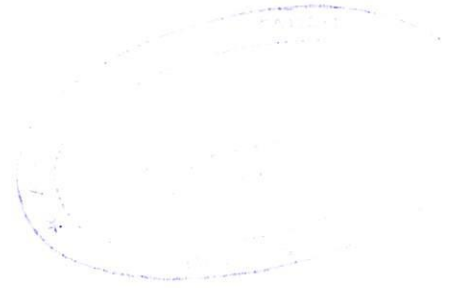


KITUI REGIONAL RESEARCH CENTRE



SOCIAL FORESTRY EXTENSION MODEL DEVELOPMENT PROJECT FOR SEMI-ARID AREAS IN KENYA (SOFEM)

ANNUAL REPORT FOR 1998

(REPORTING PERIOD: NOV.1997 – DEC. 1998)

EXTENSION METHOD AND INFORMATION SECTION

COMPILED BY: JOSEPHINE K. KALUMBU

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SOFEM ANNUAL REPORT FOR 1998

INTRODUCTION

Social Forestry Extension Model Development Project for Semi-Arid Areas in Kenya (SOFEM) is a collaborative work between Kenya Forestry Research Institute (KEFRI), Forest Department (FD) and Japanese International Co-operation Agency (JICA). The project was started in November 1997 with the main aim of equipping the inhabitants of semi-arid areas of Kenya with appropriate techniques to plant and manage trees through establishing farm forests by the local residents.

To achieve this goal, the project was divided into the following sections:

- Technology Development On-station
- Technology Development On -farm
- Farm forest establishment (extension)
- Extension method and information

Each section has its own mandate but all work jointly for the achievement of the above-mentioned goal. During the period under review the project was involved in preparatory works such as developing Project Design Matrix (PDM), plans of operations (PO) and implementation plans among others. Some of the Social Forestry Training Project Phase II activities were finalised. This report therefore outlines all the activities carried out by the project during the year 1998.

RESEARCH ACTIVITIES AND ACHIEVEMENTS

Few research activities continued in the pilot forest nursery and in the field. Monitoring of experiments that were started in the previous year continued. The progress of other activities stated in the Plan of Operation for each section is outlined below.

Technology Development (On-station)

1. Develop practical technique for establishment of farm forests in semi-arid areas

1.1 Develop technology in the pilot forest

1.1.1 Development of basic tree planting technologies

Activity 1.1.1.1 Seed Germination

Green House

Sowing of different species in the green house and pricking out of germinated seedlings was done. Some of the species sown include *M.volkensii*, *D.caffra*, *T.brownii*, *S.spectabilis*, *Vangueria rotundata*, *A.indica*, *M.indica*, *V.doniana* and *G.robusta*. Seeds of *Melia volkensii* were collected and root propagation tests done. Draft of experiment to test the germination rate under different factors such as pre-treatment methods, type of seed bed, age of pricking out among other plans is still being prepared. In relation to this activity, three poly

propagators were constructed for propagation of species that have difficulties in germination. Trials in the poly propagators included:

<i>Mellia volkensii</i>	-root/stem cuttings
<i>Azadirachta indica</i>	- stem cuttings
<i>Prosopis juliflora</i>	- thorny less stem cuttings
<i>Vitex doniana</i>	-stem cuttings
<i>Sclerocaria birrea</i>	-stem cuttings

Activity 1.1.1.2 Root System

A root system survey of eight species *G. aricantha*, *A.sieberiana*, *Psidium guajava*, *A. auriculiformis*, *Ziziphus mauritiana*, *C.papaya*, *P. americana* and *V. doniana* established in November 1997 was conducted in April 1998. For the experimental lay out see Appendix 1.

Activity 1.1.1.3 Insect/Disease Control

Monitoring was done every three months to study the effectiveness of cheaper local materials/concoctions and commercial chemicals in controlling termite damage in the 1996 and 1997 plots. Targeted species in this experiment were *E. camaldulensis*, *Casuarina equisetifolia* and *G.robusta* and the treatment applied were tobacco, wood vinegar, *Albizia anthelmintica* solution and *A. indica*.

Activity 1.1.2.3 Weeding Trial

This trial has already been planned but not yet set due to lack of the following apparatus:

- Stumble rain gauge sensor for measurement of underground rainwater discharge.
- Water potential measuring equipment used in determination of soil and leaf potential.
- Anemometer sensor used in the analysis of evaporation.

Activity 1.1.2.4.2 Sun Heat Shield Effect and Mulching

This trial on shading effect was planned for during the period under review but will be set later since it requires incorporation of many other factors hence more space and materials are needed.

Activity 1.1.4 Establishment of Wild fruits Demonstration Orchard

This was set in the pilot forest to test the performance of nine commonly used local dryland fruit tree species namely; *B. discolor*, *T. doniana*, *V. apiculata*, *A. digitata*, *S. birrea*, *C. ovalis*, *B. aegyptica*, *X. americana* and *L. uluguense*. This trial covers an area of approximately 1.0-hectare. See layout in Appendix 2

Activity 1.1.5.1 Weather Monitoring Data

At the Kitui Regional Centre and the pilot forest various meteorological parameters; temperature, rainfall, humidity and radiation were monitored and recorded. In the pilot forest probes were set and data loggers were installed. As at the end of 1998, a total of 817mm rainfall and a dry period of 5 months were recorded as shown on the graph in Appendix 3

Activity 1.1.5.3 Management of Experimental Plots and Road Network

Maintenance activities undertaken were bush clearing and weeding. Weeding was done through tractor disc plough and manual hand tilling. Manual weeding was done in compartment 2B, 4A, 4B and 4C, a total area of 3.69Ha (Appendix 4)

- Machine bush clearing was done for 0.7km major roads and 2Km minor roads.
- Replanting was done for dead or damaged trees in the roadside (Avenue) planting (phase I and II). A total of 133 seedlings were replaced as follows:

<i>Jacaranda mimosifolia</i>	-	42
<i>Delonix regia</i>	-	20
<i>Spathodea campanulata</i>	-	3
<i>Senna spectabilis</i>	-	68
- Dead fence which was damaged was completely repaired in compartment 2B (1997) of 1.5ha. and compartment 4B (1996) of 0.48ha.

Activity 1.1.5.4 Seed Collection, Production and Supply of Seedlings

Seed Collection

Seed collection and extraction was done for *Aberia caffra*, *Grevillea robusta*, *Sclerocaryea birrea*, *Prosopis juliflora*, *Senna siamea*, *Eucalyptus tereticornis* and *Mellia volkensii*. Species collected in the Coast Province were found affected by the change in seeding pattern. The most affected were *A.indica*, *P.juliflora* and *Eucalyptus* species. Overly this exercise was affected by the change of seeding pattern of most species, which was as a result of changes in rainfall pattern.

Tiva Tree Nursery

Routine activities such as potting, sowing, pricking out, watering, weeding and root pruning were carried out in the period under review. 23 different species were sown giving a total of 20,649 seedlings. The previous year's balance of seedling stock was 5561 giving a grand total of 26,210 seedlings in the nursery. A considerable number of the seedlings were lost due to effects assumed to have been caused by saline water bringing the total to 14,108 for 1998 seedling stock and 3089 for 1997 stock. A total of 12,000 seedlings were distributed to pilot forest, on-farm experiment, farm forest establishment (extension) farmers and others. Below is the list of species and number of seedlings produced in Tiva nursery in 1998.

1998 Seedling Stock

1. *Senna siamea* - 3500
2. *Azadirachta indica* - 4589
3. *Dovyalis caffra* - 200
4. *Atelea herbertsmith* - 207
(No.14182)
5. *Atelea herbertsmith* - 736
6. *Cassia spectabilis* - 700

7. <i>Schinus molle</i>	-	165
8. <i>Prosopis juliflora</i>	-	908
9. <i>Vitex doniana</i>	-	195
10. <i>Sclerocarya birrea</i>	-	171
11. <i>Grevillea robusta</i>	-	480
12. <i>Vangueria rotundata</i>		256
13. <i>Mangifera indica</i>	-	340
14. <i>Ficus benjamina</i>	-	234
15. <i>Lauranthus uluguense</i>	-	6
16. <i>Delonix regia</i>	-	512
17. <i>Jacaranda digitata</i>	-	112
18. <i>Adansonia digitata</i>	-	30
19. <i>Carica papaya</i>	-	320
20. <i>Terminalia mentalis</i>	-	60
21. <i>E. camaldulensis</i>	-	246
22. <i>Casuarina cunighaniana</i>	-	110
23. <i>E. senxylon</i>	-	<u>31</u>
Total		14,108

1997 Stock

1. <i>Tamarindus indica</i>	1450
2. <i>Balanites aegyptiaca</i>	600
3. <i>Dalbergia melanoxylon</i>	320
4. <i>Acacia senegal</i>	160
5. <i>Cordia ovalis</i>	159
6. <i>Terminalia prunoides</i>	260
7. <i>moringa oleifera</i>	70
8. <i>Acacia bevispica</i>	<u>70</u>
Total	3089

Activity 1.1.5.6 **Protection Against Human and Animal Damage**

This was achieved through the following activities:

- Conducting routine day time patrols to keep off encroachment of livestock and illegal human activities.
- Installation of 2 additional road barriers.
- Improvement of security equipment.
- Preparation of trench blocking on unnecessary outlet roads and paths.
- Repair and repositioning of road barriers to give the northern side neighbouring community a full time road access. Three barriers were repaired.

However, illegal cutting occurred in 3 plantations and encroachment of livestock increased over the year due to reduction of ground patrol force from 10 to 4.

The pilot forest land and others like UKAI Goat and Sheep project and Mwakini ranches were encroached by the local people as it appeared in the local Standard Newspaper of 16th December 1998 (Appendix 5). However, no change in experiments was witnessed for the action taken by the KEFRI Kitui office. The District and Provincial offices of Eastern province sorted out the issue.

Technology Development (On-farm)

1.2 Verify practical technology by on-farm experiments

1.2.1 Farmers' selection

Activity 1.2.1.1 Collection of Physical and Weather Condition Data

A resource survey was conducted and a socio-economic and resource survey report of Kitui District prepared as an output of this activity in June 1998.

Activity 1.2.1.2 Selection of Representative Farmers

Three farmers were selected as target for on-farm trials from each of the three divisions namely Central, Kabati and Chuluni. These were selected from the previous SFTP II target farmers due to time constraint. The major criteria used for selection were:

- willingness of the farmer to play a major role in the experimentation
- availability of enough land
- accessibility

Activity 1.2.1.3 Technology Workshop for Selected Farmers

This was successfully held on 22nd to 23rd October within Kitui Centre and the participants were 3 farmers from on-farm experiments, 6 farmers from farm forest establishment, DFEOs and TAs for the project and Forest Department. One or 2 members were invited from the family of each target farmer and a total of 25 farmers attended the workshop. The total number of participants was 46. See the workshop programme in Appendix 6.

1.2.2 Verification of Technologies dDveloped in the Pilot Forest

Activity 1.2.2.1 Water Harvesting (Micro-catchment)

Treatments on this experiment included: V-shape, W-shape and contour type of water catchment then a control. The species planted under these treatments was *Grevillea robusta*. See the proposed plan and plot designs in Appendix 7a, b, c and d.

Activity 1.2.2.2 Site Preparation

Monitoring is still being done on *M. volkensii* trees planted in the three experimental plots established in November 1998. The treatments in this experiment are hand hoeing, oxen plough and control. Monitoring duration is at the interval of 3 months and the parameters monitored are survival rate, height and diameter at ground level. See proposed plan and plot designs in Appendix 7a,b,c,and d.

Activity 1.2.2.3 Hole Size

This was tested in the three on-farm experimental plots for *Azadirachta indica*. The treatment considered were hole sizes 20cm x 20cm, 45cm x 45cm and 60cm x 60cm. Same parameters as for site preparation are to be tested at three months interval. The constraint encountered is that two farmers planted maize crop in this experimental plot. See the proposed plan and plot designs in Appendix 7a,b, c and d.

1.2.3 Introduction of New Technology

Activity 1.2.3.1 Fruit Trees

Grafted seedlings of *mangifera indica* were planted in the three on-farm trial plots. The species planted are:

- Grafted *Mangifera indica* (Apple, Tommy and Harder).
- Grafted *Citrus* species (Washington, Navel and Tangerine).
- *Carica papaya* (raised in Tiva nursery).
- Due to inadequate rainfall in November and December 1998, bottle watering is being done. See proposed plan in Appendix 7a.

Activity 1.2.4 Weather Monitoring and Soil Sampling

Simple rain gauges were installed in each of the three on-farm plots and 3 farm forest establishment plots. Monitoring is continuing since September 1998. See rainfall data in Appendix 8

Farm Forest Establishment (Extension)

2. Design, establish, monitor, and evaluate farm forest

2.1 Establish farm forests in SFTP II target area

Activity 2.1.1 Select Target Farmer within the SFTP II Target

This was done by use of previous SFTP extension data and by conducting first and second selection surveys. Six target farmers were selected from the SFTP II new target areas that is, 2 farmers per division (Kabati, Chuluni and Central). See Appendix 9.

The selection criteria were: -

- Accessibility to Forest Department, Technical Assistant (TA).
- Farmers willingness to plant trees
- Adoption of tree planting and tending techniques developed by project.

Activity 2.1.2 Conduct Profile Survey on Selected Targets

Profile survey was done for the six selected target farmers during the month of August 1998. This was aimed at collecting all the necessary information lacking in the survey reports and required to establish and manage farm forests.

Activity 2.1.3 Design Target Farm Forests

This was done based on maps made by use of compass during the profile survey. Location, type of farm forests and species to be planted were decided together with farmers. Site maps were made in which planting points were shown such that the number of trees to be planted could be counted on the map (Appendix 10).

Activity 2.1.4 Establish Farm Forests

- Six target farm forests were established through planting of trees on the designed plots on the target farmers' farms. This was done early October 1998. All of the target farmers planted fruit trees and some of them planted other tree species for windbreak or establishment of wood lot, boundary planting or live fence.
All six farmers were supplied with bottles for watering during the dry season. They also made water catchment. Individual fences were made to protect seedlings from livestock and strong sun heat. Weeding was done around the trees. Replacement was done for *Carica papaya* seedlings, which were found to be males and those, which died probably due to shock during transportation, poor hardening up and root rot. However, some of the farmers have not yet done replanting due to lack of quality seedlings.
- Establishment of Farm Forest Demonstration at Tiva was also undertaken and it involved the following activities:
 - a) A fruit orchard of *Mangifera indica*, *Persia americana*, budded *Citrus sinensis* and *Custard apple* was established.
 - b) A live fence of *Acacia mellifera* was established by direct sowing Method but the germination rate was found to be very poor.
 - c) Two different bamboo species collected from Museve forest were planted and they developed shoots, showing quite a good performance without any intensive treatment. However, one species died later due to unknown reasons.
 - d) A bamboo rain gutter was installed for roof water harvesting to Demonstrate effective utilisation of local materials.
 - e) A charcoal water purification system was also installed.
 - f) Mapping of demonstration plot was done.

Activity 2.1.5 Monitoring Establishment of Farm Forests

This is a continuing activity and it is done at a frequency of once or twice per week depending on the times a farmer is visited.

The aspects monitored include survival rate, health, wildlife/human damages, disease/pest attacks, and management techniques such as spot fencing and weeding. Project TAs, Forest department TAs, Extension officers, and DFEOs do monitoring. The methods used in this activity include observation, counting, and discussion with the farmers.

2.1.6 Record Keeping

This is done as frequently as the farmer is visited and whenever there is anything important to be recorded. The TAs and Extension agents use record forms. The farmers keep a record book which is used by the farmers themselves, TAs, Extension officers and any other visitors giving technical advice to farmers. Observations of the farmers and recommendations made by visiting officers are recorded in this book.

2.2 Collect and Analyse Information Concerning Establishment of Farm Forest

Activity 2.2.1 Review of SFTP II Extension Approaches

This activity involved extraction of information from the SFTP II reports, which are relevant to SOFEM project. Review of all-important reports on extension approaches was done and compiling of the report started.

Activity 2.2.2 Conduct General Condition Survey in Target Areas

General condition survey was done in November 1997 in Kabati, Chuluni, Central and Mutomo. This was done randomly by interviewing a few farmers. Secondary data was collected on the target area, analysed and the first draft report was prepared. Location survey was also conducted in February and March 1998 through questionnaires distributed to 33 location Chiefs in Central, Kabati, Chuluni and Mutomo. The final report is being prepared.

Activity 2.2.3 Conduct Forest Resource Survey

A short-term expert from Japan conducted this activity. Satellite imagery and ground survey was done to map together forest types and land use within the district. The team visited pilot forest area, Mutito, Mutomo and Kabati divisions for ground checking. GIS data was constructed and accumulated in computer for vegetation, soils, roads, administrative boundaries and climatic zone in the four divisions. However, new satellite imagery will be required in future and facilities for processing the data are not adequate in the Centre.

Activity 2.2.4 Conduct Survey for General Condition of Individual Farmer in Target Area

A socio-economic survey was conducted by use of questionnaires. A total of 90 farmers were interviewed in Kitui District that is in Central, Chuluni, Kabati and Mutomo divisions. This activity was undertaken jointly by all the sections and forest department personnel. Data collected was analysed and a socio-economic report prepared as mentioned under the on-farm section as activity 1.2.1.1.

Activity 2.2.5 Study of Forestry Extension Status

This activity is aimed at finding out the current forestry extension situation in the target areas. This will help to know the opportunities and constraints expected while implementing the project activities. Information was collected from Technical agents during the technology workshop and collection of available literature on forestry extension in the target area is still on process.

Activity 2.2.6 **Literature Review on Establishment of Farm Forests**

This activity is aimed at gathering useful information from literature related to farm forest establishment. Some information has already been abstracted.

Extension Method and Information

3. Collect, synthesise and disseminate information on social forestry extension

3.1 Make preparations for information activities

Activity 3.1.1 Clarify Information Flow on Social Forestry Extension

The objective of this activity is to make clear the situation of information flow within and outside KEFRI, FD and other concerned institution. Some interviews with concerned persons were done in each institution, in order to gather details on information flow and a report was compiled and the editing is about to be completed.

Activity 3.1.2 Preparation of Guideline for Information Activities

This activity is aimed at collecting, handling and storing information on project activities in a systematic and logical manner; hence records of the various activities conducted by different sections of SOFEM Project will be collected and documented for reference purpose.

The first draft of the guideline was completed and distributed to members for comments before preparing the final draft.

Activity 3.2 Hold Regular Meetings

Meetings have been held on monthly basis to confirm the progress and the next step of each information activity as well as bringing together the section members who are in different offices. Minutes of each meeting have been produced.

3.3 Collect and Analyse Information from Outside Sources

Activity 3.3.1 Collect and Analyse Publications

The objective is to collect publication on social forestry extension activities and extract useful information from publications to create information resource base for social forestry extension.

A book/report request form has been distributed to P.I.C members and their responses are yet to be received. A book catalogue has been circulated among officers and experts in each section based on their requests, and a list for purchasing is under preparation.

Activity 3.3.2 Exchange Information with Concerned Institutions

A technical information exchange programme to visit Tanzania JICA Kilimanjaro Community Social Forestry Project was to be implemented in 1998 but it was postponed to early 1999 due to unavoidable circumstances.

3.4 Collect Information Accumulated Through Project Activities

Activity 3.4.1 Keep Record of Project Activities

This is to ensure that all the useful information accumulated through project activities is recorded and stored appropriately to be used in developing appropriate social forestry extension methods.

The format for record keeping has been developed and issued to project staff for testing purpose after which all necessary amendments will be made. Existing information has also been compiled in to quarterly reports and SOFEM annual report for the year 1998 is yet to be prepared.

Activity 3.4.2 Collect Information from Farmers or Extension Agents

This is aimed at having farmers'/extension agents' views and experiences put into consideration when developing the social forestry extension model. The format for information collection form has been tested and given to Project TA's and FD TA's through DFEO to start off the activity.

3.6 Disseminate Information Through Publications or Events

Activity 3.6.1 Publishing Project Newsletter

This is aimed at creating awareness of project activities and technologies available to the farmers within the project area. It will also provide a forum for farmers to express their views on their day to day activities and their problems. The final draft of the first issue was completed, printed and distribution was done early 1999.

COLLABORATION

The SOFEM project maintained good relationship with governmental ministries such as Ministry of Agriculture and Livestock Development and non-governmental organisations such as Belgium and Israel project in Kibwezi and DANIDA among others. SOFEM project activities continued well. The Centre collaborated well with other institutions and organizations by offering its facilities and staff for workshops, seminars and other activities.

SPECIAL EVENTS

A socio-economic survey methodology workshop was held in the Centre from 2nd to 6th March and participants were KEFRI and Forest Department staff working for the SOFEM project. The JICA Experts also participated. Two resource persons were invited from the Egerton University. After the workshop, socio-economic and resource survey was carried out at 4 divisions namely Mutomo, Kabati, Chuluni and Central. This was done from 11th to 25th March by staff from KEFRI, Forest Department and JICA.

During the month of April, several meetings were held during which drafting of Project Design Matrix (PDM) and Plan of Operation (PO) was done. The consultation mission from Japan visited the Kitui Centre as from 7th to 17th May 1998 and held meetings on PDM, PO and monitoring plan.

The Chief Conservator of Forests visited the Centre and was pleased with the activities being undertaken by the SOFEM project through the joint support of KEFRI, FD and JICA. KEFRI's Board of management visited the Centre and observed the project activities in the pilot forest project and the SFTP II farmers

MANPOWER STATUS

The SOFEM project had 6 JICA experts, about 12 Kenyan counterparts and several support staff including drivers, secretaries, administrators and casual workers.

As at the end of March the SOFEM project had 93 JICA casuals.

Due to financial problems the number of these casuals reduced to 66 towards the end of the year. For the 1998 organisation chart see Appendix 11.

PUBLICATIONS

There were several meetings held and preparation of several pamphlets presented during the workshop. Such include general information on the area to be covered by the SOFEM project.

The following publications and reports were also produced over this year:

Socio-economic and Resource Survey of Kitui District by **Muok, B.O, J. Kamene, K. Kemmochi and A. Ali.**

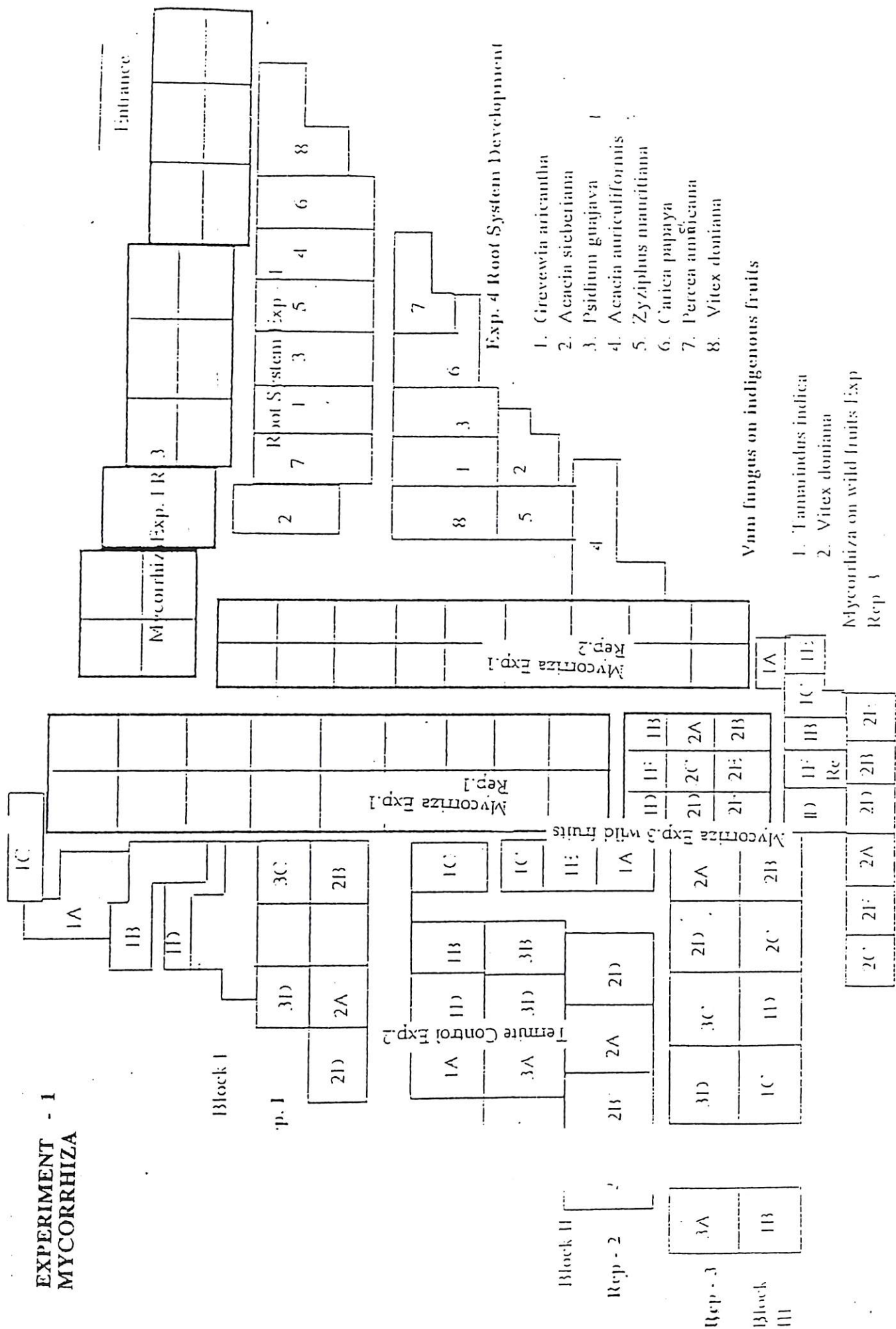
Proceedings of the workshop on socio-economic and resource survey methodology.
Compiled by **Bernard Owuor and Lucas Rateng.**

Technology workshop implementation report.
Compiled by **J. K. Kalumbu.**

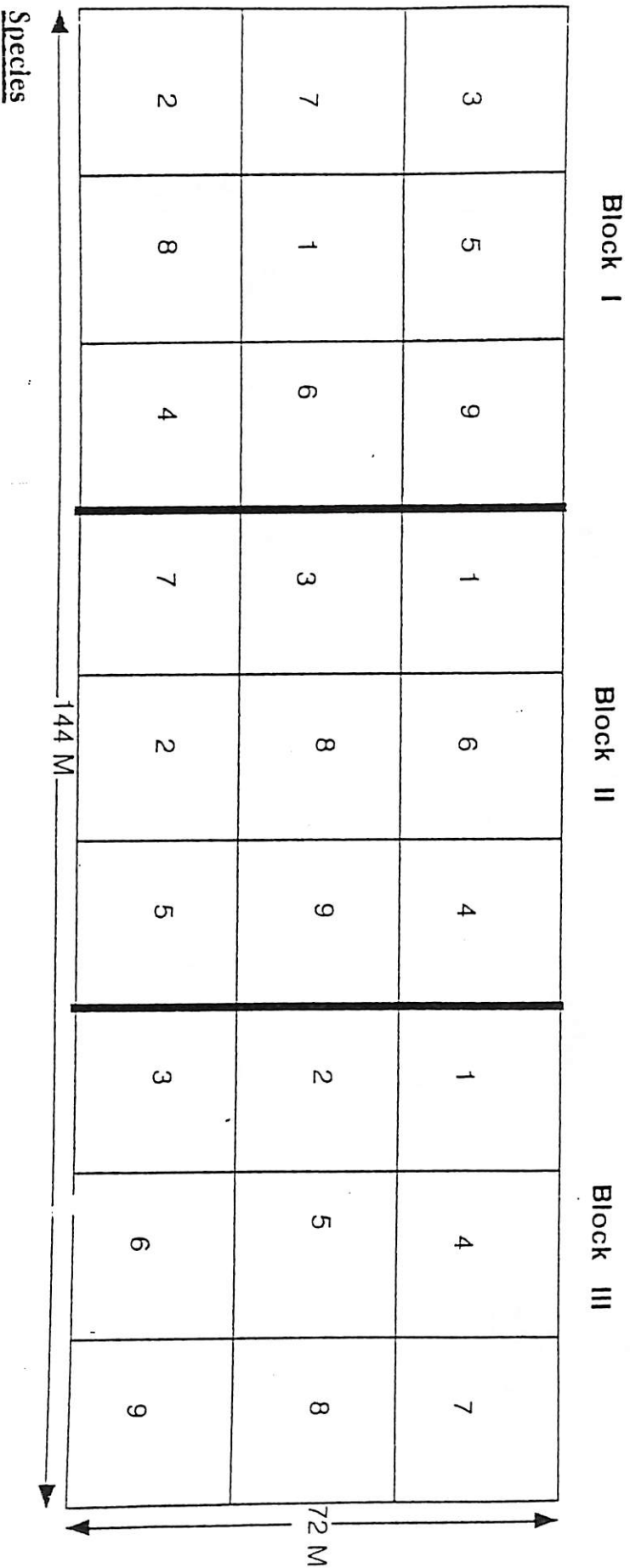
The publication noted below was revised:

Tiva Nursery seed stands (Preliminary Report) Kenya/Japan SOFEM (May 1997) by **E. M. Kyalo** (On-farm officer) and **T. Minami** (On-farm Japanese Expert).

**EXPERIMENT - 1
MYCORRHIZA**



Wild fruits demonstration trial plot layout, plan - 1998



1. Adansonia digitata
2. Balanites aegyptiaca
3. Berchemia discolor
4. Cordia ovalis
5. Grewia ancartha
6. Sclerocarya birrea
7. Tamarindus indica
8. Vangueria rotundata

Espacement: - 4m x 4m

Area: (144 m x 72 m) - 1.04 Ha

Sub - plot: (4 holes x 6 holes) - 24 planting holes

No. of Species: - 9

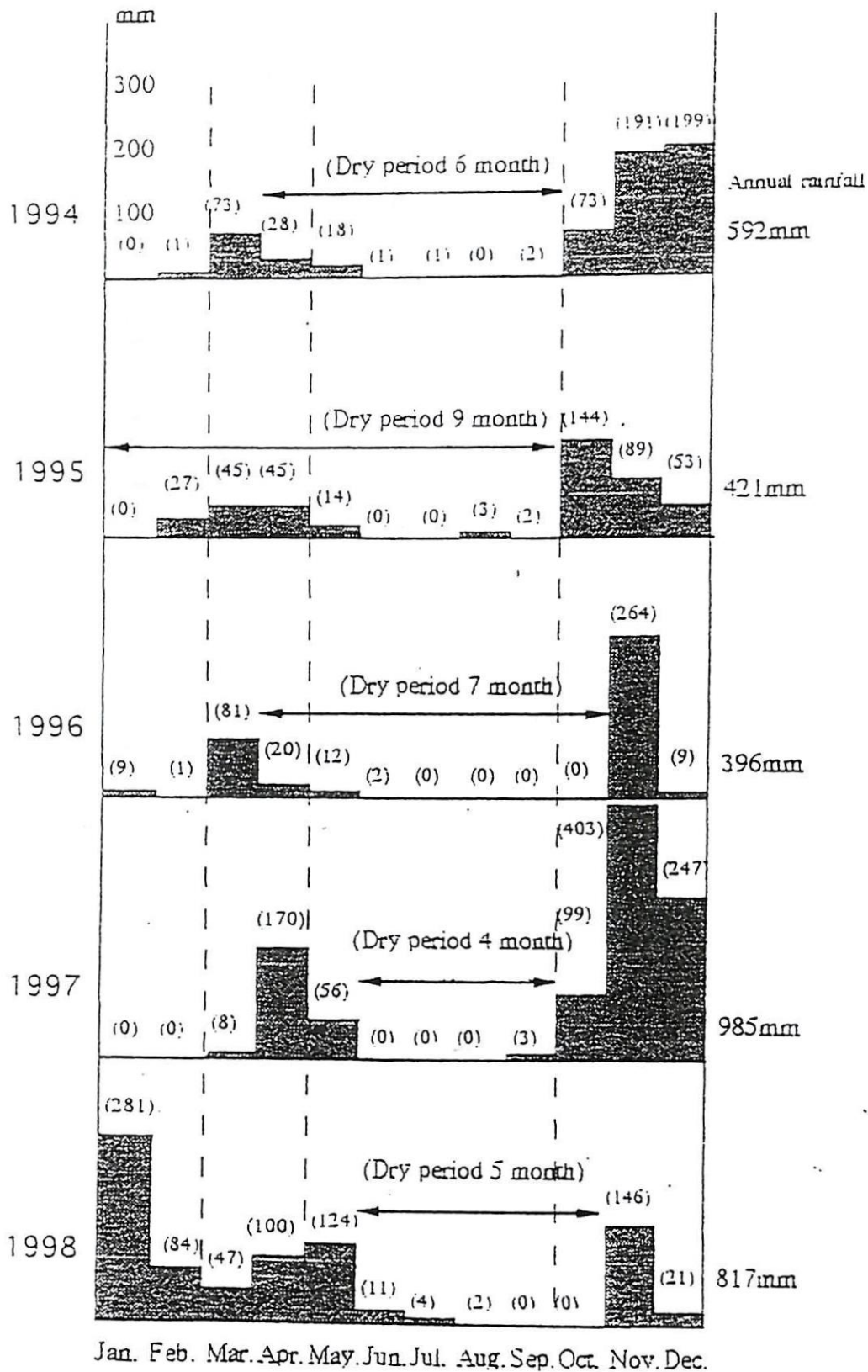
Blocks: - 3

Seedling requirement per species: 24 x 3 = 72 seedlings

Total seedling requirement: - 24 x 9 x 3 = 648

Planted date: 27/Nov./1998

Appendix 3: Annual Rainfall for Tiva in 1998



Locals grab KEFRI land

DRAMA unfolded in Kitui yesterday when over 400 residents armed with pangas invaded the giant Kitui Kenya Forestry Research Institute (KEFRI) project and started allocating themselves land.

The residents chased away the KEFRI casual workers at the 2,000 acres pilot research project situated 21 km from Kitui town.

The project is on Government land belonging to KEFRI. The area is used for forestry research and is being funded by the Japanese Government. It is situated in Kwavonza location along the Kitui-Nairobi road.

It all started when the area residents armed with pangas and led by local councillors

By James Owour

invaded the site and started dividing the land among themselves after driving the KEFRI officials out.

The residents claimed the land which has been used by the KEFRI for several years belonged to them and they wanted it back.

A resident, Daniel Katua, said the leaders and elders have decided to have their ancestral land back, adding the government should find an alternative land for the KEFRI project.

The bitter residents had already grabbed 30 per cent of the total land as the area administrative officials tried to keep vigil and held an urgent meeting at the site.

Appendix 6: Technology workshop programme

22/10/98(Thursday)

	Title	Lecturer	Remark
9:50-10:20	Opening speech	Mr. A. Gondo (DFO Kitui)	At Kitui Centre
10:20-11:30	Role of target farmers and extension agents in SOFEM activities	Mr. B. Muok	
11:30-11:45	Break	Mr. A. Atanas	
11:45-13:00	Profile of important tree species	Mr. A. Atanas	
13:00-14:00	Experiment design, establishment and management	Mr. B. Muok	
14:00-15:00	Lunch		Showing video tape
15:00-15:30	Nursery Management	Mr. E. Kyalo	
15:30-16:30	Grafting technique	Mr. G. Mutua	
16:30-16:45	Break		
16:45-17:30	Planting, tending and management techniques	Mr. O. Mudanya	
18:00	Dinner		
			Stay at KEFRI Kitui Centre

23/10/98(Friday)

	Title	Lecturer	Remark
8:30-9:00	Move to Tiva		
9:00-9:45	Visit Tiva Nursery (seedlings, seed stands, demo area, etc.)	Mr. E. Kyalo	
9:45-11:00	Visit pilot Forest (water catchment, spacing, etc.)	Mr. S. Auka	
11:00-11:30	Move to Katangi		
11:30-12:30	Visit one on farm	Mr. E. Kyalo	One in Farm in Katangi
12:30-13:30	Move back to K.T.C		
13:30-14:30	Lunch	Mr. L. Rateng Mrs. J. Musyoki	discussion with farmers while taking lunch
14:30-14:40	Closing speech	Mr. B. Muok	

Appendix 7a

On-farm Experiment
Proposed plan on plot

SUBJECTS	Plot No.	Treatments	M a n a g e m e n t s					Weeding	Species
			Land preparation	Hole size	Spacing	Water catchment			
1.2.2.1 Water catchment	1-A,B	V-Shape	Oxen plough	45cm	3.5*3.5m	V shape			
	1-C,D	W-shape	Oxen plough	45cm	3.5*3.5m	W shape		<i>Gravillea</i>	
	1-E	Contour	Oxen plough	45cm	3.5*3.5m	None		<i>robusta</i>	
	1-E	Control	None	45cm	3.5*3.5m	None			
1.2.2.2 site preparation	2-A,B	Oxen plough	Oxen plough	45cm	3.5*3.5m	V shape		<i>Melia</i>	
	2-C	Hand plough	Hand plough	45cm	3.5*3.5m	V shape		<i>volkensii</i>	
	2-D	Control	None	45cm	3.5*3.5m	V shape			
	3-A,B	20cm	Oxen plough	20cm	3.5*3.5m	V shape		<i>Azadirachta</i>	
1.2.2.3 Hole size	3-C,D	45cm	Oxen plough	45cm	3.5*3.5m	V shape		<i>indica</i>	
	3-E,F	60cm	Oxen plough	60cm	3.5*3.5m	V shape			
	Guard Rows (Buffer)			45cm					
1.2.3.1 Fruits (2)	M-1	Mangoes Var.	None	60cm	5.0*5.0m	V shape		<i>S. Siamea etc.</i>	
	C-1	Oranges Var.	None	60cm	5.0*5.0m	V shape		<i>Mangoes</i> <i>Oranges</i>	

*1 Way of weeding will be decided the next year.

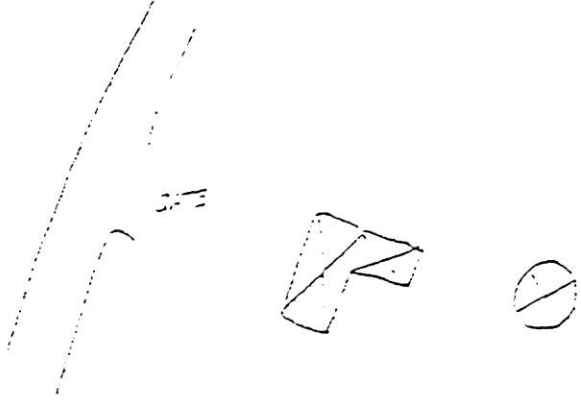
*2 The number of plots of fruits will depend on the number of breeding varieties of each species.

Monitoring Item	a) Survive rate
	b) Height
	c) Diameter

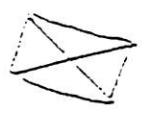
Duration of monitoring
a) Confirmation: 1 month
b) Every 3 months after 3 years
c) Once a year after 4 years

PLOT DESIGN -Mrs. Lucia-

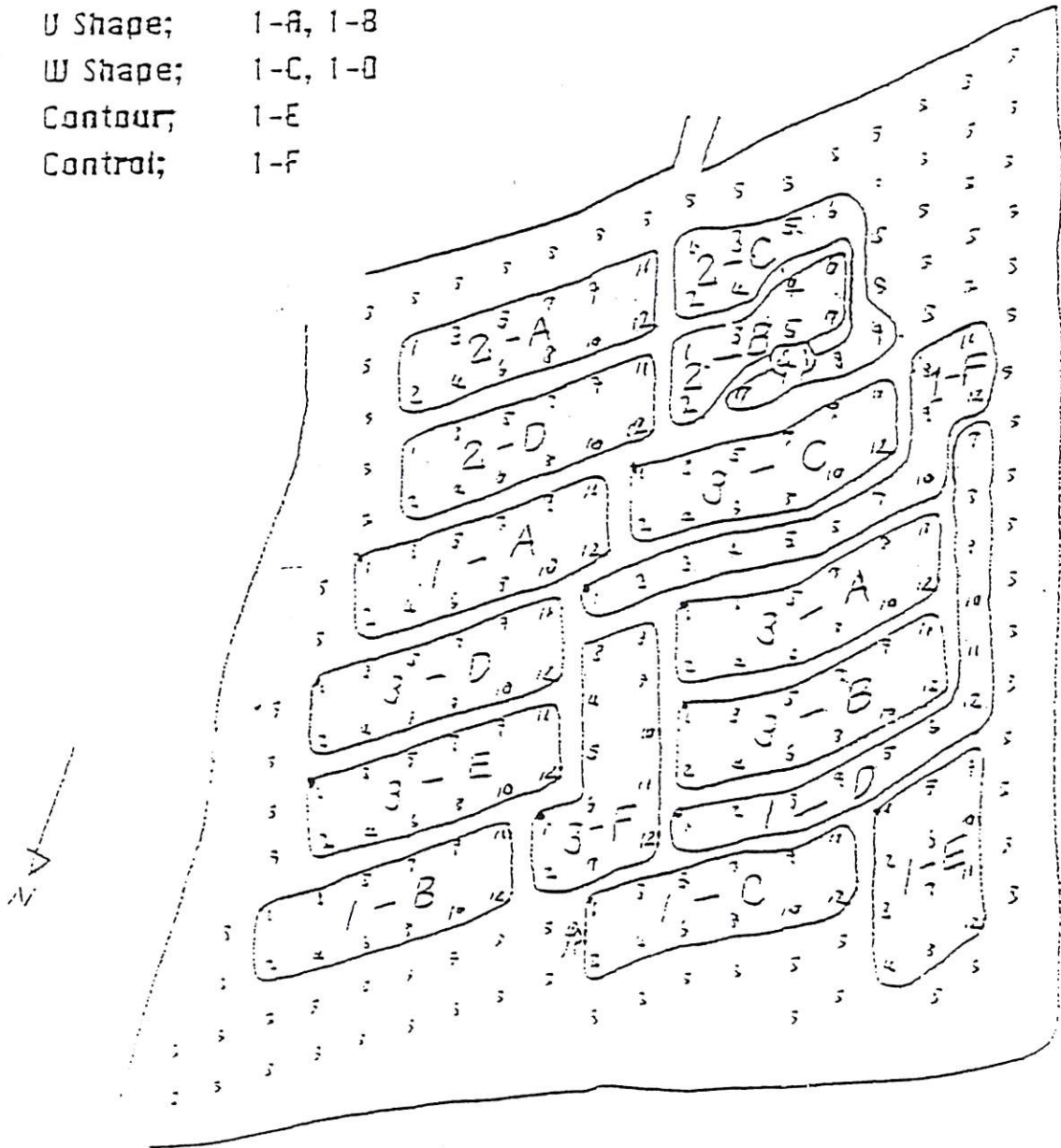
- Hole Size Block (*A.indica*)
 - 20*20cm; 3-A, 3-B
 - 45*45cm; 3-C, 3-D
 - 60*60cm; 3-E, 3-F



- Site Preparation Block (*M.volkensii*)
 - Oxen Plough; 2-A, 2-B
 - Control; 2-C, 2-D



- Water Catchment Block (*G.robusta*)
 - U Shape; 1-A, 1-B
 - W Shape; 1-C, 1-D
 - Contour; 1-E
 - Control; 1-F



PLOT DESIGN -Mrs. Nguli-

Water Catchment Block (*G.robusta*)

U Shape; 1-A, 1-B

W Shape; 1-C, 1-D

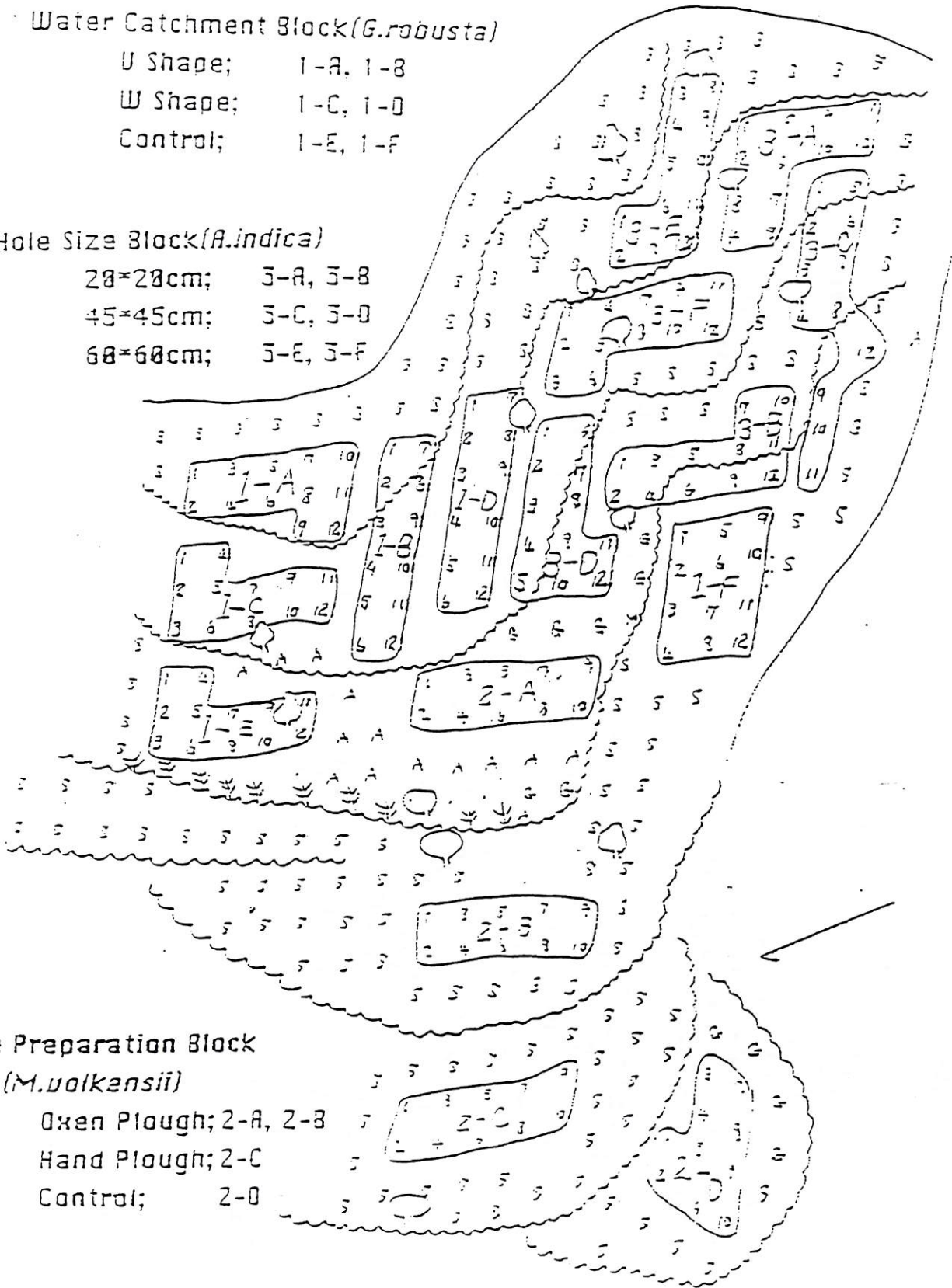
Control; 1-E, 1-F

Hole Size Block (*A.indica*)

28*28cm; 3-A, 3-B

45*45cm; 3-C, 3-D

68*68cm; 3-E, 3-F



Site Preparation Block

(*M.volkensii*)

Oxen Plough; 2-A, 2-B

Hand Plough; 2-C

Control; 2-D

PLOT DESIGN -Mr. Ngonde-

Site Preparation Block (*M. volkens*)

Oxen Plough; 2-A, 2-B

Hand Plough; 2-C

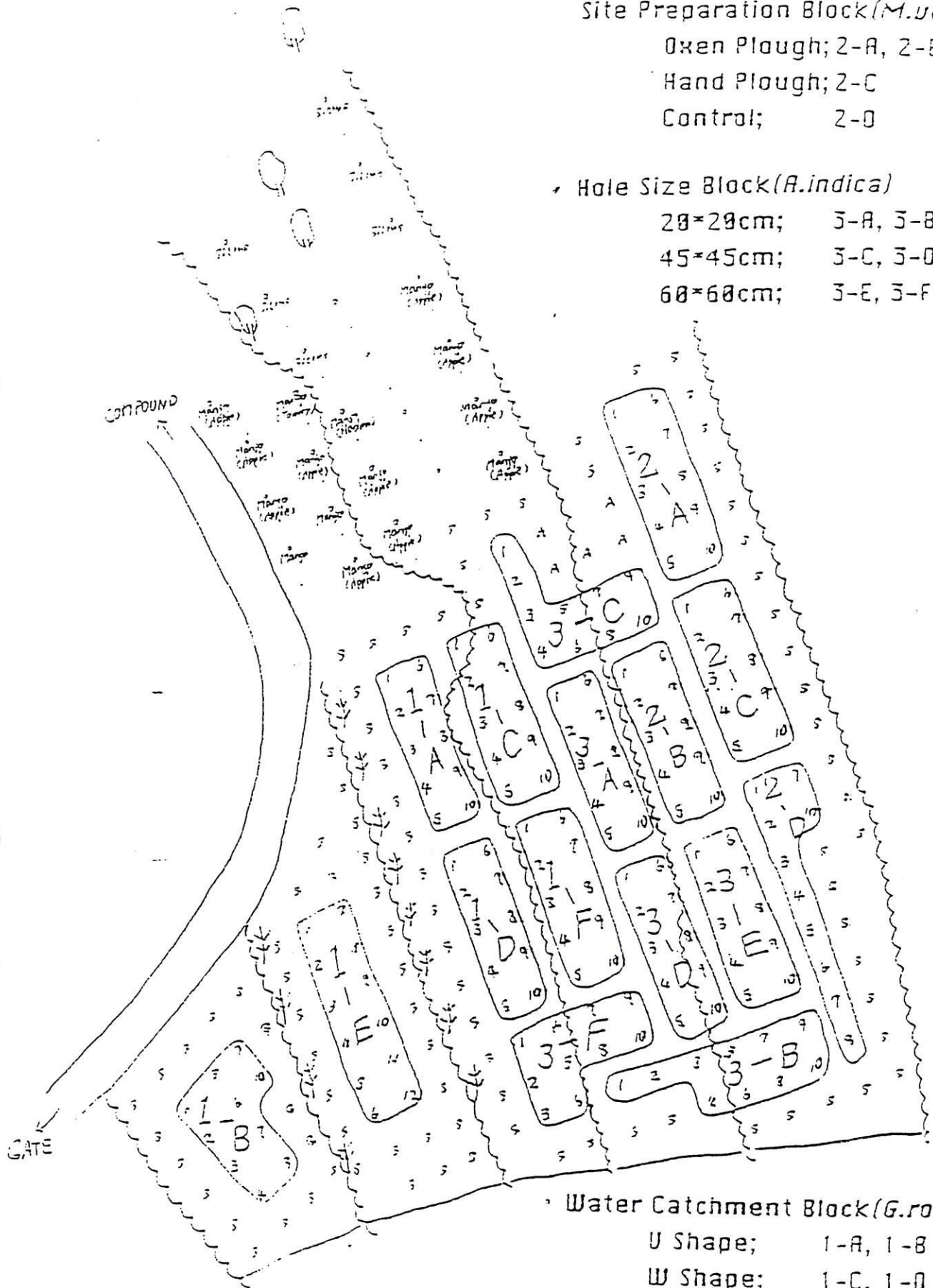
Control; 2-D

Hole Size Block (*A. indica*)

20*20cm; 3-A, 3-B

45*45cm; 3-C, 3-D

60*60cm; 3-E, 3-F



Water Catchment Block (*G. robusta*)

U Shape; 1-A, 1-B

W Shape; 1-C, 1-D

Contour; 1-E

Control; 1-F

Appendix 8

Rainfall Records

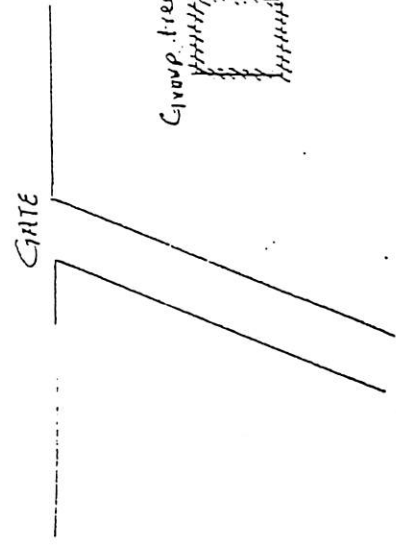
MONTH	K.T.C.	TIVA	CENTRAL		KABATI		CHULUNI	
			LUCIA	MATINDIA	NGULI	MUTWII	NGONDE	KYENZA
Oct. 1998	17.0	0.0	2.4	0.5	1.0	0.0	1.5	2.5
Nov.	362.0	144.5	250.2	285.0	265.5	174.8	292.5	390.0
Dec.	49.0	20.5	42.5	49.5	45.5	14.0	16.0	102.5
TOTAL	428.0	165.0	295.1	335.0	312.0	188.8	310.0	495.0

Appendix 9:List of target farmers for farm forest establishment in 1998

1	Mrs. Josephine K. Munyao	Central Division	Kyangwithya West Location
2	Mr. Pius M. Matindia	Central Division	Kyangwithya West Location
3	Mrs. Beatrice Mutwii	Kabati Division	Kathivo Location
4	Mr. Mwaka Muli	Kabati Division	Kathivo Location
5	Mrs. Fridan Mutyambai	Chuluni Division	Nzambani Location
6	Mrs. Edith Kyenza	Chuluni Division	Nzambani Location

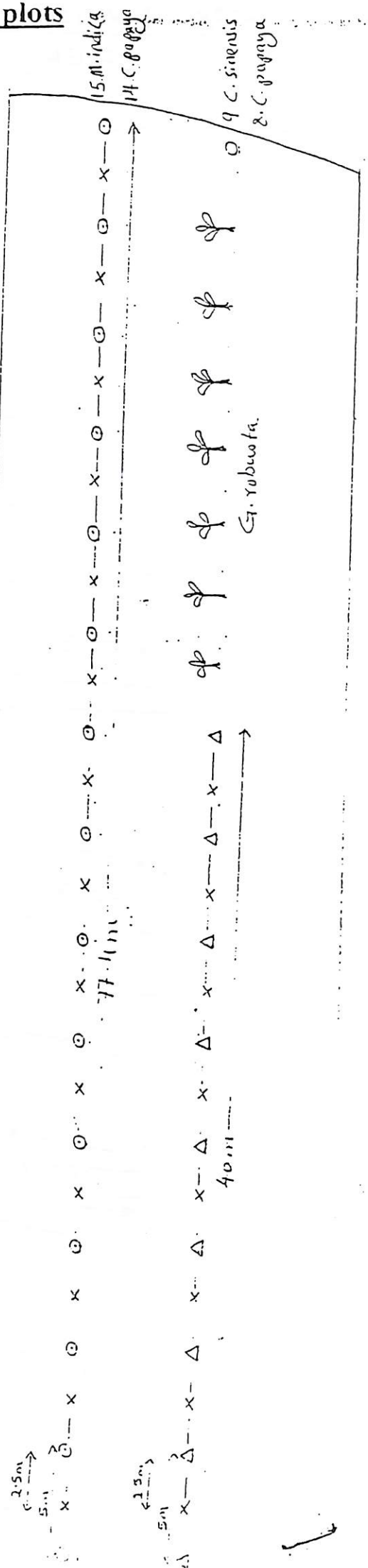
FIELDS LAYOUT 1998

Appendix 10: Design of farm forest establishment plots

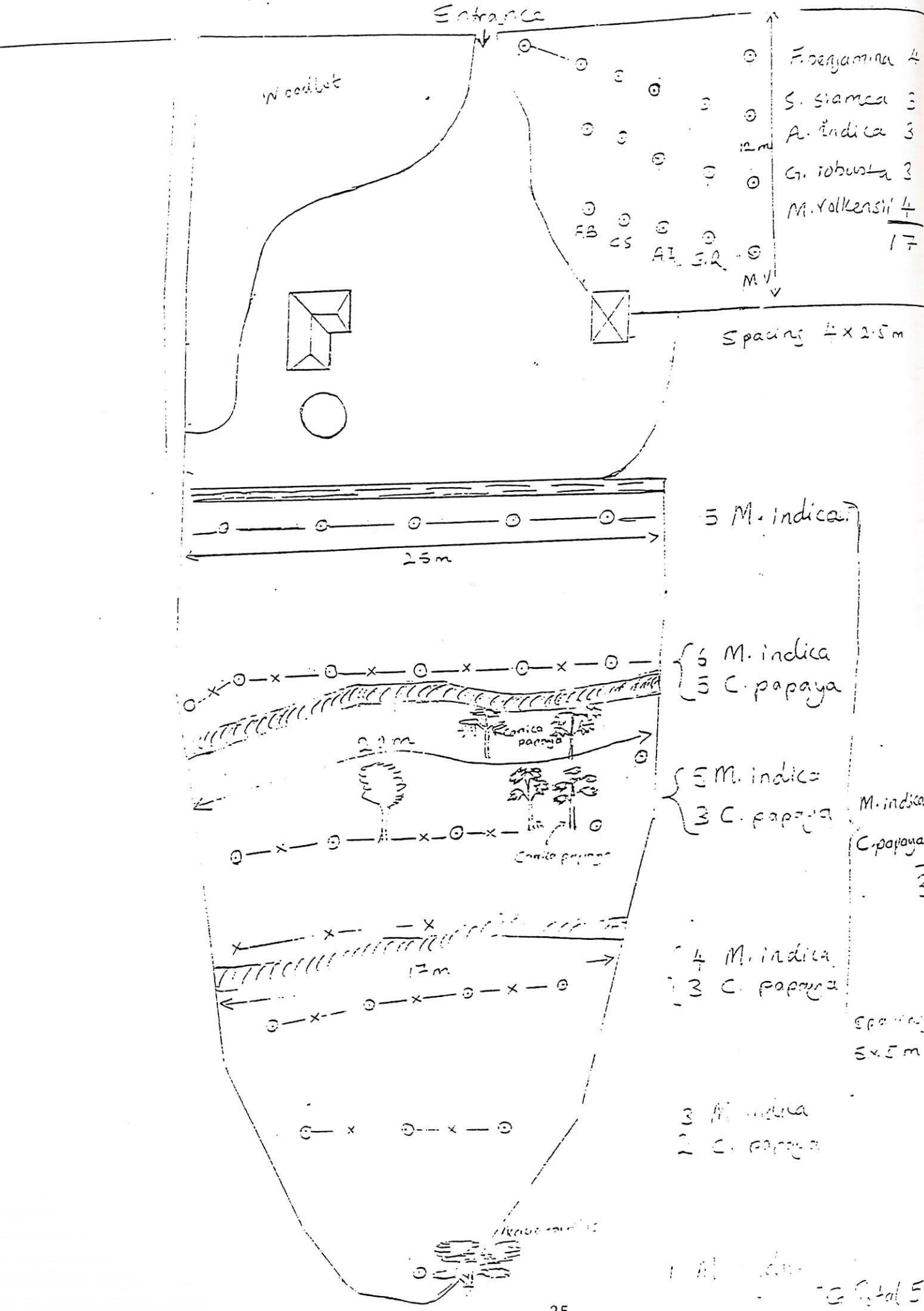


Mangifera indica	15
Citrus sinensis	9
Carica papaya	22
Total	46

Key
 O - Mangifera indica
 x - Carica papaya
 Δ - Citrus sinensis



CENTRAL DIVISION Mr Pius Matindia
 FIELD LAYOUT 1998



- F. benjamina 4
- S. siamea 3
- A. indica 3
- G. robusta 3
- M. volkensii 4
- 17

Spacing 4 x 2.5 m

5 M. indica

6 M. indica
 3 C. papaya

3 M. indica
 3 C. papaya

M. indica
 C. papaya
 3

4 M. indica
 3 C. papaya

Spacing
 5 x 5 m

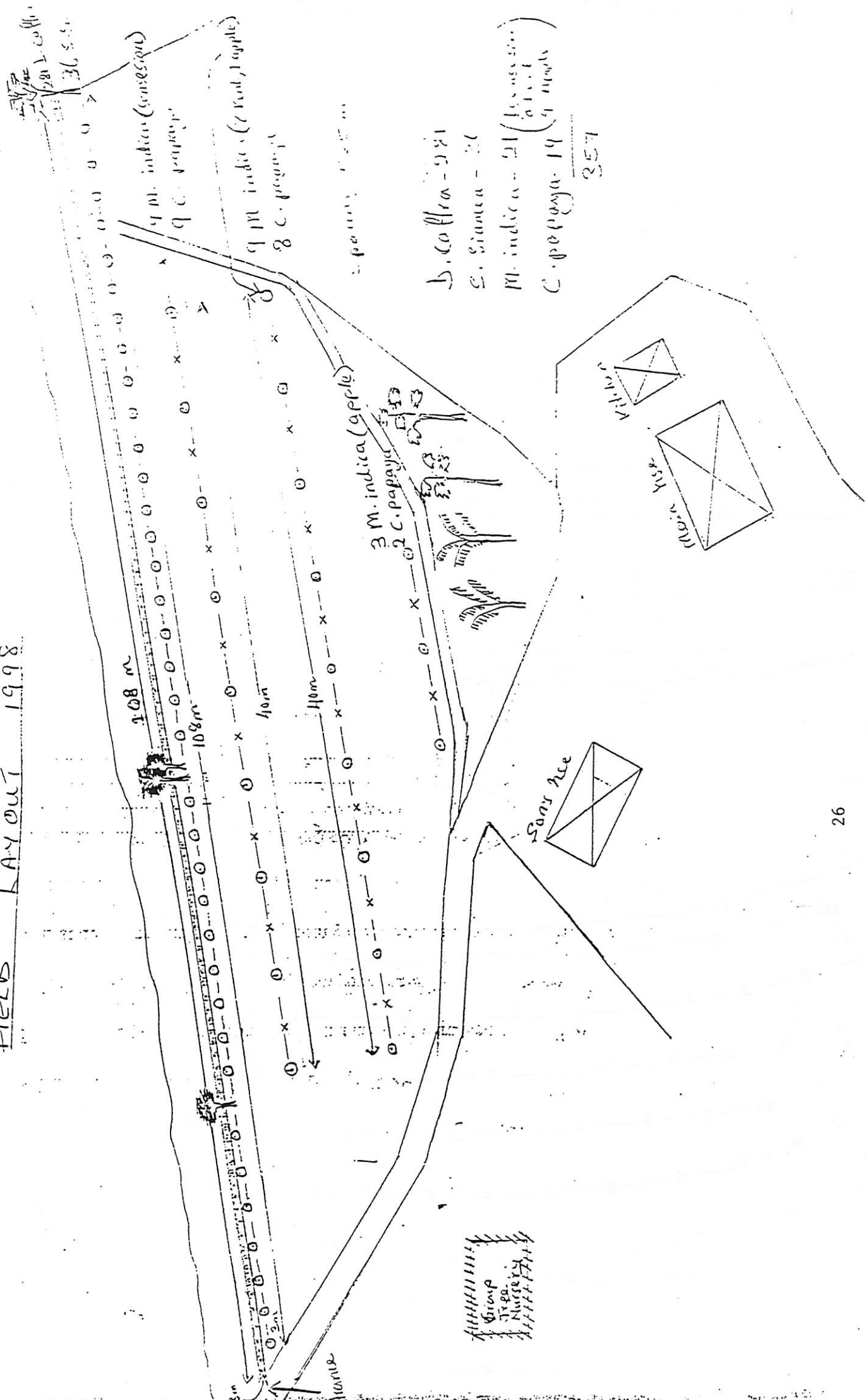
3 M. indica
 2 C. papaya

1 M. indica

Total 5

CHILLUNI DIVISION Mrs Friedlovh, Mutiambari

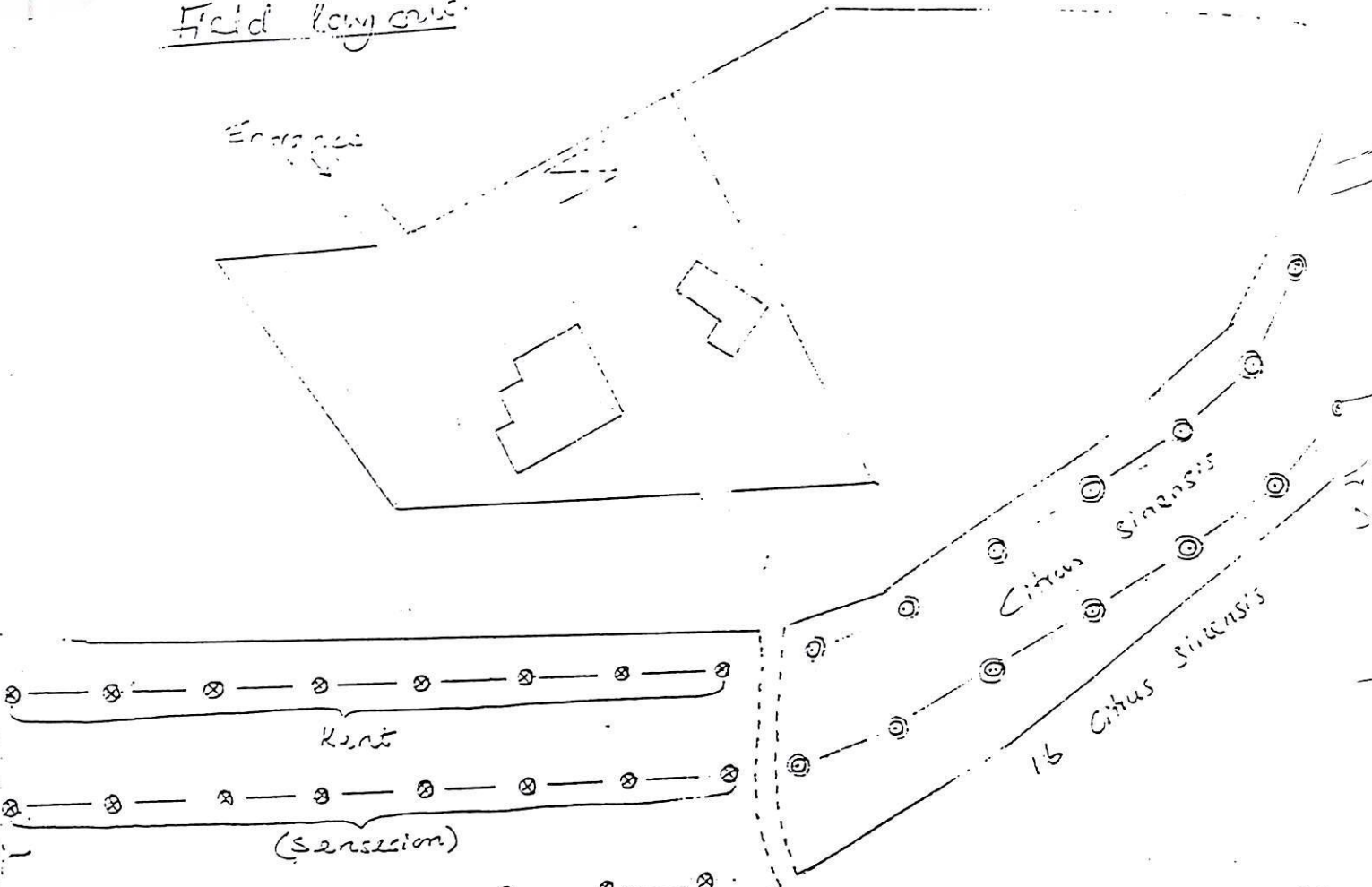
FIELD LAYOUT 1998



Chulani Division
 Field layout

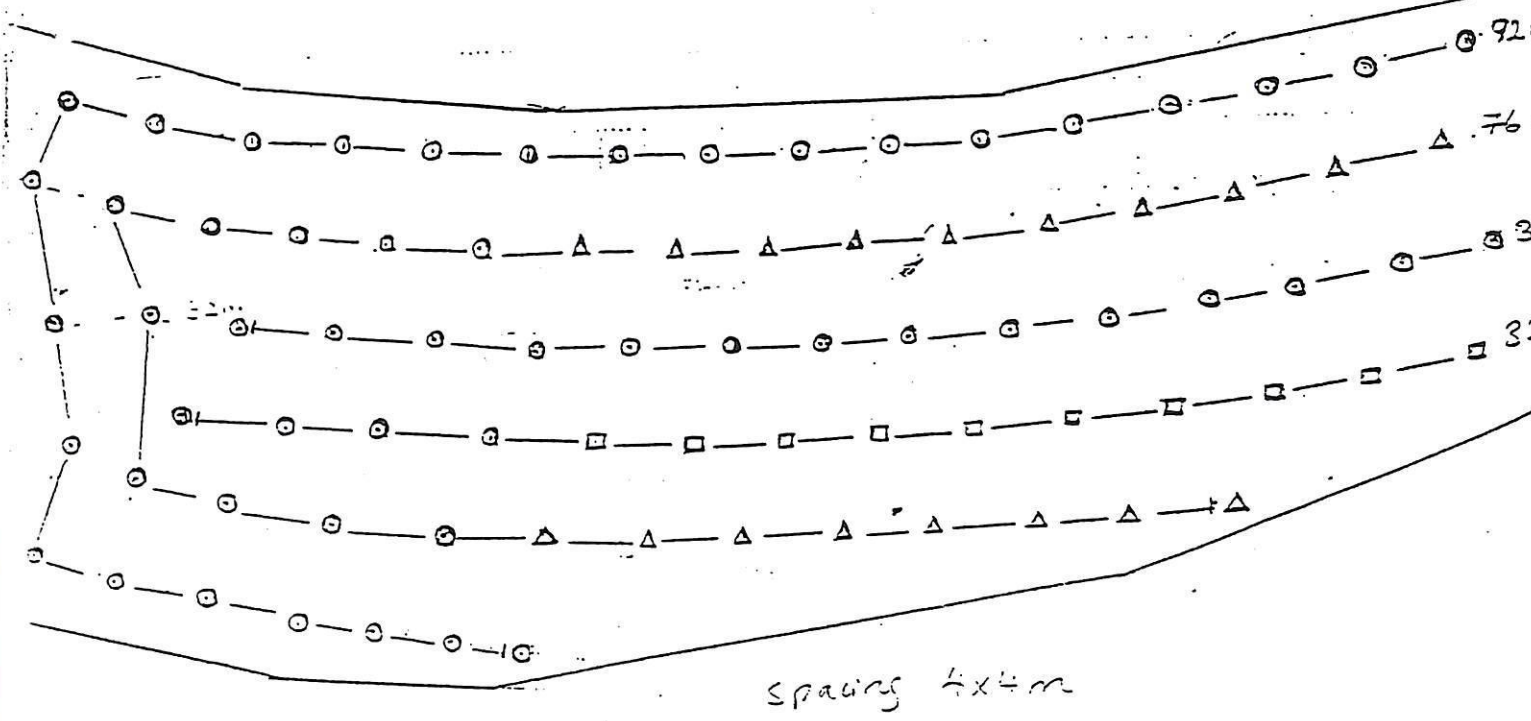
Mrs Edith Kenza

Engage



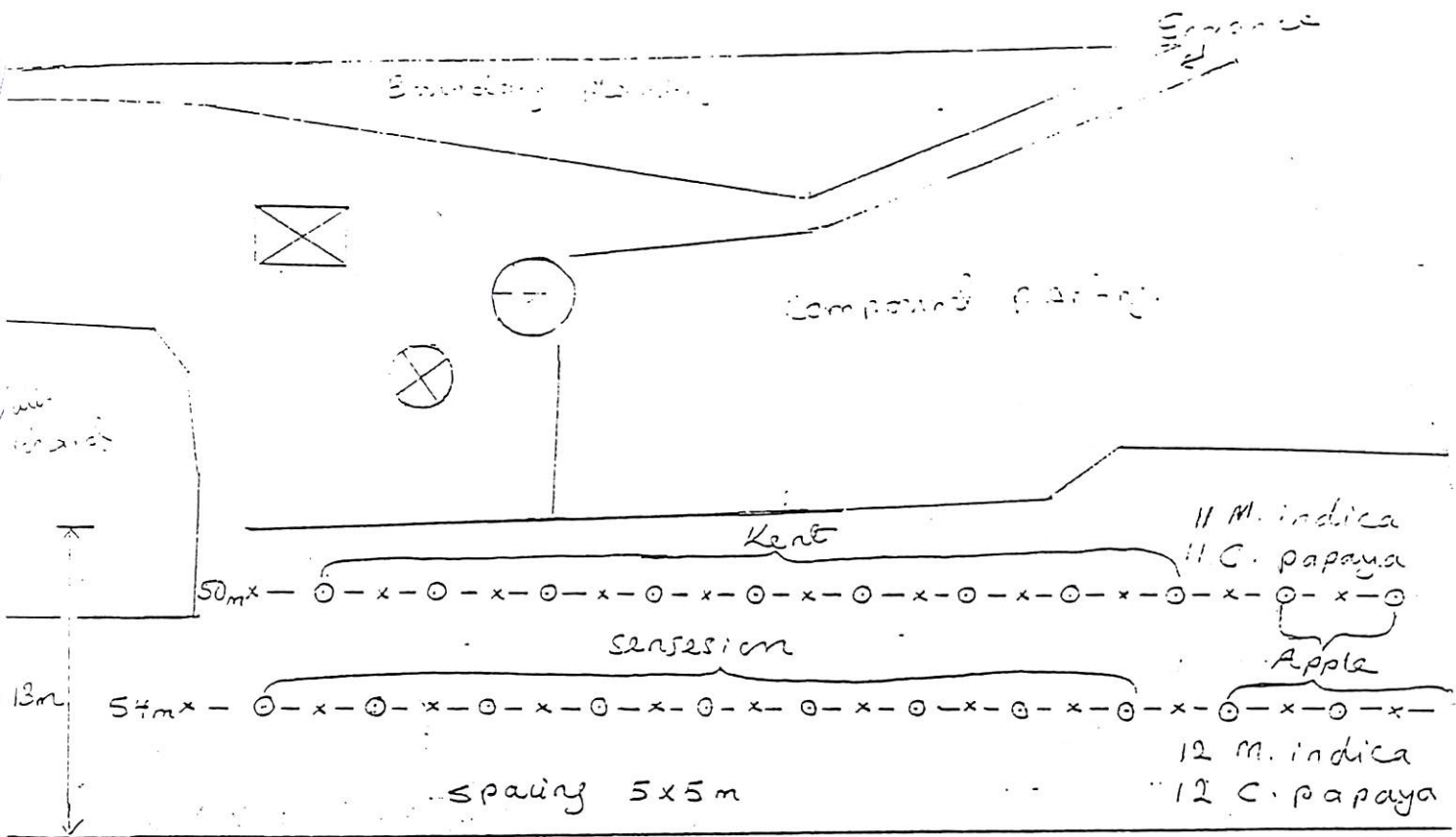
22 M. indica
 Spacing 5x5m

⊗ M. indica	-	22
⊙ Citrus sinensis	-	16
⊙ G. robusta	-	54
△ C. Cunninghamiana	-	18
□ C. lusitana	-	10
		<hr/>
		120



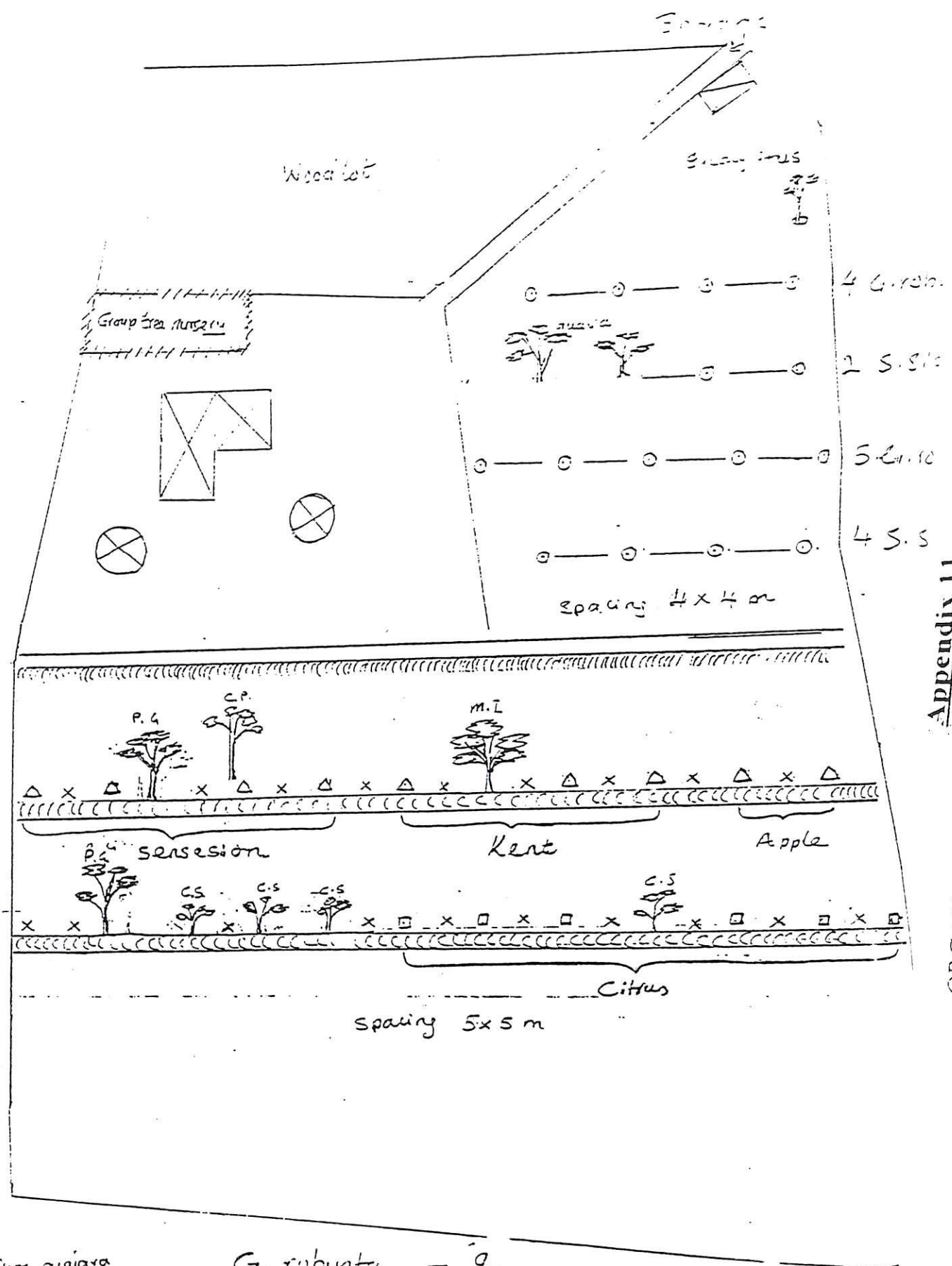
spacing 4x4m

FIELD LAYOUT 1998



○ Mangifera indica - 23
 x Carica papaya - 23
 46

FIELD LAYOUT 1998

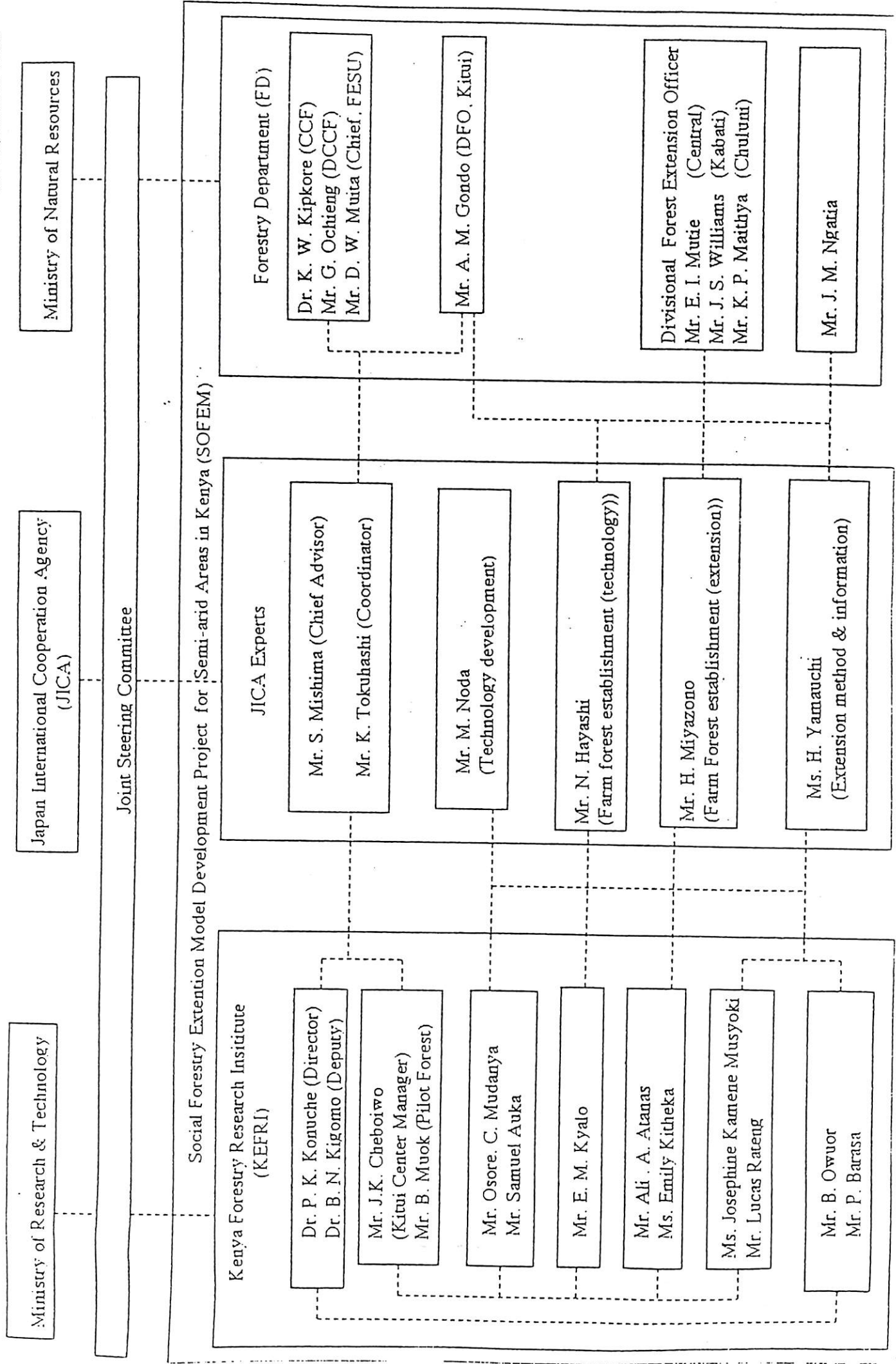


Appendix II
ORGANIZATION CHART OF THE PROJECT

- | | | |
|-------------------------|---------------|------|
| P.G - Psidium guajava | G. robusta | - 9 |
| C.S - Citrus sinensis | S. siamea | - 6 |
| C.P. - Carica papaya | Δ M. indica | - 9 |
| M.I. - Mangifera indica | □ C. sinensis | - 6 |
| | x C. papaya | - 19 |

ORGANIZATION CHART OF THE PROJECT

1st September 1998



Ministry of Research & Technology

Japan International Cooperation Agency (JICA)

Ministry of Natural Resources

Joint Steering Committee

Social Forestry Extension Model Development Project for Semi-arid Areas in Kenya (SOFEM)

Kenya Forestry Research Institute (KEFRI)

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Dr. B. N. Kigomo (Deputy)

Mr. J. K. Cheboiwo (Kitui Center Manager)
Mr. B. Muok (Pilot Forest)

Mr. Osore. C. Mudanya
Mr. Samuel Auka

Mr. E. M. Kyalo

Mr. Ali. A. Atanas
Ms. Emily Kitheka

Ms. Josephine Kamene Musyoki
Mr. Lucas Rateng

Mr. B. Owuor
Mr. P. Barasa

JICA Experts

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Mr. K. Tokuhashi (Coordinator)

Mr. M. Noda (Technology development)

Mr. N. Hayashi (Farm forest establishment (technology))

Mr. H. Miyazono (Farm Forest establishment (extension))

Ms. H. Yamauchi (Extension method & information)

Forestry Department (FD)

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Mr. G. Ochieng (DCCF)
Mr. D. W. Muita (Chief, FESU)

Mr. A. M. Gondo (DFO, Kitui)

Divisional Forest Extension Officer
Mr. E. I. Mutie (Central)
Mr. J. S. Williams (Kabati)
Mr. K. P. Maithya (Chuluni)

Mr. J. M. Ngatia

