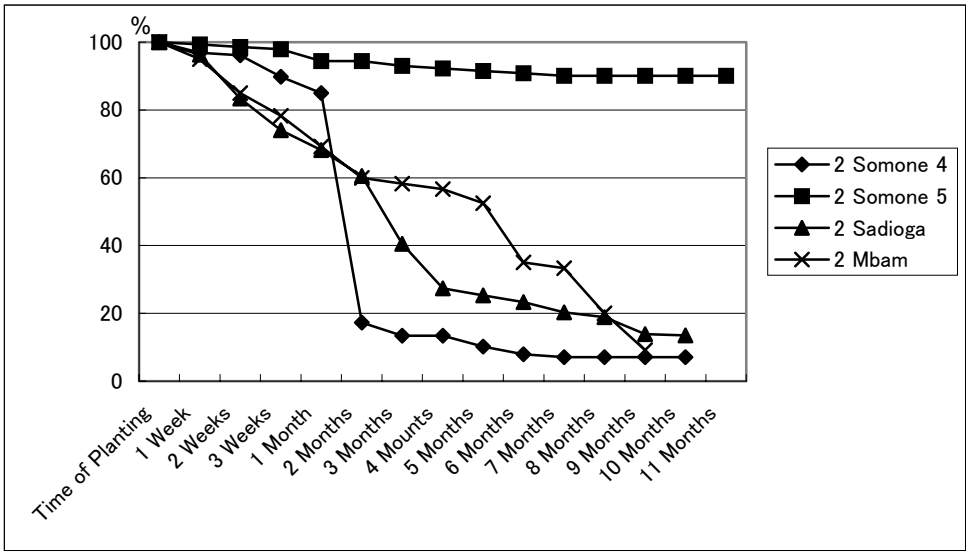


Fig. 2.3-3 Survival Rate of 1.5 Month Old Seedlings After Transplanting

2) Height Growth After Transplanting

The height growth after transplanting is shown in Table 2.3-6 and Fig. 2.3-4. At SOmone 4, most of the seedlings were eaten by fish in the second month and only nine seedlings survived until the end of the experiment (after 11 months). Comparison of the tree height between the time of transplanting and the end of the experiment showed growth from 16 cm to 58 cm at Somone 5 (after 11 months), from 29 cm to 52 cm at Sadioga (after 10 months) and from 26 cm to 47 cm at Mbam (after nine months).

Table 2.3-6 Height Growth of 1.5 Month Old Seedlings After Transplanting

(cm)

Time Passed	Time of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Mounts
Month, Year	Sept., 2003	-			Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004
2 Somone 4	17.6	17.7	17.8	17.9	18.0	19.1		
2 Somone 5	16.2	17.2	18.1	19.1	20.0	26.1	31.1	33.7
Month, Year	Nov., 2003	-			Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004
2 Sadioga	29.0	31.0	31.0	32.0	32.0	33.0	35.0	35.0
Month, Year	Dec., 2003	-			Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004
2 Mbam	26.0	26.0	29.0	30.0	31.0	32.0	34.0	36.0

Time Passed	5 Months	6 Months	7 Months	8 Months	9 Months	10 Months	11 Months
Month, Year	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004
2 Somone 4							
2 Somone 5	38.6	39.4	42.1	42.5	42.9	43.8	57.6
Month, Year	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004	
2 Sadioga	37.0	37.1	37.3	38.0	39.0	52.0	
Month, Year	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004		
2 Mbam	36.0	37.0	38.0	38.0	47.0		

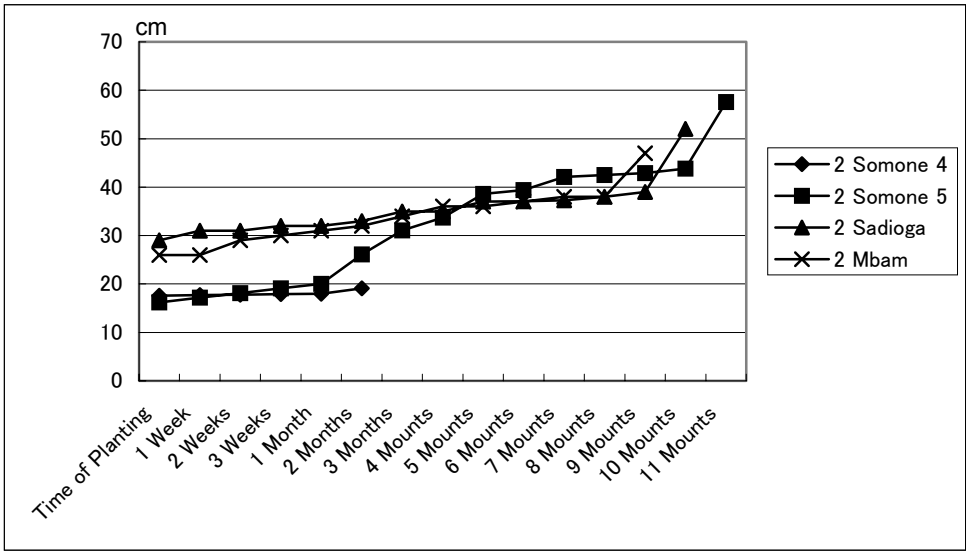


Fig. 2.3-4 Height Growth of 1.5 Month Old Seedlings After Transplanting

3) Base Diameter Growth After Transplanting

Hardly any base diameter growth after transplanting was recorded at Somone 4 because of eating damage by fish. Comparison of the base diameter between the time of transplanting and the end of the experiment showed growth of from 0.4 cm to 0.9 cm at Somone 5 (after 11 months), from 0.5 cm to 0.8 cm at Sadioga (after 10 months) and from 0.4 cm to 0.7 cm at Mbam (after nine months).

(4) Three Month Old Seedlings

1) Survival Rate After Transplanting

The survival rate after transplanting of the seedlings nursed in pots for three months is shown in Table 2.3-7 and Fig. 2.3-5.

At the end of the experiment (after 21 months), the survival rate of the seedlings planted in the first year was 20.9% at Somone 1 and 41.2% at Somone 2. Although the survival rate gradually declined at these two sites, it began to stabilise after one year. As some of the seedlings flowered and bore fruit in the second year, the planting at these sites is judged to have been successful. All of the seedlings had died by the end of the third month at Sadioga and by the end of the sixth month at Mbam.

The survival rate of the three month old seedlings planted in the second year after 10 months was 55.3% at Somone 4 and 81.3% at Somone 5. Given the performance of comparative seedlings planted in the first year, a fair survival rate is expected to be achieved by the

remaining seedlings. The survival rate of the three month old seedlings was 10% at Sadioga after eight months and 20.2% at Mbam after nine months. Even though the survival rate at these two sites is not very encouraging, some of the seedlings are expected to finally survive because of their successful survival through one dry season.

Table 2.3-7 Survival Rate of Three Month Old Seedlings After Transplanting

(%)

Time Passed	Time of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months
Month, Year	Dec., 2002	-	-	-	Jan., 2003	Feb., 2003	Mar., 2003	Apr., 2003	May, 2003
1 Somone 1	100	92.8	87.2	85.5	85.5	81.3	76.6	76.6	72.3
1 Somone 2	100	86.8	71.3	66.2	61.8	59.6	55.9	52.2	52.2
1 Sadioga	100	70.0	65.0	59.0	42.8	3.5	0.0		
1 Mbam	100	30.0	23.1	22.2	20.8	10.2	5.6	5.6	0.0
Month, Year	Nov., 2003	-	-	-	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004
2 Somone 4	100	82.9	68.3	63.4	63.4	59.3	58.5	57.7	56.1
2 Somone 5	100	92.5	89.7	87.9	86.0	85.0	84.1	83.2	82.2
Month, Year	Jan., 2004	-	-	-	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004
2 Sadioga	100	92.5	89.1	82.1	79.6	54.7	33.8	22.9	15.4
Month, Year	Feb., 2004	-	-	-	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004
2 Mbam	100	91.3	89.4	89.4	87.5	86.5	83.7	68.3	63.5
Time Passed	6 Months	7 Months	8 Months	9 Months	10 Months	11 Months	12 Months	13 Months	14 Months
Month, Year	Jun., 2003	Jul., 2003	Aug., 2003	Sept., 2003	Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004
1 Somone 1	67.7	64.3	54.5	52.8	47.2	39.1	24.3	22.1	20.9
1 Somone 2	52.2	52.2	51.5	50.7	50.0	49.3	44.1	41.2	41.2
1 Sadioga									
1 Mbam									
Month, Year	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004				
2 Somone 4	56.1	56.1	56.1	56.1	55.3				
2 Somone 5	81.3	81.3	81.3	81.3	81.3				
Month, Year	Jul., 2004	Aug., 2004	Sept., 2004						
2 Sadioga	13.9	13.4	10.0						
Month, Year	Aug., 2004	Sept., 2004							
2 Mbam	44.2	20.2							
Time Passed	15 Months	16 Months	17 Months	18 Months	19 Months	20 Months	21 Months		
Month, Year	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004		
1 Somone 1	20.9	20.9	20.9	20.9	20.9	20.9	20.9		
1 Somone 2	41.2	41.2	41.2	41.2	41.2	41.2	41.2		

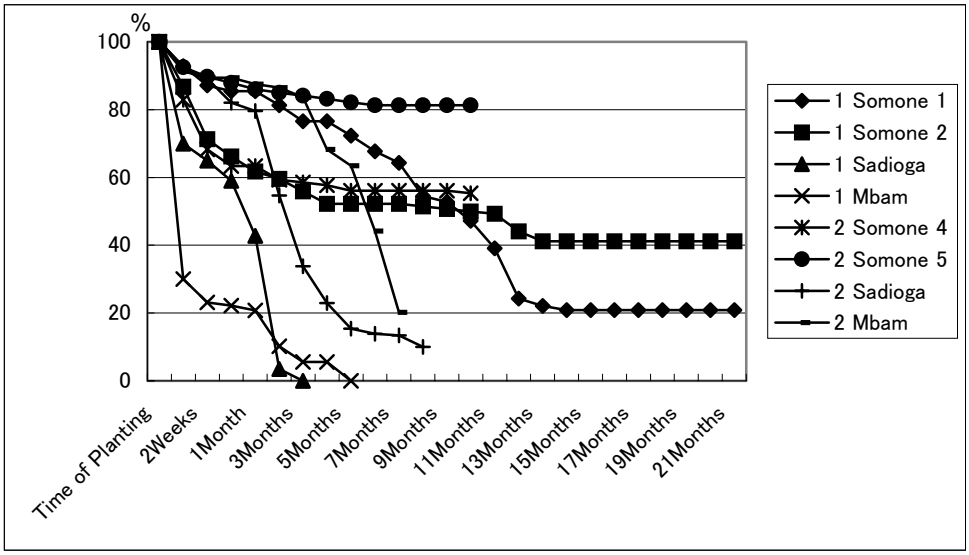


Fig. 2.3-5 Survival Rate of Three Month Old Seedlings After Transplanting

2) Height Growth After Transplanting

The height growth after transplanting is shown in Table 2.3-8 and Fig. 2.3-6. Comparison of the height of the three month old seedlings planted in the first year at the time of transplanting at Somone and at the end of the experiment (after 21 months) showed growth from 16 cm to 87 cm at Somone 1 and from 11 cm to 50 cm at Somone 2. As these values are average values, some exceeded 1 m, flowered and bore fruit. At Sadioga and Mbam, hardly any height growth of the transplanted seedlings, which were approximately 15 cm tall at the time of transplanting, was recorded and all of the seedlings had died by the end of the third month at Sadioga and the fifth month at Mbam. In the case of the three month old seedlings transplanted in the second year, the height growth up to the end of the experiment was from 28 cm to 73 cm at Somone 4 (after 10 months), from 20 cm to 45 cm at Somone 5 (after 10 months), from 32 cm to 40 cm at Sadioga (after eight months) and from 27 cm to 45 cm at Mbam (after seven months). However, the surviving seedlings at Sadioga and Mbam were vigourless.

Table 2.3-8 Height Growth of Three Month Old Seedlings After Transplanting

(cm)

Time Passed	Time of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months
Month, Year	Dec., 2002	-	-	-	Jan., 2003	Feb., 2003	Mar., 2003	Apr., 2003	May, 2003
1 Somone 1	16.1	15.7	15.3	14.9	14.6	16.9	17.9	17.7	18.0
1 Somone 2	11.1	12.9	14.7	16.4	18.2	17.8	17.4	17.0	17.4
1 Sadioga	15.0	14.7	14.4	14.1	15.0	15.0			
1 Mbam	14.8	14.9	15.0	14.5	14.0	14.0	15.0	15.5	
Month, Year	Nov., 2003	-	-	-	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004
2 Somone 4	28.1	29.7	31.3	32.9	34.5	35.8	37.2	36.1	40.4
2 Somone 5	19.6	20.0	20.5	20.9	21.3	23.4	25.6	27.8	27.4
Month, Year	Jan., 2004	-	-	-	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004
2 Sadioga	32.0	33.0	33.0	33.0	34.0	35.0	36.0	36.0	36.0
Month, Year	Feb., 2004	-	-	-	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004
2 Mbam	27.0	27.0	27.0	27.0	29.0	29.0	30.0	34.0	35.0
Time Passed	6 Months	7 Months	8 Months	9 Months	10 Months	11 Months	12 Months	13 Months	14 Months
Month, Year	Jun., 2003	Jul., 2003	Aug., 2003	Sept., 2003	Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004
1 Somone 1	18.9	20.0	23.0	28.0	38.5	49.6	66.5	71.1	75.8
1 Somone 2	19.8	22.3	23.4	30.0	37.1	35.3	35.1	39.0	42.8
Sadioga									
1 Mbam									
Month, Year	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004				
2 Somone 4	41.4	42.4	54.6	61.4	73.0				
2 Somone 5	27.5	28.2	31.0	34.9	45.4				
Month, Year	Jul., 2004	Aug., 2004	Sept., 2004						
2 Sadioga	37.0	37.0	40.0						
Month, Year	Aug., 2004	Sept., 2004							
2 Mbam	39.0	45.0							
Time Passed	15 Months	16 Months	17 Months	18 Months	19 Months	20 Months	21 Months		
Month, Year	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004		
1 Somone 1	75.0	77.2	76.4	78.1	78.9	83.5	87.3		
1 Somone 2	42.3	43.5	43.7	43.8	44.1	41.2	50.2		

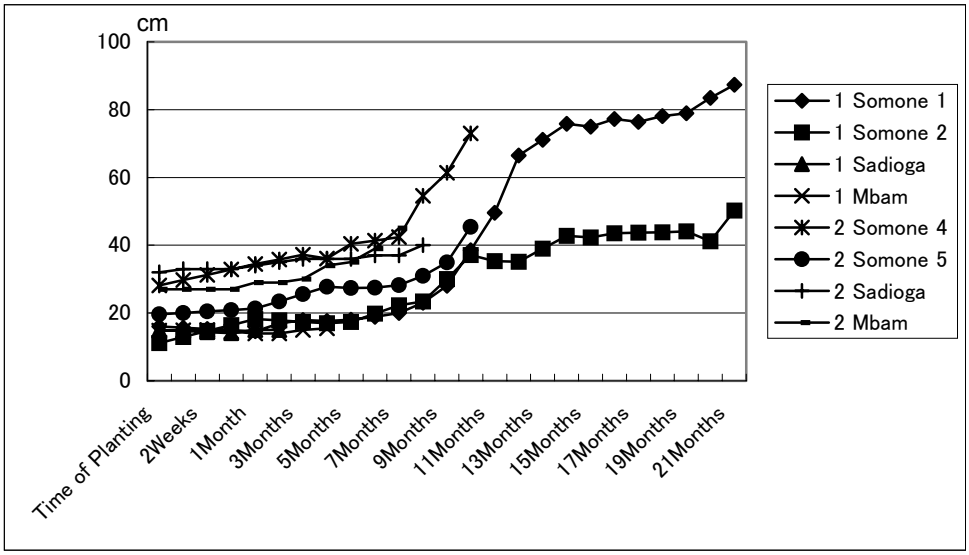


Fig. 2.3-6 Height Growth of Three Month Old Seedlings After Transplanting

3) Base Diameter Growth After Transplanting

In the first year, the average base diameter of the three month old seedlings transplanted at Somone 1 declined from 0.51 cm to 0.44 cm after one month due to the death of many seedlings of which the base diameter at the time of transplanting was larger than the average value. After 10 months, the (average) base diameter was 0.81 cm which subsequently increased to 1.48 cm at the end of the experiment (after 21 months). A similar trend was observed at Somone 2 where the (average) base diameter of 0.42 cm increased to 0.90 cm at the end of the experiment (after 21 months). At Sadioga and Mbam, all of the seedlings died with practically no growth of the base diameter from 0.4 cm – 0.5 cm at the time of transplanting.

In the case of the three month old seedlings transplanted in the second year, the average base diameter increased from 0.49 cm to 1.01 cm at Somone 4 (after 10 months), from 0.50 cm to 0.79 cm at Somone 5 (after 10 months), from 0.50 cm to 0.70 cm at Sadioga (after eight months) and from 0.40 cm to 0.60 cm at Mbam (after seven months).

(5) Five Month Old Seedlings

1) Survival Rate After Transplanting

The survival rate of the seedlings transplanted after nursing in pots for five months is shown in Table 2.3-9 and Fig. 2.3-7.

The survival rate of the seedlings planted in the first year at the end of the experiment (after 19 months) was 9.2% at Somone 1 and 36.4% at Somone 2. All of the seedlings had died by the end of the fourth month at Sadioga and by the end of the sixth month at Mbam.

The survival rate of the seedlings transplanted in the second year at the end of the experiment was 89.4% at Somone 4 (after eight months), 71.4% at Somone 5 (after eight months), 16.8% at Sadioga (after seven months) and 48.0% at Mbam (after six months).

Table 2.3-9 Survival Rate of Five Month Old Seedlings After Transplanting

(%)

Time Passed	Time of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months
Month, Year	Feb., 2003	-	-	-	Mar., 2003	Apr., 2003	May, 2003	Jun., 2003	Jul., 2003
1 Somone 1	100	63.4	58.0	54.6	52.3	40.8	40.8	40.5	39.7
1 Somone 2	100	96.9	88.3	60.5	58.0	48.8	48.8	47.5	46.3
1 Sadioga	100	78.2	14.8	1.7	0.8	0.8	0.8	0.0	
1 Mbam	100	50.9	39.8	38.0	30.6	17.6	13.0	6.5	3.7
Month, Year	Jan., 2004				Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004
2 Somone 4	100	98.9	96.8	93.6	92.6	91.5	91.5	91.5	91.5
2 Somone 5	100	90.9	81.8	81.8	77.9	75.3	75.3	75.3	72.7
Month, Year	Feb., 2004				Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004
2 Sadioga	100	95.4	88.3	77.0	67.9	62.2	50.0	33.7	31.6
Month, Year	Mar., 2004				Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004
2 Mbam	100	98.5	93.8	90.8	87.7	84.6	66.2	63.1	38.5

Time Passed	6 Months	7 Months	8 Months	9 Months	10 Months	11 Months	12 Months	13 Months	14 Months
Month, Year	Aug., 2003	Sept., 2003	Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004
1 Somone 1	35.1	32.4	19.5	19.5	11.8	10.7	10.7	9.5	9.5
1 Somone 2	42.6	42.6	41.4	41.4	36.4	36.4	36.4	36.4	36.4
1 Sadioga									
1 Mbam	0.0								
Month, Year	Jul., 2004	Aug., 2004	Sept., 2004						
2 Somone 4	91.5	90.4	89.4						
2 Somone 5	71.4	71.4	71.4						
Month, Year	Aug., 2004	Sept., 2004							
2 Sadioga	21.9	16.8							
Month, Year	Sept., 2004								
2 Mbam	48.0								

Time Passed	15 Months	16 Months	17 Months	18 Months	19 Months
Month, Year	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004
1 Somone 1	9.5	9.2	9.2	9.2	9.2
1 Somone 2	36.4	36.4	36.4	36.4	36.4

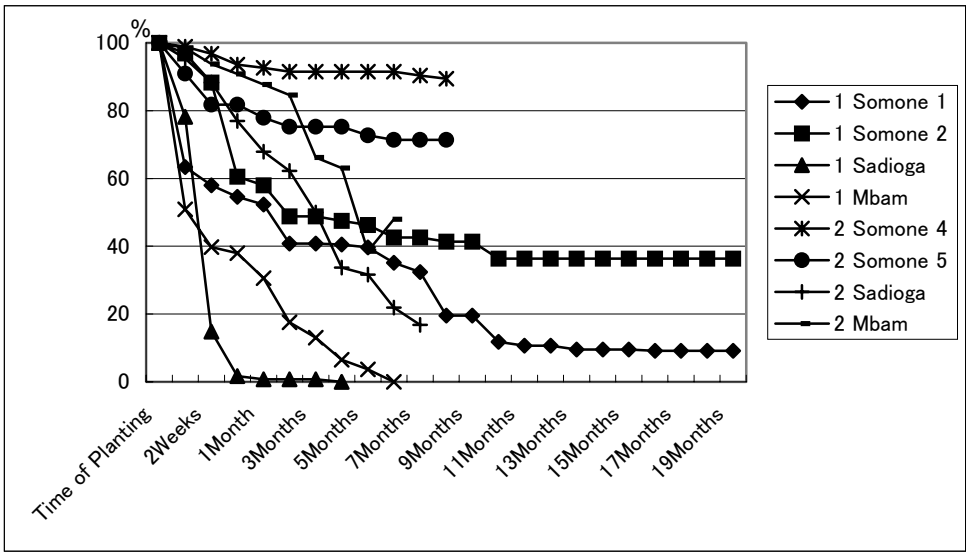


Fig. 2.3-7 Survival Rate of Five Month Old Seedlings After Transplanting

2) Height Growth After Transplanting

The height growth of the five month old seedlings after transplanting is shown in Table 2.3-10 and Fig. 2.3-8. Comparison of the height of the five month old seedlings planted in the first year at the time of transplanting at Somone and at the end of the experiment (after 19 months) showed growth from 22 cm to 45 cm at Somone 1 and from 22 cm to 77 cm at Somone 2. At Sadioga, the seedlings grew from some 14 cm at the time of transplanting to 27 cm in five months but died thereafter. Similarly at Mbam, the seedlings grew from some 15 cm at the time of transplanting to 18 cm in five months and died thereafter. In the case of the five month old seedlings transplanted in the second year, the height growth up to the end of the experiment was from 35 cm to 49 cm at Somone 4 (after eight months). At Somone 5, the average height remained practically the same or even decreased from the original 25.6 cm up to the seven month before increasing to 30.8 cm in the final month of the experiment. Such a decrease was caused by fish which ate the young leaves of the vigorous seedlings. At Sadioga, the height increased from 35 cm to 47 cm (after seven months) while height growth of from 22 cm to 48 cm (after six months) was observed at Mbam.

Table 2.3-10 Height Growth of Five Month Old Seedlings After Transplanting

(cm)

Time Passed	Time of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months
Month, Year	Feb., 2003	-			Mar., 2003	Apr., 2003	May, 2003	Jun., 2003	Jul., 2003
1 Somone 1	22.4	22.1	21.8	21.4	21.1	21.2	21.4	21.5	21.9
1 Somone 2	21.8	22.3	22.8	23.3	23.8	27.0	27.3	30.2	32.1
1 Sadioga	14.0	15.0	20.0	23.0	25.0	25.0	27.0		
1 Mbam	15.0	15.0	15.5	16.0	16.5	17.0	17.5	17.5	18.0
Month, Year	Jan., 2004	-			Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004
2 Somone 4	34.8	33.7	32.7	31.6	30.5	31.6	32.6	30.1	33.6
2 Somone 5	25.6	24.7	23.8	22.9	22.0	21.2	22.0	21.6	21.5
Month, Year	Feb., 2004	-			Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004
2 Sadioga	35.0	35.0	36.0	36.0	38.0	39.0	41.0	41.0	41.0
Month, Year	Mar., 2004				Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004
2 Mbam	22.0	22.0	22.5	23.0	23.0	25.0	31.0	33.0	39.0
Time Passed	6 Months	7 Months	8 Months	9 Months	10 Months	11 Months	12 Months	13 Months	14 Months
Month, Year	Aug., 2003	Sept., 2003	Oct., 2003	Nov., 2003	Dec., 2003	Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004
1 Somone 1	23.1	24.2	27.0	29.5	37.4	39.8	36.0	35.8	41.6
1 Somone 2	34.6	41.1	53.1	53.6	65.1	67.8	69.4	70.1	69.8
1 Sadioga									
1 Mbam									
Month, Year	Jul., 2004	Aug., 2004	Sept., 2004						
2 Somone 4	37.0	42.2	49.4						
2 Somone 5	22.7	25.0	30.8						
Month, Year	Aug., 2004	Sept., 2004							
2 Sadioga	43.0	47.0							
Month, Year	Sept., 2004								
2 Mbam	40.8								

Time Passed	15 Months	16 Months	17 Months	18 Months	19 Months
Month, Year	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004
1 Somone 1	41.4	39.9	43.3	45.3	47.8
1 Somone 2	70.1	70.3	73.3	76.0	77.3

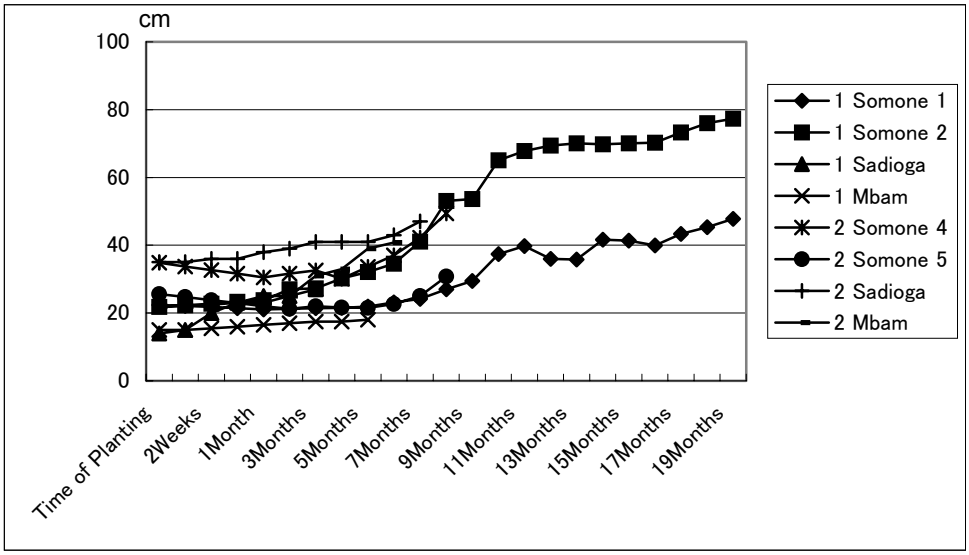


Fig. 2.3-8 Height Growth of Five Month Old Seedlings After Transplanting

3) Base Diameter Growth After Transplanting

In the first year, the average base diameter of the five month old seedlings transplanted at Somone 1 decline from 0.56 cm to 0.47 cm after one month due to the death of many seedlings of which the base diameter at the time of transplanting was larger than the average value. After 10 months, the (average) base diameter was 0.65 cm which subsequently increased to 0.99 cm at the end of the experiment (after 19 months). At Somone 2, the base diameter increased from 0.53 cm at the time of transplanting to 1.20 cm at the end of the experiment (after 19 months). At Sadioga, the average base diameter of the transplanted seedlings increased from 0.4 cm to 0.65 cm in four months but died thereafter. The average base diameter of the seedlings transplanted at Mbam only increased from 0.4 cm to 0.5 cm in five months before dying.

In the case of the five month old seedlings transplanted in the second year, the average base diameter increased from 0.38 cm to 0.72 cm at Somone 4 (after eight months), from 0.39 cm to 0.58 cm at Somone 5 (after eight months), from 0.60 cm to 0.75 cm at Sadioga (after eight months) and from 0.50 cm to 0.65 cm at Mbam (after seven months).

(6) Eight Month Old Seedlings

1) Survival Rate After Transplanting

The survival rate of the seedlings transplanted in the second year after nursing in pots for eight months is shown in Table 2.3-11 and Fig. 2.3-9.

The survival rate at the end of the experiment was 77.7% at Somone 4 (after five months), 20.0% at Sadioga (after two months) and 5.6% at Mbam (after three months). The rapid decline of the survival rate at Sadioga and Mbam suggests that the final survival of the seedlings transplanted at these sites will be difficult.

Table 2.3-11 Survival Rate of Eight Month Old Seedlings After Transplanting

(%)

Time Passed	Time of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months
Month, Year	-				May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004
2 Somone 4	100	100	96.8	94.7	91.5	91.5	88.3	84.0	77.7
Month, Year	-				Jul., 2004	Aug., 2004			
2 Sadioga	100	95.0	90.0	68.6	65.0	20.0			
Month, Year	-				Jul., 2004	Aug., 2004	Sept., 2004		
2 Mbam	100	100	94.4	86.1	77.8	41.7	5.6		

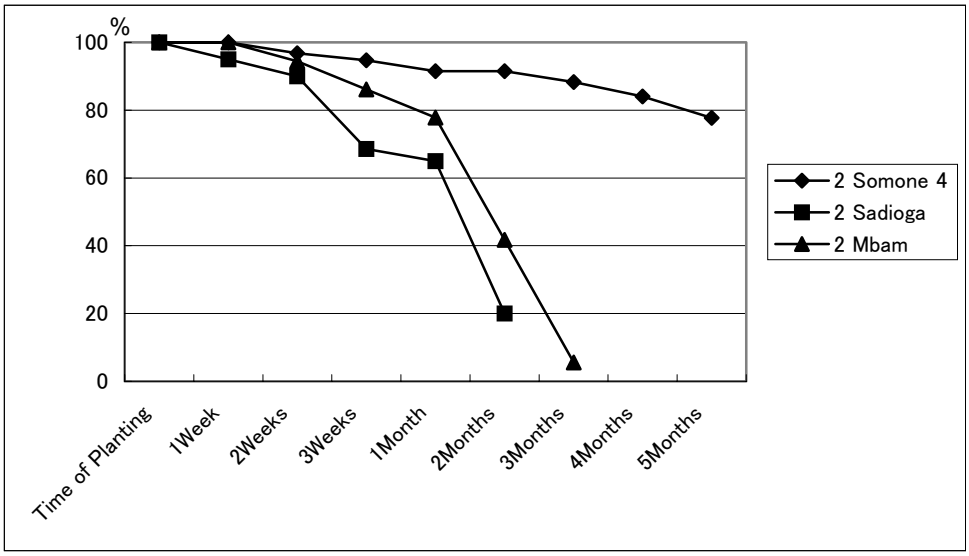


Fig. 2.3-9 Survival Rate of Eight Month Old Seedlings After Transplanting (%)

2) Height Growth After Transplanting

The height growth of the eight month old seedlings after transplanting is shown in Table 2.3-12 and Fig. 2.3-10.

At Somone 4, the average height of the seedlings increased from 31 cm at the time of transplanting to 45 cm after five months. At Sadioga, the average height of the seedlings increased from 35 cm at the time of transplanting to 37 cm after two months. At Mbam, the

average height of the seedlings increased from 14.5 cm at the time of transplanting to 29 cm after three months.

Table 2.3-12 Height Growth of Eight Month Old Seedlings After Transplanting

(cm)

Time Passed	Time of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months
Month, Year	-				May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004
2 Somone 4	31.0	31.0	31.0	31.0	31.0	34.1	34.4	40.2	45.3
Month, Year	-				Jul., 2004	Aug., 2004			
2 Sadioga	35.0	35.0	35.0	35.0	36.0	37.0			
Month, Year	-				Jul., 2004	Aug., 2004	Sept., 2004		
2 Mbam	14.5	14.5	15.5	16.0	16.0	18.0	29.0		

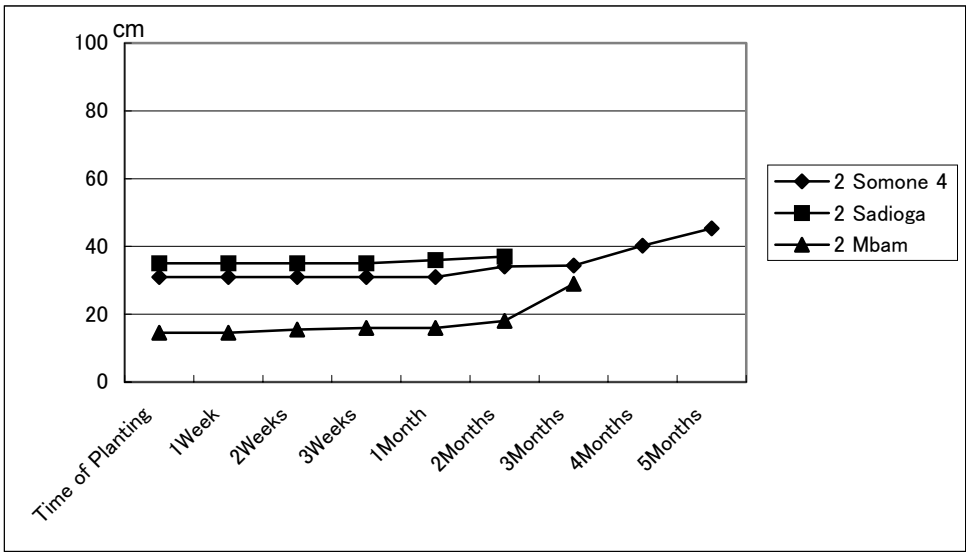


Fig. 2.3-10 Height Growth of Eight Month Old Seedlings After Transplanting (cm)

3) Base Diameter Growth After Transplanting

Comparison of the base diameter of the eight month old seedlings between the time of transplanting and the end of the experiment shows an increase from 0.56 cm to 0.75 cm at Somone 4 (after five months), from 0.60 cm to 0.65 cm at Sadioga (after two months) and from 0.50 cm to 0.60 cm at Mbam (after three months).

(7) Three Month Old Seedlings Nursed in the Ground

1) Survival Rate After Transplanting

The survival rate of the three month old seedlings nursed in the ground after transplanting is shown in Table 2.3-13 and Fig. 2.3-11. At Sadioga, nine seedlings (5.9%) survived at the end of the experiment (after eight months) while practically all of the seedlings had died by the end of the eighth month at Mbam.

Table 2.3-13 Survival Rate of Three Month Old Seedlings Nursed in the Ground After Transplanting

(%)

Time Passed	Timing of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months	6 Months	7 Months	8 Months
Month, Year	-				Jan, 2004	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004
2 Sadioga	100	96.7	92.8	88.5	81.6	54.6	29.6	23.7	14.5	8.6	7.2	5.9
2 Mbam	100	92.9	84.5	76.2	61.9	52.4	14.3	4.8	4.8	2.4	2.4	2.4

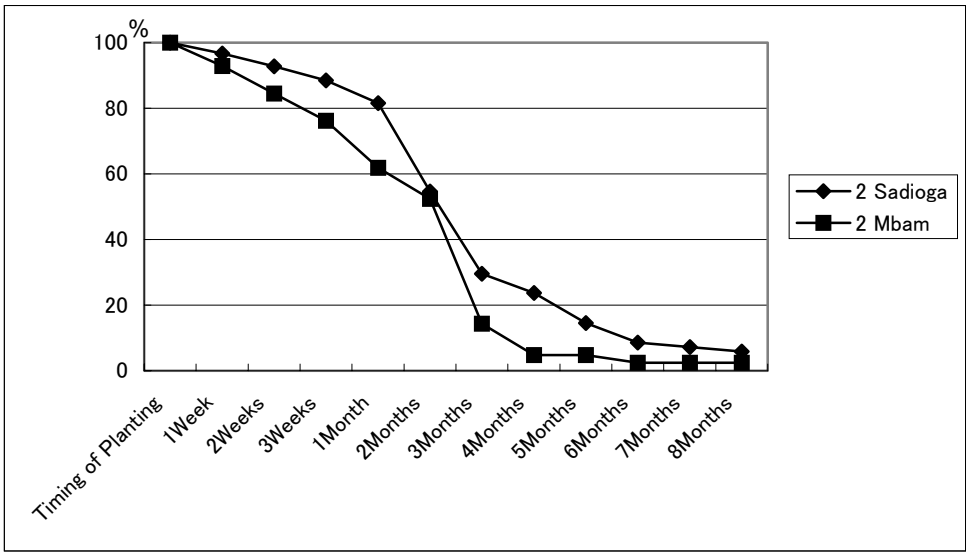


Fig. 2.3-11 Survival Rate of Three Month Old Seedlings Nursed in the Ground After Transplanting

2) Height Growth After Transplanting

The height growth after transplanting is shown in Table 2.3-14 and Fig. 2.3-12. At Sadioga, the average height of the seedlings increased from 32 cm at the time of transplanting to 45 cm at the end of the experiment (after eight months). In the same period, the average height of the seedlings at Mbam increased from 37 cm to 62 cm.

Table 2.3-14 Height Growth of Three Month Old Seedlings Nursed in the Ground After Transplanting

(cm)

Time Passed	Timing of Planting	1 Week	2 Weeks	3 Weeks	1 Month	2 Months	3 Months	4 Months	5 Months	6 Months	7 Months	8 Months
Month, Year	-				Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004	Sept., 2004
Sadioga	32.0	32.0	34.0	35.0	35.0	37.0	39.0	39.0	40.0	41.0	41.0	45.0
Month, Year	-				Jan., 2004	Feb., 2004	Mar., 2004	Apr., 2004	May, 2004	Jun., 2004	Jul., 2004	Aug., 2004
Mbam	37.0	37.0	37.0	39.0	39.0	42.0	47.0	49.0	49.0	51.0	51.0	62.0

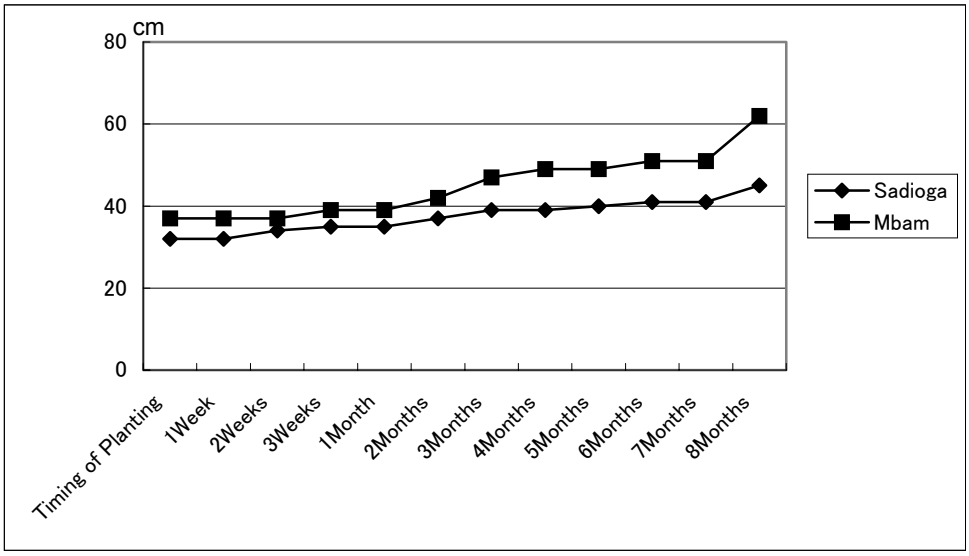


Fig. 2.3-12 Height Growth of Three Month Old Seedlings Nursed in the Ground After Transplanting

3) Base Diameter Growth After Transplanting

Comparison of the base diameter of the three month old seedlings nursed in the ground between the time of transplanting and the end of the experiment shows an increase from 0.60 cm to 0.65 cm at Sadioga (after eight months) and from 0.50 cm to 0.60 cm at Mbam (after seven months). However, all of the surviving seedlings subsequently died.

3. Biological Seasons

The biological seasons of *Avicennia* in the Study Area are outlined in Table 3-1.

Table 3-1 Biological Seasons of *Avicennia*

Item	Relevant Months, etc.
Flowering	February and March
Flowering period	2 – 3 months
Seed forming period	4 – 5 months
Maturing of seeds	June through November
Best months for seed collection	July through September

4. Salinity

The salinity changes depending on the season. It also varies from the time of low tide to the time of flood time within the same day. Furthermore, it changes in accordance with the water depth. Table 4-1 shows the average value at the experiment sites based on the observed values at the sites and the observed values in the water quality, current and bed materials survey.

Table 4-1 Salinity at the Experiment Sites (‰) (July, 2002 – September, 2004)

Experiment Site	Highest Salinity	Lowest Salinity
	April – June (End of Dry Season)	July – September (Rainy Season)
Somone	36 – 40	29 – 32
Sadioga	52 – 67	29 – 45
Mbam	54 – 66	27 - 46

The salinity at Somone is constantly similar to that of seawater because of its proximity to the sea and declines in the rainy season. At both Sadioga and Mbam, the salinity is lower than that of seawater in the rainy season but increases to nearly 7‰ at the end of the dry season, creating a severe environment for the growth of *Avicennia*.

5. Analysis

The experiment conducted over two years found several factors affecting the nursing and planting of *Avicennia* as listed below.

(1) Nursing

1) Seed size

2) Location of the nursery and the availability of shading

3) Pot size

4) Nursing duration

5) Eating damage by fish

6) Salinity at the nursery

(2) Planting

1) Planting method (direct seeding; seeding in silt balls; potted seedlings)

2) Elevation of the planting site

3) Timing of transplanting

4) Changes of the environmental conditions after transplanting

① Stability of the seedlings at the time of transplanting from pots to the planting site
② Warming of salt water due to standing water at the planting site
③ Speed of the water current at the planting site

5) Planting density

6) Salinity at the planting site

These factors affecting the nursing and planting of *Avicennia* are explained in more detail below.

(3) Nursing

1) Seed Size

The seed trees at Somone are as tall as 4 – 5 m, producing seeds with a diameter of 3 – 4 cm. In contrast, the seed trees at Sadioga and Mbam are 1 – 2 m tall and the seeds are much smaller with a diameter of 1 – 2 cm. The large seeds from Somone showed a germination rate of nearly 100% while the smaller seeds from Sadioga and Mbam showed a germination rate of approximately 90%. Even though the difference is not particularly large, it is still necessary to collect as large seeds as possible because of their better germination performance.

2) Location of Nursery and Shading

The poor yield percentage of the seedlings in the first year can be attributed to not only eating damage by fish but also to the relatively high elevation of the nurseries. A higher elevation means a shorter duration of immersion in seawater. In the second year, the nurseries were located in places immersed in seawater at full neap tide in the dry season. To be more precise, these places are covered by seawater of 40 cm – 50 cm deep at full tide in

the dry season. As seedlings are vulnerable to a high water temperature caused by solar radiation, their longer immersion in seawater acts to avoid such an adverse effect. Given the naturally strong solar radiation in the area, the introduction of shading in the second year not only improved the yield percentage of the seedlings but also resulting in better growth of the seedlings.

3) Pot Size

In the first year, the performance of 10 cm diameter pots was compared to that of 7 cm diameter pots. As no particular difference was observed between these two pot sizes in terms of the yield percentage of the seedlings, the use of 7 cm diameter pots is advantageous in terms of workability. However, the root system spreads throughout the pot in approximately 1.5 months. When seedlings are kept in pots for a year for transplanting in the rainy season, the use of 20 cm diameter pots may be considered. However, the workability of such large pots is quite poor.

4) Nursing Duration and Nursing Method

In the experiment, the nursing duration varied from 1.5 months to eight months at the nurseries with seawater. In addition, seedlings nursed in the ground for two months were experimented. The 1.5 month old seedlings were found to be the most vigorous and most adaptable to the environment. The longer the nursing duration of the seedlings was, the higher their mortality after transplanting because of their failure to adapt to a different environment. In the case of the seedlings nursed in the ground, as they were watered with fresh water, they were placed in a seawater nursery at two months old to acclimatise them to the real environment. However, they failed to fully adapt to their new environment, suggesting that nursing in the ground is difficult in areas with a high salinity.

5) Eating Damage by Fish

In the first year, eating damage by fish at the nurseries was not initially anticipated and, therefore, fine netting to prevent the entry of fish to the nurseries was not used to encircle the nurseries. It was subsequently confirmed that a kind of tilapia ate the young leaves as many of the planted seedlings died because of this. The introduction of finer netting to prevent the entry of fish had the dramatic effect of a rapid decline of the death rate.

In the second year, such fine netting was used from the beginning with a good effect. Although crabs also eat the young leaves, the damage is insignificant compared to the damage caused by fish.

6) Salinity at Nursery

The salinity is closely related to the germination rate and the survival rate. It is said that no germination takes place when the salinity exceeds 55‰. The salinity at the time of seeding (around September) at Sadioga and Mbam is 29 – 45‰, implying little impact on the germination rate. With a salinity of 40 – 45‰, the germination rate is said to be some 70 – 95‰. The results of the experiment are generally comparable to these values.

(4) Planting

1) Planting Method (Direct Seeding, Silt Balls and Potted Seedlings)

In the first year, all of the directly sown seeds and seeds in silt balls died within three months at every site. In particular, many of the seeds were washed away within one week of transplanting. At every site, the seeds sown in silt balls were lost faster than the seeds directly sown in the bed soil. This is probably because of the fact that silt balls soften faster than the bed soil when exposed to seawater. At Sadioga, the existence of a water channel near the experiment site is believed to have speeded up the loss of the seeds.

In the second year, a survival rate of 21.3% was recorded for the directly sown seeds at Somone 5 at the end of the experiment. In the case of the seeds sown in silt balls, the survival rate was 12.7%. As these survival rates were stable from the third month after seeding, the remaining seedlings are expected to grow. These favourable results can be attributed to the absence of any eating damage by fish and the clayey ground. In short, direct seeding can only succeed in places with favourable conditions.

Among the potted seedlings, the 1.5 month old seedlings recorded the best performance. The survival rate at the end of the experiment was as high as 90% at Somone 5 which is characterised by no damage caused by fish and clayey ground.

2) Elevation of Planting Site

Within the same experiment site, the death rate is higher in places with a shorter immersion in seawater. As in the case of the nurseries, the seedlings must be planted in places which are deeper than those which are immersed in seawater at the time of full neap tide in the dry season.

3) Timing of Transplanting

The actual timing of transplanting varied depending on the age of the planting stock. It is now clear that planting towards the end of the dry season when the salinity is high results in a lower survival rate. The adaptability of the seedlings is bests achieved when planting is

conducted in early September in the rainy season. This timing suggests that the use of 1.5 month old seedlings is the most appropriate.

4) Changes of Environmental Conditions After Transplanting

① Stability of the seedlings at the time of transplanting from pots to the planting sites

In pots, the roots are fairly stable in sandy soil. Once transplanted, however, the roots may be loosened, losing stability. It is necessary to carefully transplant potted seedlings so that the sand around the roots does not crumble.

② Standing water at the planting sites

At the time of nursing in pots, the pots were fully drained during low tide because of their depth of some 20 cm. At some of the planting sites, however, there was standing water, the temperature rise of which caused the seedlings to die. Places without standing water should, therefore, be selected as planting sites.

③ Speed of the water current

At those planting sites where the water current caused by the topography was much faster than the speed of the stable water current caused by tides at the nursery, the survival rate was poor, suggesting that places with a fast water current should be avoided.

5) Planting Density

Because of the experimental nature of the planting, both direct seeding and the planting of potted seedlings were conducted at a 2 m x 2 m interval. In an area like the Saloum Delta where the salinity is high and the solar radiation is strong, a higher planting density appears to achieve a better survival rate for the subsequent propagation of the surviving seedlings through natural regeneration. It is believed that the survival rate can be improved by dense planting which prevents a temperature rise of the seawater through early crown closure.

6) Salinity at Planting Sites

When the salinity exceeds 80‰, the seedlings are said to die within approximately two months. Meanwhile, when the salinity is less than 60‰, seedlings which are exposed to seawater with a high salinity can recover when the salinity declines.

The relationship between the salinity and the observed growth of the potted *Avicennia* seedlings indicates that the growth rate is the highest when the salinity is around 20‰.

Growth is maintained up to a salinity of around 40‰ but slows down when the salinity reaches around 50‰. At both Sadioga and Mbam, the salinity at the end of the dry season exceeds 60‰, suppressing the growth of seedlings.

6. Planting Method of *Avicennia*

Based on the experiment as well as the analysis results, the following method should be employed for the planting of *Avicennia* in the Saloum Delta.

6.1 Direct Sowing

(1) Suitable Sites for Seeding

Sites for planting should have clayey ground and a weak water current.

(2) Seeding Method

1) Seeds

① Timing of collection

The best time for direct seeding is mid-August and the seeds should be sown immediately after pre-treatment.

② Collection

As large seeds as possible should be collected.

③ Pre-treatment

Seeds in a bag should be immersed in water in a shaded area of a mangrove forest for 4 – 5 days. The seed coat should then be removed for the roots to grow.

2) Protection of Planting Sites

As the only way to protect the seedlings (young leaves) from being eaten by fish is to place nets around them, the planting site should be encircled by fine fishing netting (some 1 cm mesh size) to prevent the entry of fish. As ultra dense sowing is employed (100 seeds/m^2) as described next, the required quantity of fishing netting is only 10 m^2 for the sowing of 10,000 seeds.

3) Seeding

The seeds should be inserted into the bed soil with the roots facing downwards at a dense interval of some 10 cm x 10 cm. The closed part of the cotyledons should face the incoming direction of the rising tide which is faster than the ebb tide.

6.2 Nursing and Planting of Potted Seedlings

(1) Suitable Planting Sites

The planting site should be surrounded by naturally growing *Avicennia* trees. Although clayey ground is preferable as in the case of direct seeding, sandy ground is acceptable provided that no inflow of sand for sedimentation occurs at the site.

(2) Seeds

1) Timing of Collection

As the best time for planting is early September, the suitable timing of seed collection is mid-July.

2) Collection and Pre-Treatment

The requirements are the same as those for direct seeding.

(3) Nursing

1) Location of Nursery

A nursery should be set up in a place which is flooded at full neap tide in the dry season (meaning flooding twice a day) and should be covered with shading.

2) Nursing Method

Pots should be used.

3) Pot Size

The pots to be used should have a diameter of 7 cm.

4) Filling of Pots with Soil

The pots should be filled with soil in mid-June, one month before seeding, so that the soil has become firm by the time of seeding.

5) Seeding in Pots

The seeds should be placed in the pots with the roots being inserted into the soil.

6) Placing of Pots

Wooden frames with a width of 1 m should be created at the nursery to hold the pots.

7) Transplanting from Pots

The seedlings should be transplanted after nursing in the pots for 1.5 months.

(4) Protection of Planting Sites

As in the case of direct seeding, the planting site should be protected by fine fishing netting to prevent damage caused by fish.

(5) Planting

1) Timing of Planting

Planting should be conducted in early September as described earlier.

2) Planting Method

The seedlings should be carefully planted to avoid the collapse of the potting soil around the roots.

3) Planting Distance

The planting distance should be 50 cm x 50 cm. Dense planting may be acceptable depending on the conditions of the planting site.

(6) Work Schedule

The work schedule is shown in Table 6-1.

Table 6-1 Work Schedule

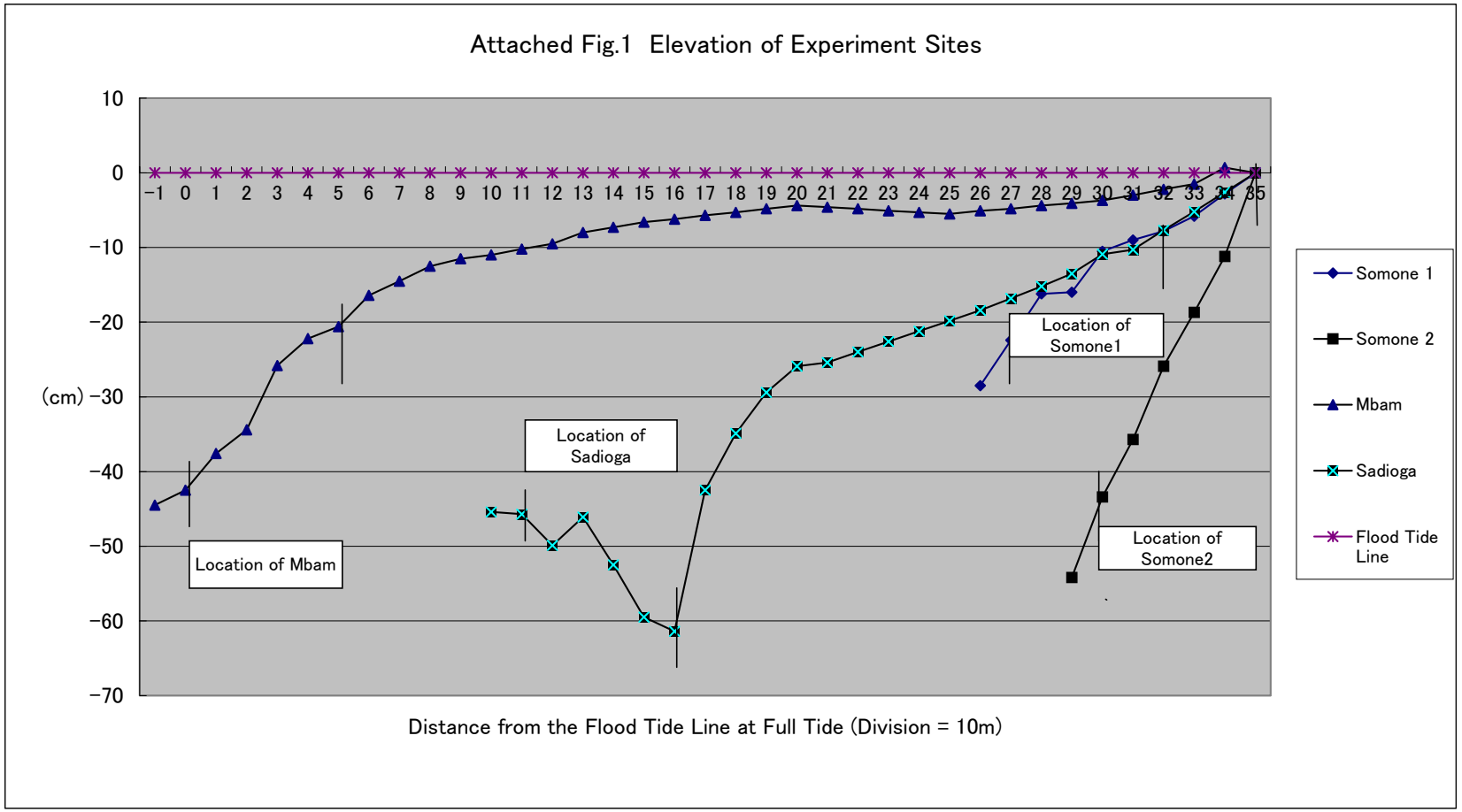
Planting Method	Work Item	1	2	3	4	5	6	7	8	9	10	11	12
Direct Seeding	Collection of seeds								—				
	Seeding								—				
	Management	—	—	—	—	—	—	—	—	—	—	—	—
Potted Seedlings	Creation of nursery					—	—						
	Collection of seeds							—					
	Filling of pots with soil						—						
	Seeding into pots							—					
	Nursing							—	—	—			
	Netting around planting site						—	—					
	Indication of planting site								—	—			
	Planting								—	—			
	Management	—	—	—	—	—	—	—	—	—	—	—	—

ATTACHED TABLE

AVICENNIA NURSING AND PLANTING EXPERIMENT

ELEVATION DATA SHEET FOR EXPERIMENT SITES

AVICENNIA NURSING AND PLANTING EXPERIMENT ELEVATION DATA SHEET FOR EXPERIMENT SITES



Monitoring Somone1 planted 1st year

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing	Sowing day	2002/9/1	350					
	after 1 week	2002/9/8		43.1	151	43.1	-	-
	after 2 weeks	2002/9/15			110	31.4	-	-
	after 3 weeks	2002/9/22			94	26.9	-	-
	after 1 month	2002/10/1			39	11.1	3.75	0.41
	after 2 months	2002/11/1			0	0		
	after 3 months							

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing of seeds with earth balls	Sowing day	2002/9/1	350					
	after 1 week	2002/9/8		13.1	46	13.1	-	-
	after 2 weeks	2002/9/15			22	6.3	-	-
	after 3 weeks	2002/9/22			20	5.7	-	-
	after 1 month	2002/10/1			9	2.6	5.83	0.43
	after 2 months	2002/11/1			0	0		
	after 3 months							

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (Nursery)	Sowing day	2002/9/1	325					
	after 1 week	2002/9/8		98.5	320	98.5	-	-
	after 2 weeks	2002/9/15			319	98.2	-	-
	after 3 weeks	2002/9/22			312	96.0	-	-
	after 1 month	2002/10/1			268	82.5	6.77	0.43
	after 2 months	2002/11/1			238	73.2	13.00	0.48
	after 3 months	2002/12/1			235	72.3	16.12	0.51

	Date		Number of transplanting seedlings	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (After trans-planting)	Transplanting day	2002/12/1	235		235			
	after 1 week	2002/12/8			218	92.8	-	-
	after 2 weeks	2002/12/15			205	87.2	-	-
	after 3 weeks	2002/12/22			201	85.5	-	-
	after 1 month	2003/1/1			201	85.5	14.55	0.44
	after 2 months	2003/2/1			191	81.3	16.90	0.44
	after 3 months	2003/3/1			180	76.6	17.87	0.44
	after 4 months	2003/4/1			180	76.6	17.70	0.45
	after 5 months	2003/5/1			170	72.3	18.00	0.45
	after 6 months	2003/6/1			159	67.7	18.86	0.54
	after 7 months	2003/7/1			151	64.3	19.96	0.56
	after 8 months	2003/8/1			128	54.5	23.04	0.65
	after 9 months	2003/9/1			124	52.8	27.96	0.75
	after 10 months	2003/10/1			111	47.2	38.50	0.81
	after 11 months	2003/11/1			92	39.1	49.56	0.96
	after 12 months	2003/12/1			57	24.3	66.50	1.02
	after 13 months	2004/1/1			52	22.1	71.10	1.10
	after 14 months	2004/2/1			49	20.9	75.83	1.15
	after 15 months	2004/3/1			49	20.9	75.00	1.25
	after 16 months	2004/4/1			49	20.9	77.16	1.29
	after 17 months	2004/5/1			49	20.9	76.41	1.27
	after 18 months	2004/6/1			49	20.9	78.08	1.26
	after 19 months	2004/7/1			49	20.9	78.91	1.42
	after 20 months	2004/8/1			49	20.9	83.50	1.45
	after 21 months	2004/9/1			49	20.9	87.25	1.48

	Date		Number of sowing seeds	Germinationratio (%)	Number of seedlings survived	Survival ratio(%)	Average height of seedlings(cm)	Average base diameter of seedlings(cm)
5 months old potted seedlings (Nursery)	Sowing day	2002/9/1	325					
	after 1 week	2002/9/8		98.8	321	98.8	-	-
	after 2 weeks	2002/9/15			318	97.8	-	-
	after 3 weeks	2002/9/22			314	96.6	-	-
	after 1 month	2002/10/1			305	93.8	7.26	0.45
	after 2 months	2002/11/1			277	85.2	13.96	0.49
	after 3 months	2002/12/1			268	82.5	18.34	0.51
	after 4 months	2003/1/1			264	81.2	20.85	0.53
	after 5 months	2003/2/1			262	80.6	22.40	0.56

	Date		Number of transplanting seedlings	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (After trans-planting)	Transplanting day	2003/2/1	262					
	after 1 week	2003/2/8			166	63.4	-	-
	after 2 weeks	2003/2/15			152	58.0	-	-
	after 3 weeks	2003/2/22			143	54.6	-	-
	after 1 month	2003/3/1			137	52.3	21.12	0.56
	after 2 months	2003/4/1			107	40.8	21.20	0.47
	after 3 months	2003/5/1			107	40.8	21.41	0.47
	after 4 months	2003/6/1			106	40.5	21.48	0.52
	after 5 months	2003/7/1			104	39.7	21.90	0.52
	after 6 months	2003/8/1			92	35.1	23.09	0.58
	after 7 months	2003/9/1			85	32.4	24.18	0.61
	after 8 months	2003/10/1			51	19.5	27.00	0.61
	after 9 months	2003/11/1			51	19.5	29.50	0.63
	after 10 months	2003/12/1			31	11.8	37.37	0.65
	after 11 months	2004/1/1			28	10.7	39.75	0.71
	after 12 months	2004/2/1			28	10.7	36.00	0.90
	after 13 months	2004/3/1			25	9.5	35.75	0.90
	after 14 months	2004/4/1			25	9.5	41.62	0.82
	after 15 months	2004/5/1			25	9.5	41.37	0.81
	after 16 months	2004/6/1			24	9.2	39.87	0.85
	after 17 months	2004/7/1			24	9.2	43.25	0.87
	after 18 months	2004/8/1			24	9.2	45.25	0.96
	after 19 months	2004/9/1			24	9.2	47.75	0.99

Monitoring Somone 2 planted 1st year

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing	Sowing day	2002/9/1	350					
	after 1 week	2002/9/8		20.00	70	20.0	-	-
	after 2 weeks	2002/9/15		23.42	48	13.7	-	-
	after 3 weeks	2002/9/22			35	10.0	-	-
	after 1 month	2002/10/1			17	4.9	5.85	0.32
	after 2 months	2002/11/1			4	1.1	7.40	0.45
	after 3 months	2002/12/1			0	0		

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing of seeds with earth balls	Sowing day	2002/9/1	350					
	after 1 week	2002/9/8		2.8	8	2.3	-	-
	after 2 weeks	2002/9/15			1	0.3	-	-
	after 3 weeks	2002/9/22			1	0.3	-	-
	after 1 month	2002/10/1			0	0		
	after 2 months	2002/11/1						
	after 3 months							

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (Nursery)	Sowing day	2002/9/1	325					
	after 1 week	2002/9/8		92.9	325	100.0	-	-
	after 2 weeks	2002/9/15			276	84.9	-	-
	after 1 month	2002/10/1			179	55.1	5.52	0.37
	after 2 months	2002/11/1			145	44.6	9.42	0.41
	after 3 months	2002/12/1			136	41.8	11.05	0.46

	Date		Number of transplanting seedlings	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (After trans-planting)	Transplanting day	2002/12/1	136					
	after 1 week	2002/12/8			118	86.8	-	-
	after 2 weeks	2002/12/15			97	71.3	-	-
	after 3 weeks	2002/12/22			90	66.2	-	-
	after 1 month	2003/1/1			84	61.8	18.23	0.42
	after 2 months	2003/2/1			81	59.6	18.24	0.48
	after 3 months	2003/3/1			76	55.9	18.25	0.48
	after 4 months	2003/4/1			71	52.2	17.00	0.41
	after 5 months	2003/5/1			71	52.2	17.40	0.43
	after 6 months	2003/6/1			71	52.2	19.80	0.49
	after 7 months	2003/7/1			71	52.2	22.30	0.53
	after 8 months	2003/8/1			70	51.5	23.40	0.64
	after 9 months	2003/9/1			69	50.7	30.00	0.70
	after 10 months	2003/10/1			68	50.0	37.08	0.75
	after 11 months	2003/11/1			67	49.3	35.30	0.68
	after 12 months	2003/12/1			60	44.1	35.12	0.56
	after 13 months	2004/1/1			56	41.2	40.66	0.70
	after 14 months	2004/2/1			56	41.2	42.83	0.66
	after 15 months	2004/3/1			56	41.2	42.33	0.75
	after 16 months	2004/4/1			56	41.2	43.50	0.66
	after 17 months	2004/5/1			56	41.2	43.66	0.46
	after 18 months	2004/6/1			56	41.2	43.83	0.43
	after 19 months	2004/7/1			56	41.2	44.16	0.78
	after 20 months	2004/8/1			56	41.2	47.00	0.88
	after 21 months	2004/9/1			56	41.2	50.16	0.90

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings(cm)	Average base diameter of seedlings(cm)
5 months old potted seedlings (Nursery)	Sowing day	2002/9/1	325					
	after 1 week	2002/9/8		99.1	322	99.1	-	-
	after 2 weeks	2002/9/15			307	94.5	-	-
	after 3 weeks	2002/9/22			279	85.8	-	-
	after 1 month	2002/10/1			239	73.5	6.85	0.39
	after 2 months	2002/11/1			206	63.4	14.90	0.46
	after 3 months	2002/12/1			173	53.2	17.09	0.46
	after 4 months	2003/1/1			164	50.5	20.62	0.51
	after 5 months	2003/2/1			162	49.8	21.80	0.53

	Date		Number of transplanting seedlings	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (After trans-planting)	Transplanting day	2003/2/1	162					
	after 1 week	2003/2/8			157	96.9	-	-
	after 2 weeks	2003/2/15			143	88.3	-	-
	after 3 weeks	2003/2/22			98	60.5	-	-
	after 1 month	2003/3/1			94	58.0	23.75	0.53
	after 2 months	2003/4/1			79	48.8	27.04	0.49
	after 3 months	2003/5/1			79	48.8	27.27	0.49
	after 4 months	2003/6/1			77	47.5	30.22	0.60
	after 5 months	2003/7/1			75	46.3	32.09	0.62
	after 6 months	2003/8/1			69	42.6	34.55	0.66
	after 7 months	2003/9/1			69	42.6	41.09	0.66
	after 8 months	2003/10/1			67	41.4	53.10	0.92
	after 9 months	2003/11/1			67	41.4	56.60	0.86
	after 10 months	2003/12/1			59	36.4	65.07	0.85
	after 11 months	2004/1/1			59	36.4	67.81	0.88
	after 12 months	2004/2/1			59	36.4	69.43	0.94
	after 13 months	2004/3/1			59	36.4	70.06	1.03
	after 14 months	2004/4/1			59	36.4	69.81	1.01
	after 15 months	2004/5/1			59	36.4	70.06	1.06
	after 16 months	2004/6/1			59	36.4	70.25	1.03
	after 17 months	2004/7/1			59	36.4	73.25	1.03
	after 18 months	2004/8/1			59	36.4	76.00	1.01
	after 19 months	2004/9/1			59	36.4	77.31	1.20

Monitoring Sadioga planted 1st year

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing	Sowing day	2002/9/12	546					
	after 1 week	2002/9/19		22.9	125	22.9	-	-
	after 2 weeks	2002/9/26			99	18.1	-	-
	after 3 weeks	2002/10/7			50	9.2	-	-
	after 1 month	2002/10/11			0	0		
	after 2 months							
	after 3 months							

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing of seeds with earth balls	Sowing day	2002/9/12	504					
	after 1 week	2002/9/19		19.6	99	19.6	-	-
	after 2 weeks	2002/9/26			20	4.0	-	-
	after 3 weeks	2002/10/7			0	0	-	-
	after 1 month							
	after 2 months							
	after 3 months							

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (Nursery)	Sowing day	2002/9/12	519					
	after 1 week	2002/9/19		90.0	490	94.4	-	-
	after 2 weeks	2002/9/26			490	94.4	-	-
	after 3 weeks	2002/10/7			475	91.5	-	-
	after 1 month	2002/10/14			450	86.7	-	-
	after 2 months	2002/11/20			420	80.9	-	-
	after 3 months	2002/12/31			400	77.1	15.00	0.40

	Date		Number of transplanting seedlings	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (After trans-planting)	Transplanting day	2002/12/31	400					
	after 1 week	2003/1/7			-	-	-	-
	after 2 weeks	2003/1/14			-	-	-	-
	after 3 weeks	2003/1/18			236	59.0	14.10	0.40
	after 1 month	2003/2/6			171	42.8	15.00	0.48
	after 2 months	2003/3/9			14	3.5	15.00	0.48
	after 3 months	2003/4/1			0	0.0		

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings(cm)	Average base diameter of seedlings(cm)
5 months old potted seedlings (Nursery)	Sowing day	2002/9/12	508					
	after 1 week	2002/9/19		90.0	346	68.1	-	-
	after 2 weeks	2002/9/26			300	59.1	-	-
	after 3 weeks	2002/10/7			300	59.1	-	-
	after 1 month	2002/10/14			300	59.1	13.10	0.30
	after 2 months	2002/11/20			300	59.1	13.70	0.30
	after 3 months	2002/12/31			280	55.1	13.90	0.40
	after 4 months	2003/1/18			280	55.1	14.00	0.40
	after 5 months	2003/2/9			280	55.1	14.00	0.50

	Date		Number of transplanting seedlings	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (After trans-planting)	Transplanting day	2003/2/9	* 358		358		14.0	0.50
	after 1 week	2003/2/16			280	78.2	15.0	0.50
	after 2 weeks	2003/2/24			53	14.8	20.0	0.50
	after 3 weeks	2003/3/2			6	1.7	23.0	0.60
	after 1 month	2003/3/10			3	0.8	25.0	0.60
	after 2 months	2003/4/13			3	0.8	25.0	0.65
	after 3 months	2003/5/10			3	0.8	27.0	0.65
	after 4 months	2003/6/1			0	0.0		

* As for 5 months old potted seedlings, number of transplanting seeds are more than number of nursed seedling because more seeds that were nursed other nurse bed were added.

Monitoring Mbam planted 1st year

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing	Sowing day	2002/9/26	325					
	after 1 week	2002/10/2		60.0	195	60.0	-	-
	after 2 weeks	2002/10/8			92	28.3	-	-
	after 3 weeks	2002/10/20			0	0	-	-
	after 1 month							
	after 2 months							
	after 3 months							

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing of seeds with earth balls	Sowing day	2002/9/26	325					
	after 1 week	2002/10/2		49.8	162	49.8	-	-
	after 2 weeks	2002/10/8			50	15.4	-	-
	after 3 weeks	2002/10/20			-	0	-	-
	after 1 month							
	after 2 months							
	after 3 months							

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (Nursery)	Sowing day	2002/9/26	800					
	after 1 week	2002/10/2		70.0	358	44.8	-	-
	after 2 weeks	2002/10/8			350	43.8	-	-
	after 3 weeks	2002/10/20			300	37.5	-	-
	after 1 month	2002/10/27			275	34.4	-	-
	after 2 months	2002/11/10			250	31.3	-	-
	after 3 months	2002/12/27			216	27.0	14.8	0.4

	Date		Number of transplanting seedlings	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (After trans-planting)	Transplanting day	2002/12/27	216				14.80	0.50
	after 1 week	2003/1/3						
	after 2 weeks	2003/1/13			50	23.1	15.00	0.50
	after 3 weeks	2003/1/17			48	22.2	15.00	0.50
	after 1 month	2003/2/2			45	20.8	14.00	0.40
	after 2 months	2003/3/11			22	10.2	15.00	0.50
	after 3 months	2003/4/6			12	5.6	15.50	0.50
	after 4 months	2003/5/1			8	5.6	15.50	0.50
	after 5 months	2003/6/1			0			

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings(cm)	Average base diameter of seedlings(cm)
5 months old potted seedlings (Nursery)	Sowing day	2002/9/26	777					
	after 1 week	2002/10/2		75.0	378	48.6	-	-
	after 2 weeks	2002/10/8			350	45.0	-	-
	after 3 weeks	2002/10/20			320	41.2	-	-
	after 1 month	2002/10/27			300	38.6	-	-
	after 2 months	2002/11/10			300	38.6	14.1	0.4
	after 3 months	2002/12/14			250	32.2	14.2	0.4
	after 4 months	2003/1/13			170	21.9	14.0	0.4
	after 5 months	2003/2/3			120	15.4	14.0	0.4

	Date		Number of transplanting seedlings	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (After trans-planting)	Transplanting day	2003/3/11	108		108			
	after 1 week	2003/3/18			55	50.9	15.00	0.50
	after 2 weeks	2003/3/26			43	39.8	15.50	0.50
	after 3 weeks	2003/4/6			41	38.0	16.00	0.50
	after 1 month	2003/4/14			33	30.6	16.50	0.60
	after 2 months	2003/5/8			19	17.6	17.00	0.60
	after 3 months	2003/6/1			14	13.0	17.50	0.60
	after 4 months	2003/7/1			7	6.5	17.50	0.60
	after 5 months	2003/8/1			4	3.7	18.00	0.60

Monitoring Somone 4 planted 2nd year

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing	Sowing day	2003/8/1	150					
	after 1 week	2003/8/8		100.0	133	88.7	-	-
	after 2 weeks	2003/8/15			100	66.7	-	-
	after 3 weeks	2003/8/22			86	57.3	-	-
	after 1 month	2003/9/1			68	45.3	6.05	0.35
	after 2 months	2003/10/1			29	19.3	6.56	0.43
	after 3 months	2003/11/1			Néant	Néant	Néant	Néant
	after 4 months	2003/12/1			Néant	Néant	Néant	Néant
	after 5 months	2004/1/1			Néant	Néant	Néant	Néant

1,5 month old potted seedlings (Nursery)	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	Sowing day	2003/8/1	150					
	after 1 week	2003/8/8		100.0	150	100.0	-	-
	after 2 weeks	2003/8/15			149	99.3	-	-
	after 3 weeks	2003/8/22			145	96.7	-	-
	after 1 month	2003/9/1			140	93.3	11.91	0.32
	after 1,5 month	2003/9/15			127	84.7	17.55	0.45

1,5 month old potted seedlings after trans-planting	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	Transplanting day	2003/9/15	127					
	after 1 week	2003/9/22		100	123	96.9	-	-
	after 2 weeks	2003/9/29			122	96.1	-	-
	after 3 weeks	2003/10/6			114	89.8	-	-
	after 1 month	2003/10/15			108	85.0	17.99	0.46
	after 2 months	2003/11/15			22	17.3	19.05	0.40
	after 3 months	2003/12/15			17	13.4	Néant	Néant
	after 4 months	2004/1/15			17	13.4	Néant	Néant
	after 5 months	2004/2/15			13	10.2	Néant	Néant
	after 6 months	2004/3/15			10	7.9	Néant	Néant
	after 7 months	2004/4/15			9	7.1	* NB: population échantillon est décimée à la suite des attaques de poissons.	
	after 8 months	2004/5/15			9	7.1	Néant	Néant
	after 9 months	2004/6/15			9	7.1	Néant	Néant
	after 10 months	2004/7/15			9	7.1	Néant	Néant
	after 11 months	2004/8/15			9	-	Néant	Néant

3 months old potted seedlings (Nursery)	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	Sowing day	2003/8/1	150					
	after 1 week	2003/8/8		100.0	150	100.0	-	-
	after 2 weeks	2003/8/15			150	100.0	-	-
	after 3 weeks	2003/8/22			148	98.7	-	-
	after 1 month	2003/9/1			144	96.0	13.43	0.32
	after 2 months	2003/10/1			131	87.3	23.86	0.44
	after 3 months	2003/11/1			123	82.0	28.06	0.44

	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (After trans-planting	Transplanting day	2003/11/1	123					
	after 1 week	2003/11/8			102	82.9	-	-
	after 2 weeks	2003/11/15			84	68.3	-	-
	after 3 weeks	2003/11/21			78	63.4	-	-
	after 1 month	2003/12/1			78	63.4	34.48	0.49
	after 2 months	2004/1/1			73	59.3	35.84	0.5
	after 3 months	2004/2/1			72	58.5	37.15	0.58
	after 4 months	2004/3/1			71	57.7	36.05	0.66
	after 5 months	2004/4/1			69	56.1	40.42	0.62
	after 6 months	2004/5/1			69	56.1	41.36	0.63
	after 7 months	2004/6/1			69	56.1	42.40	0.71
	after 8 months	2004/7/1			69	56.1	54.57	0.86
	after 9 months	2004/8/1			69	56.1	61.39	0.95
	after 10 months	2004/9/1			68	55.3	72.98	1.01

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (Nursery)	Sowing day	2003/8/1	150					
	after 1 week	2003/8/8		100.0	150	100.0	-	-
	after 2 weeks	2003/8/15			148	98.7	-	-
	after 3 weeks	2003/8/22			146	97.3	-	-
	after 1 month	2003/9/1			135	90.0	14.40	0.32
	after 2 months	2003/10/1			121	80.7	25.23	0.45
	after 3 months	2003/11/1			109	72.7	31.95	0.43
	after 4 months	2003/12/1			103	68.7	32.01	0.47
	after 5 months	2003/1/1			94	62.7	34.80	0.38

	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (After trans-planting	Transplanting day	2004/1/1	94					
	after 1 week	2004/1/8			93	98.9	-	-
	after 2 weeks	2004/1/15			91	96.8	-	-
	after 3 weeks	2004/1/22			88	93.6	-	-
	after 1 month	2004/2/1			87	92.6	30.53	0.46
	after 2 months	2004/3/1			86	91.5	31.63	0.47
	after 3 months	2004/4/1			86	91.5	32.55	0.51
	after 4 months	2004/5/1			86	91.5	30.13	0.59
	after 5 months	2004/6/1			86	91.5	33.56	0.57
	after 6 months	2004/7/1			86	91.5	37.03	0.69
	after 7 months	2004/8/1			85	90.4	42.16	0.69
	after 8 months	2004/9/1			84	89.4	49.42	0.72

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
8 months old potted seedlings (Nursery)	Sowing day	2003/8/1	150					
	after 1 week	2003/8/8		100.0	150	100.0	-	-
	after 2 weeks	2003/8/15			149	99.3	-	-
	after 3 weeks	2003/8/22			146	97.3	-	-
	after 1 month	2003/9/1			134	89.3	10.50	0.31
	after 2 months	2003/10/1			106	70.7	20.56	0.40
	after 3 months	2003/11/1			100	66.7	27.01	0.37
	after 4 months	2003/12/1			98	65.3	28.62	0.40
	after 5 months	2004/1/1			97	64.7	28.05	0.43
	after 6 months	2004/2/1			95	63.3	31.16	0.47
	after 7 months	2004/3/1			94	62.7	30.88	0.43
	after 8 months	2004/4/1			94	62.7	30.95	0.56
	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
8months old potted seedlings (After trans-planting	Transplanting day	2004/4/1	94					
	after 1 week	2004/4/8			94	100.0	-	-
	after 2 weeks	2004/4/15			91	96.8	-	-
	after 3 weeks	2004/4/22			89	94.7	-	-
	after 1 month	2004/5/1			86	91.5	31.00	0.47
	after 2 month	2004/6/1			86	91.5	34.09	0.59
	after 3 month	2004/7/1			83	88.3	34.36	0.64
	after 4 month	2004/8/1			79	84.0	40.24	0.70
	after 5 month	2004/9/1			73	77.7	45.31	0.75

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	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing	Sowing day	2003/8/1	150					
	after 1 week	2003/8/8		94.7	142	94.7	-	-
	after 2 weeks	2003/8/15			121	80.7	-	-
	after 3 weeks	2003/8/22			105	70.0	-	-
	after 1 month	2003/9/1			80	53.3	7.73	0.27
	after 2 months	2003/10/1			43	28.7	18.00	0.42
	after 3 months	2003/11/1			40	26.7	25.77	0.55
	after 4 months	2003/12/1			36	24.0	24.77	0.42
	after 5 months	2004/1/1			35	23.3	32.37	0.58
	after 6 months	2004/2/1			33	22.0	36.50	0.64
	after 7 months	2004/3/1			32	21.3	37.00	0.74
	after 8 months	2004/4/1			32	21.3	39.14	0.70
	after 9 months	2004/5/1			32	21.3	39.93	0.75
	after 10 months	2004/6/1			32	21.3	41.42	0.78
	after 11 months	2004/7/1			32	21.3	45.64	0.81
	after 12 months	2004/8/1			32	21.3	50.50	0.95
	after 13 months	2004/9/1			32	21.3	56.92	0.99

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing of seeds with earth balls	Sowing day	2003/8/1	150					
	after 1 week	2003/8/8		96.7	145	96.7	-	-
	after 2 weeks	2003/8/15			133	88.7	-	-
	after 3 weeks	2003/8/22			111	74.0	-	-
	after 1 month	2003/9/1			71	47.3	8.29	0.27
	after 2 months	2003/10/1			34	22.7	16.80	0.42
	after 3 months	2003/11/1			25	16.7	28.21	0.54
	after 4 months	2003/12/1			24	16.0	33.80	0.60
	after 5 months	2004/1/1			23	15.3	38.21	0.65
	after 6 months	2004/2/1			23	15.3	37.40	0.59
	after 7 months	2004/3/1			21	14.0	42.00	0.73
	after 8 months	2004/4/1			21	14.0	43.35	0.77
	after 9 months	2004/5/1			20	13.3	43.71	0.80
	after 10 months	2004/6/1			20	13.3	44.71	0.80
	after 11 months	2004/7/1			19	12.7	47.64	0.87
	after 12 months	2004/8/1			19	12.7	53.21	1.05
	after 13 months	2004/9/1			19	12.7	55.85	1.09

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
1,5 month old potted seedlings (Nursery)	Sowing day	2003/8/1	150					
	after 1 week	2003/8/8		100.0	150	100.0	-	-
	after 2 weeks	2003/8/15			150	100.0	-	-
	after 3 weeks	2003/8/22			149	99.3	-	-
	after 1 month	2003/9/1			147	98.0	10.33	0.41
	after 1,5 month	2003/9/15			142	94.7	16.17	0.40

	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
1,5 month old potted seedlings after trans-planting	Transplanting day	2003/9/15	142					
	after 1 week	2003/9/22			141	99.3	-	-
	after 2 weeks	2003/9/29			140	98.6	-	-
	after 3 weeks	2003/10/6			139	97.9	-	-
	after 1 month	2003/10/15			134	94.4	19.98	0.49
	after 2 months	2003/11/15			134	94.4	26.11	0.60
	after 3 months	2003/12/15			132	93.0	31.13	0.61
	after 4 months	2004/1/15			131	92.3	33.70	0.66
	after 5 months	2004/2/15			130	91.5	38.64	0.69
	after 6 months	2004/3/15			129	90.8	39.43	0.71
	after 7 months	2004/4/15			128	90.1	42.13	0.73
	after 8 months	2004/5/15			128	90.1	42.50	0.76
	after 9 months	2004/6/15			128	90.1	42.93	0.80
	after 10 months	2004/7/15			128	90.1	43.80	0.82
	after 11 months	2004/8/15			128	90.1	57.64	0.92
3 months old potted seedlings (Nursery)	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	Sowing day	2003/8/1	150					
	after 1 week	2003/8/8		100.0	150	100.0	-	-
	after 2 weeks	2003/8/15			150	100.0	-	-
	after 3 weeks	2003/8/22			148	98.7	-	-
	after 1 month	2003/9/1			143	95.3	7.24	0.38
	after 2 months	2003/10/1			122	81.3	13.31	0.46
	after 3 months	2003/11/1			107	71.3	19.62	0.42
3 months old potted seedlings (After trans-planting	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	Transplanting day	2003/11/1	107					
	after 1 week	2003/11/8			99	92.5	-	-
	after 2 weeks	2003/11/15			96	89.7	-	-
	after 3 weeks	2003/11/21			94	87.9	-	-
	after 1 month	2003/12/1			92	86.0	21.30	0.44
	after 2 months	2004/1/1			91	85.0	23.35	0.49
	after 3 months	2004/2/1			90	84.1	25.60	0.50
	after 4 months	2004/3/1			89	83.2	27.78	0.54
	after 5 months	2004/4/1			88	82.2	27.41	0.54
	after 6 months	2004/5/1			87	81.3	27.52	0.59
	after 7 months	2004/6/1			87	81.3	28.15	0.58
	after 8 months	2004/7/1			87	81.3	31.02	0.56
	after 9 months	2004/8/1			87	81.3	34.89	0.75
	after 10 months	2004/9/1			87	81.3	45.44	0.79

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (Nursery)	Sowing day	2003/8/1	150					
	after 1 week	2003/8/8		99.3	149	99.3	-	-
	after 2 weeks	2003/8/15			148	98.7	-	-
	after 3 weeks	2003/8/22			145	96.7	-	-
	after 1 month	2003/9/1			141	94.0	7.30	0.36
	after 2 months	2003/10/1			117	78.0	14.30	0.47
	after 3 months	2003/11/1			95	63.3	18.45	0.41
	after 4 months	2003/12/1			81	54.0	24.77	0.42
	after 5 months	2003/1/1			77	51.3	25.61	0.39
	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (After trans-planting	Transplanting day	2004/1/1	77					
	after 1 week	2004/1/8			70	90.9	-	-
	after 2 weeks	2004/1/15			63	81.8	-	-
	after 3 weeks	2004/1/22			63	81.8	-	-
	after 1 month	2004/2/1			60	77.9	22.00	0.40
	after 2 months	2004/3/1			58	75.3	21.20	0.43
	after 3 months	2004/4/1			58	75.3	22.04	0.41
	after 4 months	2004/5/1			58	75.3	21.58	0.48
	after 5 months	2004/6/1			56	72.7	21.48	0.43
	after 6 months	2004/7/1			55	71.4	22.70	0.37
	after 7 months	2004/8/1			55	71.4	25.00	0.56
	after 8 months	2004/9/1			55	71.4	30.77	0.58

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	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing	Sowing day	2003/10/3	375	90.0				
	after 1 week	2003/10/10			317	84.5		
	after 2 weeks	2003/10/17			283	75.5		
	after 3 weeks	2003/10/24			257	68.5		
	after 1 month	2003/10/31			234	62.4		
	after 2 months	2003/11/28			179	47.7		
	after 3 months	2003/12/26			138	36.8	5.00	0.20
	after 4 months	2004/1/21			22	5.9	5.00	0.20
	after 5 months	2004/2/22			13	3.5	5.00	0.20
	after 6 months	2004/3/21			2	0.5	5.00	0.20
	after 7 months	2004/4/17			0			

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
1,5 month old potted seedlings (Nursery)	Sowing day	2003/10/3	450	91.8				
	after 1 week	2003/10/10			413	91.8	9.00	0.30
	after 2 weeks	2003/10/17			400	88.9	15.00	0.30
	after 3 weeks	2003/10/24			382	84.9	24.00	0.45
	after 1 month	2003/10/31			344	76.4	25.00	0.45
	after 1,5 month	2003/11/19			296	65.8	29.00	0.50

	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
1,5 month old potted seedlings after transplanting	Sowing day	2003/11/20	296					
	after 1 week	2003/11/27			285	96.3	31.00	0.50
	after 2 weeks	2003/12/4			247	83.4	31.00	0.50
	after 3 weeks	2003/12/11			219	74.0	32.00	0.55
	after 1 month	2003/12/18			202	68.2	32.00	0.55
	after 2 months	2004/1/21			179	60.5	33.00	0.60
	after 3 months	2004/2/22			120	40.5	35.00	0.70
	after 4 months	2004/3/21			81	27.4	35.00	0.70
	after 5 months	2004/4/17			75	25.3	37.00	0.70
	after 6 months	2004/5/14			69	23.3	37.10	0.70
	after 7 months	2004/6/13			60	20.3	37.30	0.75
	after 8 months	2004/7/17			56	18.9	38.00	0.75
	after 9 months	2004/8/15			41	13.9	39.00	0.75
	after 10 months	2004/9/15			40	13.5	52.00	0.80

	Date		Number of sowing seeds	Germinationratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (Nursery)	Sowing day	2003/10/3	450	100.0				
	after 1 week	2003/10/10			330	73.3	8.00	0.20
	after 2 weeks	2003/10/17			330	73.3	17.00	0.25
	after 3 weeks	2003/10/24			290	64.4	22.00	0.35
	after 1 month	2003/10/31			266	59.1	25.00	0.40
	after 2 months	2003/11/28			238	52.9	29.00	0.45
	after 3 months	2003/12/26			201	44.7	32.00	0.50

	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (After trans-planting)	Transplanting day	2004/1/8	201					
	after 1 week	2004/1/15			186	92.5	33.00	0.50
	after 2 weeks	2004/1/22			179	89.1	33.00	0.50
	after 3 weeks	2004/1/29			165	82.1	33.00	0.60
	after 1 month	2004/2/5			160	79.6	34.00	0.60
	after 2 months	2004/3/21			110	54.7	35.00	0.60
	after 3 months	2004/4/17			68	33.8	36.00	0.60
	after 4 months	2004/5/14			46	22.9	36.00	0.65
	after 5 months	2004/6/13			31	15.4	36.00	0.65
	after 6 months	2004/7/17			28	13.9	37.00	0.65
	after 7 months	2004/8/15			27	13.4	37.00	0.70
	after 8 months	2004/9/15			20	10.0	40.00	0.70
	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (Nursery)	Sowing day	2003/10/3	450	90.0				
	after 1 week	2003/10/10			343	76.2	11.00	0.20
	after 2 weeks	2003/10/17			340	75.6	18.00	0.25
	after 3 weeks	2003/10/24			308	68.4	24.00	0.30
	after 1 month	2003/10/31			291	64.7	27.00	0.40
	after 2 months	2003/11/28			267	59.3	30.00	0.45
	after 3 months	2003/12/26			239	53.1	32.00	0.50
	after 4 months	2004/1/21			211	46.9	33.00	0.50
	after 5 months	2004/2/22			197	43.8	35.00	0.60
	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (After trans-planting)	Transplanting day	2004/2/25	196					
	after 1 week	2004/3/3			187	95.4	35.00	0.60
	after 2 weeks	2004/3/10			173	88.3	36.00	0.60
	after 3 weeks	2004/3/17			151	77.0	36.00	0.60
	after 1 month	2004/3/21			133	67.9	38.00	0.60
	after 2 months	2004/4/17			122	62.2	39.00	0.70
	after 3 months	2004/5/14			98	50.0	41.00	0.70
	after 4 months	2004/6/13			66	33.7	41.00	0.70
	after 5 months	2004/7/17			62	31.6	41.00	0.70
	after 6 months	2004/8/15			43	21.9	43.00	0.70
	after 7 months	2004/9/15			33	16.8	47.00	0.75
	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
8 months old potted seedlings (Nursery)	Sowing day	2003/10/3	300	100.0				
	after 1 week	2003/10/10			286	95.3	8.00	0.20
	after 2 weeks	2003/10/17			277	92.3	12.00	0.25
	after 3 weeks	2003/10/24			258	86.0	18.00	0.25
	after 1 month	2003/10/31			245	81.7	18.00	0.30
	after 2 months	2003/11/28			236	78.7	20.00	0.30
	after 3 months	2003/12/26			212	70.7	24.00	0.40
	after 4 months	2004/1/21			187	62.3	26.00	0.40
	after 5 months	2004/2/22			174	58.0	28.00	0.50
	after 6 months	2004/3/21			153	51.0	32.00	0.60
	after 7 months	2004/4/17			146	48.7	35.00	0.60
	after 8 months	2004/5/14			140	46.7	35.00	0.60

8 months old potted seedlings (After trans-planting)	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	Transplanting day	2004/6/9	140					
	after 1 week	2004/6/23			133	95.0	35.00	0.60
	after 2 weeks	2004/6/30			126	90.0	35.00	0.60
	after 3 weeks	2004/7/8			96	68.6	35.00	0.60
	after 1 month	2004/7/17			91	65.0	36.00	0.65
	after 2 months	2004/8/15			28	20.0	37.00	0.65
3 months old potted seedlings nursed in the land (Nursery)	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	Sowing day	2003/10/3	225	92.4				
	after 1 week	2003/10/10			208	92.4	15.00	0.2,5
	after 2 weeks	2003/10/17			191	84.9	18.00	0.30
	after 3 weeks	2003/10/24			180	80.0	23.00	0.40
	after 1 month	2003/10/31			169	75.1	28.00	0.50
	after 2 months	2003/11/28			152	67.6	32.00	0.60
nursed in the sea	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	after 3 months	2003/12/26						
3 months old potted seedlings nursed in the land (After trans-planting)	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	Transplanting day	2004/1/8	152					
	after 1 week	2004/1/15			147	96.7	32.00	0.60
	after 2 weeks	2004/1/22			141	92.8	34.00	0.60
	after 3 weeks	2004/1/29			136	89.5	35.00	0.60
	after 1 month	2004/2/5			124	81.6	35.00	0.70
	after 2 months	2004/3/21			83	54.6	37.00	0.70
	after 3 months	2004/4/17			45	29.6	39.00	0.70
	after 4 months	2004/5/14			36	23.7	39.00	0.70
	after 5 months	2004/6/13			22	14.5	40.00	0.70
	after 6 months	2004/7/17			13	8.6	41.00	0.75
	after 7 months	2004/8/15			11	7.2	41.00	0.75
	after 8 months	2004/9/15			9	5.9	45.00	0.80

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	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
Direct sowing	Sowing day	2003/10/27	375					
	after 1 week	2003/11/3		96.3	361	96.3		
	after 2 weeks	2003/11/10			349	93.1		
	after 3 weeks	2003/11/17			311	82.9		
	after 1 month	2003/11/24			297	79.2		
	after 2 months	2003/12/22			280	74.7	5.00	0.20
	after 3 months	2004/1/22			234	62.4	5.00	0.20
	after 4 months	2004/2/19			176	46.9	7.00	0.30
	after 5 months	2004/3/11			87	23.2	7.00	0.30
	after 6 months	2004/4/19			43	11.5	7.00	0.30
	after 7 months	2004/5/8			5	1.3	8.00	0.30
	after 8 months	2004/6/10			0			

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
1,5 month old potted seedlings (Nursery)	Sowing day	2003/10/15	450					
	after 1 week	2003/10/22		88.2	397	88.2	8.00	0.20
	after 2 weeks	2003/10/29			344	76.4	14.00	0.30
	after 3 weeks	2003/11/5			205	45.6	15.50	0.30
	after 1 month	2003/11/12			138	30.7	18.00	0.40
	after 1,5 month	2003/11/26			127	28.2	21.00	0.50

	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
1,5 month old potted seedlings after transplanting	Transplanting day	2003/12/9	120					
	after 1 week	2003/12/16			114	95.0	26.00	0.40
	after 2 weeks	2003/12/23			102	85.0	29.00	0.50
	after 3 weeks	2003/12/30			94	78.3	30.00	0.50
	after 1 month	2004/1/22			83	69.2	31.00	0.50
	after 2 months	2004/2/19			72	60.0	32.00	0.50
	after 3 months	2004/3/11			70	58.3	34.00	0.50
	after 4 months	2004/4/19			68	56.7	36.00	0.50
	after 5 months	2004/5/8			63	52.5	36.00	0.60
	after 6 months	2004/6/10			42	35.0	37.00	0.65
	after 7 months	2004/7/16			40	33.3	38.00	0.65
	after 8 months	2004/8/13			24	20.0	38.00	0.65
	after 9 months	2004/9/25			11	9.2	47.00	0.70

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (Nursery)	Sowing day	2003/11/11	375					
	after 1 week	2003/11/18		93.3	350	93.3		
	after 2 weeks	2003/11/25			334	89.1		
	after 3 weeks	2003/12/2			327	87.2	5.00	0.20
	after 1 month	2003/12/9			285	76.0	8.00	0.20
	after 2 months	05/01/2004			238	63.5	12.00	0.30
	after 3 months	08/02/2004			187	49.9	18.00	0.40

	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
3 months old potted seedlings (After trans-planting)	Transplanting day	2004/2/19	* 104					
	after 1 week	2004/2/26			95	91.3	27.00	0.50
	after 2 weeks	2004/3/2			93	89.4	27.00	0.50
	after 3 weeks	2004/3/9			93	89.4	27.00	0.50
	after 1 month	2004/3/17			91	87.5	29.00	0.05
	after 2 months	2004/4/19			90	86.5	29.00	0.50
	after 3 months	2004/5/8			87	83.7	30.00	0.50
	after 4 months	2004/6/10			71	68.3	34.00	0.55
	after 5 months	2004/7/16			66	63.5	35.00	0.55
	after 6 months	2004/8/13			46	44.2	39.00	0.60
	after 7 months	2004/9/25			21	20.2	45.00	0.60

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (Nursery)	Sowing day	2003/10/15	450					
	after 1 week	2003/10/22		84.9	382	84.9	9.00	0.20
	after 2 weeks	2003/10/29			254	56.4	14.00	0.25
	after 3 weeks	2003/11/5			248	55.1	15.50	0.30
	after 1 month	2003/11/12			236	52.4	16.00	0.30
	after 2 months	2003/12/10			197	43.8	19.00	0.40
	after 3 months	2004/1/22			143	31.8	19.00	0.45
	after 4 months	2004/2/19			122	27.1	21.00	0.50
	after 5 months	2004/3/18			65	14.4	22.00	0.50

	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
5 months old potted seedlings (After trans-planting)	Transplanting day	2004/3/21	65					
	after 1 week	2004/3/28			64	98.5	22.00	0.50
	after 2 weeks	2004/4/4			61	93.8	22.50	0.50
	after 3 weeks	2004/4/11			59	90.8	23.00	0.50
	after 1 month	2004/4/19			57	87.7	23.00	0.50
	after 2 months	2004/5/8			55	84.6	25.00	0.50
	after 3 months	2004/6/10			43	66.2	31.00	0.55
	after 4 months	2004/7/16			41	63.1	33.00	0.55
	after 5 months	2004/8/13			25	38.5	39.00	0.60
	after 6 months	2004/9/25			18	27.7	48.00	0.65

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
8 months old potted seedlings (Nursery)	Sowing day	2003/10/27	325	90.0				
	after 1 week	2003/11/2			274	84.3	15.00	0.25
	after 2 weeks	2003/11/9			227	69.8	15.50	0.30
	after 3 weeks	2003/11/16			116	35.7	16.00	0.40
	after 1 month	2003/11/23			111	34.2	16.00	0.45
	after 2 months	2003/12/21			104	32.0	22.00	0.50
	after 3 months	2004/1/22			60	18.5	23.00	0.40
	after 4 months	2004/2/19			46	14.2	23.00	0.50
	after 5 months	2004/3/11			45	13.8	23.00	0.50
	after 6 months	2004/4/19			40	12.3	** 14.50	0.50
	after 7 months	2004/5/8			36	11.1	14.50	0.50
	after 8 months	2004/6/10			36	11.1	14.50	0.50

	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
8 months old potted seedlings (After trans-planting)	Transplanting day	2004/6/18	36					
	after 1 week	2004/6/25			36	100.0	14.50	0.50
	after 2 weeks	2004/7/2			34	94.4	15.50	0.55
	after 3 weeks	2004/7/9			31	86.1	16.00	0.66
	after 1 month	2004/7/16			28	77.8	16.00	0.66
	after 2 months	2004/8/13			15	41.7	18.00	0.60
	after 3 months	2004/9/25			2	5.6	29.00	0.60
3 months old potted seedlings nursed in the land (Nursery)	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	Sowing day	2003/10/15	180	90.0				
	after 1 week	2003/10/22			134	74.4	11.00	0.20
	after 2 weeks	2003/10/29			132	73.3	19.00	0.30
	after 3 weeks	2003/11/5			111	61.7	25.00	0.30
	after 1 month	2003/11/12			100	55.6	29.00	0.40
	after 2 months	2003/12/10			84	46.7	37.00	0.50
nursed in the sea	Date		Number of sowing seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	after 3 months	2003/12/12	84		84	100.0	37.00	0.50
3 months old potted seedlings nursed in the land (After trans-planting)	Date		Number of transplanting seeds	Germination ratio (%)	Number of seedlings survived	Survival ratio (%)	Average height of seedlings (cm)	Average base diameter of seedlings (cm)
	Transplanting day	2004/12/20	84					
	after 1 week	2004/12/28			78	92.9	37.00	0.50
	after 2 weeks	2004/1/6			71	84.5	37.00	0.50
	after 3 weeks	2004/1/14			64	76.2	39.00	0.50
	after 1 month	2004/1/22			52	61.9	39.00	0.60
	after 2 months	2004/2/19			44	52.4	42.00	0.60
	after 3 months	2004/3/11			12	*** 14.3	47.00	0.60
	after 4 months	2004/4/19			4	4.8	49.00	0.60
	after 5 months	2004/5/8			4	4.8	49.00	0.60
	after 6 months	2004/6/10			2	2.4	51.00	0.60
	after 7 months	2004/7/16			2	2.4	51.00	0.60
	after 8 months	2004/8/13			2	2.4	62.00	0.60
	after 9 months	2004/9/25			0			

* very eeaked seedlings were eliminate from transplanting

** le suivi s'est fait sur un autre plant après lamort du premier (monitoring seedlings were died so monitoring seedlings were chnaged)

*** la mortalité est ici accentuée par la chaleur observée pendant ce mois qui dépassse 40° à l'ombre accompagnée de vent sec ,aggravant ainsi la salinité .(more than 40℃ of hot weather and dry wind made seedlings die)


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