KENYA FORESTRY RESEARCH INSTITUTE
KEFRI
LIBRARY

JICA

SOFEM

Social Forestry Extension Model Development Project

ANNUAL REPORT
2001

SOFEM
P. O. Box 392, KITUI
Tel 0141-22807/22311
www.kefri.org

Compiled by A. Mwamburi

LIBRARY

1.0 INTRODUCTION

The Social Forestry extension Model Development Project (SOFEM) was started in November 1997 with the aim of equipping the inhabitants of the semi-arid areas of Kenya with appropriate techniques to plant and manage trees through the establishment of farm-forests.

The Project is divided into 3 main sections, Technology development, Farm forestry establishment (Extension) and Extension Method and Information. During the year 2001, the project carried out several activities as per its plan of operations.

Notable achievements in the year included the increase in production of *Melia volkensii* seedlings, adoption of the cluster approach in farmer to farmer extension and hosting of the second social forestry seminar. The project was also a key participant in the national tree planting ceremony in Nyando district of Nyanza province.

This report summarises the activities undertaken, achievements and the progress of the various activities of the project in the year.

2.0 RESEARCH ACTIVITIES AND ACHIEVEMENTS

2.1 TECHNOLOGY DEVELOPMENT

The Technology Development Section, which is comprised of two subsections; on-station and onfarm, is involved in the development of sound and cost effective tree establishment technologies for the drylands. The technologies developed, verified and then disseminated to community both in the project target area and beyond. The section undertook various activities as described below.

2.1.1 Water Catchment Studies (1.1.2.1)

The objective of this study was to determine the effect of different water micro-catchment structures on the growth and survival of *Senna siamea.*

The trial was established in November 1995 on a one-year-old *senna siamea* plot, planted in November, 1994 in Tiva pilot forest. Different micro-catchment types (square or *Turkana*, V and W shaped) were constructed. The plots were constantly kept free of weeds through complete weeding. Tree spacing was at 3.5mx3.5m
Monitoring and assessments have been going on over the years (4 years). All the treatments showed relatively good growth performance with the square shaped *(Turkana)* micro catchments showing a slightly better performance. Survival was above 88% in all the treatments. These results could be attributed to the fact that when catchments are constructed early after planting they benefit the target trees regardless of the shape of the micro-catchment structure, so long as competition for available moisture is minimised through complete weeding.

The construction of microcatchments is strongly recommended especially in the initial stages of tree growth. If the area is slightly slopy, W-shaped catchments not only trap surface run-off but also help prevent or reduce soil erosion. However if labour is available then terrace construction is recommended.

2.1.2 Mulching Trial (1.1.2.2)

The objective of this trial was to verify the effect of mulching on tree growth. The trial was established in November 2000, on a plot planted with *Senna siamea*. W-shaped water catchment structures were constructed after planting at 4m x 4m spacing. The plots have been completely weeded and catchment repair were done whenever it was necessary. The control plot was only slash weeded and was not cropped.

Three different mulching areas were used i.e.1.6m diameter (13%), 2.3m diameter (25%), 3.2m diameter (50%) and control (0%). The treatments were replicated three times.

During the initial stage of establishment sawdust was used as mulching material due to shortage of dry grass. Because of this, data collected during the first one year may not be very reliable. It also proved difficult to follow the planned prescription because every time weeding was done, repair of catchments and mulching had to be redone. The time interval between completion of weeding and re-mulching could at times be as long as two weeks. The above factors have been considered in the analysis by Prof. Yahata.

Removal of lower branches during the second year of establishment could be necessary to avoid disturbance of mulch during windy days.
Further verification is necessary.

2.1.3 Weeding Trial (1.1.2.3)

The objective of this trial was to study the effect of different weeding methods on tree performance. A three treatment and four replicate trial plot was established on a 1999 *Senna siamea* plot. The treatments were complete weeding, slash weeding and control.

A clear difference in tree performance was observed between clear weeded and slashed plots. Crown cover developed well and faster on completely weeded plots. The good performance could be attributed to effective use of readily available soil moisture due to absence of weeds. Monitoring and assessment continues.

2.1.4 Soil moisture study (1.1.2.4.1)

The objective was to verify the effect of different weeding methods on soil moisture. Soil moisture sensors were installed on the weeding methods study plot (2.1.3 above). Data on water balance at different soil depths is recorded monthly. The different treatments are complete weeding, slashing and control.

2.1.5 Sun heat shield effect (1.1.2.4.2)

The trial was set up to verify the effect of mulching on tree performance. A trial consisting of six treatments, replicated three times was established in 1999 on a *Senna siamea* plot. Mulching materials applied included murram and tree leaves. A silk net gauze is used to control solar heat on the plots. Assessment of performance on tree

height, root diameter and survival rate was conducted. Accumulated data may not be reliable because trial prescriptions were unclear during initial stages of establishment. The trial needs further improvement.

2.1.6 Water stress and Evapo- transpiration studies (1.1.2.4.4)

The objective is to study the relation between water uptake and its effects on plant physiological balance. Moisture loss from leaves and related photosynthetic processes is measured using a steady state porometer, monitoring of sap conductance is also done. Data collection continues and the principal investigator, who is currently a Masters student in Japan will provide a report in 2003.

2.1.7 Monitoring of existing spacing plot (1.1.3.1)

To determine the optimal spacing for *Senna siamea* a trial was established in 1997 on a *Senna siamea* plot planted in1996. Five espacement regimes (1.0m x1.0m, 2.0m x2.0m, 3.5m x3.5m, 4.0m x4.0m,and 5.0m x5.0m) were used.

Closer spacing induced formation of weak (thin) and long stems. During drought, due to high competition for soil moisture, die back incidences were reported. Currently a 4m x 4m spacing interval is recommended. The spacing interval can accommodate not only animal drawn but also machinery drawn farming implements.

The spacing trial objective has been achieved as far as one species *(S. siamea)* is concerned. Further studies with other utility tree species are recommended.

2.1.8 Pruning studies on Senna siamea (1.1.3.2)

This trial, was established in 1999 to determine the optimal pruning regime for *Senna siamea*. Three types of pruning levels were used. These were pruning rate ½ height, $^2/_3$ height and a control. Measurements on tree height, diameter, survival rate and mortality were investigated.

Growth was improved by pruning but there was no difference between of upto $^1/_2$ and $^2/_3$ heights. Pruning intensity inversely affected diameter growth. Trees pruned at 2/3 had weak stems. It was however clear that pruning at whatever level reduced the occurrence of dieback. Different trials for other utility species should be initiated.

2.1.9 Coppicing studies on senna siamea (1.1.3.4)

This trial aims at determining the optimal coppicing levels of *Senna siamea* for tree product utilization. The trial was established in 1999. Coppicing heights of 10cm, 40cm, 70cm, 100cm, and 150cm were used. Coppicing ability and survival rate were monitored.

Due to labour shortage, weeding by ripping between the tree encouraged the formation of ridges and consequently surface run-off. This errosion affected data relaibility. A new trial is being considered at the time of writing this report.

2.1.10 Establishment of wild fruits demonstration plot (1.1.4)

12 species of indigenous wild fruits were established in 1999 on a 1.0 ha demonstration plot. The survival was very poor and necessitated replanting with 8 species in the year 2000. In the year 2001, a separate plot was established with 6 species, which were *T. Indica, V. rotunda, S. Birea, Digitalis, garkenia* and *G. edulis.*

Staking was performed on weak stemmed fruit trees. Watering was also intensified since these trees showed a lot of water stress. Monitoring of the growth performance continues.

2.1.11 Intercropping trial (1.1.4.1)

To study effect of intercropping on tree growth using *Senna siamea*, an intercropping trial was established in 2000 using traditional varieties of maize and beans planted at different densities. Preliminary data obtained in 2001 showed that cropping density of up to 50% does not affect tree performance.

The experiment continues.

2.1.12 Seed collection and production of seedlings (1.1.1.4)

The objective of this activity is to acquire and produce quality seeds and seedlings for technology development and extension in the project area.

(a) **Seed collection**

4247.7kgs of un-extracted *Melia volkensii* seeds were collected from Nuu, Yatta and Kavisuni.

(b) Production of seedlings

A total of **37,714** seedlings were raised in the Tiva nursery. The Breakdown of the species was as below:

Species	No. produced
1. *Dovyalis caffra*	2,550
2. *Senna siamea*	4 ,109
3. *Grevillea robusta*	920
4. *Melia volkensii*	25,000
5. *Delonix regia*	840
6. *Senna spectabilis*	1,260
7. *Casuarina equistifolia*	560
8. *Azadirachta indica*	2,444
9. *Mangifera indica*	400
10. *Spathodia nilotica*	311
11. *Psidium guajava*	220
12. *Moringa oleiferra*	893
13. *Dalbergia melanoxylon*	330
14. *Calliandra calothyrus*	194
15. *Eucalyptus camaldulensis*	183
Total	**37,714**

2.1.13 Melia planting position trial (1.2.2.6)

The objective of this trial is to determine the most suitable planting position of *M. Volkensii* on micro-catchments. A 0.16 ha trial was established in Chuluni division in 2000. The trial is a complete randomised block design with 3 treatments (upper side, lower side and inside the micro-catcment) the trial was replicated twice. Parameters measured were survival, height and root collar diameter.

Results (see fig 1 and 2) indicate that there is no difference between the trees planted in the upper and those in the lower micro-catchment. However the survival rate was markedly lower for those trees planted inside the microcatchment. From this trial it is recommended that Melia Volkensii should not be planted inside the micro-catchment.

2.1.14 On-farm technology verification (1.2)

The objective is to verify some of the technologies tested in pilot forest under farmers' conditions and to use these plots as demonstration areas for nearby farmers. Assessment of the trees in the trial plots was undertaken. Routine monitoring of experiments was also carried out. Soil survey in the farms, which were established in 1998-1999, were carried out in the year under review. Data analysis is ongoing.

3.0 FARM FORESTRY ESTABLISHMENT (EXTENSION)

The objective of this section is to establish farm forests with the initiative of local communities through provision of practical techniques developed by the Project. The Section achieved this by conducting profile surveys identifying target farmers, training of farmers and monitoring of established farm forests.

3.1 Monitoring of established farm forests (2.1.5)

Monitoring of farm forests continued over the year. Some problems were encountered with the planted trees and the farmers were advised accordingly. The survival rates for the different establishment years are presented in table1.

Table 1 Tree survival on core farmer plots

(a) 1998 planting

Division	Type of establishment	No planted	No. surviving	Survival rates (%age)
Central	Woodlot	91	62	68
	Fruit Orchard	103	85	83
Kabati	Woodlot	53	19	36
	Fruit Orchard	107	47	44
Chuluni	Woodlot	442	390	88
	Fruit Orchard	103	85	83

(b) 1999 planting

Dvision	Type of establishment	No planted	No. surviving	Survival rates (%age)
Central	Woodlot	391	199	50
	Fruit Orchard	195	120	62
Kabati	Woodlot	532	378	71
	Fruit Orchard	229	159	69
Chuluni	Woodlot	786	498	63
	Fruit Orchard	229	105	46

(c) 2000 planting

Dvision	Type of establishment	No planted	No. surviving	Survival rates (%age)
Central	Woodlot	533	242	45
	Fruit Orchard	135	50	37
Kabati	Woodlot	254	140	55
	Fruit Orchard	105	87	82
Chuluni	Woodlot	674	397	59
	Fruit Orchard	140	85	61

Mortality was mainly due to termite attack, livestock damage and water stress. There was also a major problem on diseases and pests especially on fruit trees. Plans are underway to train the farmers on pest and disease control. Land preparation using oxen ploughing was also identified as one of the causes of tree deaths especially in mangoes.

3.2 Recording of farm forestry data (2.1.6)

The various record keeping activities on farm forestry information was undertaken. This information included tree survival, rainfall and farm visits. The data was recorded in monitoring sheets and farmers record books.

3.3 Seeds and seedling information system (2.3.4)

(a) Seeds information system

The increased number of tree nurseries within the project target area has resulted into an increase in demand for tree seeds. The project cannot fully meet this demand even on cost sharing basis. To solve the problem and also ensure sustainability of tree planting, the project established a local seed information system whereby, farmers are informed on the availability of seed sources within their locality.

Suitable seed sources were identified, within the project area (Central, Kabati and Chuluni) including Yatta division. Factors considered in the survey for nomination of these seed sources included:

- The area should consist of reasonable number of mother trees.
- The trees should be mature enough.
- The trees should be healthy.
- Accessibility to members of public

A total of 46 sources were identified and the number was narrowed to 41 after the sites were visited. Selected mother trees were permanently marked with paints to be preserved for the purpose of seed collection. Between 5-10 mother trees were selected per site per species. The survey indicated uneven distribution of species within the four surveyed divisions. *Senna siamea* was found to be the most common species occurring 25 times in all the surveyed sites.

Advertisement on available sources and species in the area was carried out. A total of 20 seed posters per division were posted in public areas such as schools, shopping centers, chiefs offices, churches.

(b) On-site Training on Seed Technology

After the identification and advertisement of suitable sources within the target area, it was found necessary to offer training to the community on tree seed collection and handling.

Training was conducted in May and June 2001. A total of 16 on-site training sessions were conducted.

A total of 416 participants attended the training with 76 % being female. Also 54% of the participants were below 40 years.

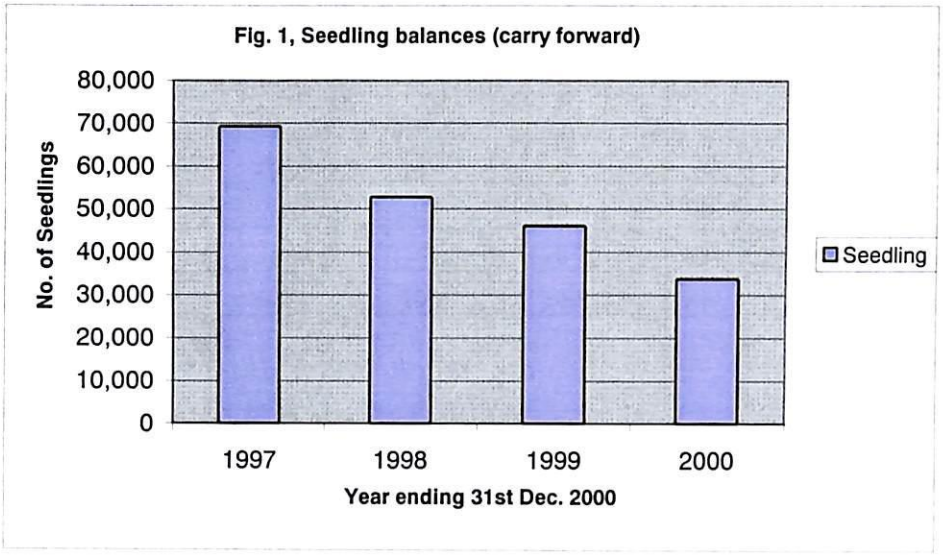
(c) Seedling information systems

The objective of this exercise is to enhance tree planting by members of the community through availing information regarding the availability of tree seedlings within their locality. Monitoring of tree nurseries by the field technical assistants was undertaken and the information on the seedlings raised by the different farmers and the community was compiled.

Only seedlings that have acquired the recommended plantable size of 30cm and above were considered. Advertisement through posters was done within social places such as locational chiefs offices, churches, shopping centers, health centers among others. This was done in the month of October just before the beginning of the rainy season. At least 20 seedlings information update posters are advertised annually per division. Information in the posters

included species, name of producer (location, sub-location), number in stock and contact person.

Preliminary results (fig 1.) have indicated some positive impact on the exercise with the number of seedlings remaining in the nursery after planting (carry forwards) reducing every year and hence reduction of loses to the groups and or individuals raising seedlings.



(d) Establishment of community seed stands

After training on seed collection and handling, the project also embarked on establishment of seed stands in the community. This was in done to increase the genetic diversity of the seed sources.

The implementation of this activity commenced in November 2001 with 6 schools participating, 2 were secondary and 4 were primary schools. This included one primary school from Yatta division where the pilot forest is located.

Table 3: Species planted in selected schools for seed sources

	Chuluni		Kabati		Central	Yatta
	Mbitini Girls Sec.	Nzangathi Pri.	Katutu Girls Sec.	Kyamtimba Pri.	Mikuyuni Pri.	Tanganyika Pri.
S. siamea	20	20	20	20	20	20
E. camaldulensis	20	20	10	10	20	
C.equisetifolia	10	10	20	20		
M. volkensii	20	20	10	10	10	20
G. robusta	10	10	20	20	10	20
M. oleifera	10	10			10	20
C. equisetifolia	10	10				
A. indica			10	10	20	20
T. mentalis			10	10	10	
Total	100	100	100	100	100	100

3.4 Cost Sharing (2.3.5)

The project continued to cost share farm forestry establishment materials with farmers during the year. The following materials were cost shared.

Table 4. Cost shared items in the year

ITEM		AMOUNT
Polythene tubes		97830
Tools	Shovels	10
	Jembes	8
	Pangas	11
	Wheelbarrows	4
	Rakes	3
	Slashers	9
	Watering cans	10
	Soil Sieves	10
	Files	1
Seeds	Grevilea robusta	2 Kg
	Azadirachta indica	0.75Kg
	T. peruviana	0.25Kg
	C. Equisetifolia	0.25Kg
Seedlings	Assorted	2500

3.4 Establishment of Farmer to Farmer Extension System (2.5)

(a) Training of farmers

A two-day seminar aimed at sharpening the farmers technical and dissemination skills was held in July before the farmers implemented farmer to farmer field days. Twelve selected farmers were involved in this year's farmer to farmer field days .The field days were held in August. The total turn up was 468 out of which 277 were females and 191 males. Low turn out was recorded in some areas due village and church meetings.

Table 5. Farmer to farmer attendance per division

Division	Location	Venue (Name of farmer)	Attendance
Chuluni	Nzambani	Munyalo	48
	Mbitini	Veronica mbiti	27
	Kisasi	Wambua Musai	20
	Nzambani	Mboloi Muasya	46
TOTAL			**141**
Central	Itoleka	David Malombe	44
	Mulango	Hilda Muema	15
	Miambani	David mutua	35
	Maliku	Mulatya kimote	53
TOTAL			**147**
Kabati	Kauwi	Lucy ndemange	60
	Matinyani	Vonza nguli	43
	Mutonguni	Kiilu Muthengi	52
	Matinyani	Kiema maithya	25
TOTAL			**180**

(c) Cluster farmer model

Cluster farmer model being an extension of the farmer to farmer training to the neighboring community was implemented during the year. Core farmers who were involved in farmer to farmer extension programme for the last two years were each given an opportunity to select 5 farmers from the neighbor hood to form a cluster. A total of 24 clusters were formed with 115 farmers. Each planted 50 seedlings including 5 local mangoes to be top grafted early the next year. A total of 5750 seedlings were planted.

3.5 Training of selected target farmers (2.4.3)

15 new target farmers were selected in the year. These farmers were trained in farm

forestry establishment at Kitui Training Center.

3.6 Design Target Farms (2.4.4)

Designing of farm forests in the newly selected farms was done after the profile surveys in full collaboration with the selected farmers.

Factors considered while designing of the farms included, farmer's tree species preferences, labor availability, seedling sources and the anticipated forest product needs of the farmer.

3.7 Demonstration plot at Tiva (2.6)

Routine management activities continued in the demonstration plot. These included: weeding of both the tree crops and planting and harvesting of the agricultural crops; maintenance of charcoal cooler, Enzaro jiko and other teaching items. The livestock (goats) were also maintained though the fish pond became unoperational due to a crack in its structure

The demonstration unit received over 480 visitors in the year. These comprised mainly of farmers, extension agents and students.

4.0 EXTENSION METHOD AND INFORMATION

4.1 Collection of publications and making of a cataloguing system (3.3.1)

The project managed to acquire a cataloguing system from UNESCO and this programme was installed in the Muguga Library. The programme could not be installed in the Kitui library because the library in Kitui does not have a computer. Efforts are underway to acquire a computer for the Kitui Library. However manual cataloguing of the publications using cards continued.

4.2 Exchange of information with concerned institutions (3.3.2)

The project members from information section made a field visit to some selected projects in Rift valley and Western Kenya. The report for this visit is still being compiled. The field trip report for Embu and Meru was finalised and distributed.

4.3 Mobile shows (3.6.4)

Mobile shows were implemented in 10 venues covering four divisions. A total of 1144 adults and 2020 children attended the shows. The report for the shows was compiled and circulated.

The project also participated in the build up of the 2001 national tree planting ceremony by implementing similar shows in Nyando district. Over 300 adults and 700 children attended the shows.

4.4 Project Newsletter (3.6.1)

The 3rd issue of the project newsletter (*Miti ni Mali*) was produced and distributed. However, there was a problem in distribution of the Newsletter for FD and KEFRI – Kitui. The Newsletter did not reach the intended target as smoothly as planned. This problem was identified and a solution has been put in place.

4.5 Dissemination of information through other media (3.6.2)

(a) Publishing of supplements in the local print media

A supplement that highlighted the SOFEM project was published in May 2001. This was just prior to the annual national tree planting festivities (season). Another supplement was published in the local media in September prior to the second social forestry seminar.

(b) SOFEM video documentaries

The section embarked on production of 2 videos for promoting SOFEM activities and tree planting especially in the dry lands. It was not possible to

launch the videos in September 2001 as previously planned. However work on the documentaries continued upto to the end of the year.

(c) **Sofem website**

The project launched a website in its Muguga office in November 2001. The address of the site is www.kefri.org. In addition to the site providing information on the project, it also provides information on the three collaborators (JICA/KEFRI/FD)

4.6 Social Forestry Seminar (3.6.3)

The second social forestry seminar was held in September 2001. Over 100 participants including participants of the regional course for the promotion of social forestry in Africa attended the seminar. The project presented 16 papers from all its sections. Compilation of the proceedings is ongoing.

5.0 PUBLICATIONS

Publications produced during the year are:

- *Panda Mpenda bure shambani mwako* (swahili version of plant Melia in your farm (Leaflet) by B. Muok and E. Kyalo.
- Mobile Show report 2000 by L. Rateng, J. Musyoki and E. Akabane
- Mobile show report 2001 by A. Mwamburi and J. Musyoki

6.0 COLLABORATION

The SOFEM Project, as a joint project of three organisations; KEFRI, FD and JICA, collaborates strongly with various organisations in Kitui and throughout the country.

The organisations the project collaborated with in the year included.

- Kibwezi irrigation project (Embassy of Israel and University of Nairobi)
- United nations Educational Social & Cultural organisation (UNESCO)
- District Forestry Development project (Belgium Technical Cooperation)
- Institute of cultural affairs (K)

The project also enjoyed cordial relations with its other land use and related programmes in Kitui, Muguga and Karura.

7.0 HUMAN RESOURCES.

7.1 Training

Mr. J. Kimondo attended short-term training in Japan while Mr. O. Chahilu also a short-term training in Philippines.

7.2 Staff changes

Ms. E. Akabane, the information expert, left the project in May 2001 and was replaced by Mr. N. Nakamura in December 2001. Mr. Muneo Segawa, the project Chief advisor left the project in June 2001 and was replaced by Mr. A. Ioki.

7.3 Total Staff Establishment

The total number of staff in the year was as follows:

- KEFRI-Kitui 125
- Forestry Department 16
- JICA experts 6
- Casual staff 55

In addition, the project benefited from contributions made by staff of KEFRI headquarters in Muguga and the Forest Department headquarters in Karura.