AGROFORESTRY REVIEW AND PLANNING WORKSHOP FOR THE EASTERN HIGHLANDS AND LOWLANDS

WORKSHOP PROCEEDINGS

BY

John Okorio
Hillary Agaba
Clet.M. Wandui
Gerald Ongodia

Held at

Salem Brotherhood, Mbale on 16TH – 17TH December 2002

FORESTRY RESOURCES RESEARCH INSTITUTE (FORRI)

January 2003

Table of contents

Table of contents i

1.0 Introduction and background 1

1.1 Project Goal, purpose and outputs 1

1.2 Workshop objectives 1

1.3 Workshop structure 2

Session 1: Opening and Welcome Remarks 3

a) Workshop Opening by Mr. Ayoo Peter, IUCN, MEDCP 3
b) Welcome Remarks by Mr JFO Esegu, Director FORRI 4
c) Defining the Workshop Objectives by Dr. J. Okorio, Programme Leader Agroforestry 5
d) On-farm Evaluation of boundary tree planting in Eastern Uganda by Dr J. Okorio and J. Sekatuba 5
e) Potential of Temperate fruit growing in the Highlands of Eastern Uganda by David Siriri, Kabale 8

Session II: Presentation of On-going activities in the farming systems 11

a) Control and Management of termites in the field; Indigenous knowledge (IK) on termite control by Dr. Nyeko Philip and Mr. Kiwuso Peter. 11
b) Termite problems in agroforestry, presented by Dr. Nyeko Philip 14
c) On-farm wood production activities in the High lands and low lands of Eastern Uganda by David Wafula 17
d) Soil fertility management in Eastern Uganda by Ibwala Opolot 21
e) Fruit tree Production in Eastern Uganda by Dr. Kagorora Kanahe 25
f) Capacity building activities in the eastern lowlands and highlands by Agaba Hillary 31
g) Introduction to Planning in working Groups by Clet Wandui Masiga 36

Session III: Development of Work-plans by District teams 40

a) Development of workplans and presentations 40
b) Comments on district work-plan presentations: 41
c) Closing Remarks by Mabuya George, District Forest Officer Mbale 42

1.0 Introduction and Background

With support from the European Union (EU), the Agro-forestry program of the Forestry Resources Research Institute (FORRI) of the National Agricultural Research Organization (NARO), has conducted Agroforestry research and development activities in the country since 1996 to date. The areas of coverage were mainly the lakeshore region (districts of Mukono, Mpigi, Wakiso and Mubende), the Kigezi highlands (districts of Kabale and Rukungiri), and in the eastern region (districts of Iganga, Busia Tororo, Kumi and Mbale). Two years ago, the EU extended support for implementation of Agroforestry R & D activities in the eastern lowlands and highlands of Uganda under the Agroforestry Research and Development project. The project goal, purpose and the expected outputs are outlined below.

1.1 Project Goal, Purpose and Expected Outputs

The project's overall goal is to contribute to the improvement of livelihoods and natural resource base conservation in the target areas. The project purpose is to improve land productivity, tree products and services. The following are the expected outputs of the agroforestry research and development project:

- Capacity to conduct agroforestry research increased.
- Appropriate agroforestry practices developed, tested and validated.
- Effective dissemination methodologies identified and applied.
- Capacity of development partners to interface with clients enhanced
- Effective joint co-ordination, monitoring and evaluation mechanisms put in place.

The project is implemented under three pillars namely: - Research, Dissemination and Capacity building. Research is undertaken to determine the best trees/shrubs for wood production, soil fertility enhancement, high value trees and fodder production. Under dissemination, linkages with development partners such as Non-governmental Organizations (NGOs), farmer groups and local councils are established in order to extend appropriate agroforestry technologies to target beneficiaries. Capacity building involves farmer training, training of trainers (TOTs), formal training of staff, student attachments and awareness creation about agroforestry among the local and district councils, political leaders, institutions and schools.

1.2. Workshop Objectives

The workshop was held at Salem Brotherhood in Mbale town from 16th – 17th December 2002, and was attended by participants from the districts of Busia, Tororo, Iganga, Mbale and Kumi. The participants

comprised of FORRI scientists, district departmental heads, NGO's and councilors. The two-day review and planning workshop was organized with the following objectives.

- To review the on-going agroforestry activities in research, dissemination and capacity building for the past year (2002) in the Eastern lowlands and Eastern Highlands.
- To develop annual work plans for the districts of Iganga, Tororo, and Kumi in the Eastern lowlands; and in district of Mbale in the Eastern Highlands for the coming year (2003).
- To identify areas of collaboration with partners in each district for the two zones.
- To highlight commitment of resources by various agroforestry partners (districts, NGOs, local councils) on collaborative activities.

1.3. Workshop Structure

The first day of the workshop constituted three sessions. Session one included workshop registration, self introductions, introductory remarks and defining workshop objectives. Session two covered the presentations on the review of past and on-going agroforestry activities in the various districts, while session three covered the development of work plans for each district, group discussions and presentations of the proposed plans by the participating districts of Iganga, Kumi, Mbale, Busia and Tororo. The programme for day two included a visit to the project nursery in Mbale and a field visit to Bumbo sub-county to see agroforestry activities in some of the farmers' fields.

Session I: Opening and Welcome Remarks

Chaired by Dr. Nyeko Philip, Faculty of Forestry and Nature conservation, Makerere University

This session began with self-introductions by participants and was followed by the opening remarks by the guest of honour.

a) Workshop Opening by Mr. Ayoo Peter (IUCN, MEDCP)

In his opening remarks, Mr. Ayoo recognized the presence of the director of Forestry Resources Research Institute (FORRI), the Agroforestry co-ordinator, FORRI, and his team, the workshop organizers, partners in Agroforestry Development both from government and Non-Government collaborating institutions from the Eastern highlands and Lowlands.

On behalf of the communities and people from the districts of the Eastern highlands and Lowlands and on his own behalf, he expressed gratitude and appreciated the honor and opportunity that FORRI have given to the communities of these zones at this crucial moment to be involved in the promotion of Agroforestry Research and Development amongst the rural communities of the Eastern region.

The recent sustainable development summit in Johannesburg- South Africa brought a fresh public focus and awareness to the high population growth problems particularly in developing countries, the associated environmental degradation due to population pressure on the natural resource base, particularly forest and land products and services and the need to enhance Agricultural productivity. These three interrelated issues of environmental degradation, high population growth rate and the need to enhance Agricultural productivity constitute a triple global challenge to many communities, governments and Non-governmental organizations especially in the developing countries, including those in the Eastern Highlands and Lowlands.

In all the four participating districts of this region (i.e. Iganga, Busia, Tororo, Mbale and Kumi), the challenge paused by the environmental degradation is evidenced by decline in agricultural productivity due to increased soil erosion and soil fertility decline, deforestation, encroachment on protected areas and household poverty and food insecurity, exacerbated by high population growth, combine to make agroforestry both a land use system and technology that holds the future of the rural communities in this region. This is because a majority of these communities derive their livelihoods from land and forest products and services.

This workshop involves technocrats (researchers and extensionists), two key players in the rural Agroforestry development process and the purpose is mainly dual: -

- Review of the previous agroforestry research work and extension in the region
- Participatory planning as a way forward in the collaboration between FORRI and partners in agroforestry research and development.

The workshop is timely because it comes at a time of the initiation of the Uganda Government's plan to eradicate poverty amongst the rural communities through the Poverty Eradication Action Plan (PEAP) to be implemented as Plan for Modernization of Agriculture (PMA), Local Government Development Program (LGDP), and Poverty Alleviation Fund (PAF).

This is relevant because it recognizes the need for strategies to ensure collaboration among the different stakeholders and the need for mobilization of resources to be committed for sustainable interventions in addressing the needs of rural households and communities in this region. However, the practicability and success of agroforestry activities will depend on the participation at all levels of planning, implementation, monitoring and evaluation of agroforestry plans that continuously involve the farmers, researchers and the extension workers in the region. With these remarks, I wish to take the honor and privilege to declare this workshop open.

b) Welcome Remarks by Director FORRI, Mr. J.F.O Esegu.

The Director welcomed all the participants to the workshop and emphasized the purpose of the workshop as: -

- Review of the past agroforestry activities that have already been done; and
- Participatory planning in Agroforestry Research and Development while aiming at improving the livelihoods of the communities in the target areas

This is a challenge to agroforestry research and development process and for it to be of any relevance, we as researchers have the mandate to develop appropriate agroforestry technologies that can be consumed by the end-users. We can then be hopeful that if properly practiced, then the communities should be able to produce agroforestry products such as firewood, fodder, poles and timber for construction on a sustainable basis thus meeting their household needs and at the same time maintaining the natural resource base.

This can be achieved by accessing variable information that can be useful in developing strategies, together with the development partners in research; identifying areas for capacity building at various levels (i.e. extension staff, development workers, policy level etc); identifying areas of collaboration with the development partners as a collective effort into the agroforestry research and development effort.

This should form the basis for incorporating agroforestry activities into district work plans. Again for agroforestry R & D to succeed, we must also develop appropriate dissemination strategies in order for the developed agroforestry technologies to reach the beneficiaries. We must also commit resources in terms of both manpower and logistical support. Therefore with all these issues at hand, we as researchers and development partners have the challenge and I call for a collective effort from all of us in championing agroforestry research and development in Eastern Highlands and lowlands.

c) Defining the Workshop Objectives by Dr. J. Okorio, Programme Leader Agroforestry, FORRI

Dr. Okorio presented the objectives of the workshop as outlined earlier in section 2.0. He further outlined the expected workshop outputs as: -

- Collaborative activities in Research, Dissemination and Capacity Building in each of the districts of the two zones for the coming year (2003) developed;
- Areas of collaboration with agroforestry development partners in each district of the two zones identified.
- Resources for commitment towards implementing and supporting collaborative activities by partners, (districts, local councils, NGOs etc) agreed upon.

d) On-farm Evaluation of boundary tree planting in Eastern Uganda by Dr J. Okorio and J. Sekatuba

In 1995, agroforestry activities were initiated in the districts of Iganga, Tororo and Mbale. The aim was to evaluate on-farm boundary tree species in selected parishes in each district. Contact farmers were selected and they planted the tree species. Tree species planted were *Alnus acuminata, Casuarina equisetifolia, Grevillea robusta* and *Maesopsis eminii.* A report on the growth performance of these species on the farms was made.

In Iganga district the study was conducted in Bugweri county, Ibulanku sub-county and in the parishes of Ibulanku and Kikuyu, while in Tororo district the work was done in West Budama county, Tororo sub-county in the parishes of Nyangole and Kidera. In Mbale district, the activities were carried out in Bulambiuli county, Bulago sub-county in the parishes of Bunasafwa and Bumwambu.

Table 1: Number of tree seedlings and Farmers

District	*Number of Farmers*	*No. of seedlings distributed*
◆ Iganga	133	130,000
◆ Tororo	956	220,000
◆ Mbale	437	198,000
◆ **Total**	**1,526**	**548,000**

Table 2: Number of tree seedlings and Farmers

District	*Number of Farmers*	*No. of seedlings distributed*
• Iganga	133	130,000
• Tororo	956	220,000
• Mbale	437	198,000
• **Total**	**1,526**	**548,000**

Table 3: Seedling survival and causes of mortality by district

District	*Species*	*Survival (%)*	*Causes seedling mortality*
◆ Iganga	*Grevillea robusta*	63	Termites, mole rats, drought, animal
	Maesopsis eminii	65	damage, thefts and malicious damage
	Casuarina equisetifolia	61	
◆ Tororo	*Grevillea robusta*	66	Termites, drought, animal damage, thefts &
	Casuarina equisetifolia	64	thefts and malicious damage
◆ Mbale	*Grevillea robusta*	83	Drought, planted with tubes, animal
	Alnus acuminata	85	damage, thefts & malicious damage

Table 4: The growth of the tree species in Iganga District

Species	Parish	Height (m)	Diameter (cm)
♦ *Grevillea robusta*	Ibulanku	7.8	18.0
	Kikuyu	11.3	18.8
	Mean	**9.7**	**18.4**
♦ *Maesopsis eminii*	Ibulanku	7.7	20.1
	Kikuyu	12.3	20.6
	Mean	**10.0**	**20.4**
♦ *Casuarina equisetifolia*	Ibulanku	6.7	12.6
	Kikuyu	12.1	14.1
	Mean	**9.4**	**13.3**

Table 5: The growth of the trees in Tororo District

Species	Parish	Height (m)	Diameter (cm)
♦ *Grevillea robusta*	Kidera	13.3	23.3
	Nyangole	11.2	22.8
	Mean	**12.2**	**23.1**
♦ *Casuarina equisetifoli*	Kidera	11.9	16.0
	Nyangole	10.1	15.9
	Mean	**11.0**	**15.8**

Table 6: The growth of the trees species in Mbale District

	Species	*Parish*	*Height* (m)	*Diameter* (cm)
♦	*Grevillea robusta*	Bumwambu	11.6	21.9
		Bunasufwa	11.1	20.2
		Mean	**11.3**	**21.0**
♦	*Alnus acuminata*	Bumwambu	13.4	22.1
		Bunasufwa	10.5	20.0
		Mean	**12.9**	**21.5**

Table 7: The growth of *Grevillea robusta* across the three districts

	District	Height (m)	Diameter (cm)
•	Iganga	9.7	18.4
•	Tororo	12.2	23.1
•	Mbale	11.3	21.0

e) Potential of Temperate fruit growing in the Highlands of Eastern Uganda by David Siriri, Agroforestry Programme Kabale

Temperate fruit trees can be grown only in highland areas of Uganda namely: -

- Highland areas of Nebbi in West Nile. However, high temperatures usually limit their growth in this area.
- Eastern Highlands of Mbale, Sironko, and Kapchorwa
- South Western Highlands of Kigezi.

The fruit trees that can be grown in the highland areas of Uganda include apples, nectarines, plums (*Prunus salicina*), pears and figs. Nectarines however, perform better at lower altitudes of between 1,500 – 1,800m

above sea level. Temperate fruits that thrive well in the Kigezi highlands could probably as well thrive in the Eastern Highlands. This is because of the similarity in the climatic conditions between the two regions.

Why do we want to promote temperate fruits?

- Temperate fruits have high economic potential for both the domestic and the international market.
- Temperate fruits have high nutritional value
- Temperate fruit trees are usually small in size thus requiring a small land area for production.
- Temperate fruit trees can be integrated with other crops thus maximizing land use.
- Temperate fruit trees fruit early in time

Examples of economic benefits of temperate fruits

✓ ***The example of Apples***

	Discount parameters			
	Low Management		High Management	
Number of fruits per tree	50		150	
Farm gate price (Ushs)	100	200	100	200
Net returns/ Ha/ Yr. (Ushs)	1,470	4,313	5,550	18,050
Net returns/tree/Yr. (Ushs)	1,700	5,176	6,660	21,660
Returns to labour per day (Ushs)	3,086	7,909	6,771	15,451

The key factors affecting growth of temperate fruits

I: Suitable Altitude Range

Fruit type	Altitude range (m)
Apples	1,550 – 2,300
Nectarines/Peaches	1,500 – 2,500
Pears	2,000 – 2,700
Plums	1,700 – 2,600

II: The right or correct panting materials.

III: Management practices such as propagation by grafting in the field, pruning, and physical defoliation. These management practices however, have economic implications on the returns if not properly done.

Reasons for grafting include the following: -

- So as to have trees that fruit early in time.
- So as to have high quality disease free fruits that fetch high market prices.
- So as to have trees that remain short which are easy to harvest.

Reasons for pruning include:

- In order to acquire scions for grafting.
- To produce more fruits per tree.
- In order to give a desired tree shape.

Challenges in fruit tree growing

- Lack of germplasm. The root stock seed is not available and thus is sill imported. This causes an increase in the production costs and hence affecting the final market price. There is need, therefore, to establish mother tree orchards.

Session II: Presentation of On-going activities in the Farming systems

Chaired by Mr. Gongo John, District Environment Officer, Tororo

a) Control and management of termites in the field: Indigenous knowledge (IK) on termite control presented by Dr. Nyeko Philip (MUK) and Mr. Kiwuso Peter (FORRI).

Introduction

Termites are a major constraint not only in agricultural crops and forest plantation establishment but also in agroforestry systems. The problem is particularly bad in dry marginal areas. Exotic trees, particularly *Eucalyptus* and *Grevillea* are particularly prone especially when young. Agricultural crops such as maize are also attacked. The fungus growing termites are the most destructive but other species also cause considerable damage. Losses especially in forest plantations due to termite damage have been recorded to be 50 – 100%.

The control of termites has up to now mainly relied on chemicals. Due to the ineffectiveness of the chemicals and the costs involved, farmers have had to find alternative control measures against termites. Some of these measures have been claimed to be effective. A survey funded under ARTP II was, therefore, initiated with the aim of carrying out an evaluation on-station and on-farm for recommendation and dissemination to farmers.

Methodology

A structured questionnaire was used during this study. The questionnaire was intended to capture information on: - the name of farmer, locality of the farmer, farm size, crops/trees grown, importance of termite damage, details of IK control measures used, effectiveness of the control measures and whether there is need to improve on the methods.

Farmers to be administered with the questionnaire were identified at random with the assistance of the district agricultural or forestry staff. In Masaka VI Agroforestry project were the collaborators, while a coffee based organization "Kumutundo" operating in Mbale and Sironko districts were used. Visits were also made to the farms where the control measures had or were being practiced. The study covered Sironko, Tororo,

Iganga, Masaka, Mbarara, Luwero, Kumi, Soroti and Katakwi districts. The Northern region was not visited because of the insecurity but indigenous knowledge based control measures were sought from some people originating from the area.

Results

In most districts visited termites were reported to be a major pest problem not only damaging trees and crops but also eating up mulch in banana establishments. In agroforestry systems planted with Grevillea the tree was noted to be highly susceptibility to termites. A farmer in Masaka reported 100% loss of the woodlot she had previously planted until she was advised to interplant with melea azediraca.

A wide range of IK based termite control methods were also noted among farmers growing trees. These included: -

- Proper timing of planting and proper management (e.g. weeding) reduces termite and other pest problems.
- Use of pounded *Melea azadirach* leaves mixed with water and an adherent mainly soap.
- Use of mixture of ash (1 kg), animal urine (20 litres) and red pepper (¼ kg). The mixture is kept for two weeks under shade to reduce phytotoxicity on the plants being sprayed. The mixture can be poured into termite mounds, in trenches dug around the plants or on the nursery bed (where pricked plants are going to be positioned). The mixture if filtered can also be sprayed against the termites. This method is allegedly very effective.
- Intercropping tree crops with *Tephrosia vogelli* or *Melea azedirach*. These plants allegedly chase (repel) away the termites from the area.
- Biological control using a black ant (samples carried for identification) against the termites. The method is widely used in Mbarara and Bushenyi against the termites. The black ants are trapped using ripe bananas during the wet season. They are then released in termite infested areas. It is said to be very effective as the termites disappear completely.

Other methods included:

- Use of residues of shea butter mixed with water and poured into termite mounds

- Physical removal of queen from the termite mound, directing water runoff into ant hills, use of wood ash sprinkled around tree bases, use of pounded *Tephrosia vogelli* leaves mixed with water over night and poured into termites and use of *Melia azadirach* leaves as mulch around tree bases.
- Spraying with red pepper alone
- Smearing used oil on tree bases
- Spraying infested crops with fermented cow urine
- Spraying crops with ash mixed with *Senna* species leaves/seed and water.

The frequency of use of termite control methods among farmers is shown in table 1 below

Table 1: The frequency of use of the methods among the farmers

Method	No. of respondents	% response
Proper timing & management	3	4.1
Ash + animal urine + red pepper + water	7	9.6
Intercropping with *Tephrosia vogellil* pouring pounded *Tephrosia* mixed with water into anthills	5	6.8
Intercropping with *Melia azedarach or* pouring pounded *Melia* leaves mixed with water into anthills	6	8.2
Biological control using black ant	4	5.5
Physical removal of queen	19	26.0
Directing water run off into anthill	4	5.5
Use of wood ash	8	11.0
Red pepper mixed with water	3	4.0
Pounded tobacco + H_2O + cow urine + pepper	1	1.4
Cow urine	2	2.7
Smearing used oil on tree bases	3	4.0
Ash + cassia leaves/seed + water	1	14.0
Urine + Tithonia + red pepper	1	1.4
Tithonia leaves spread as mulch	1	1.4
Use of farm yard manure	1	1.4
Pouring hot crude waragi distillate in anthills	2	2.7

Pour goat droppings + water into anthill	1	1.4
Pouring hot water into anthill	1	1.4
Total	**73**	

Discussion

Except for biological control using the black ant which was reported only in Mbarara and Bushenyi, the other methods could be found in almost all the districts surveyed. Physical removal of the queen through digging up was most used. Most of these methods were allegedly quite effective. Field observations of a Eucalyptus woodlot in Masaka part of which had been interplanted with *Tephrosia* while the other was empty showed negligible attack compared with the part where there was no *Tephrosia vogelli*.

Conclusion and way forward

The IK methods are allegedly said to be effective. None of these methods have been evaluated for their effectiveness. Some trial plots are being set up to evaluate some of these methods.

Question:

In what quantities must wood ash be used in the soil to control termites yet wood ash is known to affect soil pH?

Answer:

No idea on the quantities of wood ash that must be used in the soil for termite control. However, this method has been used on a small scale and has been known to be effective in termite control.

b) Termite problems in agroforestry, presented by Dr. Nyeko Philip (MUK)

Termites have long been recognised as pests of agricultural importance, and are one of the major agroforestry pests in the tropics. Economic losses can be substantial on annual crops, trees and pasture. About 300 species of termites have been recorded as pests. Yet, non-termite specialists often consider termite control as if a single pest were to be dealt with. Termite's nests are of different forms, e.g.

(i) Conspicuous mounds up to 2m high

(ii) Series of low mounds punctuated by a number of wide vertical shafts

(iii) Subterranean nests of scattered chambers connected by tunnels.

Thus neither the presence nor the absence of termite mounds in a planting area necessarily indicates a termite hazard.

Termite damage

Termite damage to plants can take different forms, e.g.

(i) Stem is cut near the base

(ii) Attack just below the ground surface, extending upwards until the stem is ring-barked or downwards until the tap root tapers off and is severed

(iii) The roots are penetrated and hollowed out

(iv) The stem is penetrated and galleries excavated within it.

Factors influencing termite attack include: -

(i) Stress: moisture, transplanting shock, diseases, weeds, etc.

(ii) Seasonal activity rhythms of termites

(iii) susceptibility/resistance of plant species

(iv) Composition of termite fauna

(v) Characteristics of land to be planted

Control measures involve methods which attempt to prevent termite access to plants, reduce termite numbers in the vicinity of the plants or educe susceptibility/increase resistance of the plants themselves These include chemical and non-chemical measures.

Chemical control:

- Chemical control of termites has largely relied on broad-spectrum and persistent organochlorine insecticides.
- Serious problems and limitations include:
  (i) Long-term persistence in soils
  (ii) Emergence of termite resistance
  (iii) Difficulty in monitoring and controlling the use
  (iv) Cost and inadequate availability to many rural farmers
  (v) Legal restrictions on the use

Non-chemical control:

Involves control of termites without using commercial insecticides. These include cultural methods such as maintenance of plant vigour, using good quality seeds, healthy seedlings, appropriate transplanting procedure, crop rotation, weeding. Other methods are mmanipulating termite numbers and behaviour, e.g. inter-cropping, crop residues and other organic matter, trap crops, timing of crop harvest and high density sowing.

Non-chemical control:

- ✓ Biological control using predators (e.g. ants) or pathogens (e.g. fungi, bacteria, nematodes)
- ✓ Mechanical control such as the removal of the queen from the termite mound
- ✓ Plant insecticides, wood ash and other toxic/repellent material
- ✓ Plant resistance
- ✓ Physical barriers

Question:

Can you elaborate on the method of using sand to control termites?

Answer:

When a layer of pure sand is spread on the soil surface, a barrier is formed which will stop termites, which would cause damage to the tree/crop stems, from penetrating to the soil surface.

Question:

How do you reconcile the control of termites with the importance of termites in the break down of dead organic matter, which would be beneficial to both trees and crops?

Answer:

Termites belong to a diversity of different sub species. Therefore not all the termite species are useful in the break down of dead organic matter. This therefore calls for further research to identify useful termite species and harmful species.

Question:

Can you clarify on tree moisture stress conditions in relation to termite damage to trees?

Answer:

Either too much or too little moisture in the soil causes stress conditions to a tree. Under any one of the conditions above, trees are very prone to termite attack. This is even severe when there is too little moisture

in the soil (i.e. in the dry season). Termite repellents may also not be very effective because they are species specific. Therefore some termite species may be repelled while other species may not be repelled.

C) On-farm wood production activities in the highlands and lowlands of Eastern Uganda, by David Wafula (FORRI)

Why on-farm wood production in these two zones?

- Tremendous reduction of tree cover in these two zones (NEMA 1994)
- Insufficient supply of tree products and services to households.
- Shortage of fuel wood, building poles and timber in most households.

Steps taken to address the problem: -

- 1995/ 96 agroforestry trees were provided to farmers for on-farm evaluation in the districts of Iganga, Tororo, Mbale and Sironko.
- After 4 years, these farmers started benefiting (poles and fuel wood)
- After 6 years, an impact assessment was carried out.
- Activities were intensified and expanded in April 2002.

Table 1: The technologies promoted and the tree species used

Boundary planting	Scattered planting	Home-garden planting
Grevillea robusta	*Albizia chinensis*	*Canarium schweinfurthii*
Maesopsis eminii	*Cordia abyssinica*	*Syzgium cuminii*
Markhamia lutea	*Moringa oleifera*	*Vangueria apiculata*
Melia azederach	*Podocarpus usambarensis*	
Milicia excelsa	*Senna spectabilis*	

Table 2: Study areas in the various districts

Zone	District	Sub-county	Parish	No. of Villages
Lowlands	Iganga	Magada	Magada	9
	Tororo	Kisoko Osukuru	Kisoko Kayoro	2 1
	Kumi	Kumi	Olupe	2
Highlands	Mbale	Bungokho- Mutoto	Bumboyi	2

Table 3: Collaborators by District

District	Collaborator
Iganga	Africa 2000 Net work; Depts. of Forestry, Agric., Vet. & Environment
Tororo	Africa 2000 Net work; Depts. of Forestry, Agric., Vet. & Environment
Mbale	IUCN/ MECDP; HPI, Depts. Of Forestry, Agric., Vet. & Environment
Kumi	SOCADIDO; Depts. of Forestry, Agric., Vet. & Environment

Table 4: Seedling distribution in Iganga District

Species	No. Planted	No. of farmers	Gender		No per farmer
			M	F	
Grevillea robusta	2,144	67	60	7	32
Maesopsis eminii	1,008	112	99	13	9
Markhamia lutea	510	30	26	4	17
Melia azederach	888	111	98	13	8
Milicia excelsa	336	56	49	7	6
Albizia chinensis	560	35	31	4	16
Cordia abyssinica	155	31	27	4	5
Moringa oleifera	798	114	101	13	7
Senna spectabilis	259	37	34	3	7
Syzgium cuminii	96	24	20	4	4
Total	**6754**	**114**	**101**	**13**	**111**

Table 5: Seedling distribution in Tororo District

Species	No. Planted	No. of farmers	Gender		No. per farmer
			M	F	
Grevillea robusta	876	73	60	13	12
Melia azederach	520	26	20	6	20
Milicia excelsa	260	52	46	6	5
Albizia chinensis	300	3	3	0	100
Canarium schweinfurthii	93	31	21	10	3
Syzgium cuminii	72	24	17	7	3
Vangueria apiculata	69	23	18	5	3
Total	**2144**	**77**	**185**	**47**	**51**

Table 6: Seedling distribution in Mbale District

Species	No. Planted	No. of farmers	Gender		No. per farmer
			M	F	
Grevillea robusta	600	20	11	9	30
Maesopsis eminii	280	20	11	9	14
Markhamia lutea	40	8	5	3	5
Milicia excelsa	35	7	4	3	5
Moringa oleifera	2	1	1	0	2
Albizia chinensis	100	20	11	9	5
Canarium schweinfurthii	60	20	11	9	3
Podocarpus usambarensis	6	2	1	1	3
Syzgium cuminii	60	20	11	9	3
Vangueria apiculata	60	20	11	9	3
Cordia abyssinica	100	20	11	9	5
Total	**1343**	**20**	**11**	**9**	**78**

Table 7: Seedling distribution in Kumi district

Species	No. Planted	No. of farmers	Gender		No. per farmer
			M	F	
Grevillea robusta	1200	20	18	2	60
Maesopsis eminii	100	20	18	2	5
Markhamia lutea	1300	20	18	2	65
Melia azederach	500	20	18	2	25
Milicia excelsa	100	20	18	2	5
Canarium schweinfurthii	60	20	18	2	3
Syzgium cuminii	60	20	18	2	3
Total	**3320**	**20**	**18**	**2**	**166**

Table 8: Causes of seedling mortality in the three Districts

Iganga	Tororo	Mbale	Kumi
Termites	Drought	Theft	Drought
Drought	Termites	Drought	Termites
Theft	Theft	Termites	-

Table 9: The number of farmers and seedlings received per District

District	Farmers	Seedlings
Iganga	114	6754
Tororo	77	2144
Mbale	20	3320
Kumi	20	3320
Total	**231**	**13,561**

Planned Activities

- Survival assessment to be carried out,
- Intensify and expand on the areas of operation,
- Train 1995/ 96 farmers on "Tree management practices".

d) Soil fertility management in Eastern Uganda, by Ibwala Opolot

The approach

- Application of type II research trials, Researcher designed, farmer managed.
- Extrapolation and testing of research results from similar agro-ecological zones and farming systems in the East and central African region.

The main objective of the activity

- To adapt and adopt selected short term leguminous shrub species for soil fertility in the eastern lowlands of Uganda

Specific objectives

- To asses biomass production by the species (leaves, twigs and wood)
- Establish the duration taken by the species from the time of flowering to attain required maximum biomass in one planting season.
- Assess the effect of these shrubs on crop yields.
- Test the effect of these shrubs on soil status as regards organic matter input and related soil improvement levels.

Assumption Tested

- The use of leguminous shrub species for improved fallow offers a high potential for soil fertility replenishment in the eastern lowlands of Uganda.

Factors leading to loss of soil fertility

- General soil exhaustion due to continuous cultivation.
- Poor tillage methods and land use practices
- Nutrient mining due to continuous removal of crop residues
- Population pressure on diminishing land resource

What are improved fallows?

- Involves the planting of nitrogen fixing leguminous shrubs for soil fertility revitalization
- The shrubs are later cut after a season or two when they have attained the required maximum biomass.
- The legume shrubs are then allowed to shed off their leaves, which are ploughed back and incorporated into the soil.

Why the initiative for improved fallows in the Eastern lowlands

- Clear evidence of soil exhaustion as shown by stunted crop growth and asserted farmer poor yields.
- Need to promote profitable organic agricultural production while cutting down on inorganic fertilizer costs but producing acceptable products.
- Improve on food security and income through sales of surplus produce.

The legume shrubs tested

For short-term fallows (6-8 months) *Crotolaria grahamiana, Crotolaria paulina, Crotolaria ochloreuca* and *Tephrosia vogelii* were used, while for long-term fallows (9-12 months) *Sesbania sesban, Calliandra calothyrsus, Leucaena spp, Cajanus cajan and Tephrosia candida* were used.

Field methods

- Farmer identification was made directly or through collaborators or extension link farmers.
- Informal discussions were carried out with farmers regarding crop production constraints and soil fertility aspects.
- Training and sensitization sessions were organized in respective villages during which objectives and benefits of the practice or technology, and the roles of both the Researcher and the farmer were pointed out.
- During the training and sensitization, the trial sites and their conditions and design were spelt out and later agreed upon.

Current study sites and coverage

Table 1: The trial sites in Olupe parish in Kumi county, Kumi District

Asinge village		Olupe village		Season I	Season II	Total
F	M	F	M			
4	29	12	17	51	11	62

Table 2: The trial sites in Kisoko parish in Kisoko sub-county, West Budama county, Tororo District

Olobai village		Kakola village		Season I	Season II	Total
F	M	F	M			
4	23	4	22	42	11	53

Table 3: The number of trial plots established in 2002

Species	Kumi	Tororo
• *Crotalaria grahamiana*	50	51
• *Crotalaria ochloreuca*	38	37
• *Crotalaria paulina*	25	26
• *Tephrosia vogelii*	30	38
• *Tephrosia candida*	21	26
TOTAL	**164**	**178**

Data to be collected

- Initial soil samples taken
- Post-fallow soil status to be determined (e.g. Organic Matter content, PH, exchangeable bases)
- Shrub variables such as vigour differences, establishment, pests &diseases, weed suppression
- Biomass production

Preliminary observations

- *Crotalaria ochloreuca* flowers 5 months earlier and loses leaf biomass at peak fruiting
- Weed suppression is significant in *Tephrosia* and *Crotalaria* plots
- *Crotalaria paulina* has a high potential for weed suppression but biomass build up to optimum levels is low
- Caterpillars seen in most of the Crotalaria plots
- Soil darkening, maize vigour and greenness observed more in *Crotalaria* than *Tephrosia* plots
- *Tephrosia* observed to establish and shrive well on poor sites than moderate, while the reverse is true for Crotalaria.
- *Tephrosia* takes longer to attain harvestable biomass
- *Crotalaria ochloreuca* exhibits high seed yields

Constraints

- Lack of seed is a hindrance to scaling up of the technology
- Dry spells affect collection of proper data
- No reliable knowledge on pests and diseases of the shrubs
- Extra load on field collaboration staff gives limited room for close attention to trials

Future plans

- Need to establish a type I trial to triangulate the on farm results
- Need to carry out studies on pest and disease dynamics of these shrubs
- Need to train extension link farmers
- Need to scale up to other districts and within districts

e) Fruit tree production in Eastern Uganda, by Dr. Kagorora Kanahe

Justification for fruit tree production

- To avoid over dependence on cotton and other annual crops
- Mango, Avocado and Citrus already grow well in Eastern Uganda as the climate is suitable
- Grown fruit most suitable for the market
- Use small pieces of land through agroforestry

Methodology

- 7 Mango cultivars
- 6 Avocado cultivars
- 3 Orange cultivars

Farmer groups

- In each district 20 farmers selected
- 20 farmers divided into 2 groups of 10 farmers each
- Group 1 received 4 mango types, 3 avocado types 3 orange types.
- Group 2 received 3 mango types, 3 avocado types, 3 orange types

Group 1

- Mangoes: Bire, Alfonso, Glenn, Tommy atkins
- Avocadoes: Semile 34, Drsom 1, Drsom 3
- Oranges: Washington navel, Nova, Tangelo Seminole

Group 2

- Mangoes: Ngowen, Apple mango, Boribo
- Avocadoes: Semile 43, Drsom2, Reed
- Oranges: Washington navel, Nova, Tangelo seminole

Farmer Groups by District

Table 1: Iganga district - Group1

Avocado	Received	Died/Lost	Balance
Semile 34	20	1	19
Drsom 1	20	2	18
Drsom 3	-	-	-

Table 2: Iganga district - Group1

Oranges	Received	Died/Lost	Balance
Washington navel	20	0	20
Nova	20	0	20
Seminole	20	0	20

Table 3: Iganga district – Group 2

Mangoes	Received	Died/Lost	Balance
Ngowen	20	0	20
Apple mango	20	0	20
Boribo	-	-	

Table 4: Iganga district – Group 2

Avocadoes	Received	Died/Lost	Balance
Semile 43	-	-	-
Drsom 2	20	0	20
Reed	-	-	-

Table 5: Iganga district – Group 2

Oranges	Received	Died//Lost	Balance
Washington Navel	20	0	20
Nova	20	0	20
Seminole	20	0	20

Table 6: Summary for Iganga district

Fruit tree	Expected	Delivered	Balance
Mangoes	140	120	20 Boribo
Avocadoes	120	60	60 Semile 43, Reed
Oranges	120	120	0

Table 7: Tororo district, Kisoko Parish, Olobai village Group 1

Fruit tree	Received	Dead/Lost	Surviving
Bire	10	-	10
Alfonso	14	-	14
Boribo	10	-	10
Tommy	10	-	10
Apple	10	-	10
Ngowen	10	-	10
Washington	20	-	20
Seminole	20	-	20
Nova	20	-	20

Table 8: Tororo district - Osukuru Subcounty, Asinge village Group 2

Fruit tree	Received	Dead/Lost	Surviving
Bire	12	-	12
Alfonso	11	-	11
Boribo	8	-	8
Tommy	11	-	11
Apple	8	-	8
Ngowen	11	-	11
Washington	20	-	20
Seminole	20	-	20
Nova	20	-	20

Table 9: Summary for Tororo district

Fruit tree	Expected	Received	Balance
Mangoes	140	125	15
Avocados	120	0	120
Oranges	120	120	0

Comments on Tororo

- Mistake in distribution as all ten farmers in each group received all types of fruit trees
- In some cases, each farmer received only one tree seedling of a mango variety instead of two seedlings.
- All avocados are not supplied?

Table 10: Mbale-Buwambwa village, Buteteya Parish, Bumbo subcounty Group1

Mangoes	Received	Died/Lost	Balance
Bire	20	-	20
Alfonso	20	-	20
Glenn	20	-	20
Tommy	20	-	20

Table 11: Mbale Group 1

Fruit trees	Received	Died/Lost	Balance
Avocado	20	-	20
Semile 34	20	-	20
Drsom 1	20	-	20
Drsom 2	20	-	20
Oranges	20	-	20
Washington navel	20	-	20
Nova	20	-	20
Seminole	20	-	20

Table 12: Mbale Group 2

Mangoes	Received	Died/Lost	Balance
Ngowen	20	-	20
Forigon	20	-	20
Apple	20	-	20
Semile 34	20	-	20
Drsom 2	20	-	20
Reed	20	-	20
Washington	20	-	20
Nova	20	-	20
Seminole	20	-	20

Summary of Mbale

- All fruit trees have been received and planted on farm?
    - Survival on farm is not clear

Table 13: Kumi district – Olupe village Group1

Fruit tree	Received	Died/Lost	Surviving
Bire	10	2	8
Alfonso	10	2	8
Glenn	10	2	8
Tommy	10	2	6
Reed	-	-	-

Table 14: Kumi district - Olupe village Group 2

Fruit tree	Received	Died/Lost	Balance
Ngowen	10	0	10
Apple	10	0	10
Boribo	10	0	10
Reed	10	3	7

Table 15: Kumi district - Asinge village Group 1

Fruit tree	Received	Died/Lost	Survived
Bire	10	2	8
Alfonso	10	0	10
Glenn	10	2	8
Tommy	10	0	10

Table 16: Kumi district, Asinge village Group 2

Fruit tree	Received	Died/Lost	Survived
Ngowen	10	-	10
Apple	10	-	10
Boribo	10	-	10

Comments on Kumi

- Information on Avocado and orange seedling distribution is lacking
- Another set of farmers in Olupe and Asinge were given fruit trees due to excessive loading at Kifu. Group 1 was given only Tommy while group 2 was given Ngowen, Apple and Boribo.

Conclusion

- Many mistakes have been made in the distribution
- Many losses have occurred due to thefts and local confusions and weather due to poor timing
- Serious monitoring and assessment of performance needs to start immediately

f) Capacity Building activities in the Eastern Lowlands and Highlands, by Hillary Agaba

Eastern Lowlands and Highlands

The Lowlands include the districts of Iganga, Tororo, Kumi, Busia and Pallisa, while the highlands include the districts of Mbale, Sironko and Kapchorwa

Capacity Building activities undertaken in the past year include:-

- One training of Trainers (TOT) workshop
- Eight Agroforestry (AF) sensitization workshops
- Two survey report presentations

i. Training of trainers (TOT)

Training of trainers' workshop (TOT) was held from 20th – 23rd August 2002 at Salem Brotherhood in Mbale town and involved participants from the districts of Iganga Tororo, Mbale and Kumi. The targeted people included: -

- District production departments
- Collaborating NGOs like Africa 2000 Network (A2N), Heifer project International (HPI), International Union for Conservation of Nature (IUCN)/Mount Elgon Conservation and Development Project (MECDP).

Objectives of the TOT workshop

- To build the capacity of FORRI partners to promote agroforestry in the Eastern highlands and lowlands.

Topics covered in the training included: -

- The role of Research in the Modernization of Agriculture
- Tree seed collection and handling
- Tree nursery establishment and management
- Propagation of fruit trees
- Application of tree nursery practices
- Fruit tree pests and diseases
- Tree establishment and management
- Sustainable germplasm production
- Agroforestry shrubs for soil fertility management
- Improved fodder bank establishment and management
- The role of Agroforestry in environmental management
- Participatory planning of Agroforestry micro projects with rural communities
- Extension and Agroforestry development
- Agroforestry and energy saving stoves as a strategy to address energy crisis
- The role of partnership and networking in Agroforestry

ii. Agroforestry sensitization workshops/seminars

Objectives of the seminars: -

- To create awareness among the districts and sub-county leadership on the importance of agroforestry in rural development.
- To solicit support from the district and sub-county leadership for the integration of agroforestry development activities into the Plan for the Modernization of Agriculture (PMA), National Agricultural Advisory Services (NAADS) programs.
- To disseminate knowledge on agroforestry to the district and sub-county leadership.

Topics covered during the seminars: -

- The role of agroforestry in the Plan for the modernization of Agriculture (PMA)
- The role of agroforestry in the National Agricultural Advisory Services (NAADS)
- Local on-farm research in Agroforestry
- The role of Agroforestry in soil and water conservation and soil fertility management
- Fruit production in Agroforestry
- The role of Uganda Agroforestry Development Network (UGADEN) in Agroforestry Research and Development in Uganda
- Agroforestry micro projects

Table 1. Involvement in the District and sub-county Agro-forestry sensitization workshops held

District/sub-county	Target group	Attendance
➢ Iganga District (October 2002)	• District councilors • Departmental Heads: - Veterinary, Agriculture, Forestry, Environment, and Fisheries	• 50 participants
➢ Iganga District, Magada Sub-county (November 2002)	• Sub-county councilors • Extension Workers	• Over 45 participants
➢ Iganga District (Sept/Oct 2002)	• Fruit tree growers (Trained on the use of local organic materials and management approaches)	• 20 participants
➢ Iganga District (April 2002) Facilitator: Africa 2000 Network (A2N)	• Farmer groups (Aspects of growing trees for timber, fruits, fodder and soil fertility management).	• 100 participants
➢ Busia District (July 2002) Facilitators: (FORRI and FAO)	• Extension workers • Departmental Heads: - Veterinary, Agriculture, Forestry, Environment, Fisheries • CBOs • NGOs • Farmer Groups	• 31 Males • 7 Females Total = 38 participants
➢ Tororo District (Sept. 2002) Facilitator: FORRI	• District leaders • Departmental Heads: Veterinary, Agriculture, Forestry, Environment and	• 50 participants

	Fisheries • Environment and production committees	
➢ Tororo District, Kisoko Sub-county (Nov. 2002) Facilitator: FORRI	• The Local Council • Extension workers • The Chiefs • Religious Leaders • Opinion Leaders	• 35 Males • 11 Females Total = 48 participants
➢ Mbale District (October, 2002) Facilitator: FORRI	• District council members • Departmental Heads: Veterinary, Agriculture, Forestry, Environment and Fisheries • Heifer Project International (HPI) • International Union for Conservation of Nature (IUCN) • Integrated Rural Development Initiative(IRDI)	• 32 Males • 8 Female Total = 40 participants
Mbale District, Bungokho Sub-county (Nov. 2002)	• Sub county councilors • Civil Leaders • Extension workers	• 41 Male • 7 Female Total = 48 participants
➢ Kumi District 30/10/2001 Facilitators: FORRI and FAO	• Extension workers • Departmental Heads: Veterinary, Agriculture, Forestry, Environment and Fisheries • CBOs NGOs Farmer Groups	

g) Introduction to Working Groups by Clet Wandui Masiga and John Okorio

Objective

- To generate agroforestry work plans by district for January – December 2003

Outputs

- Data on agroforestry situation in the Districts
- Agroforestry needs (Research/Technology, Dissemination, Capacity building, Monitoring and Evaluation)
- Implementation schedule/plan/sequencing agroforestry activities
- Resources required
- Stakeholder roles/ building consensus

Layout of the presentation

- Part one: Theory
- Part two: Practical

Part One: Theory

Prioritization of Agroforestry needs (Rank in order of importance)

- Agroforestry technologies
- Dissemination methodologies
- Capacity building in agroforestry
- Monitoring and Evaluation of agroforestry activities

What this means to a farmer

- To a farmer, technologies will be developed according to his/her needs
- Trees will be selected depending on the idea/ desirable tree characteristics which are suited for a given technology

Understanding the available Dissemination methodologies

- Individual extension
- Group extension
- Model farms and demonstrations
- Using schools
- Audio visual aids (drawings, slides, film shows and radio presentations)
- Excursions
- Collaboration with other partners

Production and Distribution of seedlings

Seedling production is a key element in most Agroforestry projects. Seedling supply can be by:

- Centralized nurseries
- Group nurseries
- Farm nurseries

Monitoring and Evaluation

i) Monitoring

- Monitoring is the systematic recording and periodic analysis of information that has been chosen and recorded by insiders with the help of outsiders
- The purpose is to provide information during the life of the project, so that adjustments and/ or modifications can be made if necessary
- The activities involve recording of information on a daily, weekly monthly or seasonal basis and taking the time to stop and analyze the information

The steps to monitoring include:

- Discuss reasons for monitoring
- Review objectives and activities
- Develop monitoring questions
- Establish direct and indirect indicators

- Decide which information gathering tools are needed
- Decide who will do the monitoring
- Analyze and present results

ii) Evaluation

- Evaluation is an opportunity for both outsiders and insiders to stop and reflect on the past in order to make decisions about the future. Insiders are encouraged and supported by outsiders to take responsibilities and control of:
  - ⇒ Planning what is to be evaluated
  - ⇒ How the evaluation will be done
  - ⇒ Carrying out the evaluation
  - ⇒ Analyzing information and presenting evaluation results

Capacity Building

- To equip agroforestry development workers with the most recent skills and information
- The capacity building program is to identify the areas of need and facilitate the training of stakeholders in the identified agroforestry capacity reqiurements.

Part two: Practical

Of the four agroforestry areas, planning will be done according to the following:

- Current situation.
- Assess needs.
- Set the goals.
- Set priorities.
- Develop the activity plan.
- Resource use (state the resources required and those available)
- Role of partners (FORRI, extension workers, Local councils, NGOs, Farmers).

General Discussions:

It was noted that fodder trees did not feature in the workshop presentations yet are very important especially in the highland areas of Mbale and Sironko where zero grazing is being practiced because of shortage of grazing land. Since the initiation of agroforestry activities in Mbale in 1995, farmers have been growing trees for fodder production. These are mainly the shrub species like *Gliricidia sepium, Calliandra calothyrsus* etc.

Also collaborators in partnership with FORRI have encouraged the growing of legume and other fodder species. An example is the Heifer project International (HPI) which is currently carrying activities in the districts of Kumi and Mbale.

On inter-cropping of agricultural crops with agroforestry trees/shrubs for soil fertility replenishment, farmers have been advised not lose time during the planting season and to maintain an appropriately close spacing in order to acquire maximum biomas input into the soil. Farmers have also been advised to collect their own seed from the fallows from which they can raise their own seedlings other than depending solely on the seedlings supplied by FORRI. This strategy encourages the farmers to be responsible for their seedlings.

There is need to scale –up sensitization of the collaborating partners (local governments and private organizations) especially in the districts where NAADS is already operational, for example, Iganga, Tororo, Busia and Kumi. This will act as an entry point for disseminating agroforestry practices and technologies into the communities in those districts.

One other important department in sensitization is the education department through schools and higher institutions of learning. There is need to explore this department as a way forward in the dissemination of agroforestry practices and technologies. Also sensitization can be done through forestry based associations like:

- Uganda Forestry Association (UFA)
- Uganda Agro-forestry Development Network (UGADEN)

One of UGADEN'S objectives is to unite agroforestry development partners in Uganda in order to scale up agroforestry practices in Uganda.

Session III: Group Discussions and Presentations

Chaired by Mr. Ikanut Bernard, District Environment Officer, Kumi

a) Development of work-plans, group discussions and presentation of work plans

The workshop participants split up into groups according to their districts. The main objective was to develop agroforestry work-plans for each district for the next twelve months (i.e. January – December 2003). The district work-plans were developed on the basis of the following themes:

- Research
- Dissemination
- Capacity building
- Priority areas of collaboration
- Commitment of resources by collaborators

Table 1: Guide to work-plan development

Theme	Activities
➢ Research	• Tree species for wood and energy production • Tree/shrub species for soil fertility enhancement • Tree/shrub species for soil conservation • Trees with high value products • Tree/shrubs for fodder production
➢ Dissemination	• Tree seed supply • Tree nursery development and management • Tree seed orchard establishment
➢ Capacity Building	• Training of farmers • Training of councilors • Awareness creation among political leaders • Training and awareness creation in schools and higher institutions
➢ Priority areas for collaboration	• Supply of seeds/ seedlings
➢ Commitment by collaborating partners on joint activities	• Manpower resource • Funding of field activities

b) Comments on district work-plan presentations:

Busia district

- It was suggested that the agroforestry team should organize sensitization workshops in order to create awareness at all stakeholder levels about agroforestry research and development in the district.
- Also there are some Non governmental organizations (NGOs) that are already spear heading some development activities in the district, therefore, there is need to get in touch with these NGOs and this should act as an entry point for agroforestry research and development activities.
- Termite damage to trees was singled out as a serious problem in the district; the agroforestry team was advised to highlight the trees that were seriously damaged by termites.

Kumi District

- The district agroforestry team was advised to indicate the resources needed for agroforestry activities and also to indicate those resources that are already available in the district.
- There was need to indicate the already on–going agroforestry activities in the district.
- There was need to create room for future agroforestry research activities.
- The district agroforestry team was also advised to exploit other sources of funding that are available in the district but not solely depending on FORRI for funding and the team should work together with other development partners in the district in order to harmonize development activities.

Iganga district:

- Following the sensitization workshops that have already been conducted in the district, the agroforestry team and the collaborating partners to encourage the sensitized groups to set up their own private enterprises, for example, establishment of private, communal or institutional tree nurseries.

Tororo District

- It was noted that there is a high incidence of soil erosion in the district leading to soil loss thus calling for the need to introduce trees/shrubs that will act as cover crops and at same time improving soil fertility, for example, the legumes such as *Cajanus cajan*.
- *Acasia angustissima* has a high potential especially in swampy areas thus calling for the need to introduce this tree species in the swampy areas of Tororo.

Mbale District

- Tree species for soil fertility improvement that thrive well in the low altitude areas of Mbale may not thrive well in the highland altitude areas probably because of the differences in the climatic conditions between the two areas. So there is need to identify tree/shrub species for soil fertility improvement in the low altitude areas and those for the high altitudes.
- However the major problem faced by the farmers in the high altitude areas is soil erosion other than soil fertility loss. Therefore there is need to focus more on soil erosion control by identifying trees/shrubs for soil conservation.

The problems to be addressed in the work-plans should clearly be defined and this applies to all the Districts

c) Closing Remarks by Mr. Mabuya George, District Forest Officer Mbale

In his closing remarks, the DFO Mbale thanked all the workshop participants, especially the collaborating partners, for their efforts in contributing to the success of the workshop. He then commended the Agroforestry Research and Development program of FORRI for holding this workshop in Mbale, and called Upon all those promoting Agro-forestry in Mbale and other districts of the Eastern region to continue supporting agroforestry activities.

Appendix I: Field visit to Bumbo Sub-county in pictures



Figure 1: Workshop participants pose for a group photograph at Bumbo Sub-county headquarters

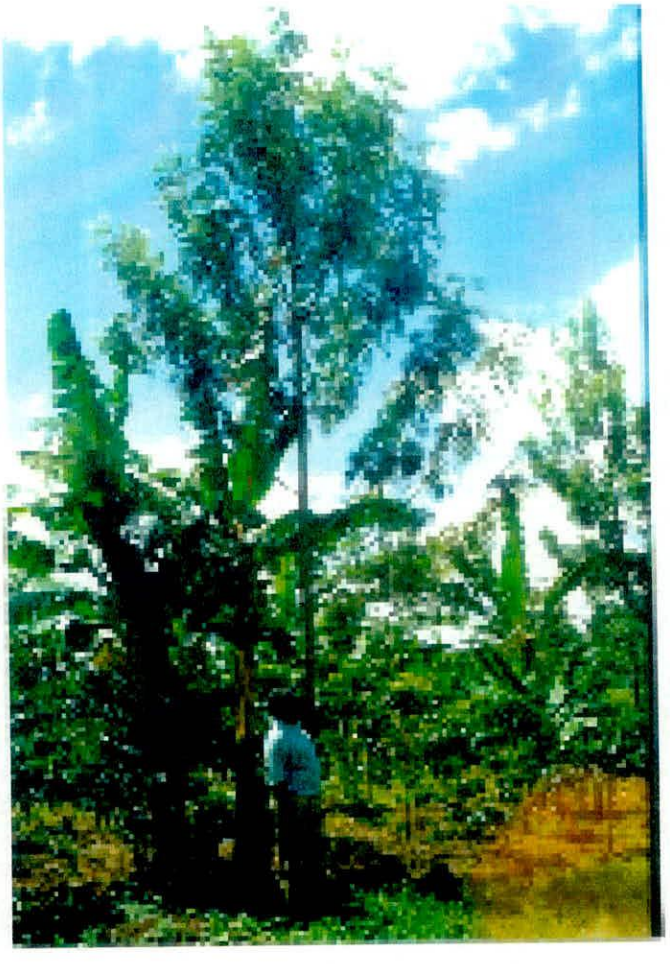


Figure 2: Programme Leader, Agroforestry admires one of the *Grevillea* trees planted in 1995 when the agroforestry work was initiated in the Eastern district of Mbale



Figure 3: A farmer explains some of the problems they face in looking after fruit trees including damage by termites and destruction by domestic animals.



Figure 4: Some of the measures used by farmers to protect their trees from damage by animals.



Figure 5: Wire mesh used in protecting trees from animal damage. The choice of material for this purpose has economic implications to the farmer.



Figure 6: An entomologist from Makerere University explains the incidence of defoliators on a castor oil plant in the foreground

Appendix II: List of participants

Name	Designation
1. Oboi Andrew	Agricultural extension worker, Kumi
2. Ikanut Benard	Assistant District Environment Officer, Kumi
3. Wakinya John	District Agriculture officer, Tororo
4. Opendi Geofrey	NAADS Coordinator Rubogi Sub-county, Tororo
5. Otheino Buru	Uganda National Farmers Federation
6. Galina Steven	District Forest Officer, Busia
7. Ouma Anthony	Assistant Forest Officer, Tororo
8. Opio John	District Agriculture Officer, Busia
9. Agaba Hillary	Dissemination Officer, FORRI Mbale
10. Wandui Clet Masiga	Dissemination Officer, FORRI Mbale
11. Ongodia Gerald	Research assistant, FORRI Mbale
12. Ogwang James	Forestry Department, Tororo
13. Esyara Sam	Forestry Department, Iganga
14. Mabuya George	District Forest Officer, Mbale
15. Dr Chepkruit	Veterinary Officer, Mbale
16. Ojambo J	District veterinary Officer, Iganga
17. Nambuya Modesta	District Agricultural Officer, Mbale
18. Mwambu Paul	District Environment Officer, Mbale
19. Opolot Vicent	Senior Technician, FORRI
20. Sekatuba Jude	Socio-Economist, FORRI
21. Kidiya Magomu	Technician, FORRI
22. Kugonza James	District Forest Officer, Iganga
23. Mukirane Moses	Africa 2000 Network, Iganga
24. Wafula David	Senior Technician, FORRI
25. Ayo Peter	SD Coordinator IUCN
26. Esegu Francis	Director, FORRI
27. Nyeko Philip	Lecturer Makerere University
28. Kiwuso Peter	Research Officer, FORRI
29. Gongo John	District Environment Officer, Tororo
30. Mwalye James	Assistant District Forest Officer, Mbale
31. Mutenyo Moses	Assistant Forest Officer
32. Siriri David	Research Scientist, ICRAF Kabale
33. Anguti Silas	District Forest Officer, Tororo
34. Namusooba	Extension worker
35.Wakwoma Gabriel	Extension worker
36. Dr Kagorora Patrick	Dissemination Specialist, ICRAF
37. Dr Okorio John	Programme Leader, Agroforestry