

**First Training of Trainers
Workshop for Primary School
Teachers Training in Agroforestry
and Fruit Tree Technologies**

Supported by PRASUPE and ITFSP



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Introduction

A training course held in the Machakos Teacher Training College from 29th to 30th March 1999 and targeted to Teachers advisory committee members, plus Teachers college lecturers within the following objectives:

- To familiarize the participants with new concepts in Agroforestry and the dissemination of Fruit Tree Technologies.
- Highlight on the economic potential and role of tree crops in development in different farming systems in the country.
- Explore on the various activities being undertaken towards development of the tree crop sector by organizations especially ITFSP.
- An introduction to farmer trainer training approach for tree propagation and management with a view to assessing the appropriateness of the available training modules for primary school.
- Introduce the TOTs to practical aspects of fruit tree propagation e.g. grafting nursery establishment and disease control.

Elaborate agenda for syllabus development for primary schools with emphasis on development and experimentation training of skills in tree crop technologies

In introducing the ITFSP representative Mr. Njenga of PRASUPE noted that the information on agroforestry and the role of agroforestry and fruit trees in income generation, and hence poverty alleviation had not been clearly appreciated. The participants he noted had very high expectations on the course and hoped to be more enlightened on the subject by the end of the course, with the hope that this would filter through to the pupils to whom they were responsible for their training. This would in turn create a society more aware of environmental conservation and better and more profitable farming methods.

After the introductions the ITFSP representative briefly introduced their organization's objectives, upto date achievements and constraints they were facing in developing new concepts on transfer of technologies on trees, and its integration into farming systems. He then looked at economic analysis of tree crops done in various Agro-Eco zones, and from this results discussed the role of fruit trees in the farms in terms of income generation.

On completing the presentation on economic analysis, grafting followed with practicles in the college farm. Presentations ended with one on processing technologies with samples of processed fruit and tree products in display. The presentations involved lectures, slide shows and use of overhead projector especially for illustrations.

After the presentations a plenary discussion was held in order to ensure that the participants understood what they were supposed to look at when trying to develop a syllabus on Agroforestry and fruit trees for primary school. They were then divided into groups each looking at various topics as presented in the farmer trainers manual as their guide. After the group discussion every group presented their summary to the rest of the participants, the summary of which is included in this report.

Course presentations

A) Constraints of the tree crop sector and ITFSP objectives:

Through analysis of the tree crop sector in some selected countries the results show the following constraints:

- ◆ Low priority given to the tree crops by farmers and extension agencies
- ◆ Inadequate technology and lack of skills in tree management by farmers
- ◆ Inadequate processing and marketing of tree crops products
- ◆ Limited access to finances and credit
- ◆ Inadequate extension and marketing support systems
- ◆ Inadequate non-farmer oriented research

Based on this findings ITFSP whose main focus is in Eastern and Southern Africa (Tanzania, Malawi, Uganda, Zimbabwe and Kenya) aims at achieving an overall goal "That the utilization of tree crops potential is considerably increased." The purpose for the project at present is that regional experiences

in the development of the tree crop sector is analysed and situation specific approaches for implementation are developed and tested

The systematic sequence of activities of ITFSP includes:

* Analysis of the Tree crop sector in the selected countries

This would involve the following activities:

- ⇒ Stakeholder analysis
- ⇒ Literature review and data bank establishment
- ⇒ Gathering experiences of tree extension projects implemented by government institutions, donors and NGOs
- ⇒ Identifying constraints with regard to production, processing and marketing
- ⇒ Identifying market potential for tree crops.

* Concept Development

This would include:

- ⇒ Development of country strategies and concepts
- ⇒ Identification of local partners and pilot projects
- ⇒ Planning and implementation activities to test new technologies with collaborating partners.

* Extension and Working Approach Development

This involves:

- ⇒ Identification and formulation of extension concept
- ⇒ Support partners in developing extension concept for production technologies, processing and marketing
- ⇒ Redefine role of extension agents and farmers
- ⇒ Induce networking at farmer's, district and provincial levels

* Regional networking

- ⇒ Analyse pilot projects
- ⇒ Increase exchange of experiences and expertise within the region.

B) Main activities and achievements of ITFSP

The Kenyan experience has shown that there is a need for a holistic approach for tree crops, which would involve reorganisation of the support and services structure if the extension for tree crops were to be improved. The new setup should be developed through the following activities:

- organising decentralised and demand-driven farmer managed tree nurseries
- Developing extension approaches for practical skill development, processing and marketing of tree products
- Identifying new tree products and developing marketing strategy
- Networking and supporting establishment of farmer organisations

The extension concepts of ITFSP involve: Production (Technology tree management)

Processing (Processing technology and marketing)

Organization (Interest groups Associations-that would deal with supply of germplasm and other inputs, processing, marketing, training)

NB (see figure 1)

ITFSP has developed an extension approach, which is based on group training of identified farmers who have some skills in the tree crop technologies. The existing skills of the farmers are improved in practical training workshops during the production cycle of the trees in nurseries or orchards.

Agenda

- Introduction of participants and ITFSP trainer
- ITFSP's objectives and the identified constraints of the tree crop sector
- ITFSP's development concept and some achievements
- Results from studies about the economic role of tree crops in different farming systems in Kenya

- Introduction to the Farmer Trainer Training Manual (FTTM) for tree propagation and tree management
Table of content
Introduction to fruit production and Agroforestry
Which fruits can grow where?
- Syllabus development for the different class levels and assessment of the appropriateness of training modules from the FTTM
Introduction to Module 2, Nursery establishment
Introduction to Module 3 Easy methods in tree propagation
- Work in work groups to elaborate required topics and assess available training material
- Presentation of Workgroup results and discussions
- Practical in the field on fruit tree propagation techniques

Presentation of Workgroup results and discussions on syllabus development

The discussion on syllabus development was enlightening with various contributions from the participants. The general agreement was that the Farmer Trainer Training manual (FTTM) for tree propagation was simple enough to be understood as the language and expressions therein were basic. What was therefore left to do was to collate the module's practical orientation with the prevailing primary school syllabus. The participants picked the topics they considered relevant to primary schools teaching and in groups worked on making them more appropriate for that particular target group. It was also felt that classification of the various modules to classes would not be appropriate at this stage but the prevailing syllabus would be followed with inclusion of the modules so discussed. The groups thus formed with their various modules selected:

Group 1

Members:

Dickson Nyaga Kaugi

Solomon Njuneria

Francis Ouma Sikukuu

Prisilla Tsanzi

Module: 3.8 Tree maintenance

3.9 Pest & Disease Control

Tree Maintenance

Objectives:

Pupils should be able to describe and carry out pruning and top working practices
Pupils should be able to identify tools for pruning for pruning and top working
Pupils should be able to use pruning and top working tools correctly
Pupils should be able to identify types of trees for top working
Pupils should be able to appreciate the results of the practical work

Tools

Panga

Pruning saw

Secateur

Wax

Polythene paper

Rootstock

Scions

Grafting knife

Procedure

Introduction: This should attempt to explain why the practical is necessary, advantages when the practical is needed.

Identification of tools and materials

Discuss reasons for pruning/top working

Demonstration of the procedure following an earlier introduced checklist

Pupils to carry out activities

Conclusion showing the maintenance and storage of tools after a practical.

Pest and Disease control

Objectives

Pupils will be able to identify common pests and diseases of the tree crop being studied

Pupils will be able to identify and discuss methods of pest and diseases control

Pupils will be able to know the safety precautions when handling chemicals

Pupils will be able to practice pest and disease control procedures

Tools and Equipment

Spray pump (hand)

Gumboots

Gloves

Cap

Facemask

Disinfectant

Plastic overalls

Chemicals

Fungicides

Herbicides

Pesticides

Concoctions

Procedure

Introduction

Discussion

Identification of pests and diseases

Identification of tools and equipment

Demonstration

Practical work by pupils.

Conclusion stressing the importance of care in handling of chemicals

Group 2

Members

DR. Lumumba O. Achieng

Mutwiri J.Nkanata

James Mwangi

Phillip Kones

Modules: Fruit Propagation

3.3 Seed propagation

3.4 Cuttings stooling & Layering

Seed Propagation

Specific objectives: At the end of the topic, the pupils should be able to:

- State the advantages and disadvantages of seed propagation
- State conditions under which seed propagation is recommended
- Select good quality seeds and identify their sources
- Extract and treat seeds
- Carry out test for seed germination: sinkers and floaters
- Sow seeds in a seedbed and also transplant into containers
- Carryout maintenance of planted seeds i.e. pricking out.

Introduction:

Theory:

Common methods of propagation (seed, Cutting & layering, stooling)
Advantages and disadvantages of seed propagation

Conditions recommended for seed propagation

Sources of seeds: Local sources of seeds

Collection of seeds

Quality of seeds: Selection of good seeds

Good quality fruit trees as seed source

Seed extraction and treatment:

Procedure in extracting seeds from fruit (theory)

Extraction of seeds from fruit (practical)

Seed germination carry out simple tests: sinkers and floaters

Planting of seeds in prepared seedbeds and maintenance

Transplanting seeds into containers

Maintenance of planted seedlings in containers.

3.4 Cuttings & Layering

Objectives

Pupils should be able:

- Describe propagation by use of cuttings and layering
- Select and prepare fruit tree cuttings for planting
- Plant and care for fruit tree cuttings

Carryout layering on at least three fruit trees successfully

Introduction:

Define cuttings

State reasons for using cuttings

Outline qualities of a good cutting (show an example of a good cutting)

Collection of cuttings: Pupils collect and prepare cuttings from well-selected mother trees

Demonstrate on handling of the cuttings.

Planting of cuttings: Outline the procedure of planting a cutting on a ready seedbed

Demonstrate actual planting of cuttings

Pupils in groups plant cuttings on their plots as the teacher supervises

Care of cuttings: Outline the care of cuttings from acquiring them to planting.

Layering & Stooling

Preparation

Avail the required tools and materials

Make diagrams/illustrations of stooling and layering

Familiarize one within the relevant skills

Introduction: define stooling & layering as methods of propagation

Outline reasons for using these methods.

Procedure

Outline the procedure of layering and stooling

Demonstration of: stooling

Air layering

Pupils to carryout stooling and layering on selected mother trees in the group

GROUP 3

Members

Evans Njenga

Rose K Gitaari

Benson Butu

Module 2: Nursery Establishment

The pupils should be able:

- to make a nursery bed
- Manuring, leveling drills
- Planting, mulching, watering
- Shading, weeding, spraying,
- Keeping of records
- Maintenance

Introductory activities:

- Show pupils samples of fruits
- Identify fruits grown in the area
- Which of the fruits costs more in the local markets
- Discuss the importance of these fruits

Actual nursery site selection with pupils

Introduce the tools & materials needed, their purpose and application

Nursery preparation

Theory: Mention the types of nurseries

Outline the steps to be followed when preparing a seedbed.

Practical: Demonstrate how to prepare a nursery; raised, sunken.
Pupils in groups of 4-5 make a nursery each.

Nursery establishment

Theory: Outline how sowing of seeds is done

Mention methods of sowing, scattering and drilling.

Practical: Seed collection from local fruit trees

Demonstration of direct and indirect sowing

Groups sow in their nurseries

Nursery care

Theory: Ask pupils to name things done in a nursery to make plants grow.

Describe good care of the nursery.

Practical: Demonstrate good watering, mulching, and shading, removing excess seedlings and plant them on another bed, removing excess branches and thinning, replacing lost seedlings.

Practical approach:

1. Collecting materials: mulching materials, water, manure, Tape measure, string, pegs, seeds, jembe, Rake, panga, slasher, watering can fungicide

Trainer Activities	Pupils activities
Guide the learners to identify types of seeds.	Dig and level nursery bed
Nursery beds	Manuring, measure size
Supervise the following activities, for nursery beds raised and sunken.	Planting, mulching making shade, watering
	Record keeping, removal of shade, pricking
	Weeding
Avail containers: pots, tins	

The target classes for these activities would be class 4,5, &6

Nursery tending operations

Objective: Learners be able to root prune the seedlings
Reasons for root pruning
How to root prune

Training activities	Training points
Seedlings, Knives	Reasons for root running

Wire, secateurs Panga	Root system, shifting containers
Rootstocks	Sound root system young plants
	Handling seedlings

A. Classroom activities:

- Discussion on various root systems
- Reasons for root pruning i.e. avoiding development of strong roots at early stage.
- Disadvantage of strong root system.

B. Learner activities:

- Handling of seedlings
- Handling and use of tools
- Pruning of the roots
- Shifting the plants

Summary of lesson plan for a particular activity

Topic: Nursery tending operation

Subtopic: root pruning

Objectives	T/P preparation	Teaching Points	Class discussion	Evaluation
The learner should be able to state reason for root pruning in fruit seedling	Rootstocks, secateur, wire,	Reasons for root pruning	Discussion of various root systems	Evaluate pupils
		Root systems	Handling of seedlings by pupils	Seedling handling
		Shifting containers		Actual pruning
		Development of sound root system,		
		Root deformation		

GROUP 4

Members

Josephine Mwanzia

Daniel Olminis

Daniel Kavoi

Festus Musumba

Module 3.5& 7

3.5 Propagation II

Grafting and budding

Objectives: By the end of the module, pupils should be able to:

- Define the terms grafting and budding
- Select good rootstocks and scions
- Know the importance of grafting and budding
- Tell the tools used
- Do grafting and budding correctly
- Know the terms used in grafting and budding e.g. bud eye
- Know the right procedures in grafting and budding
- Know the different methods used in grafting and budding
- Tell the advantages and disadvantages of grafting and budding
- Know the crop protection measures undertaken when grafting and budding

Practicals

- Grafting using different methods
- Budding using different methods
- Sharpening the grafting knife
- Cleaning of tools
- Record keeping

NB

1. The pupils book-should contain drawings or pictures showing every activity in progress, accompanied by brief explanation and activities to be done by the pupils.
2. Teachers guide-should contain much of the information and organization and tools required by the teacher before teaching.
3. Teachers should be able to give pupils projects assignments and summary notes, he/she should also evaluate the pupils and keep progress records

Module 7

Fruit Tree Establishment

Objective: By the end of the topic the pupils should be able to establish a small-scale farming

Soil mixture of planting hole (2x2x2ft) by use of farmyard manure and fertilizer

Practical procedure as per the manual

Planting fruit tree as per the procedure: add the pictures as shown also protect trees from animals as shown.

Water harvesting catchments for fruit trees: as per the manual, the diagrams are relevant.

NB

For fruit trees on contours lines: the language used is above the level of primary school.

Maintenance after planting the fruit trees, which includes the following subtopics:

- Weeding
- Formative pruning
- Training the tree to a single stem
- Stimulate the development of main branches
- Plant protection

The above subtopics are as per the manual. The subtopic on shaping the framework of the main branches would not be clear to the pupils and would therefore need to be simplified.

Other topics to be included:

Intercropping

Evaluation checklist

Timing for the activities

Methods of teaching (i.e. teachers guide book)

Presentation and practical of grafting

Requirements for successful grafting operation:

- The stock and scion must be compatible
- The cambium region of the scion must be placed in intimate contact with that of the stock
- The grafting operation must be done at a time when the stock and scion are in the proper physiological stage, i.e. scion buds are dormant while graft union are capable of producing callous tissue necessary for healing the graft.
- Immediately after the grating operation is completed all cut surfaces must be protected from desiccation.
- Proper care must be given to grafts for a period of time after grafting

Types of grafting:

Whip and Tongue

Splice grafting

Side grafting

Cleft grafting

Wedge grafting

Practical were done on grafting particularly wedge grafting. There were also slides presented of the various methods.

Presentation on Processing Technologies for tree crops

This involved a discussion on processing Technologies, which included the various activities undertaken by ITFSP in raising the incomes of the small-scale farmers through introduction of the Technologies that are appropriate and easy to use in their situation. Some of this includes

Solar drying of fruits and vegetables e.g. Mangoes, Guavas, Bananas, Tomatoes

Cashew nut processing

Fruit jams, juices, chutneys production

These discussions included slide shows of the various technologies and stages involved in the processing of the tree crops in question.

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