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RESEARCH PROGRAM ON
Roots, Tubers and Bananas



Trainer's manual

A training course for banana farmers interested in growing tissue culture bananas

Includes modules on:

Working in groups
How to grow bananas
Business skills
Marketing

IITA
Research to Nourish Africa

VEDCO

Trainer's manual

A training course for banana farmers interested in growing tissue culture bananas

Moses Lule, Thomas Dubois and Daniel Coyne
International Institute of Tropical Agriculture (IITA)

Dan Kisitu, Herbert Kamusiime and Joseph Bbemba
Volunteer Efforts for Development Concern (VEDCO)

With contributions from

Vinzenz Bauer and Volker Hoffman, Universität Hohenheim

Peter Mwirigi, Peter Mwaura, Losenge Turoop and Esther Kahangi
Jomo Kenyatta University of Agriculture and Technology

Edward Agabe, TechnoServe

Salvator Nkurunziza, Jean-Claude Hobayo
International Institute of Tropical Agriculture

Grace Babirye, Jane Kintu and Henry Kizito
Volunteer Efforts for Development Concern

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Katherine Lopez

PMB 5320, Oyo Road, Ibadan 200001, Oyo State, Nigeria

International Mailing Address: IITA, Carolyn House, 26 Dingwall Road, Croydon, CR9 3EE, UK

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Farmers during a training session. Herbert Kamusiime, VEDCO.

Photos in document by Herbert Kamusiime, Dan Kisitu, Moses Lule and Thomas Dubois

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Background: the need for training in tissue culture bananas

Banana is an essential staple crop throughout the Great Lakes region of East Africa. It is also an important source of trade and income. To safeguard sustainable banana production and generate wealth for smallholder farmers, high quality planting material is crucial.

Banana in smallholder farmer systems in East Africa is traditionally propagated by means of suckers, which contain pests and diseases. Plants produced through tissue culture are mostly free from pests and diseases (with a few exceptions). There are many further benefits to using tissue culture plants: (1) they are more vigorous, meaning faster growth and higher yields; (2) they are more uniform, allowing for better planned marketing; and (3) they can be produced in large quantities in a short period of time, facilitating distribution of both existing and new cultivars. In other words, tissue culture technology can help banana farmers to make the transition from subsistence to income generation.

However, there are hurdles that are limiting widespread uptake and optimal use of tissue culture technology among smallholder farmers in East Africa. Distribution systems of tissue culture plantlets to farmers are one key obstacle. Plantlets are often distributed in large quantities at subsidized prices by various development partners, but this is not sustainable in the long run. Tissue culture plantlets are fragile, and their thriving depends on good management by nursery operators and farmers, especially in the early stages. This knowledge is currently mostly lacking. For nursery operators, the correct handling of plantlets in humidity chambers and shadehouses determines plantlet survival and quality. For farmers, plantlets need to be carefully and properly transported, and receive suitable water and fertilizer to fully reap the benefits.

Switching to tissue culture technology from conventional suckers requires different skills and knowledge for both nursery operators and farmers. For nursery operators, training in agronomic and technical know-how, while important, is not sufficient; nursery owners also need business and marketing skills to turn their nursery into a profit-making business. For farmers, the potentially higher production and more uniform harvesting times of bananas will require good business and marketing skills for them to fully benefit. Working together in groups has been shown (in Kenya and Southern Uganda) to strengthen the position of farmers within the banana value chain; however organizing into groups takes additional skills.

Promotion of tissue culture bananas has in the past been too focused on commercial tissue culture producers. Therefore, in 2008, a project was launched which aimed at developing improved and efficient pathways to deliver tissue culture plants to less commercial farmers. The project, titled ‘Banana tissue culture: community dissemination pathways for delivery of high quality planting material to create markets for African farmers’, was funded by the Federal Ministry of Economic Cooperation and Development (BMZ) and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The project built on an earlier phase that demonstrated potential for tissue culture technology with smallholder banana farmers. As part of the project, training was undertaken in East Africa of tissue culture nursery operators and farmers. In Burundi and Uganda, over 700 farmers were trained during more than 250 training sessions, and 150 nursery operators during 20 training sessions. In Kenya, farmers and nursery operators were trained together, and 75 training sessions were organized. The training courses were lengthy and detailed, with an individual farmer or nursery operator attending up to 40 training events over the course of 1–2 years. This manual, and the accompanying manual for training of nursery operators, are based on the training notes from these courses.

How to use this manual

This training manual can be used by anyone involved with training of smallholder tissue culture farmers, such as extension agents or applied scientists. The manual is not intended as a guide for farmers themselves. The trainings were mostly carried out by a facilitator and an assistant from VEDCO and IITA.

The manual is organized into five modules, and each module is divided into sessions. The sessions are based on actual training sessions carried in Central Uganda. Each session was carried out and evaluated three or four times, with adaptation and fine-tuning along the way.

Most of the sessions are structured similarly: after listing the 'tools' (personnel and equipment), the activities are given as a series of steps. The actual content for each session is given below this, in a coloured box. Each session concludes with a Q&A section, which includes actual questions posed during the training.

We recommend that implementation of any training adheres as closely as possible to the format detailed within the manual. However, modifications according to geography and farmer conditions may be necessary.

The modules are organized in the order in which we recommend they be delivered, however they are largely stand-alone and can be interchanged. Within a module, however, the order of the sessions should remain fixed. The entire training course (all sessions from all modules) takes approximately 1–2 years if modules are run sequentially, however modules can be run in parallel to reduce the training period.

Some of the modules are relevant beyond tissue culture bananas, e.g. 'Working in groups', 'Business skills for farmers' and 'Marketing for farmers' can be applied to business activities beyond growing of bananas.

Brief overview of the modules

Module 1: Introduction to tissue culture bananas (one session)

Aims to raise interest among farmers in growing tissue culture bananas.

Module 2: Working in groups (seven sessions)

Guides farmers on how to mobilize and organize farmer groups, as well as useful lessons on group dynamics, such as leadership, motivation, communication and conflict resolution.

Module 3: How to grow tissue culture bananas (eleven sessions)

Covers the steps that need to be taken to care for and grow banana plants, including tissue culture plants, from field preparation to harvest. Important concepts, such as water and soil conservation practices and pest, disease and weed management, are covered in separate sessions.

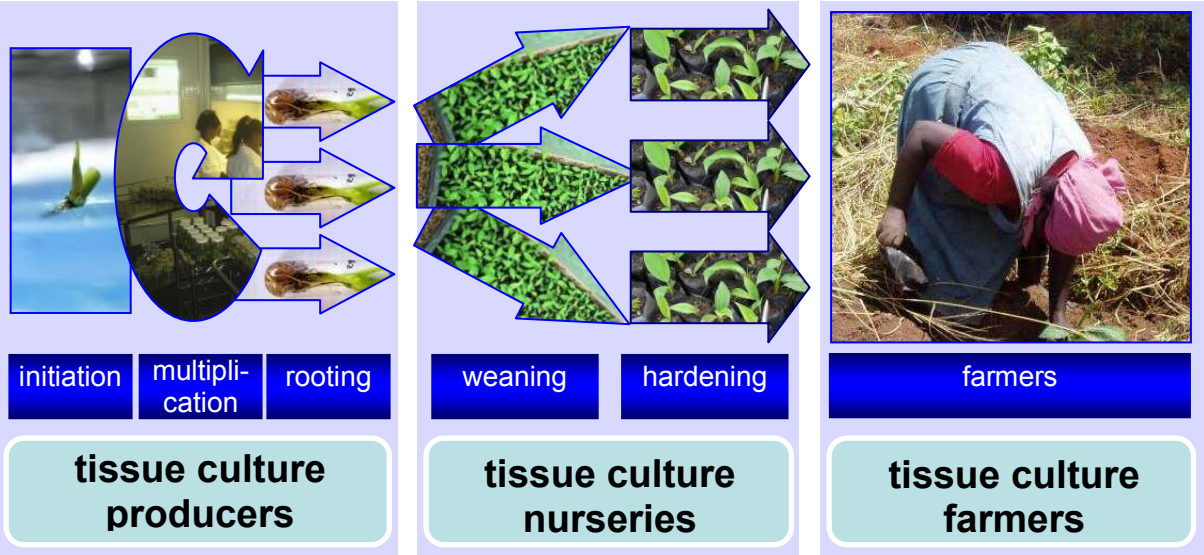
Module 4: Business skills for farmers (five sessions)

Covers the basic concepts of business planning and record keeping, using an instructive but simplified example of benefit–cost calculation.

Module 5: Marketing for farmers (six sessions)

Explains the basics of marketing, with a focus on collective marketing.

Producing tissue culture bananas: a summary



Specialized tissue culture laboratories (see table on next page) carry out the first stages of tissue culture banana production. These are:

1. Initiation: The meristem is taken from a plant in the field and transferred into sterile, specialized media in the laboratory, where the tissue develops into shoots.
2. Multiplication (1 cycle takes approx. 1 month): Each month, the tissue is subdivided and cultured. How often the tissue is subdivided and into how many shoot pieces depends on the tissue culture laboratory and banana cultivar, but with more multiplication cycles and shoots, the greater the number of plants generated.
3. Rooting: Further to the multiplication cycles, shoots are placed on rooting media for about 1 month where they are induced to form roots and produce banana plantlets.

Nursery operators then take the fragile plantlets and put them through weaning and hardening, before they are ready for selling to farmers:

4. Weaning (approx. 3 weeks): During this critical stage, plantlets are removed from and gradually weaned from the conditions within a tissue culture flask (100% relative humidity, sterile and no direct sunlight) to the environment of the shadehouse; weaning is usually accomplished using humidity chambers within the shadehouse.
5. Hardening (1–3 months, until sale to farmers): During this stage, weaned plants are exposed to the environment in the shadehouse which prepares them for field conditions.

Finally, farmers buy and grow the tissue culture plantlets, in much the same way as banana plants derived from suckers or corm pieces.

Commercial tissue culture laboratories in East Africa

Country	Name	Address	Contact
Burundi	Agrobiotec	P.O. Box 5667, Kinindo, Bujumbura, Burundi	Theodomir Rishirumuhirwa +257 22241972 agrobiotec2002@yahoo.fr
Burundi	Phytolabu	13 Route de Rumonge, Kinindo, Bujumbura, Burundi	Giovanni Forgione +257 22248724 giovanniforgione.phytolabu@yahoo.fr
Kenya	Jomo Kenyatta University of Agriculture and Technology (JKUAT)	P.O. Box 62000, Nairobi, Kenya	Esther Kahangi +254 726052879 estherkahangi@yahoo.com
Kenya	Mimea International	Nairobi, Kenya	Anne Mutsya +254 724644301 mimea_international@yahoo.co.uk, annkitisya@yahoo.com
Uganda	Agro-Genetic Technologies	P.O. Box 11387, Kampala, Uganda	Erostus Nsubuga +256 414371186 ewforce@yahoo.com
Uganda	Makerere University Plant Tissue Culture Laboratory	P.O. Box 7062, Kampala, Uganda	+256 414 533580 maktclab@agric.mak.ac.ug

Note : this is not necessarily a complete list.

Module 1
Introduction to tissue culture bananas

Overview

This module aims to instruct trainers how to carry out an introductory session with farmers. The introductory session explains the basic processes involved in tissue culture for banana plants, and aims to stimulate interest among the participants so that they decide to attend future sessions and learn how to raise tissue culture plantlets.

Structure

This training guide is structured as follows:

1. Planning for the training session:
    - Mobilizing participants
    - Preparing training materials
    - Obtaining materials and equipment needed for the session
    - Preparing the venue for the session.
2. Conducting the training session:
    - Delivering the content
    - Agreeing schedule, timing and location of subsequent training sessions with those participants who want to continue the training
    - Baseline survey of participants.

The training session is scheduled for 3 hours, and should be carried out in a single session.



Planning for the training session

Mobilizing participants

Purpose: To reach as many potential participants as possible, provide them with information about the training course and the first training session, and elicit feedback on likely attendance at the first session. Potential participants include smallholder and commercial banana farmers, farmers who are planning to start banana production, people who are selling banana tissue culture plantlets as a business and those who intend to venture into this business.

Personnel: A facilitator and an assistant (training team)

Supplies: Mobile phone, transport, computer(s), printer, recording material (pens, notebooks)

Time: Begin 2 weeks ahead of the intended date for the training session

Tasks

1. Prepare flyers for distribution to potential participants
2. Identify and contact key people who may help with reaching potential participants
3. Approach and provide information to potential participants, and collect feedback on the likelihood of them attending the training session
4. Follow-up with potential participants who showed interest, to remind them about the training session.

1. Prepare flyers

Flyers are intended to inform potential participants and stimulate their interest to attend the first training session. They should include the title of the training course (Training course for banana farmers interested in growing tissue culture bananas); the venue, date and time for the first training session (see Module 1); and a phone number for further information. The flyer should ideally be a single page, should be visually attractive, and should be produced in the relevant language or languages (Appendix 1).

2. Identify and contact key people

Key people who can help link the training team to potential participants include agricultural extension workers, banana tissue culture nursery operators, agriculture-related organizations such as NGOs, and influential people in the area such as religious leaders, businessmen, local council leaders and traditional leaders. Explain to the key people, either in a joint meeting or individually, the objectives of the training course and seek their help in reaching potential participants. This help could be passing on the flyers to potential participants, or providing names and contact information of potential participants.

3. Approach and provide information to potential participants, and collect feedback on the likelihood of them attending the training session

Distributing the flyers is an essential way to reach and inform potential participants. The training team may distribute the flyers themselves, ask the key contacts to distribute them, or share the task. If the key contacts are helping with distribution, the training team should provide practical assistance such as transport or fuel, mobile phone credit, books, pens and folders.

While distributing flyers, try to capture and record relevant information about the recipients, i.e. name, phone number, date of receiving the flyer, and whether they expect to attend the training session. This information will help to plan the training session. Use a feedback form to collect this information (Appendix 2). If key contacts are helping with distribution, provide them with feedback forms and ask them to try and collect the same information.

Other ways to reach potential participants include radio announcements, and displaying flyers in communal places such as marketplaces.

4. Follow up with potential participants to remind them about the training session

About 5 days before the training session, contact (by phone or visit) all the potential participants who showed interest in the training session and remind them of the date, time and venue for the session.

Preparing training materials

Purpose: To prepare training materials for use during the training session. The materials should inform participants about tissue culture bananas, and raise their interest in investing in tissue culture plantlets.

Personnel: Training team, people with experience in writing training materials

Supplies: Relevant literature, mobile phone, transport, computer(s), printer, recording material (pens, notebooks), markers

Time: Begin 3 weeks ahead of the intended date for the training session

Tasks

1. Review relevant literature
2. Consult people with experience in writing training materials
3. Prepare, review and print the basic training handout
4. Prepare any further materials, such as posters.

1. Review relevant literature

Review available literature on tissue culture bananas, as well as materials for other farming training courses.

2. Consult people with experience in writing training materials

Talk to people who have had experiences in writing farmer training materials to learn what it takes to successfully prepare them.

3. Prepare, review and print the basic training handout

After reviewing the literature and consulting experienced people, put together a draft training handout. This should then be shared with as many relevant technical people as possible, and their comments used to revise and improve the document. Finalize and print as many copies as anticipated participants.

4. Prepare any further materials

Additional materials could include posters, flyers or brochures. Obtain or print as many copies as anticipated participants. Also, prepare the attendance form, for collecting information on participants (Appendix 3).

Obtaining materials and equipment needed for the session

Appendix 4 gives an example of the materials and equipment that might be needed for the training session. Plan and prepare a similar checklist for your session, and use it to collect all the necessary materials and equipment ahead of the session.

Preparing the venue

The venue must be agreed ahead of printing the flyers, so that this information can be included in the flyers. The venue should ideally be a banana tissue culture nursery. The meeting room should have adequate lighting/shade and seating arrangements for the participants.



Conducting the training session

Objectives

The training session has four objectives:

1. To introduce the training course and its aim and objectives to the participants
2. To introduce farmers to the basics of tissue culture bananas
3. To agree the schedule, timing and venue for subsequent modules with those participants who want to continue the training
4. To determine some key characteristics of those participants who will be continuing the training.

Delivering the content

Personnel: A facilitator and an assistant (the training team)

Supplies: Posters, transport, recording material (pens, notebooks), markers, flipchart, camera, flyers, masking tape, seats for the participants, attendance form, table, hoe, 2 banana suckers (one visibly healthy and one visibly infested by pests and/or diseases), 1 panga, 1 knife, 1 jerry can of tap water, 2 glass tubes/baby jars containing tissue culture banana plantlets, 2 weaned tissue culture banana plantlets, refreshments

Time: 3 hours

1. The training team should arrive at the venue at least 1 hour before the meeting to prepare the room and equipment for the session. As participants arrive, welcome them, show them where to sit and make them feel comfortable. Ask them to register using the attendance form. Provide them with any training materials and supplies they need for the session.
2. Begin the training session. Welcome the participants and have each member of the training team introduce him or herself to the participants, including their name, the organization they work for, and their role on the training course. Then have the participants introduce themselves, including their name, where they live, how they got to know about the meeting and their expectations from the meeting.
3. Introduce the objectives of the training course. Briefly summarize the five modules that comprise the course. Then introduce Module 1 and its objectives.
4. Give a detailed presentation about tissue culture bananas. Make the presentation as practical as possible, using demonstrations as appropriate. Encourage questions or comments from the participants throughout. The presentation can be based on the content on pages 6–12, and structured as follows:
    - What is banana tissue culture?
    - How to produce banana tissue culture plantlets
    - Soil sterilization
    - Removing plantlets from laboratory culture containers and potting them into soil
    - The humidity chamber
    - The hardening process

- Where to obtain tissue culture banana plantlets
- Advantages and disadvantages of tissue culture banana plants
- Some myths about tissue culture banana plants.

5. The participants and training team discuss and agree the dates, time and venue for the subsequent training sessions.
6. Carry out a baseline survey of participants. Useful information to gather includes: size of banana plantation owned; number of banana plants and cultivars grown; past experience with banana tissue culture plants; experience in banana production; challenges encountered with banana production; average yields; and marketing channels for banana produced by the farmer. Use the checklist in Appendix 5 to obtain this information (this may need to be translated into an appropriate language.) Ask farmers to take the checklists and return them during the next meeting.
7. Wrap up the session as follows:
   - Briefly recap the day's session
   - Ensure that all participants have registered their names on the attendance list
   - Communicate the topic for the next training session (Working in groups) and remind participants of the date, time and venue.

Content

What is banana tissue culture?

Tissue culture is a technique for multiplying clean banana planting material from small plant pieces taken from a mother plant. Although any part of the banana plant can be used to generate tissue culture plants, it is the meristem/shoot tip that is commonly used.

How to produce tissue culture banana plantlets

[Trainer: Demonstrate steps 1–6, then present steps 7–10 theoretically, in simple language.]

1. Carefully select source materials (peepers or small sword suckers) that appear healthy (pest- and disease-free) and that are growing vigorously. [Trainer: Show two suckers to the participants: one that has visible evidence of pest or disease infestation and one that appears healthy. Explain that you cannot be sure if you are planting infected or clean material, as most suckers appear to be relatively healthy until their corms are exposed.]
2. Using either a hoe or a panga, separate the sucker ('ex-plant') from the mother plant.
3. Clean the sucker by removing soil and cutting off the roots to expose the corm. Cut off parts of the pseudostem to a length of about 30 cm.



Fig. 1. Removing the outer leaf sheath from a sucker.

4. Pack the pseudostem parts in a clean nylon bag and transport them to a cleaner environment for further manipulation.
5. Wash the sucker under tap water to remove mud and other debris.
6. Trim away the outer leaf sheaths, leaf bases and corm tissue of the ex-plant until a 2 × 2 × 2 cm^3 cube enclosing the shoot apex remains. Be careful to avoid cutting through the apex.
7. The ex-plant is placed directly on a multiplication-inducing culture medium in containers. A growth regulator (cytokinin) is added to the multiplication medium to speed up the process. The containers are transferred to incubators or growth chambers and maintained at an optimal growth temperature of 28 ± 2°C.
8. Banana tissue culture shoots often suffer from blackening caused by exudates from wounded tissues. These undesirable exudates form a barrier round the tissue, preventing nutrient uptake and hindering growth. To prevent this, during the first 4–6 weeks fresh shoots are transferred to new medium every 1–2 weeks.
9. The shoot tips then start to develop.
10. Individual shoots or shoot clumps that have formed are transferred to a nutrient medium which does not promote further shoot proliferation but stimulates root formation (rooting media). After rooting, plantlets are ready to leave the laboratory for weaning and hardening.

[Trainer: Show the participants a culture bottle with plantlets that are ready to leave the laboratory for weaning. Briefly describe the remaining process the tissue culture plantlets have to go through before they are ready for planting: after leaving the laboratory, the tissue culture plantlets are removed from their culture containers, placed into small bags containing sterilized soil, and transferred to a humidity chamber for weaning.]

Soil sterilization

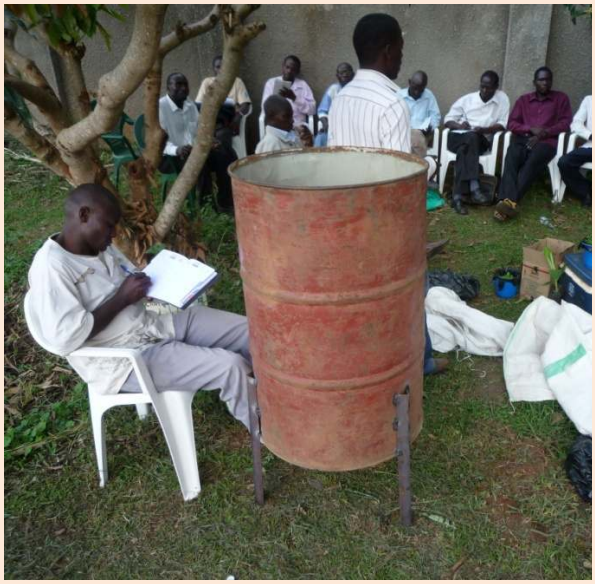
Soil sterilization destroys plant pathogens, pests and weeds which may be present in the soil.

1. Prepare the necessary materials: oil drum, water, fireplace and firewood, forest soil, sand, manure, hoes, spade, wheelbarrow and sisal bags.



Fig. 2. Preparing ex-plants prior to the initiation stage for tissue culture plantlets in the laboratory.

2. Ensure the drum has no holes. Weld some strong metal pipes inside the drum, horizontally and approximately 30 cm from the bottom of the drum, to make a shelf for the soil sacks so that the soil sacks are kept above the water.
3. Pour water into the drum up to approximately 25 cm from the bottom of the drum. The water should not touch the metal pipes.
4. Thoroughly mix the forest soil, the manure and the sand in the right proportions. Note that different nurseries use different proportions; the most common are: 5:2:1, 2:1:1 or 4:2:1 for forest soil:manure:sand.
5. Pack about 10 kg of the mixture into sisal sacks and lift them into the drum so that they sit on the metal pipes. When the drum is full, cover the top of the drum with sisal bags so that steam is retained when the drum is heated.



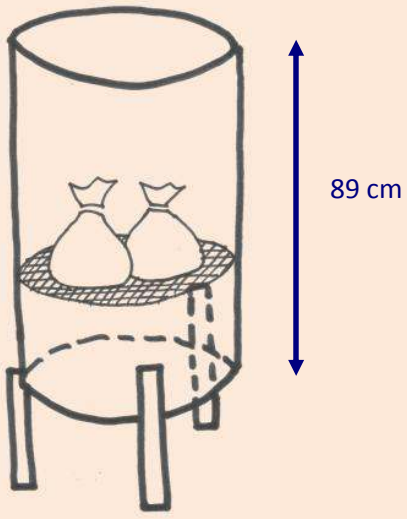


Fig. 3. Oil drum for soil sterilization.

6. Proper sterilization of the soil depends on the amount of firewood used and the intensity of the fire. Generally, after 1–2 hours of a large enough fire, when steam is seen coming out of the soil, the soil should be fully sterilized.
7. When the soil is considered fully sterilized, remove the covering sisal bags and leave the drum to cool. After cooling, remove the sisal bags containing the soil mixture and pour the soil onto a clean surface, spreading it out to cool. It may take 2–3 hours, or overnight, before the soil cools completely and is ready to use.

Removing plantlets from laboratory culture containers and potting them into soil

1. After removing the plantlets from the culture bottles, rinse their roots to remove agar residue which could encourage development of pathogens. If the plantlet has long roots, shorten them to about 2–3 cm, since long roots may break and take more time to establish.
2. Plantlets coming out of the culture bottles are not of uniform size and may be clumped. Carefully separate any that are clumped, and sort them according to size.
3. Pot plants of the same size into small plastic containers (~150 ml) containing sterilized soil mixture. Up to five plantlets of the same size can be potted into one plastic container.



Fig. 4. Plantlets ready for weaning in the humidity chamber after being removed from tissue culture laboratory containers.

The weaning process (humidity chamber)

The fragile plantlets are weaned in a humidity chamber, which helps them adapt to the external environment. While in the culture bottles, plantlets are under 100% relative humidity and lower light intensities. In the humidity chamber, they experience lower humidity and higher light levels, getting them used to conditions in the field.



Fig. 5. A shadehouse with a humidity chamber for weaning tissue culture plantlets.

The following conditions are recommended in the humidity chamber:

- Temperature should be between 25°C and 35°C. Lower or higher temperatures can lead to poor plant development.
- Keep plantlets shaded. Shades can be constructed using sheeted bamboo poles, grass or leaves and placed on the roof of the humidity chamber. The chamber itself can be kept in the shadehouse or under natural shade (e.g. a tree).
- High relative humidity should be maintained by regular misting using a hand sprayer. Humidity can be gradually reduced over time.

The hardening process (shadehouse)

Plants should be transplanted into containers or black polythene bags either directly after removal from tissue culture flasks or following 1–2 weeks growth in a humidity chamber.

Procedure for transferring the plantlets to a shadehouse for hardening:

- Fill the polythene bags (~ 250–350 ml) or containers with a soil mixture and pour some water into the polythene bags.
- Carefully uproot the plantlets (coming from the humidity chamber) from their container, one at a time.
- Using your index finger or a rod, make an insertion into the moist soil within the polythene bag and carefully insert the uprooted plantlet in an upright position. Plant only one plantlet per bag or container. Cover its entire corm with the potting mix.
- Transfer the potted plantlet into the shadehouse for hardening. After about a month in the shadehouse, the plantlets are ready for planting in the soil.

The following conditions are recommended in the shadehouse:

- Daily watering, either in the morning or in the evening; twice a day (morning and evening) during very dry conditions.
- Temperature between 15°C and 35°C, with an optimum of 25–30°C.
- A high standard of hygiene is necessary to reduce the risk of damage by pest or pathogens. Caterpillars and mites can be serious leaf pests in the nursery. Spraying plants with insecticides can be effective for the control of such pests.
- Partial shading is essential especially during the early stages in the shadehouse. Shade can be provided by using a special shadenet to cover the shadehouse.



Fig 6. A shadehouse for hardening tissue culture banana plantlets.

Where to obtain tissue culture banana plantlets

Production of tissue culture plantlets takes place at specialized laboratories (see table on page viii). Plantlets can be procured at different levels of maturity (post-flask, post-weaning or post-hardening) and through different channels (directly from the laboratory, at a tissue culture banana nursery or from tissue culture banana distributors). Farmers would most likely buy post-hardened plantlets from a nursery or a distributor.

Advantages and disadvantages of tissue culture banana plants

Advantages	Disadvantages
• Disease- and pest- free planting material • Little space needed for multiplying large numbers of plants • Uniform plantlets which provide for consistent plantation development • More vigorous plants, with shorter harvest-to-harvest periods and higher bunch weights • Prerequisite for cross-border traffic of planting material • Allows for faster distribution of superior germplasm • Can be used in gene banks to conserve plant genotypes for future use in research or agriculture	• Price of tissue culture planting material is usually double that of conventional sucker material • Better plant management and care is needed (watering, weeding and adding fertilizer), especially at early stages • Plantlets are easily infected with pests and diseases if transplanted in pest- and pathogen-infested soils • The number of different cultivars produced and sold by the laboratories may be limited, reducing genetic diversity in the planting material market

Some myths about tissue culture banana plants

MYTH: Tissue culture banana plants cannot be attacked by any pests or diseases.

FACT: Tissue culture banana plants, just like an ordinary sucker, are susceptible to pest and disease attack. They are, however, free from pests and diseases when they are planted out (apart from viruses and some types of bacteria).

MYTH: Tissue culture bananas are flowers.

FACT: Tissue culture banana plants are not flowers. However, before being established in the field, they resemble a flower called *Strelitzia* spp.

MYTH: Suckers from tissue culture banana plants are also tissue culture plants.

FACT: Suckers from tissue culture plants are ordinary suckers just like the ones from ordinary banana plants.

MYTH: Tissue culture is a variety/cultivar.

FACT: Suckers from tissue culture plants are ordinary suckers just like the ones from ordinary banana plants. Tissue culture plants are not a variety/cultivar. They are the usual banana plants that nursery operators have always planted except that they can be rapidly multiplied in the bio-technology laboratory.

Questions and answers

Q1: How does one become a nursery operator?

A1: We are running a parallel training with prospective tissue culture banana nursery operators and anyone can join. Give us your telephone contact and we will let you know when the training is happening.

Q2: What is IITA in full?

A2: IITA is the International Institute of Tropical Agriculture. It is an agricultural research organization with its headquarters in Ibadan, Nigeria, and stations in Benin, Cameroon, DR Congo, Ghana, Malawi, Mozambique, Nigeria, Tanzania and Uganda.

Q3: Can IITA or VEDCO subsidize people who want to start tissue culture nurseries?

A3: No. However IITA/VEDCO can equip interested people with the relevant skills and knowledge, and this is free. The training includes a module on financing for tissue culture nursery operators, which will help mobilize finances for running a tissue culture nursery.

Q4: Is it okay to establish a banana orchard using suckers derived from tissue culture plants?

A4: Yes, it is ok and there are several people who sell suckers from orchards that were started using tissue culture plants. However, suckers derived from tissue culture plants are just like any other suckers, and not pest- and disease-free.

Q5: How long do tissue culture plants take to mature and fruit?

A5: If a tissue culture plant is managed very well, it will always fruit and mature faster than an ordinary sucker. Usually, this takes 9–12 months after planting.

Q6: Do tissue culture plants require special management techniques compared to conventional banana plants?

A6: Tissue culture plants, just like ordinary suckers, require good management if you want to have optimal yields. However, especially just after field transplanting, tissue culture plantlets need extra attention.

Q7: Several technologies exist to treat suckers. Are treated suckers as clean as tissue culture plants?

A7: There are two types of sucker treatments: hot water treatment and solar energy treatment. Hot water treatment involves submerging a sucker into hot water (50–55°C) for 30 minutes or, alternatively, in boiling water for 10 seconds. Solar energy treatment uses solar radiation. Before both treatments, however, the suckers are pared to a depth of half a centimeter to remove all the roots and nematode lesions. Both procedures are especially useful for killing banana-parasitic nematodes and banana weevils, but they do not remove all banana diseases. Tissue culture plants, on the other hand, do not contain pests and diseases (with the exception of viruses and some types of bacteria).

Q8: I was told that tissue culture plants have a shorter production cycle. Why is this?

A8: Tissue culture-derived planting material is in general more vigorous than conventional planting material. Also, because tissue culture plants are pest- and disease-free at the time of planting, they are less stressed and can grow faster than conventional planting material.

Q9: What are the challenges associated with tissue culture banana plants?

A9: The price of a tissue culture plantlet is usually double compared to a conventional sucker. Also, better management and care of the plants is required, especially at the early stages. Otherwise, growing tissue culture banana plants has no special challenges compared with ordinary banana plants.

Q10: If I looked after my suckers very well, possibly after a rigorous sucker treatment process, won't they yield the same as tissue culture plants?

A10: Sucker treatment reduces the levels of nematode and banana weevil infections in a sucker, but it does not kill all the other banana diseases. So if your sucker contains any diseases, it will not have the same yield as a tissue culture plant under the same conditions. Also, tissue culture plants are more vigorous than suckers, treated or not.

Q11: Is it true that suckers from tissue culture plants take longer to establish in the garden and also perform poorly?

A11: Suckers from tissue culture plants are just like any other sucker from conventional plants and should behave the same way when planted.

Q12: Why is the price of tissue culture banana plants so high?

A12: The price reflects the cost of the inputs used to raise the plantlets.

References (module 1)

Israeli Y, Lahav E and Reuveni O. 1995. In vitro culture of bananas. In: Gowen S (ed), *Bananas and Plantains*. Chapman and Hall, London, UK, pp 147-178.

Thaker MN and Jasrai YT. 2002. Increased growth of micro-propagated banana (*Musa paradisiaca*) with VAM symbiont. Plant Tissue Culture 12:147-154.

Vuylsteke DR. 1999. *Post-Flask Management of Micro-Propagated Bananas and Plantains*. International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria.

Appendix 1. Flyer for mobilizing farmers



What is tissue culture

Tissue culture plants are normal banana plants that are pest and disease free. If you take care of them, they grow faster, are uniform and produce bigger bunches!

What is our training program

We want you to make more money from your banana farms. We will start a training program very soon. We will form farmer groups and assist your group to market your tissue culture bananas better. Over the course of the next several months, we will increase your skills in: banana agronomy, business planning, financing, marketing, group initiation and dynamics, and group organization and records.



IITA VEDCO

Appendix 2. Feedback form for collecting information on potential participants

First Contact Form – Potential farmer participants

Date: _ _ - _ _ - _ _ _ _ ID-Code: U-NEWNRS - _ _ _

☐ Likely to come ☐ Unlikely to come

Do you already know something about banana tissue culture? ☐ Yes ☐ No

Remarks: .....

.....

Would you like to make money from producing and selling banana from tissue culture plants?

☐ Yes ☐ No

Remarks .....

.....

Would you spend time on training in banana production and management? ☐ Yes ☐ No

Remarks .....

.....

Contact details: (acquired ☐ in person ☐ by phone)

Name:.....

Cell phone number: .....

Age: .....

Current major occupation:.....

Location:

District:.....

Town: .....

Village:.....

GPS coordinates: Elevation: N/S: E/W:

General remarks: .....

.....

Appendix 3. Attendance list

Attendance list for farmer training

Place of training: .....Date:.....

Training start time: .....Training end time:.....

No.	Name	Parish	Village	Phone no.	Signature
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Appendix 4. Checklist for the preparation of the introductory meeting for farmers

Checklist for the BMZ project introductory meeting at Nalwana, Luwero district

Meeting date: 23rd June 2009

No.	Material	Source	Availability
1	Pin board	VEDCO	
2	Posters	VEDCO	
3	Markers	VEDCO	
4	Pens	VEDCO	
5	Books	VEDCO	
6	Refreshments (soda and water)	VEDCO	
7	News print	VEDCO	
8	Masking tape	VEDCO	
9	Flyers	IITA	
10	Attendance form	IITA	
11	2 baby jars with tissue culture plantlets	IITA	
12	6 banana tissue culture plantlets (hardened)	IITA	
13	1 table	Farmer	
14	1 hoe	Farmer	
15	2 suckers (healthy & non healthy one)	Farmer	
16	1 panga	Farmer	
17	1 knife	Farmer	
18	1 jerry can of water	Farmer	
19	Participants seats/sitting arrangement	Farmer	

Appendix 5. Baseline survey of participants

Information given on this form will help the training team better understand who they are working with. The information you provide is confidential and will only be used to help the training team prepare the training course.

Please provide answers to the following questions

Personal details

1. Name:.....

2. Village:.....Parish: .....

3. Current major occupation:.....

Information about banana production

4. What is the current size of your banana plantation? ..... acres

5. How many banana plants do you own on your banana plantation?.....

6. Have you planted any banana using tissue culture plantlets before? Give reasons for your answer.....

7. For how long have you been involved in banana production?..... years

8. What how many bananas do you harvest from your banana plantation per month?

.....bunches

9. What is the average weight (estimated) of the bananas you harvest from your plantation? ..... kg

10. Do you market your bananas? ☐ Yes ☐ No. If yes, proceed to question 12

Who do you sell your bananas to? .....

11. List the top three constraints you face with banana production in order of importance (1 = biggest constraint)

1: .....

2: .....

3: .....

Module 2
Working in groups

Overview

Objective

The objective of this module is to familiarize participants with ways in which people can come together, form a group, and work productively for a common purpose.

Structure

The module is comprised of the following sessions:

- Session 1: Introduction to working in groups
- Session 2: Who should join the group?
- Session 3: Group leadership
- Session 4: Group motivation
- Session 5: Communication within the group
- Session 6: Solving conflicts within the group
- Session 7: Making a group constitution

Sessions 1–6 can each be carried out in a single training session, while Session 7 is scheduled to take 8 hours and should be carried out in three separate sessions on different days. The entire module should take about 4 months to complete (2–3 sessions/month).

All sessions should be held in a convenient classroom or other meeting place.



Session 1: Introduction to working in groups

Personnel: One facilitator and one assistant (the training team)

Supplies: Box of markers, flipchart, masking tape, 4 glasses or cups, refreshments

Time: 3 hours

Preparation for the session

Write the topic of the day (Introduction to working in groups), and the questions that will guide the session, on the flipchart ahead of the training. The questions are:

- What is a group?
- What are the benefits of working as a group?
- What are the factors contributing to group success?
- What are the causes of group failure?

Conducting the session

1. Open the day's session by displaying the flipchart with the title of the day's session and the questions guiding the session.
2. Invite participants to brainstorm on what the word 'group' means. List their responses on the flipchart. Based on participants' input, extract a definition of 'group' that includes at least the following elements:
    - People rather than things
    - Size, i.e. two or more persons
    - Purpose – members have a common goal or goals
    - Interaction, i.e. members interact to pursue the goal of the group.

    Write the definition on the flipchart and display prominently. Ask the participants to use this definition to identify types of groups that exist in their community. Give participants a few minutes to think about this.
3. To demonstrate the benefits of working as a group, invite four participants to come to the front of the training hall to take part in a game. Place a glass of water in front of each of the four participants, and ask them to lift the glass off the table using only their index finger. When they cannot do this individually, suggest that they work together. If all four use their index fingers at the same time to lift one glass they will be successful. Ask participants what this demonstration shows about the advantages of working as a group. Are there other advantages to working as a group? Write responses on the flipchart.
4. For the other two questions guiding the day's session, divide participants into groups of about five and let each group brainstorm on the questions. Allow groups about 20–30 minutes to come up with answers. Call back the groups and let a spokesperson from each group present the answers to the class. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.

5. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Who should join the group?), and the date, time and venue (ideally the venue will be the same for all the sessions).

Content

Definition of a group

A group is a collection of individuals who have regular contact and frequent interaction, and who work together to achieve a common goal or goals.

A farmer group is a collection of farmers with a common objective or problem to solve, which is often associated with the production and marketing of agricultural products.

Benefits of working in a group

Benefits include:

- Groups of farmers can get access to services such as advisory services, technology, credit, markets and information, which individual farmers, particularly the disadvantaged (poor, women and youth), may not be able to.
- Collective production, marketing and purchase of inputs can offer economies of scale and therefore reduce costs for farmers.
- Farmer groups provide a forum to share experiences and learn from one another.
- Group pressure tends to stimulate adoption of knowledge and change to improved practices.
- Increases farmers' opportunities for participation in development programmes.
- Promotes inter-personal relationships and collaboration.
- Encourages better management of shared resources.
- A farmer group can act as security for loans (group guarantee).
- Gives farmers a 'voice', which they may use to influence policy.

Characteristics of successful farmer groups

A successful famer group:

- has a clear goal, objectives and action plan
- has a constitution, or a written record of its purpose and rules, which are observed by all members
- has good leaders, elected by the members
- has a name and a physical address
- keeps proper records for transparency
- has members make financial contributions and encourage group savings, which helps build a sense of ownership

- has honest members who work hard to achieve their shared objectives
- holds regular meetings and takes minutes
- has members participate in decision making, and share the benefits.

Causes of group failure

- Some or all of the characteristics above are lacking
- Cliques/factions develop in the group
- Unresolved conflicts/problems in the group.

Questions and answers

Q1: Is our farmers' group eligible for a bank loan?

A1: Your group is eligible for a loan from a bank that offers agricultural loans, as long as the group meets the minimum requirements for borrowing, which differ from bank to bank. Banks normally lend money to people in groups because group members can act as guarantors for the loan.

Q2: What should be the maximum number of individuals in a farmers' group?

A2: There is no maximum number, but the bigger the size of the group, the harder it becomes to manage. A total of 50 members may be ideal, but with good management a larger group could be successful.

Q3: Many non-government organizations in this area seem to prefer working with women's groups. Why is this?

A3: Women play a key role in agricultural development and ensure food security at a household level, and yet in most communities they don't make key decision regarding agricultural production or marketing, which are instead left to men. For this reason, many NGOs are prioritizing working with women's groups to increase the capacity of women in making key agricultural decisions.

Q4: In the past, we tried to form groups but they didn't last. How can we make sure new groups will be successful?

A4: If you ensure that your group has the characteristics of successful farmers' groups (see above), then it should be successful.

Q5: Can a farmers' group do things outside farming?

A5: Yes, a farmers' group can do things outside farming as long as they are in line with the group vision and objectives and all members are in agreement over the new developments.

Session 2: Who should join the group?

Personnel: One facilitator and one assistant (the training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 2 hours

Preparation for the session

Write the topic of the day (Who should join the group?) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What kinds of people would you ask to join your group?
- Should both men and women be included in the group?
- Would you include people of different classes or ethnic groups?
- How large would you try to make your group?
- Would it be important for members of your group to live nearby?

Conducting the session

1. Have a volunteer participant briefly recap the previous session.
2. Open the day's session by displaying the flipchart with the title of the day's session and the questions guiding the session.
3. Divide participants into groups of about five people. The groups then discuss among themselves and agree some responses to the questions. Allow about 30 minutes for the group work, then assemble all groups and let a spokesperson from each group share the group's responses in the plenary. List the points on the flipchart.
4. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Group leadership), and date, time and venue.

Content

Who should be invited to join the group?

- People who share common goals, and are committed to reaching the goals.
- People who share common interests. Similar interests and a good understanding of each other contribute to a successful group.
- People who are motivated and interested in becoming members of the group. No one should be forced to join.

Should the group include both women and men?

The gender composition of the group is important, both for the internal workings of the group (group dynamics), and for achieving the goals of the group. When forming a gender-balanced group, the group should strive for things such as equal participation in decision-making structures and processes, equal opportunities, and equal access to information.

Should the group include people of different classes or ethnic groups?

There are rich, poor, middle class, and different ethnic groups within most communities. Whether to include a range of classes and ethnic groups will depend on the goals of the group and on practical considerations. There can be advantages to mixed groups, for example the group may benefit from a wider perspective. However, if too many members are from rich and elite communities, they may dominate the decision-making processes.

What size should the group be?

A large group size can be unmanageable. Also, it can be difficult for all members to meet frequently, and resources may be insufficient. However, with good management in place, a large group can function effectively.

From how far away should members be recruited?

If group members are far away from each other, meetings will be difficult. Groups consisting of individuals living in the same location or village, or nearby villages, are usually more effective.

Questions and answers

Q1: Can people become members of more than one group?

A1: Joining more than one group may mean that the person cannot devote enough time to either group. It is probably better to decide which the most appropriate group is and stay with that one.

Q2: Should members of a group all be from the same village?

A2: There are benefits if members are living close to each other, for example it is easier to meet. However, groups can also have members from nearby villages.

Q3: How long should a person be living in an area before they are eligible to join a group?

Q3: This will depend on the group constitution, but 1 year would be a good length of time, so that the person has got to know the community.

Q4: How often should a group hold meetings?

A4: A group should probably meet at least two times a month, but this will also depend on the nature of the group.

Session 3: Group leadership

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 2 hours

Preparation for the session

Write the topic of the day (Group leadership) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What is the meaning of 'leadership'?
- What are the roles of a leader?
- What are the different types of leadership?
- What are the qualities of a good leader?

Conducting the session

1. Have a volunteer participant briefly recap the previous session.
2. Open the day's session by displaying the flipchart with the title of the day's session and the questions guiding the training.
3. Divide participants into groups of about five people. The task of each group is to:
    - Select a leader from among themselves
    - Discuss how and why they selected that person as their leader.
4. Allow about 15 minutes for the group work, then assemble in plenary and have a spokesperson from each group describe how they selected their leader, and why they selected that person. List the points on the flipchart.
5. Ask participants if they can suggest a definition for the term 'leadership'. Then ask participants to brainstorm on the remaining questions. Write down the responses on the flipchart. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.
6. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Group motivation), and the date, time and venue.

Content

Leadership

Leadership is the art of motivating other people towards achieving a common goal. Group leadership involves facilitating the achievement of group goals and objectives, and motivating members to pursue group goals.

Roles of a leader

- Create an environment of trust, open communication, creative thinking, and cohesive team effort
- Provide the team with a vision
- Motivate and inspire team members
- Lead by setting a good example (role model)
- Coach and help team members
- Facilitate problem solving and collaboration
- Strive for team consensus
- Ensure discussions and decisions lead to closure
- Maintain healthy group dynamics
- Intervene when necessary to aid the group in resolving issues
- Assure that the group members have the necessary education and training to effectively participate
- Encourage creativity, entrepreneurship and ongoing improvement
- Recognize and celebrate group and group member accomplishments and exceptional performance.

Types of leadership

Autocratic leadership

Autocratic leadership is where a leader exerts high levels of power over his or her employees or team members. People within the team are given few opportunities for making suggestions, even if these would be in the team's or organization's interest.

Bureaucratic leadership

Bureaucratic leaders work 'by the book', ensuring that their staff follow procedures exactly. This is a very appropriate style for work involving serious safety risks (such as working with machinery, with toxic substances or at heights) or where large sums of money are involved (such as cash-handling).

Charismatic leadership

A charismatic leadership style is one where the leader injects a lot of enthusiasm into his or her team, and is very energetic in driving others forward. However, a charismatic leader can tend to believe more in him- or herself than in the group. This creates a risk that the entire organization might collapse if the leader were to leave, because their followers believe that success is tied to the presence of the charismatic leader. As such, charismatic leadership carries great responsibility, and needs long-term commitment from the leader.

Democratic or participative leadership

Although a democratic leader will make the final decision, he or she invites other members of the team to contribute to the decision-making process. This not only increases job satisfaction by involving employees or team members in what's going on, but it also helps to develop people's skills. Employees and team members feel in control of their own destiny, and so are motivated to work hard by more than just a financial reward.

Laissez-faire leadership

This French phrase means 'leave it be' and is used to describe a leader who leaves his or her colleagues to get on with their work. It can be effective if the leader monitors what is being achieved and communicates this back to his or her team regularly. Most often, laissez-faire leadership works for teams in which the individuals are experienced and skilled self-starters.

Qualities of a good leader

A good leader:

- is gender sensitive
- acts with self-confidence, avoids anger, and takes decisions on a rational and informed basis
- is able to admit his or her weaknesses
- is willing to delegate responsibility
- has a good understanding of human behaviour
- respects and accommodates the needs of others
- motivates others toward the attainment of the organizational goals
- has personal motivation, that is, the enthusiasm to complete a task
- has good communication skills
- is able to manage conflicts within the organization.



Questions and answers

Q1: At what age can someone be considered for a leadership position in a group?

A1: The age that is legally recognized is 18 years and above.

Q2: How many leadership positions should a group have?

A2: It depends on the size of the group, but normally a group should have at least five leadership positions: chairperson, vice chairperson, secretary, mobilizer and treasurer.

Q3: How often should group leadership be changed?

A3: This varies from group to group, but leaders should hold their positions for at least a year.

Q4: Can one person hold more than one leadership position within a group?

A4: No, ideally one person should not hold more than one leadership position.

Q5: People say the position of treasurer is for women. Is this correct?

A5: No, a man or a woman can hold the position of treasurer. However, most communities tend to agree that women might be more trustworthy with money.

Q6: Should the leadership positions be held by educated people?

A6: This depends on the interests and goals of the group, but it is probably better if the leaders can write and read.

Session 4: Group motivation

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 2 hours 30 minutes

Preparation for the session

Write the topic of the day (Group motivation) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What is the meaning of 'motivation'?
- How important is motivation?
- What are the various techniques of motivation?

Conducting the session

1. Have a volunteer participant briefly recap the content of the previous session.
2. Open the day's session by displaying the flipchart with the title of the day's session and the questions guiding the training.
3. Divide participants into four groups. Ask each group to select a leader. Take the four leaders aside, and explain to them that they are to go back to their group and collect as many items as they can from the members of their group, by any means possible. They will have a set amount of time (10 or 15 minutes). The items can be anything – purses, paper, pens, jewellery, etc. The leaders return to their groups and carry out the task, without revealing the objective to their group. When the time is up, ask a volunteer from each group to count the number of items collected by the leader. Declare a winner and provide a prize.
4. Discuss with the whole group why some leaders collected more than others.
5. Again ask the participants to split into four groups. This time, explain the rules to the entire group. Tell them that the group that collects the most items in the allotted time will win a prize. When the time is up, ask a volunteer from each group to count the number of items collected. Declare the winning group and provide the prize.
6. Discuss why some groups collected more than others. What was it that motivated the members of each group to give items to the leader? (Was it the prize? Was it the desire to be the winner? Was it good motivational skills of the leader? Were the participants self-motivated?)
7. Relate the activity to the importance of motivation, and the differences between directed and self-motivated groups. Summarize the points raised by participants about motivation, and re-state the importance of motivation. Display the responses for all to see. Supplement the discussion where necessary.

8 Wrap up the training session as follows:

   - Briefly recap the day's session
   - Communicate the topic of the next session (Communication within a group), and the date, time and venue.

Content

Motivation

Motivation is an inner state that drives someone to do something. Motivation includes desires, wants, drives, motives and incentives to do something.

Motivating others involves creating conditions where people are willing to work with initiative, interest and enthusiasm, and with a sense of responsibility, loyalty and discipline, so that the goals of an organization are achieved effectively. Motivation is one of the most important factors for managing human resources within family, groups or organizations.

Understanding motivation will help:

- To ensure active participation
- To maximize utilization of human capacity
- To build self-reliant development
- To build accountability for successful performance
- To be inclusive.

Motivational techniques

What is it that motivates individuals to work with initiative and enthusiasm in pursuit of a common goal? There is no single answer to this question, as different things motivate different people. Some people are motivated by money or other material rewards, some are motivated by the recognition and praise of others, some are entirely self-motivated by individual standards and goals they have set, some are motivated by the fear of failure, and so on. People may be highly motivated if they are actively involved in activities, such as problem analyses, programme design, implementation, etc. Equality in a group, as well as trust and safety, are important prerequisites to motivation.

Motivators include:

- Rewards such as
  - – money
  - – prizes
  - – recognition and respect from others
  - – praise
  - – love and friendship
- Job/work motivators
  - – assignments that are interesting and sufficiently challenging
  - – being given opportunities to learn and gain skills
  - – being recognized and respected by colleagues
- Internal motivators
  - – desire and belief that one can improve one's life (setting and reaching individual goals)
  - – self-satisfaction from meeting individual goals



  – self-satisfaction for work well done
  – self-satisfaction from working with others
  – self-respect
- Negative motivators
  – fear of failure
  – threat of punishment
  – threat of withdrawal of recognition and respect.

Questions and answers

Q1: How does a group stay motivated when it suffers a setback?

A1: All group members need to know that setbacks need not be the end. They're just a little stone on the road. It is important for group members to work together to stay motivated in the event of a setback, and stay focused on achieving the group goals.

Q2: If a leader seems to be losing interest in the group, what can we do?

A2: When a leader in the group loses motivation to continue group work, the management of the group should try to seek the reasons for the situation and encourage him or her to continue with the work (providing a supporting environment). If this fails, the management may decide to relieve the person of his or her duties.

Q3: How can group members be motivated to attend meetings regularly?

A3: There is no single way to motivate people. The group management could speak with the people concerned to find out why they are not attending meetings regularly. They could try to encourage them by reminding them of the group's goals and objectives. But if members continue to miss meetings, they could earn penalties as stipulated in the group's constitution.

Session 5: Communication within a group

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 2 hours 30 minutes

Preparation for the session

1. Write the topic of the day (Communication within a group) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:
   - What is the meaning of 'communication'?
   - What are the different types of communication?
   - What are the possible barriers to communication?
   - What are ways of overcoming communication barriers?
2. Prepare a simple paragraph not exceeding two sentences ahead of the training (Appendix 1). Print out at least three copies of the paragraph.

Conducting the session

1. Have a volunteer participant briefly recap the content of the previous session.
2. Open the day's session by displaying the flipchart with the title of the day's session and the questions guiding the training.
3. Invite four participants to volunteer for an activity. Take them outside of the training room, and explain the activity as follows. One volunteer reads a short paragraph, and then puts it aside and shares the main points with the second volunteer. This should be done out of earshot of the other two volunteers. Then, the second volunteer tells the third, and the third tell the fourth, without the others hearing. In the meantime, in the meeting room, ask a participant to read the paragraph aloud to the rest of the participants. Bring the four volunteers back to plenary, and ask each to describe, in turn starting with the fourth volunteer, the message they heard.
4. Discuss whether the original message reached each volunteer. If the message changed, why did this happen?
5. Ask the participants 'Why it is important to be able to communicate well?' and 'What might be the consequences of poor communication?' Write points on the flipchart. Review the importance of good communication.
6. Divide participants into small groups. The task of each group is to:
   - identify communication barriers
   - discuss ways to overcome each barrier.

   After the groups have had time to discuss, ask each group to name one barrier they identified, and ways of overcoming that barrier. Have the groups take turns until no new barriers or ways of overcoming them are identified. Write down the responses on the flipchart. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.

7. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Solving conflict within a group), and the date, time and venue.

Content

Communication within a group

Communication means passing on information from one person to another. Effective communication is needed so that members of the group and employees understand the group's objectives and their roles in the group, and feel they are able to contribute and belong to the group. Effective communication within a group is also an important aspect of motivating employees.

Types of communication

Formal communications are part of the organized communication system, and relate to the operations of the group. Many groups have a formal communication system that indicates who will report to whom, who will inform whom about what, the form in which messages will be sent (e.g. written, oral), how messages will be stored (e.g. filing system) and so on.

Informal communications are casual and based on social interactions among people who work and live together. Informal communications are not bound by group policy. Informal communications can both help and hinder formal communications. Information can be passed on quickly through informal channels, bypassing layers of hierarchy. But informal communication has a greater chance of being distorted, so it can also hinder formal communication.

Barriers to effective communication

There are many things that can interfere with the communication process. These barriers can be physical, cultural, social or personal, and are often interrelated. Examples of barriers include:

- Physical barriers: these may be geographic barriers such as distance, weather disturbances or mountain ranges; or weaknesses or problems with the mechanisms that are used for communication, e.g. poor telephone lines, computer systems being down, or poor postal services.
- Group barriers: communications can be impeded by complex group structures, complex communication systems, conflict, different personal goals or ambitions, or lack of cooperation within groups.
- Socio-economic and personal barriers: communications can be impeded when the people involved come from different social classes, economic backgrounds, language groups, educational levels, occupations, or geographic locations. Communications are also influenced by people's attitudes to one another, perceptions about one another, their personal ambitions, and ideological beliefs. For example, individuals who dislike each other or are hostile to one another may have difficulty communicating.
- Gender: in many situations women are less able to communicate than men. Women are less empowered and participate less in decision-making processes. They are less confident than men about speaking out, asking for information, and expressing their views. As a result women are not always able to communicate fully and contribute equally in an organization.

- Poor communication skills: lack of communication skills, such as speaking, writing and listening skills, can present a barrier to effective communication.
- Lack of trust: one of the barriers to communication is lack of trust. When people first meet and don't know each other well, they are often cautious about disclosing too much information. As they get to know each other and develop trust, their communications become more open.

Questions and answers

Q1: How can a group overcome a problem of communication barrier?

A1: The group should first identify the type of communication barrier, and then come up with appropriate solutions to address it. For example, if the barrier to communication is identified as lack of trust within the group, this could be solved if group members took some time to get to know each other better so that they can trust each other.

Q2: Is it good practice for all group members to contact the chairperson every time they have an issue/problem they want to be addressed?

A2: Each group has its own communication system or structure. For some groups all issues have to be addressed by the chairperson, while for other groups different officers handle different sorts of issues/problems.

Q3: If a group member is illiterate and cannot read or write, how best can they be helped in instances that require written communication?

A3: It is good practice to identify limitations of group members at an early stage during group formation. If some members are unable to read or write, the group management should devise ways of helping them, for example pairing them with members who can read and write, or limiting the tasks that require reading and writing.

Session 6: Solving conflict within a group

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 2 hours 30 minutes

Preparation for the session

Write the topic of the day (Solving conflict within a group) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What is the meaning of 'conflict'?
- What are possible causes of conflict in a group?
- How do you solve conflict in a group?

Conducting the session

1. Have a volunteer participant briefly recap the previous session.
2. Open the day's session by displaying the flipchart with the title of the session.
3. Read out the case study about conflicts with group (Appendix 2) and have participants deliberate the following questions.
    - What was the reason for the conflict?
    - What could be done by the group to resolve the conflict?
4. Display the questions guiding the day's session one by one and have participants brainstorm on each one of them. Write down the responses on the flipchart. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.
5. Wrap up the training session as follows:
    - Recap the day's session briefly
    - Communicate the topic of the next session (Making a group constitution), and the date, time and venue.

Content

Why conflicts arise

People have their own values and opinions that they consider important. Conflicts arise when others have different values and opinions. Conflicts may arise between individual people, between groups of people, within organizations or between organizations.

Conflict is not necessarily negative. Conflict can help build institutional capacity, and generate creative ideas. Tension from well-managed conflict can lead to change (in fact, conflict, or tension, is an essential component of change). However, if conflict is not properly managed, it can create harmful events.

Examples of causes of group conflict include:

- Lack of resources
- Differences of opinion
- Lack of respect for others' ideas
- Personal egos of some members leading to them dominating the group
- Personal ambitions and goals out of line with group goals
- Gender discrimination
- Poor communication systems within the organization
- Failure of the organization to meet its intended goals.

Conflict management

There are many ways of managing conflict. Some of these are:

- Avoid
- Accommodate: the conflicting parties express their opinions, but do not change these
- Dominate: the conflicting parties attempt to dominate each other
- Compromise: one or both parties compromise, i.e. change their position
- Collaborate: the conflicting parties collaborate to arrive at a mutually agreeable solution.

Questions and answers

Q1: If a group member threatens to leave the group due to a conflict with another member, how should the group deal with this?

A1: Groups should have by-laws in place stipulating ways of resolving conflict within the group. If a member threatens to leave, the group leadership should talk to the person to understand the problem. The leadership should then try to resolve the conflict so that the member agrees to stay.

Q2: Do all group conflicts end with members making up?

A2: No, in the real world this does not always happen. Some conflicts may even end in violence. However, groups should always do everything in their powers to resolve conflicts peacefully.

Q3: If a conflict arises where group members suspect the leadership is misusing group resources (such as money), how should the group handle this?

A3: Firstly, at the inception of the group, members should emphasize transparency in the way the group leadership carries out its activities, and this includes the handling of group finances. However, where the leadership is suspected of misusing group finances, the group should summon the leadership and have them transparently declare the group accounts to the plenary. When misuse of finances is identified, the group should agree on a penalty for the people involved. This could be confiscating the property of the people involved until the group finances are recovered, or in extreme cases, calling in the police.



Session 7: Making a group constitution

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 8 hours, spread over three separate sessions/days

Preparation for the session

Write the topic of the day (Making a group constitution) and the questions that will guide the training on the flipchart ahead of the first training. The questions are:

- What is the meaning a constitution?
- What are the contents of a constitution?

Conducting the session

1. Have a volunteer participant briefly recap the previous session.
2. Open the day's session by displaying the flipchart with the title of the session.
3. Display the questions guiding the day's session one by one and have participants brainstorm on each of them. Write down the responses on the flipchart. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.
4. Have the group agree to draft a constitution for their operations. Plan and conduct two more sessions to do this.
5. At the end of the third session, wrap up the training session as follows:
    - Briefly recap the session
    - Communicate the topic of the next session (a new module on how to grow tissue culture bananas), and the date, time and venue.

Content

What is a constitution?

A constitution is a document that sets out the laws and principles that govern a group of people such as a farmers' group, an association or a nation. A constitution is a requirement before a group can be formally registered as a legal entity.

Contents of a constitution

Contents of the constitution can be basic or complex. They should include:

- The name of the group/organization/company
- Definition of terms, titles and phrases used
- Physical location of the group
- Affiliation to other bodies or groups

- The objectives of the group/association and its major intended activities
- Membership composition and criteria for admitting new members
- Administrative structure, e.g. board of directors, committees, etc.
- Financial year
- Methods and authority of purchasing, caring for and disposal of group properties
- Bank signatories and authorization on group bank documentation
- Duties, powers and privileges of the management committee, members, etc.
- By-laws, and procedure for their origination, adaptation and application
- Language of business and meetings
- Scope and amendment of constitution
- Interpretation and resolution of disputes.

Questions and answers

Q1: Whose role is it to make a constitution?

A1: The entire group takes responsibility to develop its own constitution.

Q2: Can the group hire someone to draw up its constitution?

A2: Yes, a lawyer could be hired, but the group must takes responsibility for explaining to the lawyer what they need in terms of the content.

Q3: How often should we amend the constitution to accommodate changes?

A3: The group can amend the constitution any time there is need, but this should not be misused, and the entire group should agree on the need to amend.

Q4: If someone refuses to respect the constitution, what can be done?

A4: If a group member refuses to respect the group constitution, he or she should be dismissed from the group.

References (module 2)

Anonymous. 1997. 25. A brief guide to group dynamics and team building. In: Cornwall A (ed), *Participatory Learning and Action 29*. International Institute for Environment and Development (IIED), London, UK, pp 92-94.

Anonymous. 2000. *Tree Crop Propagation and Management: a Farmer-Trainer Training Manual*. Integration of Tree Crops into Farming Systems Project (ITFSP), Nairobi, Kenya.

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Appendix 1

The following paragraphs can be used for the exercise in Session 5:

The chairperson for the district indicated he will not attend the burial ceremony because he has been invited by the city authority to preside over a meeting aimed at ending a 4-day strike by the market vendors. He sent his apologies.

The president of Kenya, visiting the source of the Nile in Jinja, observed that Uganda would make a good tourist destination if the road infrastructure could be improved. He also visited the national parks in the area.

Appendix 2: Case study

The Community Development Centre is an NGO established several years ago in one of the districts in Northern Uganda. Its objective is to improve the socioeconomic situation of poor and marginalized women, men and children in rural communities. Until about a year and a half ago, the organization ran smoothly with a good working environment. Members respected one another, shared a strong organizational vision and held a sense of responsibility to meet that vision. Members and staff were committed and energetic. However, gradually over the past year, the organization has lost its good spirits and working environment. Now regular meetings among the members and staff are not held, and the chairperson only meets with a few of his special friends in the organization. He discusses organizational matters and programme issues with them, and does not share information with others. Members are not aware of decisions taken or the activities of the NGO. When members provide feedback or ideas, they are ignored and made to feel their contribution is not important. Women feel that they are not able to contribute ideas because the meetings are held at times when they cannot attend. When invitations are received by the NGO for outside meetings or training, the chairperson and his close friends are the only ones able to participate. The chairperson and his friends have taken control of the NGO, and hold all the rights and responsibilities. Consequently, the members' feeling of ownership and commitment to the organization has declined. This has made the members feel much less motivated to volunteer for work in the NGO, and the organization nearly disintegrated. Finally, the chairperson has become aware of the depth of the problem in the organization and is trying to take action.

Module 3
How to grow tissue culture bananas

Overview

Objective

The objective of this module is to teach the participants good agronomic practices associated with banana cultivation.

Structure

The module comprises the following sessions:

- Session 1: Introduction to growing bananas
- Session 2: Types of banana planting material, and how to prepare them for planting
- Session 3: Field preparation
- Session 4: Planting and initial care
- Session 5: Water and soil conservation
- Session 6: Use of organic and inorganic fertilizers
- Session 7: Weed control
- Session 8: Routine field management
- Session 9: Pest and disease management
- Session 10: Preparation for farm visits
- Session 11: Individual farm visits

The sessions should ideally be carried out over 4–5 months (two to three sessions per month). Each of Sessions 1–8 and 10 can be carried out in a single meeting (2–3 hours). Session 9 takes 5–6 hours and should be carried out as two 2–3 hour meetings on separate training days. Session 11 involves the training team visiting all the participant farmers' fields, and the time and number of days will depend on the size of the group being trained and the distance to be travelled to reach the fields. Ideally Session 11 should be completed within 2 weeks.

Sessions 1 and 2 are held at a convenient classroom or other meeting place. Sessions 3–10 are held in participant farmers' fields. These can be different for each session except for Sessions 3 and 4 which should be held in the same field. Session 11 is held in individual fields of participating farmers.

Session 1: Introduction to growing bananas

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 1 hour 30 minutes

Venue: A convenient meeting place

Preparing for the session

Write the topic of the day (Introduction to growing bananas) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What is the importance of bananas?
- What are the different banana cultivars grown in this area?
- What are the different agronomic practices needed for the establishment and management of a banana plantation?

Conducting the session

1. Open the day's training session by displaying the flipchart with the topic of the day.
2. Display the questions that will guide the day's session one by one, and solicit answers from the participants for each question. Write the responses on the flipchart. Supplement the discussion with additional points which may have been left out by the participants.
3. Inform participants that the module will cover all the agronomic practices listed on the flipchart, using a hands-on training approach. Advise participants that the training team will visit every participant's field at the end of the module, to offer personalized advice.
4. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Types of banana planting material, and how to prepare them for planting), and the date, time and venue for the session. Ideally, the venue should be the same as the current session. A volunteer should be requested to provide the following materials for the next session: a panga, a knife, and four healthy looking banana suckers.

Content

Importance of bananas

Plantain and banana are important staples and a source of income for the smallholders who grow them in the humid forest and mid-altitude agro-ecologies of sub-Saharan Africa. Many families use banana for food security purposes as well as an income-generating crop.

In addition, banana:

- provides soil surface cover
- reduces soil erosion on steep slopes
- is a good source of mulch for maintaining and improving soil fertility
- provides animal feed.

Types of banana grown in East Africa

1. Cooking bananas (matooke): mature bananas are harvested green, peeled, boiled (steamed) and consumed. Examples of cultivars grown in Uganda include Kisansa, Mpologoma, Mudwale, Namaliga, Atwalira and Mbwazirume.
2. Beer/juice bananas: mature plants are harvested, ripened and squeezed into juice. Examples of cultivars grown in Uganda include Kisubi, Kabula, FHIA-1 and FHIA-25.
3. Dessert bananas: these bananas are eaten raw when ripe. Examples of cultivars grown in Uganda include Bogoya, Ndizi, FHIA-17 and Cavendish.
4. Roasting bananas: these bananas are sweet, and are eaten roasted. Examples of cultivars grown in Uganda include Manjaala and Katansense.

Agronomic practices needed for the establishment and management of a banana plantation

1. Banana field establishment:
   – site preparation (demarcation of the field, digging holes and manure application)
   – preparation of planting material
   – planting
   – management immediately after planting (according to type of planting material).
2. Water and soil conservation practices:
   – mulching
   – digging trenches
   – manure application (organic and inorganic fertilizers).
3. Plantation management practices:
   – weed control (cultural methods, herbicides)
   – de-suckering (helps match harvest with peak market season like Christmas and Easter)
   – staking or propping
   – removal of the male bud.
4. Pest and disease control
5. Harvesting

Session 2: Types of banana planting material, and how to prepare them for planting

Personnel: One facilitator and one assistant (training team)

Supplies: 2 tissue culture plantlets, 4 sword suckers uprooted with their entire root system and all the leaves (these should be provided by the farmer hosting the training, to avoid introducing banana pests or diseases), a knife, a panga, markers, flipchart, masking tape, refreshments

Time: 2 hours

Venue: A convenient meeting place

Preparing for the session

Write the topic of the day (Types of banana planting material, and how to prepare them for planting) and the questions that will guide the day's training on the flipchart ahead of the training session. The questions are:

- What are the different types of banana planting material?
- What are the best practices for preparing the different banana planting materials prior to planting?

Conducting the session

1. Open the day's training session by asking a volunteer participant to briefly recap the previous training session.
2. Display the topic of the day written on the flipchart. Display the questions that are guiding the day's training session one by one, and solicit answers from the participants for each question, writing the responses on the flipchart. Supplement the discussion with additional points which may have been left out by the participants.
3. Demonstrate the preparation of the different planting materials prior to planting. Have volunteer participants repeat the process of preparing the planting materials in front of the group.
4. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Field preparation), and the date and time for the session
    - Agree the venue for the next two sessions with the group. Either ask for another volunteer to host the sessions, or have the group choose the best person in the group to host the sessions. The farmer hosting the sessions needs to provide a small piece of land where at least 12 plantlets can be planted, as well as materials that will be used during the training (hoes, string and pegs for field demarcation, panga, 12 basins of organic manure, wheelbarrow for carrying manure). If the farmer hosting the sessions cannot provide all the materials required, ask the other participants to help. The facilitator should provide any of the materials that the farmers cannot provide. Ask the host of the next session to clear the piece of land where the training session will be conducted of weeds, tree stumps, etc., ahead of the training in order to save time on the training day.

Content

Banana planting materials

There are three main types of planting material.

1. Tissue culture plants: banana planting material grown in a clean environment in the laboratory from small plant pieces taken from a mother plant. Tissue culture plants can be obtained from various commercial producers and nurseries.
2. Suckers: shoots growing from the rhizome of banana plants which then grow into new plants. Ideally suckers should come from a healthy, pest- and disease-free plantation.
3. Corm pieces: portions of the banana plant cut from the rhizome (corm) of the plant and with a bud attached. Advantages of using corm pieces include:

   – relatively clean planting material

   – more planting material from fewer suckers

   – easy to transport

   – easy to treat for pest control.

   Corm pieces should come from a healthy, pest- and disease-free plantation.

How to prepare different banana planting materials

1. Tissue culture plants: No major preparation is needed of tissue culture plants if they have been kept in a clean environment prior to planting. However, if the plants are seen to have pest-infested leaves or leaves in a bad condition, these should be cut off prior to planting.
2. Suckers: Uproot sword or maiden suckers from healthy, pest- and disease-free banana plants using a hoe. Sword suckers (1.8–2.1 m high and ~4.5 cm in girth) are preferred, partly because they are less infested with nematodes and banana weevils than larger planting material. Sucker preparation should be done far from the new field. Remove all leaves, roots and all parts of the rhizome that appear diseased (tunnels indicating banana weevils, reddish lesions at base indicating nematodes, yellow-brown lesions indicating Armillaria root rot). The oldest leaf sheaths should also be removed as they may house banana weevil eggs or adults. A slanting cut is made to remove the top part (slanting prevents water from collecting on top, causing rotting). Plant suckers within a week after uprooting.



Fig. 1. Preparing suckers for planting.

3. Corm pieces: Select suitable suckers (healthy, 1.8–2.1 m long and ~4.5 cm in girth). Separate the corm from the stem of the sucker. Cut off the outer layers of the corm, about 3 cm deep, to reduce nematode populations. Remove damaged parts and wash the corm with clean water. Cut up the corm into 4–7 pieces depending on corm size and number of buds. Every piece should contain a visible, healthy bud. Treat corm pieces with recommended insecticides before planting (e.g. cypermethrin).

Questions and answers

Q1: How much does it cost to start a banana tissue culture production facility?

A1: The actual cost of starting a banana tissue culture production facility depends on the size of the facility. It is however a costly venture that may require at least 50 million Ugandan shillings (1 US$ = 1,900 Ugsh on 1/1/10). This may explain why there are few such facilities in Uganda despite the high demand for tissue culture plantlets.

Q2: For how long does a banana field established using banana tissue plantlets last?

A2: How long a banana plantation lasts depends on the level of management, and is the same whether started with tissue culture plantlets or other planting material. A well-managed plantation should last for a minimum of 10 years.

Q3: Are suckers from tissue culture plant also called tissue culture plants?

A3: No. When a tissue culture plantlet is planted into the field, all the suckers it produces thereafter are not tissue culture plants, they are ordinary suckers.

Q4: Can all banana cultivars be produced using banana tissue culture technology?

A4: Yes, all banana cultivars can be produced using tissue culture technology. However, the management of a tissue culture laboratory will first assess the commercial potential of a demanded cultivar to ensure profits.

Q5: When you remove the roots and all the debris from the corm of a sucker, is the planting material then free from all banana pests and diseases?

A5: No, removing roots and debris from a sucker cannot eliminate all pests and diseases that may be affecting the sucker. However, many pests, such as nematodes or banana weevil eggs, are removed.

Session 3: Field preparation

Personnel: One facilitator and one assistant (training team)

Supplies: Hoes, string and pegs for field demarcation, panga, 12 basins of organic manure, wheelbarrow for carrying manure, notebook, pens, refreshments

Time: 2 hours 30 minutes

Venue: A farmer's field

Preparing for the session

Write the topic of the day (Field preparation) and the questions that will guide the day's session in the notebook ahead of the training session. The questions are:

- What should be considered when selecting a site for a banana plantation?
- How do you prepare the land before planting bananas?

Conducting the session

1. Open the day's training session by asking a volunteer participant to briefly recap the previous training session.
2. Introduce the day's topic, and explain to participants that the day's session is going to be practical and they are encouraged to participate.
3. Read out the questions that will guide the day's training session one by one, and solicit responses from the participants. Note down the points in the notebook and read them out again after the responses are exhausted. Supplement the discussion with additional points which may have been left out by the participants.
4. Have participants carry out the different steps for preparing the land before planting bananas. They should start by demarcating a space in the field where the planting holes will be dug (the land should have been freed of weeds ahead of the training session). During this step, discuss with participants the advantages of properly demarcating the field before digging planting holes. Advise participants of the various ways they could demarcate their fields before digging holes.
5. After demarcating the field, participants should dig planting holes where the bananas will be planted. During this step, discuss the following:
    - Size of the planting hole, and factors that dictate the size of the hole
    - Methods of digging a planting hole
    - The best time for digging planting holes
    - Spacing between banana planting holes.

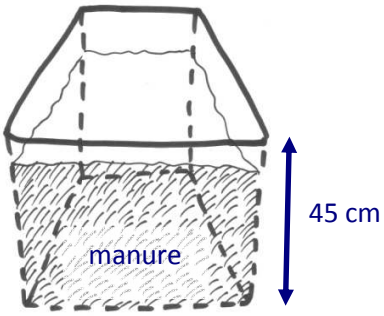


Fig. 2. Sketch of a planting hole.

6. After digging the planting holes, participants should apply manure into the holes. During this step, discuss the following:
    - Importance of adding manure to the planting hole before planting the banana
    - Amount of manure to apply
    - How to apply the manure.
7. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Planting and initial care), and the date, time and place (the same field where the current session has taken place) for the session.
    - The farmer hosting the next session should agree to provide at least eight healthy looking sword suckers, hoes, a panga, a knife, two jerry cans of water (20 liters each), manure (12 basins) and dry grass. The training team will provide four tissue culture plantlets.

Content

Choosing a site for a banana plantation

- For good yields, bananas need a deep, well-drained loam soil with high humus content, ideally volcanic or alluvial origin and with considerable amounts of nutrients.
- Very acidic soils are not suitable.
- The site should be free of dead roots of big trees as they harbour Armillaria root rot.
- The site should be free of perennial weeds, e.g. couch grass.
- If the site is sloping, appropriate soil conservation structures are needed.
- The plantation should be close to a road, for easy transport of the produce, inputs and planting material.

Preparing the land

- Bananas can be planted on fallow land (ideally after 3–5 years of fallow) or in newly established fields. If the latter, bush should be cleared and any debris removed or burned. If fallow land is used, the vegetation should be cleared without burning, as burning destroys useful organic matter.



Fig. 3. Digging a planting hole.

- A few days after cutting the vegetation, the remaining grass may be sprayed with an appropriate herbicide to speed up organic matter breakdown. A pre-planting weed spray can reduce later weed control applications and reduce costs. If paraquat (e.g. Gramoxone) is used, ploughing can be done 2 days after spraying; if glyphosate (e.g. Roundup) is used, ploughing can be done after 2 weeks.
- Generally two ploughings are sufficient to provide a good seedbed for the banana plantation. A couple of weeks should be left between the two ploughings to allow germination of weed seeds which are then killed with another herbicide application prior to the following ploughing.

Preparing the planting holes

- The recommended spacing between plants is 3 m between the planting rows and 3 m within the row (3 × 3 m) or wider, depending on the soil fertility.
- Rows should be straight in flat fields to give plants the maximum amount of sunlight. On sloping land, the rows should follow the contour lines in order to decrease soil erosion.
- Intercropping increases plant spacing, and 6 × 6 m is often used.
- Minimum planting hole size is 30 × 30 × 30 cm. The most common planting hole size is 45 × 45 × 45 cm. The maximum planting hole size is 60 × 60 × 60 cm. Large and deep planting holes ensure that the roots exploit the greatest volume of soil, and also makes plants more stable and less likely to topple in high wind.
- The topsoil, which contains humus, should be separated from the sub-soil during the process of digging the planting hole.
- Organic manure such as cow dung or chicken droppings is applied to the hole. The manure should be mixed in equal quantities with the topsoil dug from the hole and the manure/soil mixture placed in the planting hole. Do not fill the planting hole to the top, so that there is some space for collecting rainwater around the growing sucker.



Fig. 4. Mixing manure and soil before placing it in the planting hole.

- If the manure is very fresh, then planting should be delayed for 6 weeks to 2 months to avoid damaging the plants (through heat production during fermentation of the manure). On the other hand, if the manure is well dried, planting can be carried out on the same day.
- Planting should ideally occur at the onset of the rainy season.

Questions and answers

Q1: What is the standard size of a planting hole?

A1: The size of the planting hole depends on many factors including soil type, soil texture, etc. It is common practice to dig a hole measuring 45 cm × 45 cm × 45 cm.

Q2: If intercropping banana and coffee, when is it best to demarcate the planting holes for coffee?

A2: It is best to plan and demarcate the planting holes for both coffee and banana at the same time.

Q3: Should the planting holes be dug and manure applied on the same day? And can the bananas be planted on the same day?

A3: It is fine to dig the planting hole and apply manure at the same time. Whether you can also plant on the same day depends on the manure you are using. If the manure is very well dried and well mixed with the topsoil, then it is okay to plant on the same day.

Session 4: Planting and initial care

Personnel: One facilitator and one assistant (training team)

Supplies: Hoes, panga, 12 basins of organic manure, eight healthy sword suckers, four banana tissue culture plantlets, 40 liters of water, dry grass (mulch), refreshments

Time: 2 hours

Venue: A farmer's field, the same field as Session 3

Preparing for the session

Write the topic of the day (Planting and initial care) and the questions that will guide the day's session in the notebook before leaving for the field. The questions are:

- How do we plant the different types of banana planting material?
- What care is needed for the different types of banana planting material immediately after planting?

Conducting the session

1. Open the day's training session by asking a volunteer participant to briefly recap the previous training session.
2. Introduce the day's topic, and explain to participants that the day's session is going to be practical and they are encouraged to participate.
3. Read out the questions that will guide the session one by one, and solicit responses from the participants. Write the responses in the notebook, and read them out again when the responses have stopped. Supplement the discussion with additional points which may have been left out by the participants.
4. The participants learned how to prepare planting materials in Session 2. Have them take the lead in preparing the materials now. They should use the eight sword suckers to prepare sucker and corm planting materials.
5. After the planting materials have been prepared, use one of each type (corm piece, sucker and tissue culture plantlet) to demonstrate the correct way of planting. Have the participants plant the remaining planting materials. Plant into the planting holes that were prepared during the previous session.
6. Explain to participants the best practices for taking care of the plants immediately after planting. Also, the farmer hosting the session should be told specifically how to look after the newly established plants until they establish new leaves.
7. Wrap up the training session as follows:
    - Briefly recap the day's training session
    - Communicate the topic of the next session (Water and soil conservation), and the date and time of the next session
    - Agree the venue for the next session with the group, which should be in a different farmer's field. The host should agree to provide the following: hoes, panga and mulch or dry grass that can sufficiently cover at least 20 banana mats (type of mulch should be one that is easily available).

Content

How to plant the different types of banana planting material

- Dig holes and apply manure as described in the previous session. Organic manure from farmers' own farmyards is recommended. Use of artificial (inorganic) fertilizers should be minimized as much as possible because of the high costs associated with them. Farmers who chose to use inorganic fertilizer should read the labels and follow the instructions. Where organic manure is used on the same day of planting, ensure that you mix it thoroughly with an equal amount of topsoil.
- For tissue culture plants: first remove the plantlet from plastic bag, taking care that the soil around the plantlet does not break up. Do not damage the plant or dislodge the soil when removing the plantlet from the bag: use a knife instead of a hoe.
- For suckers and tissue culture plants: dig a small hole in the middle of the hole that was earlier dug and filled with a mixture of topsoil and organic manure. Place the sucker or tissue culture plants in the middle of the dug hole at a depth of about 30 cm, leaving 15 cm at the bottom of the hole for the mixture of topsoil and manure (in a 45 cm hole).
- For corms: dig a small hole in the middle of the hole that was earlier dug and filled with a mixture of topsoil and manure. Place the corm pieces in the middle of the hole at a depth of 10 cm. Ensure that the bud/eye is facing downwards and the cut end upwards to prevent the bud from rotting.

Initial care immediately after planting

Immediately after planting, place some dry grass (mulch) in a layer 2–3 cm thick around the plantlets or corm piece, ensuring that some space is left between the plant and the mulch (at least 2 cm). Water the plant carefully, using a watering can with small nozzles or by wetting the mulch layer. Ensure that the water is poured on the dry grass acting as mulch. The plant should be given plenty of water – at least 2 liters – on the day of planting. If there is no rain after planting, the plants must be watered daily (preferably in the evening) using at least half a liter per plant during the first 2 weeks. The best practice is to plant at the onset of the rains.



Fig. 5. Planting tissue culture bananas.



Fig. 6. Planting a banana sucker.

The best conditions for planting bananas

- Bananas are ideally planted in the early part of the rainy season. Because they should be able to grow vigorously and without stress during the first 4–6 months after planting, they should not be planted during the last months of the rainy season.
- 25 mm of rainwater per week is the minimal requirement for satisfactory growth. Annual rainfall of 2,000–2,500 mm is satisfactory.

Questions and answers

Q1: For how long should I water the banana plantlet after planting?

A1: The best practice is to water until the plantlet starts developing new leaves. However, you do not have to keep watering if it is raining sufficiently.

Q2: What is the significance of applying mulch around the newly planted bananas?

A2: This is done to prevent water loss. As the plantlets are fragile immediately after planting, if they dry out they can become damaged or die.

Q3: When is the best time to plant the bananas – is it in the middle of the rainy season or at the onset?

A3: The best time to plant bananas is at the onset of the rainy season. This means that you have to have the field prepared (planting holes dug and manure applied into the holes) before the rains start.

Q4: Would you recommend intercropping banana and maize?

A4: It is not recommended to intercrop maize and banana since maize will compete with bananas for light. Also, unlike crops that fix nitrogen in the soil, for example beans, maize does not add any nutrients into the soil.

Q5: Why is it that in the past (20 years ago) banana fields lasted longer than they do today?

A5: There could be several reasons to explain why banana fields used to last longer in the past, such as less disease pressure (e.g. diseases like Xanthomonas wilt were not yet present), soil fertility was not as depleted as it is currently, and global warming was not as intense as it is now. But if you take care of your banana field it should last for 10 years.

Session 5: Water and soil conservation

Personnel: One facilitator and one assistant (training team)

Supplies: Mulch (dry grass) that can sufficiently cover at least 20 banana mats, hoes, panga, notebook, pen, refreshments

Time: 2 hours

Venue: A farmer's field

Preparing for the session

Write the topic of the day (Water and soil conservation) and the questions that will guide the day's session in the notebook before leaving for the field. The questions are:

- What are the benefits of mulching?
- What are the materials commonly used for mulching?
- What are the best practices for conserving water?

Conducting the session

1. Open the day's training session by asking a volunteer participant to briefly recap the previous training session.
2. Introduce the day's topic. Read out the questions that will guide the session one by one, and solicit responses from the participants. Write the responses in the notebook, and read them out again when the responses have stopped. Supplement the discussion with additional points which may have been left out by the participants.
3. Demonstrate the best way of mulching the banana field. Encourage participants to fully participate so that they learn practical skills that they can use in their fields.
4. Wrap up the day's training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Use of organic and inorganic fertilizers), and the date and time for the session
    - Agree the venue for the next session with the group, which should be in a different farmer's field. The farmer hosting the next session should have an existing banana field with at least 20 banana plants, preferably established for more than six months. The hosting farmer should also provide at least 20 basins of organic manure. The inorganic fertilizer will be provided by the training team.

Content

Mulching

Advantages of mulching:

- Restricts weed growth: a closed mulch cover (≥2 cm) suppresses almost all weeds
- Protects the soil against heavy rainfall and intensive sunshine
- Prevents erosion: stops loss of rich topsoil, where banana roots feed
- Adds nutrients, especially potassium and other cations: mulch spread to a depth of 2 cm over a hectare can add as much as 300 kg of potassium
- Stimulates root development
- Improves soil drainage
- Decreases soil temperature
- Increases soil porosity and biological life
- Conserves water by reducing evaporation and improving infiltration rates. Bananas require a lot of water (1,500 mm/year); when rainfall is only 1,000 mm/year, you will experience about 50% yield loss. So, especially when rainfall is low, it is very important to conserve water.

Different mulching materials:

- Organic matter obtained from the banana plantation itself: leaves, debris, pseudostem, stalks, etc.
- Mulching plants that are easy to grow and which produce a substantial amount of vegetable matter, for example *Pennisetum purpureum* (elephant grass), *Tripsacum laxurn* (Guatemala grass) and *Panicum maximum* (Guinea grass)
- Animal organic matter (e.g. poultry, pig and cow manures), which should be spread near the plant
- Cover crops as live mulch (e.g. legumes) for the first 12 months.

Precautions that need to be taken while mulching:

- Mulching is known to increase pest attack and toppling, and so a ring should be left around the plant base where the mulch does not touch the plant
- If thick mulch is introduced early, and in contact with the plants, this can cause high mats. This increases likelihood of banana plants toppling, especially during high winds.

Water conservation

Banana is a succulent crop which requires a lot of water and is susceptible to drought. In areas which receive less than 1,000 mm of annual rainfall, water conservation practices are important. Methods that can be used include:

- Irrigation: the most common yet most expensive method of providing continuous water to crops
- Heavy mulching: a 15 cm layer of mulch regularly applied to the field minimizes evaporation and water run-off

- Contour trenches: these should be 30–45 cm deep, 45–60 cm wide, with a bund of 30–45 cm down the slope, planted with fodder grass
- Trench composting: trenches should be 45 cm wide and 30 cm deep, in between the rows of plants, filled with a biodegradable substance such as manure or organic matter from the plantation, and covered with top soil; when it rains the compost absorbs and stores water which the plants can use during dry periods.

Questions and answers

Q1: Should mulching material always be dry?

A1: Yes. Material that is not dry should not be used as mulch because it can easily rot in the field and produce heat (through fermentation) that can be dangerous to the plants.

Q2: Does mulching control banana weevils?

A2: No, mulching does not control banana weevils. In fact, it increases their multiplication since it provides them with a favourable environment to reproduce. This is why it is not recommended to apply mulch close to the banana plant.

Q3: Can a farmer who mulches his plantation but does not apply fertilizers obtain big bunches?

A3: A farmer could still get quite big bunches, but they would be bigger if fertilizer was also used. The best bunches are produced where all the recommended agronomic practices are carried out, including both mulching and applying fertilizer.

Q4: Would you recommend a farmer to water his or her banana plantation even after mulching?

A4: Yes, it important to water the plantation even after mulching (unless there is plenty of rain). Mulching does not add water to the soils but only conserves water which is already there by reducing the rate at which the soil loses water to the atmosphere.

Q5: Is it essential for a banana field to have trenches?

A5: No, it is not essential. Trenches are usually dug where water flows through the banana field, in order to trap the water and also control erosion.

Q6: As mulching conserves water in the soil, is it also necessary to dig trenches in a mulched banana field?

A6: If there is water flowing through the field, the trenches are needed even if the field is mulched. Mulching and trenches have different roles: mulching conserves water in the soil, whereas the trenches trap the water within the field and also stop topsoil from being eroded.

Q7: When is the best time to dig trenches? Can one dig trenches before planting?

A7: Trenches are ideally dug immediately after the banana field is established, so that the young plants can benefit from the water that they hold. It is ok to dig trenches before planting, but it will be best if you dig them after digging the planting holes.

Session 6: Use of organic and inorganic fertilizers

Personnel: One facilitator and one assistant (training team)

Supplies: Notebook, pens, 5 kg of inorganic fertilizers (e.g. DAP, urea, etc.), organic manure (20 basins), refreshments

Time: 2 hours

Venue: A farmer's field with at least 20 banana plants, at least 6 months old

Preparing for the session

Write the topic of the day (Use of organic and inorganic fertilizers) and the questions that will guide the training session in the notebook ahead of the training. The questions are:

- What is plant nutrition?
- What are the symptoms of nutrient deficiency in bananas?
- What are the best sources of organic fertilizers for bananas?
- What are the best sources of inorganic fertilizers for bananas?
- What is the schedule for fertilizer application in bananas?
- What are the optimal quantities of fertilizers for bananas?

Conducting the session

1. Open the day's training session by asking a volunteer participant to briefly recap the previous training session.
2. Introduce the day's topic. Read out the questions that will guide the session one by one, and solicit responses from the participants. Write down the responses in the notebook, and read them out again when the responses have stopped. Supplement the discussion with additional points which may have been left out by the participants.
3. Demonstrate to the participants the best way of applying the different fertilizers to bananas. Both organic and inorganic fertilizers should be used during the demonstrations. Encourage participants to fully participate so that they learn practical skills that they can use in their fields.
4. Wrap up the day's session as follows:
    - Briefly recap the day's session
    - Communicate the topic for the next session (Weed control), and the date and time for the session
    - Agree the venue for the next session with the group, which should be in a different farmer's field. The farmer hosting the next session should have an existing banana field with at least 20 banana plants, and preferably some weeds.

Content

Plant nutrition

As a plant grows, it takes up nutrients from the soil. A lot of the nutrients taken up by a banana plant go into the fruits (bunch). Farmers remove the fruits and they are sold, and so nutrients are lost from the system. The only way to maintain soil fertility is by regularly putting back nutrients into the soil in the form of organic or inorganic fertilizer. If fertility is not maintained in this way, even the most fertile soils will gradually become unproductive.

Nutrients needed for banana production

Bananas have a high demand for nitrogen (N) and potassium (K). Other minerals that are vital for banana production, though in small quantities, include phosphorus (P), magnesium (Mg) and calcium (Ca). Each nutrient plays a different role in banana production as follows:

- N contributes to overall growth of a banana plant, and keeps leaves green and healthy which allows bananas to capture more sunlight to make big bunches
- K helps with movement of food and water from the roots to the leaves and bunches
- P helps the banana plant to have strong and healthy roots that will capture more water and nutrients from the soil
- Mg helps the leaves to use the sunlight captured to make food.

Symptoms of nutrients deficiencies in banana

Nitrogen

Symptoms of nitrogen deficiency develop quickly over leaves of all ages. Symptoms include:

- Leaves are very small and pale green
- Mid-rib, petioles and leaf sheaths become reddish pink
- The rate at which leaves are produced decreases
- Distance between successive leaves is reduced, giving the plant a rosette appearance
- Growth is poor, leading to a stunted plant
- Banana bunches become small.

Potassium

Symptoms of potassium deficiency normally appear at the time of flowering; they include:

- Rapid appearance of orange/yellow colour on the older leaves and their subsequent drying and death
- The mid-rib of the leaves exhibiting symptoms are often bent or broken at a distance of two-thirds along the length, so that the leaf points towards the base of the plant
- Small leaves
- Delayed flowering
- Reduced bunch sizes.

Phosphorus

Deficiency symptoms of phosphorus are rarely seen in the field. They however include:

- Stunted growth and poor root development
- In the older four or five leaves, the leaf margins (edges) lose their colour (chlorosis). Then purple brown flecks develop that eventually combine until leaf edges are dead
- Affected leaves curl and the petioles break
- Young leaves have a deep bluish green colour.

Magnesium

- Yellowing (chlorosis) of leaf margins of older leaves; the yellowing extends towards the mid-rib, with a green band remaining near the mid-rib, and is more severe where the leaves are exposed to the sun.

Fertilizers for banana production

Organic fertilizers

Good organic fertilizers include:

- Crop residues (e.g. bean hulls and stalks, maize stovers, sorghum residues and millet residues), other plant residues (e.g. swamp and elephant grass (chopped and dried))
- Animal waste (e.g. cow and chicken manure).

These fertilizers can be applied individually and directly, or can be combined and composted. An important use for organic fertilizer (mature compost or manure) is in the planting hole, mixed with soil. In established plantations organic fertilizer may be placed on the soil surface in a ring or furrow 45 cm from a mat, or can be ploughed into the soil around the plant.

Inorganic fertilizers

There are different types of fertilizers available that provide the same nutrients. Table 1 shows some commonly used fertilizers and the nutrients they provide. The rate of application depends on how quickly the nutrient is removed from the soil. Some nutrients leach very quickly when it rains, and these ones need to be added frequently but in small quantities, as shown in Table 1.

Table 1. Important nutrients, sources and application rates for better banana production

Nutrient	Fertilizer providing the nutrient	Amount per stool (g)	Number of times the fertilizer should be applied in a year
Nitrogen	Urea, DAP	75	4 times
Potassium	Potash	85	2 times

Applying inorganic fertilizers

Remove trash and make a ring about 30 cm away from the stool (mother plant and suckers). Sprinkle and spread the measured amount of fertilizer in the ring. Cover the fertilizer with soil but do not work it (dig it) into the soil, because you may cause damage to the superficial roots of the banana plant.

Questions and answers

Q1: Is it true that liquid manure cures Xanthomonas wilt?

A1: No, it is not true. At the moment the disease has no cure, it can only be controlled with preventive measures that limit the spread of the disease.

Q2: Which is better for banana production: chicken or cow manure?

A2: Both types of manure are good, and the type of manure you use depends on availability. However, chicken manure is used up faster than cow manure, so cow manure is better from that point of view.

Q3: How can I tell fake fertilizers from genuine fertilizers?

A3: The only way is to buy fertilizers from a reputable agro-input dealer or company.

Q4: What is the maximum amount of organic fertilizers recommended for a banana plant? Is it possible to 'overdose' with organic fertilizers, as is the case with inorganic ones?

A4: No, overdose with organic fertilizers is very unlikely, but farmers should avoid using too much as it is a waste. For bananas, apply only two basins (~ 20 kg) of organic manure at the beginning of the rains.



Fig. 7. A healthy banana plantation.

Session 7: Weed control

Personnel: One facilitator and one assistant (training team)

Supplies: Sprayer, basin, 1 liter of herbicide (e.g. paraquat, or a mixture of 2,4-D and dicamba), 20 liters of water, notebook, pen, refreshments

Time: 2 hours

Venue: A farmer's field with at least 20 banana plants, and some weeds

Preparing for the session

Write the topic of the day (Weed control) and the questions that will guide the day's session in the notebook before leaving for the field. The questions are:

- What are weeds?
- Why is it important to control weeds in the garden or plantation?
- What are the different methods of weed control?

Conducting the session

1. Open the day's training session by asking a volunteer participant to briefly recap the previous training session.
2. Introduce the day's topic. Read out the questions that will guide the session one by one, and solicit responses from the participants. Write down the responses in the notebook and read them out again when the responses have stopped. Supplement the discussion with additional points which may have been left out by the participants
3. Demonstrate the process of mixing herbicides using the recommended dosage and the correct procedure for applying the herbicide. Give the participants a chance to practice the procedures.
4. Wrap up the day's session as follows:
    - Briefly recap the day's session
    - Communicate the topic for the next session (Routine field management), and the date and time for the session
    - Agree the venue for the next session with the group, which should be in a different farmer's field. The farmer hosting the next session should have a banana field that is more than 2 years old, and should provide a hoe, panga and knife.

Content

Weeds

A weed is a plant growing where it is not wanted and having a harmful impact.

Importance of weed control

The removal of weeds is important because:

- These plants compete with the crop plants for space, water and nutrients

- Weeding helps to 'loosen' the soil, so that water can infiltrate more rapidly and roots of the cultivated plants can develop more easily
- Weeds act as alternate hosts for insect pests and diseases, i.e. they increase pest and disease problems
- Weeds reduce fertilizer efficiency and thus banana yields.

Timing of weeding

Weed control is particularly important during the first year of plantation establishment, while the banana plants become established. Once the plants are big enough that the leaves completely shade the ground, weeds become less of a problem and mulching can be sufficient to keep the weeds down.

Types of weeding

1. Cultural

- Weeds can be hand-pulled or weeded with a hoe.
- Hand or hoe weeding can be carried out alone or combined with chemical weed control. For example, ring or row weeding of the banana plants can be followed by herbicide application on the remaining weeds.
- When the plants are mature, avoid use of a hoe when weeding.

2. Chemical

- Chemical weed control is less laborious, provides longer control and is faster than hand or hoe weeding.
- Chemical weed killers are applied using a knapsack sprayer. Spraying should be done at a time when there is no or little wind.
- Herbicides commonly used include paraquat (e.g. Gramoxone) and glyphospate (e.g. Roundup). If a contact herbicide such as glyphosate or 2,4-D is used, precautions must be taken to avoid drift onto the bananas.
- Farmers must follow the manufacturer's recommended dosage.
- Do not smoke or eat during treatment and avoid contaminating water for human/animal consumption with herbicides. Do not reuse herbicide containers for domestic purposes.

Questions and answers

Q1: Is it true that herbicides stay active for a long time after application?

A1: Yes, some herbicides can stay active in the soil for a long time, especially if not used properly. This is called a residual effect.

Q2: Is it okay to mix different herbicides together, e.g. mixing those that are effective on broad-leafed weeds and those that work on grasses?

A2: No, herbicides should never be mixed, because it can disrupt the active ingredients. The exception is if there is a commercial product that contains mixed active ingredients.

Session 8: Routine field management

Personnel: One facilitator and one assistant (training team)

Supplies: Knife, panga, hoe, 4 poles to be used to demonstrate propping techniques, notebook, pen, refreshments

Time: 3 hours

Venue: A farmer's field with bananas more than 2 years old

Preparing for the session

Write the topic of the day (Routine field management) and the questions that will guide the day's session in the notebook before leaving for the field. The questions are:

- What are the advantages and disadvantages of intercropping?
- What are the best field practices for de-suckering?
- What is de-leafing? How is de-leafing done properly?
- How (and why) do you remove a male bud?
- What is propping? What is the best way of propping?

Conducting the session

1. Open the day's training session by asking a volunteer participant to briefly recap the previous training session.
2. Introduce the topic of the day's session. Read out the questions that will guide the session one by one, and solicit responses from the participants. Write down the responses in the notebook, and read them out again when the responses have stopped. Supplement the discussion with additional points which may have been left out by the participants.
3. Take the farmers through the practical steps of the different banana field management practices. The practices are de-suckering, de-leafing, removal of the male bud and propping. During the demonstrations, have participants volunteer to replicate the procedures so that they learn practical skills that they will be able to use in their own fields. Be sure to explain to the participants the significance of each practice being demonstrated.
4. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Pest and disease management), and the date and time for the session
    - Agree the venue for the next session with the group, which should be in a different farmer's field which has not been used before during the training. The farmer hosting the next session should have an old banana field with some visible symptoms of disease and pest infestation. The training could take place at several fields so that more banana pests and diseases are seen.

Content

Intercropping

- During the first few months, before the banana canopy closes, there is some space available between rows. This space can be used for plants that have a short life cycle and that do not compete with bananas.
- The intercrop should be planted before (e.g. coffee or cocoa) or at the same time (e.g. legumes such as groundnuts, vegetables or maize) as the bananas.
- Do not plant too close to the banana plant to avoid direct competition for nutrients between the banana plant and the intercrop.
- In mature plantations (after the first crop), intercropping, especially with annual crops, should be discontinued.
- With beans as intercrops, minimum tillage is used.

Advantages of intercropping	Disadvantages of intercropping
• Land gives a return before the banana crop is ready to be harvested • Weed control is easier • Soil is protected against erosion • Soil moisture is conserved • Organic matter is added to the soil	• Competition with bananas for nutrients, sunlight • Labour requirements may be higher • The intercrop may attract pests that could be harmful to the banana plants

De-suckering

- De-suckering – removing the suckers – is done to reduce competition (for water, light and nutrients) and maximize yield.
- De-sucker the banana mat to a total of three plants at different growth stages (mother, daughter and granddaughter). That is, only one sucker from each successive generation is allowed to grow.
- Take care not to harm the motherplant and the suckers that are being retained. For de-suckering, choose suckers that are coming from well down on the corm because the banana plant has a tendency to grow out of the ground. Also, choose suckers on the opposite side of the bunch of the motherplant.
- De-suckering should be timed so that the farmer can take advantage of peak marketing seasons such as Christmas.

De-leafing

- De-leafing is the process of removing dead hanging leaves covering the young suckers and the old sheaths on the base of pseudostem which would otherwise provide an ideal refuge for adult banana weevils.
- Remove dead sheaths and leaves regularly, and use them as mulch (if no banana weevils are evident).



Fig. 8. Explaining routine field management to farmers.

- Leave enough leaves to produce a good quality bunch (at least 9–12 leaves at flowering and 4 at harvest).
- De-leafing of the plant immediately prior to harvest is not recommended as this starts the ripening process.

Cutting off male buds

- Male buds are removed to encourage development of the young bunch and to protect the plant from being infected with Xanthomonas wilt. Care should be taken not to damage the hands of the bunch. Remove the male bud with a forked stick immediately after the last cluster forms. Do not chop off the male bud, as knives/pangas can easily spread infection.

Propping

- The heavy weight of the banana bunch can cause the pseudostem to break, or can uproot (topple) the entire corm. Propping is done to prevent this. Most plants need this, but especially during the dry season, in strong winds, or if infested with nematodes or banana weevils.
- The support can be made from one or two wood props (usually bamboo). A lateral branch with a natural fork can also be used. Depending on the weight of the bunch, the branch or branches can be placed underneath the bunch or along the pseudostem.

Questions and answers

Q1: Is it true that you can tell the future size of the bunch by looking at the size of the bud?

A1: Yes, to some extent it is true but there are other factors that also affect the size of a bunch.

Q2: Doesn't regular de-suckering weaken the banana field?

A2: No, it will only weaken the banana field if the job is not done properly.

Q3: Does removing a male bud helps control banana pests such as the banana weevil?

A3: No, removal of the male bud has nothing to do with controlling banana weevil. However, removal of male buds helps in controlling the spread of Xanthomonas wilt.

Session 9: Pest and disease management

Personnel: One facilitator who is very knowledgeable about banana pests and diseases, and one assistant (training team)

Supplies: Posters and pamphlets about banana pests and diseases, hoe, knife, panga, notebook, pen, refreshments

Time: 6 hours (two 3-hour sessions)

Venue: One or more farmer's fields with old bananas and visible symptoms of pests and diseases

Preparing for the session

Write the topic of the day (Pest and disease management) and the questions that will guide the day's session in the notebook before leaving for the field. The questions are:

- What are the most common pests and diseases affecting banana in your area?
- What are the symptoms of these banana pests and diseases?
- What are the best practices for overcoming or reducing the effect of these pests and diseases?

Conducting the session

1. Open the day's training session by asking a volunteer participant to briefly recap the previous training session.
2. Introduce the day's topic. Inform the participants that the day's session is going to be practical and they are encouraged to participate.
3. Read out the questions that will guide the session one by one, and solicit responses from the participants. Write down the responses in the notebook, and read them out again when the responses have stopped. Supplement the discussion with additional points which may have been left out by the participants.
4. Have the farmers identity the various pests and disease in the banana field where the training session is being held. For each pest or disease identified, explain how it is spread, its symptoms and the best control methods. For the pests and diseases that are not seen in the field, the facilitator should describe the symptoms so that farmers can at least identify them. Use any posters or pamphlets available about the various pests and diseases to show to the farmers.
5. Explain that the training team will also visit all the participants' fields at a later date to identify the pests and diseases found on the individual farms.
6. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic for the next session (Preparation for farm visits), and the date, time and venue for the session.

Content

Banana pests

Two important pests of bananas in East Africa are the banana weevil (*Cosmopolites sordidus*) and plant-parasitic nematodes. These pests may result in severe yield loss if not controlled.

Banana weevil

Damage and symptoms:

- Banana weevil damage results from larvae feeding and tunnelling into banana corms and pseudostems.
- The adult banana weevil lays its eggs near the corm and, on hatching, the larva attacks the underground part, boring tunnels in it.
- As banana weevil larvae grow in size, they make large tunnels of up to 1.5 cm in diameter that may extend 60–100 cm up the pseudostem. The damage weakens the plant and interferes with uptake of nutrients and water.
- Weevil infestation of young plants causes stunting, disruption and delay of fruiting, and sometimes leads to plant death.
- Heavily infested plants produce small bunches and have reduced resistance to drought and strong winds, sometimes leading to snapping and toppling of plants.
- The banana weevil causes more damage to cooking bananas than to beer bananas.

Cultural control measures:

Cultural control, based on manipulation of banana weevil habitat and oviposition sites, provides the first line of defence against the banana weevil. It is cheap and does not entail extra inputs. Cultural control practices include:

- Use of clean planting material. This reduces the spread of the weevils which are usually carried to new sites with infested suckers. Clean suckers may be obtained from non-infested fields, by paring the corm to remove eggs and larvae, and by use of tissue culture plants.



Fig. 9. Banana weevil damage.

- Good crop husbandry. This produces vigorous plants that are more tolerant to banana weevil damage. It involves regular weeding, de-suckering, adding manure and mulching,
- Destruction of post-harvest residues. Removal and splitting of harvested stems into small strips and spreading them out to dry quickly reduces hiding and breeding sites for the banana weevil. It also exposes weevil eggs and larvae to desiccation. Burning of the residues can also be done at a safe distance from the plantation.
- Trapping. Two types of traps are used: pseudostem and disc-on-stump traps. The pseudostem trap is made from pseudostem pieces split longitudinally into halves, and placed against a banana plant with split surface on the ground. The disc-on-stump traps are made by cutting harvested stumps 15–25 cm above ground level and then placing a pseudostem sheath or banana leaves on top of the stump. The banana weevils attracted to these traps are collected and destroyed. Traps remain effective for about 1–2 weeks and are renewed whenever pseudostem pieces are available.
- Use of mixtures of ash, urine and insecticidal plants. Farmers often use concoctions containing various amounts of ash, urine, tobacco, capsicum and other weed species. The method and rates of application vary from farmer to farmer. A 14-day fermented mixture is often used, at the rate of 1–2 cups (500–1,000 ml) per banana stool. While the practice is being recommended by some organizations, especially those promoting organic farming, its efficacy is unclear.

Chemical control measures:

- Monitoring of banana weevils is recommended before chemical control is used. Chemical control should only be considered if monitoring results in more than 2 weevils per trap.
- At planting, an insecticide such as carbofuran (e.g. Furadan) can be applied around the sucker in the planting hole.
- For an established plantation, an insecticide can be applied to the soil around the base of the banana stool.
- Chemical pesticides can also be used with pseudostem or disc-on- stump traps in mature banana plantations to kill weevils in the traps.

Nematodes (eelworms)

Several nematode species attacks banana roots: *Meloidogyne* spp., *Radopholus similis*, *Helicotylenchus multicinctus* and *Pratylenchus coffeae*.

Damage and symptoms:

Nematodes are not seen by the naked eye and their damage is therefore often underestimated. However, they are very serious banana pests. Infestation occurs in roots. Symptoms include:

- Stunted growth
- Plants easily uprooted by wind (toppling), particularly those with bunches
- Root damage: in early stages brown threads appear in the root; at later stages roots become dark brown and rot; the root system is reduced and appears short and black
- Leaves lose green colour and turn yellow; then dry and drop off
- Bunches produce few clusters with small fingers.

Cultural control measures:

- Plant resistant cultivars
- Use clean planting material
- Hot water treatment: after paring, dip suckers in water of 50–55°C for 15–20 minutes, or boiling water for 1–2 minutes
- Prepare land in the dry season
- If a field is highly infested, uproot all plants and leave it fallow for 2 years
- Practice crop rotation with root crops like cassava and sweet potato
- Mulch the plantation, since mulched plants tend to cope better with nematodes.

Chemical control measures:

- Use of nematicides is currently the only method that effectively controls nematodes in an established banana plantation. The recommended chemical is carbofuran (e.g. Furadan). Always follow the instructions as prescribed on the label or have the input supplier explain to you the application rates before using any nematicide.

Other pests

Monkeys can be destructive, especially in plantations near forests. Monkeys can be scared off by dogs or guards.

Ants can dig up soil and expose the banana corms, making the plants more susceptible to toppling.

Banana diseases

The major diseases found in East Africa are: Mycosphaerella leaf spot (also called black sigatoka, Panama wilt and black leaf streak, caused by *Mycosphaerella* spp.), Fusarium wilt (caused by *Fusarium oxysporum* f. sp. *cubense*) and Xanthomonas wilt (bacterial wilt, caused by *Xanthomonas campestris* pv. *musacearum*). Other diseases are less important and include Armillaria corm rot (caused by *Armellaria* spp.), anthracnose (caused by *Colletotrichum musae*), cucumber mosaic virus (CMV), cigar end (caused by *Verticillium theobromae* and *Trachysphaera fructigena*) and Cladosporium speckle (caused by *Cladosporium musae*).

Leaf diseases may be difficult to identify in the field, and farmers often confuse their symptoms with banana weevil damage and nutrient deficiencies. The diseases are worse where other stresses are severe, such as banana weevils, nematodes or nutrient deficiency.

Black sigatoka

This is the most important leaf disease. Symptoms and damage include:

- Large reddish-brown streaks on underside of leaves, especially 4th leaf
- Advanced stage has blackened patches on topside of leaf
- Leaf blade edges folded
- Affected plants have few functional leaves (three or four)
- Leaves appear burnt
- Fruits ripen before maturity



Fig. 10.Demonstrating black sigatoka in farmers' fields.

- Small fingers.

Cultural control measures:

- There are no fully effective control measures for this disease at the moment
- Use resistant cultivars, e.g. FHIA-17, FHIA-23, Musakala, Namaliga, Kibuzi, Mbwazirume
- Maintain soil fertility, which enhances plant vigour
- Remove/burn infected material
- Remove unwanted suckers
- Free the plantation from weeds
- Use clean banana planting materials (such as banana tissue culture) when starting a banana farm.

Fusarium wilt

Fusarium wilt is caused by a fungus that lives in the soil and attacks the plant through the lateral roots. The disease can be very destructive and can cause yield losses of up to 100%. The pathogen can stay in the soil long after the banana plant has gone. The disease affects especially the cultivars Sukali Ndiizi, Kisubi and Kayinja. The disease is easily spread through infected suckers.

Symptoms:

- Yellowing of leaves
- Wilting of all leaves
- Leaf sheaths loosen and pseudostem splits
- Emerging leaves are whitish
- Attacked plant may fail to flower and to develop a bunch.

Cultural control measures:

- There are no fully effective control measures for this disease at the moment
- Remove/uproot infected plants and their suckers, and destroy them
- Use resistant cultivars: FHIA-17, FHIA-23, FHIA-3
- Do not move suckers from infected to non-infected areas
- Fusarium wilt can spread in the soil that adheres to tools and shoes. Keep farm tools and shoes clean.

Xanthomonas wilt

Xanthomonas wilt is caused by a bacterium and is spread from a sick plant to a healthy one by bees visiting the male bud, by farm tools such as knives and hoes, or by planting diseased suckers.

Symptoms:

- Male bud wilts and fruit ripens early when the bunch is still young
- Young leaves turn brown and wilt
- Fruits show brown discolouration when cut
- Stem oozes yellow liquid when cut.

Cultural control measures:

- There are no fully effective control measures for this disease at the moment
- Remove the male bud. Use a forked stick to remove the male bud after the last cluster forms
- Destroy diseased plants. Chop and sun-dry diseased plants and suckers
- Use clean planting material (clean suckers or tissue culture plants)
- Always disinfect tools with fire or bleach.

Armillaria corm rot

This occurs in plantations planted on cleared forest land. The disease affects the roots, corms and stumps.

Symptoms:

- Yellowing and death of leaves
- Advanced infection results in total collapse of the plant.

Cultural control measures:

- There are no fully effective control measures for this disease at the moment
- Burn infected plants
- Complete removal of all stumps and large roots
- Use tolerant cultivars such as FHIAs.

Anthracnose

Anthracnose affects fruit. This disease is most common on cooking bananas.

Symptoms:

- Small black circular specks on flower and skin
- Tip of banana fruit hardens
- At an advanced stage, sunken lesions appear to form large spots on surface.

Control measures:

- Monitoring of field conditions
- Isolation of infected plant material.

Questions and answers

Q1: Do bees transmit black sigatoka?

A1: No, bees do not transmit black sigatoka. They do however transmit Xanthomonas wilt.

Q2: Is there any relationship between nutrient deficiency and diseases in bananas?

A2: Yes, there is a big relationship. Bananas that lack some nutrients are stressed and are much more easily attacked by diseases.

Q3: What would you consider the most dangerous disease of bananas at the moment, Xanthomonas wilt or Fusarium wilt?

A3: At the moment, Xanthomonas wilt is considered the most dangerous disease.

Q4: If banana has Mycosphaerella leaf spot, can it still produce bunches?

A4: Yes, bananas that are infected with Mycosphaerella leaf spot still produce bunches. However, the farmer should provide more manure to such bananas to increase the plant's vigour and help it withstand the disease.

Q5: Do bananas share any diseases with other crops like beans?

A5: Some of the types of pathogens that cause disease in banana are also found in beans. However, pathogens are generally rather specific, and diseases specific to banana do not occur on beans.

Session 10: Preparation for farm visits

Personnel: One facilitator and one assistant (training team)

Supplies: Farm visit forms, a ream of paper, pens, flipchart, markers, masking tape, refreshments

Time: 2 hours

Venue: A convenient meeting place

Preparing for the session

The aim of this session is to produce plans that will help the training team visit all the participants' farms in the following session. Prepare and print out enough copies of the farm visit form (Appendix 1) so that each farmer has one form.

Conducting the session

1. Open the day's training session by asking a volunteer participant to briefly recap the previous training session.
2. Communicate the purpose of the day's session, which is to produce plans that will help the training team visit all the participants' farms in the following session.
3. Ask farmers to form groups according to the villages where they come from. Give each group paper and pens or markers and ask them to draw a plan that the training team can use to visit each of them. The plan should include the names of all the farmers in that group, and the order in which the training team will visit the farms.
4. Collect the plans from the groups and agree with the whole group the order of visiting the different villages, and the dates and times for the visits. Request the farmers to make sure they remember the date for their visit, and are available at their farm at the agreed time. The entire programme of visits should be completed within 2 weeks.
5. Give a farm visit form to each farmer, and ask them to complete their name, location, and the date of the farm visit. When they have done this, collect the forms back from the farmers.
6. Wrap up the session as follows:
    - Briefly recap the day's session
    - Repeat again the dates and times when each participant will be visited. Also inform the group when the group training will resume (which will be the next module, Business skills).

Content

What is expected during the farm visits?

The facilitator will advise farmers individually about their banana production, based on the actual conditions on their farms.

Session 11: Individual farm visits

Personnel: One facilitator and one assistant (training team)

Supplies: Plans produced in the previous session, farm visit forms which the farmers started to fill in the previous session, pen

Time: A minimum of 45 minutes per farm. Total programme of visits should be completed within 2 weeks

Preparing for the session

Call the relevant farmers at least 3 days ahead of your visit, or alternatively ask the leader of the farmer group to remind the farmers about the visit.

Before setting out, remember to carry the plans produced in the previous session, and the relevant farm visit forms.

Conducting the session

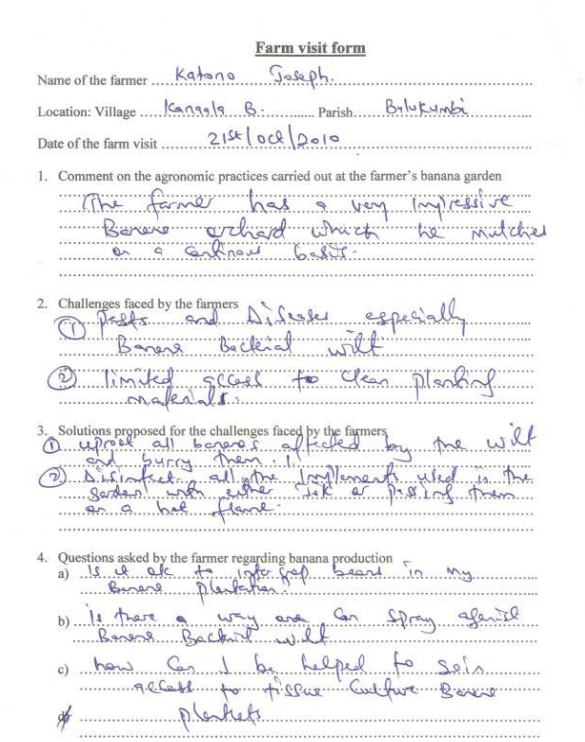
1. At the farmer's plantation, have him or her take you through the following:
   - The history of the plantation (when it was started, the source of initial planting materials, the main objective(s) for setting up the plantation, etc.)
   - The agronomic practices used at the plantation, and how effective they are
   - The challenges faced within the plantation.

   Write down all the information provided during the farm visit on the relevant farm visit form.
2. Encourage farmers to ask as many questions as possible related to banana production. Try to answer the questions on the spot, but where you do not have the answer, write down the question (to seek further clarification from elsewhere) and tell the farmer you will give the answer when the group trainings resume.



Fig. 11. Conducting farm visits.

3. Based on the information given, and your own assessment of the plantation, provide a detailed account of how the farmer can improve his plantation. Try to provide practical solutions to the problems.
4. Wrap up the session as follows:
   - Thank the farmer, and encourage him or her to act on the advice given to improve their banana plantation.
   - Communicate the date, time and venue when group training will resume.



Farm visit form

Name of the farmer Katono Joseph.

Location: Village Kanaala B. Parish Bulukumbi

Date of the farm visit 21st/oct/2010

1. Comment on the agronomic practices carried out at the farmer's banana garden

The farmer has a very impressive Banana orchard which he mulches on a continous basis.

2. Challenges faced by the farmers

① Pests and Diseases especially Banana Bacterial wilt

② limited access to clean planting materials.

3. Solutions proposed for the challenges faced by the farmers

① uproot all bananas affected by the wilt and burry them.

② Disinfect all the implements used in the garden with either Jik or passing them on a hot flame.

4. Questions asked by the farmer regarding banana production

a) Is it ok to intercrop beans in my Banana plantation?

b) Is there a way one can spray against Banana Bacterial wilt

c) how can I be helped to gain access to tissue Culture Banana plantlets

Fig. 12. Farm visit form.

Questions and answers

Q1: What is the best tree species to plant with bananas?

A1: Coffee is an ideal intercrop with bananas. Trees that add nitrogen to the soil (like *Calliandra* and *Sesbania*) are also good to plant with bananas. Other tree species like *Ficus* can be planted to provide shade.

Q2: Is it okay to grow different cultivars of bananas in one field?

A2: It is advised not to mix cultivars, as some cultivars are more susceptible to pests and diseases which may then spread to the others. The banana field should be organized according to cultivars.

Q3: What are the signs of Xanthomonas wilt?

A3: The symptoms are: male bud wilts and fruits ripen early when the bunch is still young, young leaves turn brown and wilt, fruits show brown discoloration when cut, and the pseudostem oozes yellowish liquid when cut.

Q4: Can bananas be grown in swampy areas?

A4: Yes, they can be grown in swampy areas, as long as the soil is not waterlogged for long periods.

Q5. How would you control monkeys that destroy the bananas?

A5: You can use a scarecrow in the banana field, or have the field guarded by a dog to scare away the monkeys.

Q6: Why is 'matooke' from Western Uganda different in taste to that from Central Uganda?

A6: This is caused by a number of factors, such as the soils, the rainfall pattern, management practices, etc.

Q7: Can I grow bananas together with pineapples?

A7: Yes, bananas can be grown together with pineapples, but if bananas are the main crop, then they need to be planted using a relatively bigger spacing.

Q8: What would you recommend and why: cooking or roasting types?

A8: This totally depends on the farmer's interest. The management practices are the same.

Q9: Is it good to plant fruit trees with bananas?

A9: It is okay to plant fruit trees with bananas, but ensure that the spacing is optimal to avoid competition for soil nutrients and light. Make sure the fruit trees are pruned regularly.

Q10: Can bananas planted without manure produce big bunches?

A10: Yes, if the soil is very fertile, and good management practices are used.

Q11: When is the best time to cut off the male bud?

A11: When all the fingers have developed from the flowers.

Q12: Is it true that hoes should not be used to control weeds in bananas?

A12: It not true. However, precaution should be taken when using a hoe to not damage the roots of the bananas.

Q13: How long does a banana take to mature?

A13: Bananas take about one year from planting before the fruits are ready to eat.

Q14: Can nutrient deficiency weaken the bananas?

A14: Yes, nutrient deficiency weakens the bananas and also leads to poor harvest.

Q15: Is it okay to spray herbicides in a banana field intercropped with coffee?

A15: Yes, it is okay as long as the herbicide is used according to the manufacturer's specifications.

References (module 3)

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Appendix 1: Farm visit form

Name of the farmer .....

Village.....Parish .....

Date of the farm visit .....

1. Comment on the agronomic practices used on the banana farm

   .....

   .....

   .....

2. Challenges faced by the farmer

   .....

   .....

   .....

3. Solutions proposed for the challenges faced by the farmer

   .....

   .....

   .....

4. Questions asked by the farmer regarding banana production

   a).....

   b).....

   c).....

   d).....

Module 4
Business skills for farmers

Overview

Objective

The objective of this module is to familiarize participants with business skills, which should result in better planning and management of their farming business and hence higher profits.

Structure

The module comprises the following sessions:

- Session 1: Farming as a business
- Session 2: Record keeping
- Session 3: Benefit–cost analysis
- Session 4: Savings
- Session 5: Managing group lending

Each session can be carried out in a single classroom-based training session. Sessions should be held approximately every 2 weeks, and the entire module should take about 2 months to complete.



Session 1: Farming as a business

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 1 hour 30 minutes

Preparing for the session

Write the topic of the day (Farming as a business) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What is the meaning of farming as a business?
- Why is it important for farmers to treat farming as a business?
- What are the requirements for a successful farming business?

Conducting the session

1. Open the day's session by displaying the flipchart with the title of the module and the topic of the session.
2. Display the questions guiding the day's session one by one, and have participants brainstorm on each of them. Write down the responses on the flipchart. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.
3. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Record keeping), and the date, time and venue for the session. Ideally the venue will be the same as the current session.

Content

Farming as a business

A business is an activity that aims to earn a profit through providing a service or a product. Farming as a business is built on the principles of improving farm production to increase profits and/or ensure sustainability of farm output.

The importance of farming as a business

Treating farming as a business helps farmers to get the best out of their farms and their resources. Applying business methods, such as record keeping and benefit–cost analysis, to farming can greatly improve its efficiency. The following are some benefits from taking a business approach to farming:

- Farm goals are defined, such as
    – Where is the business going?
    – What needs to be done?

- When everyone involved with the farm (family members, extension workers, development agencies, etc.) understands the goals, they will work better together towards them.
- Valuable information is collected through record keeping, and used to make better decisions affecting the farm. For example, production records might show a reduction in output, and the farmer may decide to increase the number of banana plants or change his or her agronomic practices to improve yields; or sales records may show a loss over time, which the farmer can investigate and address, perhaps by changing planting dates in order to target times when prices are high in the market.
- Communication about the business is improved. For example, a farmer who has proper cash flow details about his or her farm can communicate better to other stakeholders such as loan officers about the viability of the farm to service a loan.
- An organized farming business is more likely to attract capital from private investors, venture capital funds, lenders, banks, trust companies, etc.

Requirements for a successful farming business

- Skills and knowledge necessary to grow crops or raise animals
- Production requirements such as land for growing crops, labour for farm activities, capital which can be in form of tools, equipments, building or cash, and organization which enables optimal use of all the resources available
- Marketing skills.

Questions and answers

Q1: Can farmers with less than 1 hectare of land carry out farming as a business?

A1: Yes. Farming as a business has nothing to do with farm size. It aids you in making decisions regarding practices you perform on your farm, which can be of any size.

Q2: Do I need to acquire a certificate from the local authorities for my farm to be considered a business?

A2: In Uganda, farmers involved in primary farm production (with no major value addition) don't need to acquire a certificate and they don't pay taxes for farming.

Q3: Will my farm be eligible for business loans if I am running it as a business?

A3: For a farm business or any business to be eligible for a business loan, a bank has to assess its viability, that is, whether the business has the potential to pay back a loan. If you keep good records and can show that you can pay back the loan, then your farm will be eligible.

Session 2: Record keeping

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 4 hours

Preparing for the session

Write the topic of the day (Record keeping) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What is record keeping?
- What is the importance of keeping records?
- What are the basic records needed for any farming business?

Prepare templates of the different types of farm records, using the examples in the Content section below. Print as many copies as the number of participants.

Conducting the session

1. Have one volunteer participant briefly recap the content of the previous session.
2. Open the day's session by displaying the flipchart with the title of the session.
3. Display the questions guiding the day's session one by one, and have participants brainstorm on each of them. Write down the responses on the flipchart. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.
4. For each of the different types of record, distribute the relevant template to the participants and have them fill in information. Participants should use figures based on data/information from their own farms. They could do this individually or in small groups of not more than five.
5. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Benefit–cost analysis), and the date, time and venue for the session. Ideally the venue will be the same as the current session.

Content

Record keeping and its importance

Record keeping is the systematic compilation of certain types of information. Reliable and accurate records are used to make better decisions affecting the farm.

For example, farmers should record:

- All incomes and costs as soon as they are incurred. These are then summarized periodically, e.g. by week, month, quarterly or annually. By comparing annual income to annual costs, you can determine whether you have made a profit or a loss over the year.

- Prices received from buyers every time a sale is made. This will help identify periods during the year when higher prices can be obtained, or buyers who offer a better price. With this information, farmers can adjust production so that they have more produce available when prices are higher.
- Yields obtained and total sales (by volume and price) for products in order to enable comparison with previous years, and forecasting for future years.
- Applications made such as fertilizers, mulch and water, and yields, in order to identify the best inputs and input schedules, and also compare costs of applications against increased (or decreased) yields.

Types of farm records

1. Farm planning schedule. This details the planned farm activities and the tentative dates for carrying them out. The schedule should be among the first records a farm manager produces.

An example of a farm planning schedule for starting banana production

Activity	Timeframe
• Buying tools and equipment • Preparing land including clearing and ploughing • Marking the field • Digging planting holes • Procurement and application of manure • Buying plantlets (tissue culture/suckers/corms)	1st month
• Gap filling • Digging trenches • Mulching • Routine management (weeding, watering if necessary)	2nd–4th month
• Routine management (e.g. weeding, removing trash, pruning, removal of male bud, irrigation) • Selling suckers	5th–11th month
• Routine management • Looking for markets • Selling banana bunches • Selling suckers • Harvesting	From 12th month onwards

2. Input record. An input record details the materials purchased and invested in the business. This should include the name of the input, the date of purchase, the price of the input, the amount of input(s) obtained, the total expenditure and where possible the expected useful life of the input.

Example of an input record for starting a banana farm[a]

Input	Date of purchase	Expected useful life	Unit cost	Quantity	Total cost
Tissue culture plantlets					
Manure					
Pesticides					
Mulch					
Implements (hoes, knives, pangas, etc.)					
Gumboots (pairs)					
Sisal rolls for marking planting holes					
Pegs for marking planting holes					

[a]Land is an important input in a banana farm. Therefore, land holding (land owned, rented or purchased) could be added along with the costs if required.

3. Labour record. This type of record details the labour used for the various tasks on the farm. Information in the record includes the activities, the period when the activities took place, the duration of the activities, the amount of labour used and the cost of the labour.

Example of a labour record for a banana farm

Activity	Timing (e.g. March)	Duration of the activity (e.g. days)	Amount of labour used (e.g. person-hours)	Cost of the labour (e.g. 1,000 Ugsh/hr)
Land clearing				
Ploughing and harrowing				
Field marking				
Digging holes				
Manure application				
Planting				
Weeding and pruning				
Mulching				
Watering				
Harvesting				
Transport				

4. Production record. This record details the output from the business in a given period. It is advisable to record information in the production records at regular intervals, e.g. weekly, bi-weekly, monthly or quarterly.

Example of a monthly production record for a banana farm

Month	Quantity produced (bunches)			Quantity consumed	Quantity sold
	Small	Medium	Large		
January					
February					
March					
April					
May					
June					
July					

5. *Sales record*. The sales record is used to capture information on the sales made. It should include the volumes of the produce sold, the date of the sale, the average selling price, the type of buyer and the mode of payment.

Example of a sales record for a banana farm

Date of sale	Quantity of banana bunches sold (by size)			Average price per bunch sold (by size)			Type of buyer, e.g. bicycle traders, wholesaler, etc.	Mode of payment, e.g. cash, cheque, credit, etc.
	Small	Medium	Large	Small	Medium	Large		

Questions and answers

Q1: Do I have to include everything that has been discussed here in my own farm records?

A1: You don't have to include everything that is being discussed here. You should try and capture just the information that is necessary for you and your farm.

Q2: How can I estimate quantities of farm inputs (fertilizers, pesticides, etc.) if I don't have any proper measuring equipment?

A2: You can use things like jerry can lids, or plastic bottles, as measures for your inputs. You can also ask input sellers for their advice on estimating quantities of the inputs they are selling to you.

Q3: For the sales record, what do I record for the months I don't sell any bananas?

A3: If you did not sell any bananas, write a zero for that month in the correct column. This is a valid record.

Q4: How do I record prices that vary every time I sell? The cell for recording the price is single for every month?

A4: The record formats presented here are only a guide. You could devise your own format so that you can capture the price of a bunch every time you sell.

Q5: Do I have to keep all these farm records if I don't sell my bananas?

A5: Even when you don't produce for the market, it is good to keep track of your farm activities, as this can help you improve them. So always keep records about production activities, inputs and yields.

Q6: Are the skills we are learning in this module applicable to other farm enterprises apart from banana production?

A6: Yes, the concepts we are learning can be used for all farm enterprises.

Q7: Would you call a receipt book a record?

A7: Yes, a receipt book is a type of record. However, it only records payments or purchases of goods. It does not capture most of the information that farmers need to improve their production.

Q8: How would you advise someone who cannot write to keep records?

A8: They should try and get a relative or friend to help them write the farm records.

Session 3: Benefit–cost analysis

Now that farmers are familiar with how farm records are kept, in this session they learn to attach monetary values to the different items (tasks/activities/outputs) so that they can appreciate the costs and benefits associated with producing bananas.

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 4 hours

Preparing for the session

Write the topic of the day (Benefit–cost analysis) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What are costs?
- What are benefits?
- What is meant by 'net income'?
- How do you carry out a benefit–cost analysis?

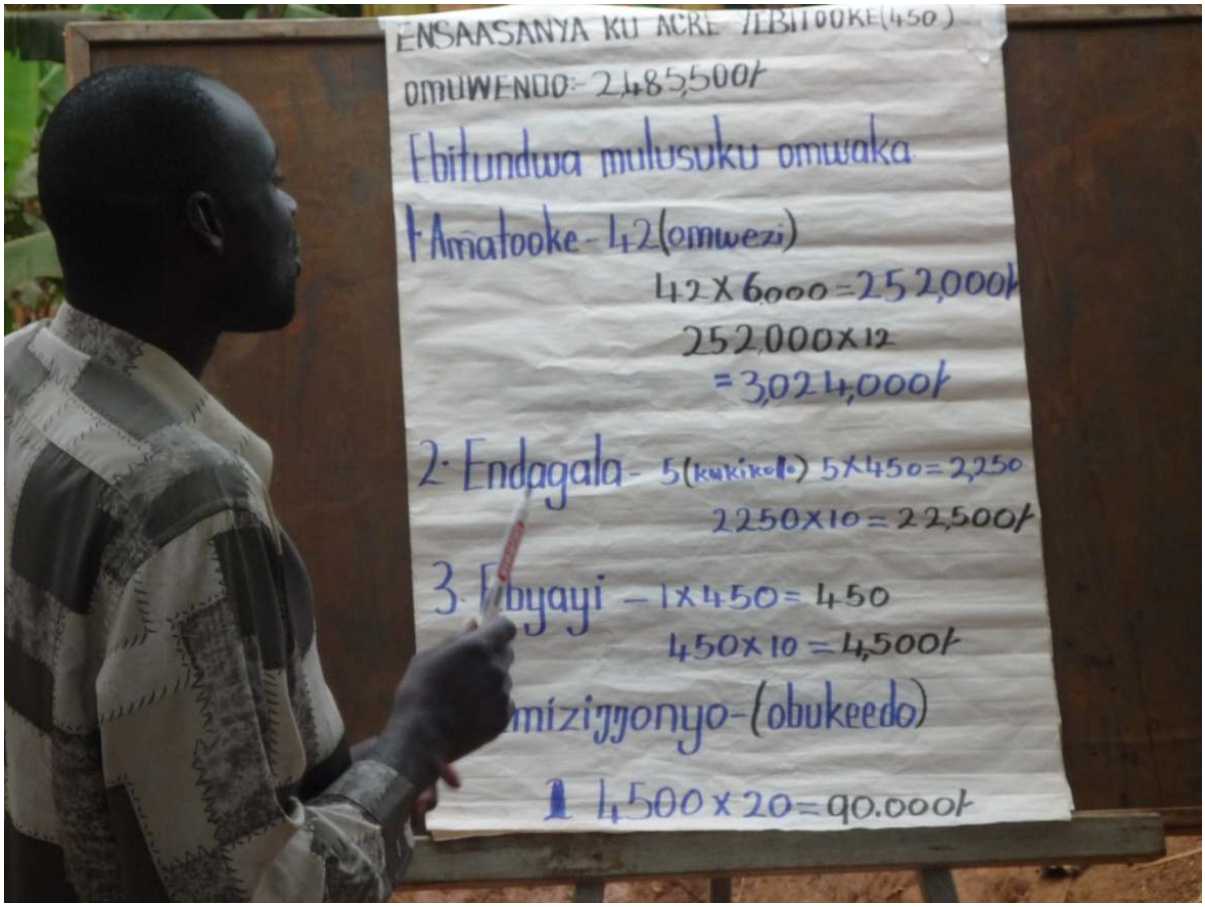
Prepare templates which will be used to capture costs and benefits in the day's lesson, using the examples in the Content section below. Print as many copies as the number of participants.

Conducting the session

1. Have a volunteer participant briefly recap the content of the previous session.
2. Open the day's session by displaying the flipchart with the title of the session.
3. Present the questions on the flipchart one at a time and have participants respond. Write down the responses. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.
4. Divide participants into groups of 5–10 people and have each group write down costs and revenues for a theoretical banana farm on 1 acre (~ 0.40 ha) of land, using the templates provided. Encourage participants to try and include all the different activities that are undertaken during banana production as well as all the resources needed. Costs (estimated) should be attached to all the listed activities/resources and total costs worked out. Revenue should be based on estimated outputs and current market prices. Note that the actual figures are not so important at this stage – it is the process that the participants are learning.
5. Give the groups 45 minutes to perform the task before recalling them. A spokesperson for each group should present the group's work to the participants. Encourage the other participants to ask questions. The facilitator should try to ask probing questions during the presentations that should help the participants understand the concepts of benefit–cost analysis. Questions could include:
    - How did you decide on the price for the outputs?
    - Did you include the cost of transport of the equipment from the point of sale to your farm?

- How did you budget for family labour?
- What prompted your choice of type of planting materials?
- Did you consider that some cultivars produce better bunches than others?

6. After all groups have presented their work, lead the entire group in producing a comprehensive benefit–cost analysis for producing banana on 1 acre of land in their area.
7. Wrap up the training session as follows:
    - Briefly recap the day's session
    - As homework, ask each participant to do a personal benefit–cost analysis for their banana farm. Where farmers are already growing bananas, they can draw up costs and benefits for improving their current farms. Remind participants to bring their benefit–cost analysis for review in the next meeting.
    - Communicate the topic of the next session (Savings), and the date, time and venue for the session.



Content

Costs

A business has many different costs, from paying for raw materials to paying the rent or the utility bills. By careful classification of these costs a business can analyse its performance and make better decisions. Business costs can be classified as:

- Variable costs: costs that change depending on the amount of output. These may include raw materials, wages, fuel for machines, etc.
- Fixed costs: costs that remain the same no matter the level of production of the business. For example, rent for land, or interest charges for a loan.

How to calculate the cost of production

Cost of production is the sum of the costs of the resources or inputs that went into producing a given product.

Cost of production = total fixed costs (TFC) + total variable costs (TVC)

Template for capturing and computing cost of inputs for producing banana (first season)[a]

No.	Input	Unit	Quantity	Average price	Total for season
	Tissue culture plants				
	Manure				
	Pesticides				
	Mulch				
	Implements consolidated				
	Pits for making composite (2 m x 2 m)				
	Gumboots				
	Sisal rolls for marking planting holes				
	Pegs for marking planting holes				
	Poles for supporting bananas with fruits				
	Total cost of inputs (A)				

[a]Land is an important input in a banana farm. Therefore, land holding (land owned, rented or purchased) could be added along with the costs if required.

Template for capturing and computing the costs of labour for producing banana (first season)

No.	Activity	Unit	Quantity	Average price	Total for season
	Land clearing	person-hours[a]			
	Ploughing and harrowing	person-hours			
	Field marking	person-hours			
	Digging holes	person-hours			
	Planting	person-hours			
	Manure application	person-hours			
	Digging trenches	person-hours			
	Weeding and pruning	person-hours			
	Pesticide application	person-hours			
	Mulching	person-hours			
	Watering/irrigation	person-hours			
	Harvesting	person-hours			
	Total labour costs (B)				

[a]A person-hour is the amount of work performed by an average worker in one hour.

Template for capturing and computing the marketing costs for banana

No.	Activity	Units	Quantity	Average price	Total for season
	Transport to the market	lump sum			
	Communication (airtime costs)	lump sum			
	Total marketing costs (C)				

Benefits (revenue)

For benefit–cost analysis, the benefits from farming are equivalent to the revenue, which is the total money received for the goods or products. To compute the revenue for a period of time, you need to multiply the amount of produce sold by the selling price over that period.

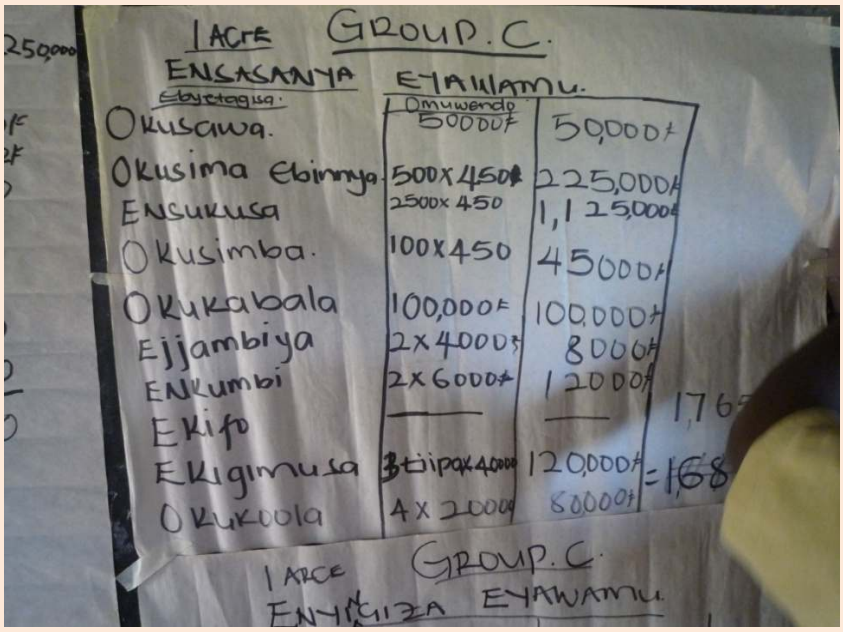
Template for capturing and computing revenue from banana production over one season

No.	Item		Units	Quantity	Average price	Total for the season
	Banana bunches	Small	number			
		Medium	number			
		Large	number			
	Suckers		number			
	Banana leaves		number			
	Total revenue (D)					

Net income

This is the difference between the total revenue and the total costs.

Net income = total revenue – (cost of inputs + cost of labour + marketing costs) = D – (A + B + C) from tables above



Benefit–cost analysis

Benefit–cost analysis is a process where costs and benefits are compared to determine whether a business is profitable and therefore financially viable.

A benefit–cost ratio is calculated by dividing total revenue by total costs. It is used to judge the efficiency of the farm business. It indicates the relationship between farm expenses and returns. The farm is said to be efficient when it yields a greater output per unit of input used, i.e. when the ratio is > 1. A ratio > 2 is preferred in order to take into account unforeseen events associated with agricultural production and which are not known when one computes a benefit–cost ratio of a farm business, such as inflation, natural risks (bad weather), biological risks (pests and diseases) or other risks.

Example of a benefit–cost analysis for a high-input banana farm (first season, 1 acre; 1 US$ = 1,900 Ugsh on 1/1/10)

No.	Item/activity	Units	Quantity	Average price	Total for season
1.	**Costs**				
A	**Inputs**				
	Tissue culture plants	number	440	2,100	924,000
	Manure	kg	2,000	120	240,000
	Pesticides	liters	2	15000	30,000
	Mulch	bundles	1,000	250	250,000
	Implements consolidated	lump sum	1	200,000	200,000
	Pits for making composite (2 m x 2 m)	lump sum	3	15,000	45,000
	Gumboots	pairs	5	15,000	75,000
	Sisal rolls for marking planting holes	rolls	2	5,000	10,000
	Pegs for marking planting holes	number	440	100	44,000
	Poles for supporting bananas	number	100	1,500	150,000
	Total cost of inputs (A)				**1,968,000**
B	**Labour costs**				
	Land clearing	person-hours	18	2,500	45,000
	Ploughing and harrowing	person-hours	38	4,000	152,000
	Field marking	person-hours	20	2,500	50,000

	Digging holes		person-hours	75	4,000	300,000
	Planting		person-hours	40	3,000	120,000
	Manure application		person-hours	26	3,500	91,000
	Digging trenches		person-hours	12	3,500	42,000
	Weeding and pruning		person-hours	30	3,000	90,000
	Pesticide application		person-hours	10	4,000	40,000
	Mulching		person-hours	48	5,000	240,000
	Watering/irrigation		person-hours	25	2,000	50,000
	Harvesting		person-hours	24	2,000	48,000
	Total labour costs					**1,268,000**
C	**Marketing costs**					
	Transport to the market		lump sum	1	150,000	150,000
	Communication (airtime costs)		lump sum	1	10,000	10,000
	Total marketing costs					**160,000**
A+B+C	**Total costs (A + B + C)**					**3,396,000**
2.	**Revenue**					
	Banana bunches	Small	number	105	4,500	472500
		Medium	number	215	7,000	1,505,000
		Large	number	120	8,500	1,020,000
	Suckers		number	1,200	800	960,000
	Banana leaves		number	1,000	50	50,000
D	**Total revenue**					**4,007,500**
3.	**Net income (D-(A+B+C))**					**611,500**
4.	**Benefit–cost ratio**					**1.18**

Questions and answers

Q1: Do all farmers have to incur all the costs indicated in the benefit–cost analysis?

A1: No. Different farmers incur different costs when producing banana. For example, some farmers without pests in their fields will not incur costs of buying pesticides.

Q2: If a farmer has a small benefit–cost ratio, would you recommend giving up on banana production?

A2: A benefit–cost ratio > 1 indicates that the farmer is making a profit from his farm, and a benefit–cost ratio < 1 indicates a loss. However, there may be reasons to explain the small ratio, which means that a farmer should not immediately give up. For example, many farmers register a benefit–cost ratio < 1 in the first season and this then changes in following seasons, because the first season requires the most investment.

Q3: If I use household labour on my banana farm, how do I record it as a cost of production?

A3: You should cost family labour as equivalent to hired labour, because if family labour is not being used on the farm it could be used for other productive ventures.



Session 4: Savings

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 4 hours

Preparing for the session

Write the topic of the day (Savings) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What are savings?
- Why do people save?
- What are the various ways of saving?
- What are group savings?
- What are the advantages of saving in groups?

Prepare individual (Appendix 1) and group savings tracking sheets (Appendix 2) and print out as many copies as participants. Also print out the same number of copies of the example savings guidelines (Appendix 3).

Conducting the session

1. Have a volunteer participant briefly recap the previous session.
2. Review homework from the previous session and ensure that you address any queries/concerns of the participants regarding the homework before opening the day's session.
3. Open the day's session by displaying the flipchart with the title of the session.
4. Display the questions guiding the day's session one by one, and have participants brainstorm on each of them. Write down the responses on the flipchart. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.
5. Take the participants through the procedure of recording information about individual and group savings. Distribute the savings tracking sheets and go through the sheets together with the participants, explaining the significance of each record.
6. Explain the basics of how to save as a group.
7. Discuss with participants the need for guidelines for group savings. Using Appendix 3, encourage the group to draw up their own guidelines.
8. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Managing group lending), and the date, time and venue for the session.

Content

What are savings?

Saving means withholding something valuable for future use. This can be in the form of cash or material goods whose value appreciates over time. It entails discipline and sacrifice, as one postpones consumption from now to a future date. It leads to capital accumulation over time, which can be invested in profitable enterprises.

Why do people save?

People save for a variety of reasons, which include:

- To be prepared for future emergencies or risks, such as natural disasters, sickness or accidents
- To smooth out variations in income and consumption, i.e. saving during surplus periods for use during difficult periods ('saving for a rainy day')
- To meet future obligations such as school fees, marriages, purchases of land and funerals
- To invest in profitable business opportunities such as buying a cow, opening a retail business or trading agricultural produce
- In groups, the principle purpose for saving is to build up a group fund from which to lend to individual members and to fund group economic activities or enterprises.

What are the various ways of savings?

People save in various ways, as individuals or in groups. The most common ways of saving are:

- Saving in kind, which is the most common way of saving among the poor. It entails investing in items or goods whose value appreciates with time. This could be produce (grain), poultry, small ruminants (goats or sheep) or cattle. This form of saving is most suited to local communities where banking institutions are non-existent.
- Saving cash is usually the most preferred way of saving, because cash is portable, storable, not very visible and can be exchanged for almost anything. It can be used to meet immediate needs such as food, clothing, fees and medical expenses. Cash is best saved in the bank.
- Purchase of high value items, such as jewellery, is another way of saving. While this type of saving may be portable, it is often difficult to convert it into cash.
- Saving can also be trade-based, that is, providing either labour or part of the harvest at a time of abundance (e.g. soon after harvest) and claiming it back during a period of scarcity.
- Individuals may lend cash to others, which is payable after a specified period usually with interest.
- Individuals may invest in small-scale businesses, which generate returns.

What are group savings?

A group of people with a common goal may pool some of their financial resources into group savings. They save regularly in small amounts agreed on by the whole group, and the money can then be loaned out to members or used to finance joint economic activities. As the funds accumulate, safekeeping facilities are needed, and the group may decide to open an account in a nearby bank. Group savings requires mutual trust among members. It also requires a high level of integrity among members, especially from the leadership. Proper records and accounts need to be

maintained and regular reporting on the progress of individual member's saving needs to be made. Group record books should also be available for audits and scrutiny by members.

What are the advantages of saving in groups?

- Group savers may accumulate larger amounts of money than they would if saving as an individual, as they will be motivated to save regularly.
- Group savers are eligible for loans from the group funds.
- Group savings can be used as insurance for individual members, who can borrow in emergencies.
- Saving as a group gives members access to safe-keeping facilities such as cash boxes and safes, which may not be otherwise available in rural communities.
- Individuals are protected from demands from immediate family and relatives, who might want to share their savings, as what is saved in the group is deemed as belonging to the group.

How to save as a group

1. Make savings and credit one of the key group objectives.
2. Decide how often the group will meet for purposes of saving. This could be weekly, bi-monthly or monthly. The more frequently the members save, the faster the group fund will grow.
3. Decide the minimum that each member will contribute at each meeting. It is better to start with a small amount that all members can afford and increase when members' incomes improve.
4. Agree on a set of rules and regulations to govern saving and lending to members in order to ensure discipline and trust. These rules must be strictly enforced.
5. Elect a working committee to oversee saving and lending activities. The elected leaders should be honest and trustworthy.
6. Procure safe-keeping facilities such as cash boxes or safes, and/or open an account in the bank.
7. Decide on how long members need to save before lending can start. The earlier members can access loan funds the more they are likely to continue saving.
8. Agree on loan terms, especially interest to be charged, loan period, grace period and any charges for late payment or default.

Questions and answers

Q1: Is it possible for non-members to join the group's saving and credit scheme?

A1: No. For someone to join the savings and credit scheme of the group, they should have been a fully paid-up member of the group for at least 6 months.

Q2: Can one borrow more money from the group fund than their savings?

A2: Yes, one can borrow money beyond their savings. The amount borrowed will depend on factors such as the statement from the loan guarantor, the purpose of the loan and the report about the borrower by the loans committee. The next session will address this question in more detail.

Q3: Can one deposit more than the minimum amount?

A3: Yes, a group member can deposit more than the minimum amount.

Session 5: Managing group lending

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 4 hours

Preparing for the session

Write the topic of the day (Managing group lending) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What is a loan?
- What are the sources of loans?

Prepare templates of a loan application/approval form (Appendix 4) and the loans repayment plan and tracking record (Appendix 5) and print as many copies as the number of participants. Also print out the same number of copies of the example lending policies and guidelines (Appendix 6).

Conducting the session

1. Have a volunteer participant briefly recap the content of the previous session.
2. Open the day's session by displaying the flipchart with the title of the session.
3. Display the questions guiding the day's session one by one, and have the participants brainstorm on each of them. Write down the responses on the flipchart. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.
4. Take the participants through the process of applying for a loan and repaying a loan, using the loan application/approval form and the loans repayment schedule/form.



5. Discuss with participants the need for policies and guidelines for group lending. Using Appendix 6, encourage the group to draw up their own policies and guidelines.
6. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session, which is a new module called 'Marketing for farmer groups', and the date, time and venue for the session.

Content

What is a loan?

A loan or credit is money borrowed by an individual from relatives, friends, groups, moneylenders, micro-finance institutions (MFIs) or banks in order to meet either social or economic obligations. A loan is usually paid back over a specified period with or without interest. Loans look attractive because they do not entail sacrifice and discipline, however loans can prove a burden especially where collateral is required, loan terms are unfavourable, and when one fails to repay in time.

What are the sources of loans?

- Banks and financial institutions
- Societies and associations
- Friends, relatives and family members
- Suppliers of goods
- Customers
- Government loans
- Farmer groups with savings and credit initiatives

Questions and answers

Q1: Can one take out a second loan before completing payment for the preceding loan?

A1: For someone to be eligible for a loan, he or she should not have an outstanding loan.

Q2: If two or more group members decide to form a business partnership, can they be granted a loan not as individuals but as a partnership?

A2: Yes, this should be possible especially when both members meet all the criteria for accessing the group loans.

Q3: After completion of a loan repayment, how soon should a member be eligible for another loan?

A3: After completion of the loan repayment, a member should be immediately eligible for another loan if he or she meets the requirement for borrowing.

References (module 4)

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Appendix 1: Individual savings tracking sheet

Name of the account holder .....

Date	Particulars	Deposit	Withdraws	Balance	Account holder's initials	Signature of treasurer

Account holder's signature **Treasurer's signature**

..... **.....**

Appendix 2: Example of a group savings tracking sheet

Date: 1st may 2011	**1st meeting**	
	Starting balance	**0**
Members' name	**Deposit**	**Cumulative members' savings**
Michael	5,000	5,000
Hassan	4,000	4,000
Jack	8,500	8,500
	Ending balance	**17,500**
Date: 8th may 2011	**2nd meeting**	
	Starting balance	**17,500**
Members' name	**Deposit**	**Cumulative members' savings**
Michael	3,500	8,500
Hassan	6,500	10,500
Jack	7,500	16,000
	Ending balance	**35,000**
Date: 15th may 2011	**3rd meeting**	
	Starting balance	**35,000**
Member s' name	**Deposit**	**Cumulative members' savings**
Michael	4,000	12,500
Hassan	3,000	13,500
Jack	2,500	18,500
	Ending balance	**44,500**

(1 US$ = 1,900 Ugsh on 1/1/10)

Appendix 3: Example savings policies and guidelines from a farmers' group

1. Eligibility to own saving account with the group

All members who wish to join the savings and credit initiative with the farmers' group should:

- Be fully paid up members of the farmers' group
- Pay a savings account opening fee of 2,000 Ugandan shillings (Ugsh).

2. Frequency of saving

All members holding a savings account with the group will have to make periodic savings at least once every month with a minimum amount of 5,000 Ugsh. Members are free to deposit their savings any time of the month and as many times as they wish.

3. Savings documentation/record

- An official receipt shall be issued for all savings transactions made and each saver will be given a copy at the time of depositing his savings.
- The group management committee (loans and savings committee) shall keep accurate accounting records of all transactions.
- A statement reflecting the status of the group savings will be presented to the group members during the last week of every month by the group Treasurer.

4. Withdrawal of savings

Members are encouraged to refrain from withdrawing their savings unless absolutely necessary. The maximum number of times a member is allowed to withdraw his/her own savings is four times in a year. Members are not allowed to withdraw all their savings at once. All withdrawals will be accompanied by two receipts confirming the transaction, one to be kept by the group Treasurer and the other to be taken by the transacting member.

5. Interest on the accumulated savings

A 3% interest rate on savings per annum will be offered by the group.

6. Banking of group savings

- The group shall invest or deposit its funds in a bank account opened with the commercial bank of Centenary, Mukono branch.
- The group Treasurer shall be allowed to keep petty cash not exceeding 30,000 Ugsh in a safe for emergencies and operating costs.

7. Signatories for the group

There will be three signatories of the group. These will be the Chairman, the Treasurer and the Secretary. For any withdrawal of cash and for writing of cheques, at least two signatories are required, one of which shall always be the Treasurer.

8. Use of group funds

The group funds, which include the savings account opening fees of 2,000 Ugsh per member, deposits made by members, the annual membership subscription, any financial donation to the group, etc., will be used by the group to accomplish the following tasks:

- Lending out to group members
- Payment of administrative costs (e.g. loan processing)
- Funding of relevant training for members of the group
- Payment of employees and/or contractors engaged by the group.

Appendix 4: Loan application/approval form

Section A (to be filled by the applicant)

Name: ..... Date: .....

Sex: ..... Age: ..... Marital status: .....

Village/LC1: .....

Loan amount requested: ..... Loan period requested: .....

Purpose of loan: .....

How many loans have you received so far? .....

Where all repaid fully? .....

What is your recent savings balance with the group? .....

Signature: .....

Section B (to be filled by the guarantor)

Name:..... Date: .....

Village/LC1: .....

In the event that the borrower named above is unable to pay back the loan or any part of it, I agree to take on responsibility for paying the outstanding loan and any interest.

Signature :.....

Section C (to be filled by a member of the group management committee)

Loan amount approved: ..... Duration of loan: .....

Interest rate charged: .....Total interest on loan: .....

Actual cash disbursed: .....

Loan approved by:

Name: .....Signature: ..... Date: .....

Name: .....Signature: ..... Date: .....

Name: .....Signature: ..... Date: .....

Remarks: .....

Appendix 5: Loan repayment plan and tracking record

Name of borrower: ..... Signature: .....

Date	Loan instalment	Interest	Late fee	Amount paid	Remaining loan amount

Loan approved by:

Name: .....Signature: .....Date: .....

Name: .....Signature: .....Date: .....

Name: .....Signature: .....Date: .....

Appendix 6: Example lending policies and guidelines from a farmers' group

1. **Eligible borrowers/loan applicants**
   - Shall be fully paid up members of the farmers' group only.
   - Shall not be defaulters on outstanding loans or guarantors for defaulting borrowers.
   - Shall not have any outstanding loan (whether current or in default).
   - Should have an active savings account. This is in addition to being a fully paid-up member.
2. **Loan size:** To avoid credit concentrations to a single or a few borrowers, the maximum loan size that can be extended to any borrower shall be 150,000 Ugandan shillings (Ugsh).
3. **Loan period:** To enable more members access the group loan facility, loan repayment period will not exceed 6 months. A grace period of 2 weeks shall be provided.
4. **Loan repayment instalments:** Any loan extended to a member shall be repaid in equal monthly instalments starting after the date of disbursement. The principal and interest on loan repayment instalments shall be communicated to the borrower at the day of taking the loan.

   Borrowers shall be encouraged to make prepayments even in small sums in respect of loan instalments, so that by the due date a sufficient sum will have been built to settle in full the amount due.
5. **Interest on loans:** All loans shall attract an interest rate of 5% per month on a flat rate basis. Interest shall be paid together with the principal loan instalment. The lending (interest) rates shall be regularly reviewed (by the group members on the advice of the group management committee) to bring them in line with the economic changes which may have taken place in the area, including local inflation, cost of capital, operational costs, and risks associated with enterprises/activities to be financed.
6. **Penalties on delayed or late loan repayments:** Delayed or late loan repayments shall attract a penalty fee of 3% per month on all amounts over due. This shall be on top of the normal interest rate charged on the loan.
7. **Location/residence of the borrower:** To minimize costs of loan processing, monitoring and follow-up, and service delivery, priority in lending shall be accorded to members who are located and reside in the group operational area.
8. **Collateral/security for the loan:** The signing of the loan agreement by the guarantor who must be a member of the group is considered enough security.
9. **Guarantor:** Every loan applicant must provide one guarantor. The proposed guarantor must be a member the group and an active participant in the group's saving programme. The guarantor must be of good character, must not be a defaulting borrower nor a guarantor to a loan in default, and not a guarantor to another loan. The guarantor must be someone who can bring pressure to bear on the borrower to repay the loan and in case of failure, the guarantor must stand to lose his/her savings and pay for the outstanding loan and interest thereon.
10. **Loan repayment schedule:** A loan repayment schedule shall be prepared in duplicate and the borrower shall be given a copy for information and record.
11. **Loan processing cycle:** Within 7 days of applying, applicants shall be informed about the status of their loan applications.

Module 5
Marketing for farmers

Overview

Objective

The objective of this module is to familiarize participants with collective marketing of their bananas, including gathering and using market information, and negotiating with buyers.

Structure

This module comprises six sessions:

- Session 1: Introduction to marketing
- Session 2: Collective marketing
- Session 3: Market information
- Session 4: Marketing-oriented farm visits
- Session 5: Negotiating with buyers
- Session 6: Marketing trials

Sessions 1 and 2 can be carried out in a single classroom-based training session. Sessions 3 and 4 require two separate classroom-based sessions about 2 weeks apart. Session 5 is a long classroom-based session. Session 6 is a classroom-based session followed by marketing trials.

Sessions should be held approximately every 2 weeks, and the entire module should be completed within 4 months (allowing for the marketing trials and finding a committed buyer).



Session 1: Introduction to marketing

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 2 hours 30 minutes

Preparing for the session

Write the title of the module (Marketing for farmers), the topic of the day (Introduction to marketing) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What is a market? What are the examples of markets?
- What is demand? What factors can affect demand of a product?
- What is supply? What factors can affect supply of a product?
- What influences the price of a product?

Conducting the session

1. Open the day's session by displaying the flipchart with the title of the module, and the title of the session.
2. Display the questions guiding the day's session one by one, and have participants brainstorm on each of them. Write down the responses on the flipchart. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.
3. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Collective marketing), and the date, time and venue for the session.

Content

Markets

A market is a platform that brings together buyers and sellers to exchange goods and services. Marketing consists of all activities involved in moving a product from the point of production to the point of consumption. In other words, marketing involves all those activities linking producers and consumers. Successful marketing ensures that products are available:

- In the right place
- In the form wanted
- In the quantities and quality required
- At the time needed
- At the right price.

Markets can be classified by:

- Commodities, e.g. banana market, orange market
- Time, e.g. Sunday market, evening or morning market
- Location, e.g. Owino market, Kabalagala market.

What is demand?

Demand can be defined as the amount of a particular product or service which buyers are willing and able to buy. Demand is not static but constantly changing. Some of the factors affecting demand are:

- Prices. If prices rise, demand usually falls; if prices fall, demand usually increases.
- Income. When consumers' income increases, so does their purchasing power and their demand for various products; when incomes are low, the opposite happens.
- Quality. Buyers are sensitive to the quality of agricultural products. Improvements in quality can lead to an increase in demand, whereas a decline in quality can have the opposite effect.

What is supply?

Supply can be defined as the amount of a product which producers and market intermediaries are able to provide. Some of the factors influencing the supply of agricultural products are:

- Climate. Favourable weather conditions will mean a good harvest and increased supply, while drought or floods will have the opposite effect.
- Pests and diseases can have a similar, negative impact on production and supply.
- Production costs. An increase in the production cost of a certain commodity may lead farmers to shift to other commodities with better returns. A decline in production costs might have the opposite effect.
- Prices. If possible, farmers will increase supply when prices rise, and reduce it when prices fall. In the case of storable crops, such as grains, farmers may be able to respond rapidly to price increases by releasing stocks.
- Transport infrastructure. An improvement in transport infrastructure can allow farmers to reach urban markets more easily and increase supply.

What influences the price of a product?

Prices are largely determined by supply and demand. Prices can fluctuate significantly, even during a single day. If large quantities of a certain product, such as banana, suddenly arrive on the market, for example during the harvesting period, prices will fall. When there is a shortage of supplies in the market, for example because of a failed crop, prices will rise. During festive periods like Christmas, demand for banana expands, leading to an increase in the price. Knowing what is happening with demand and supply is essential to understand not only short-term and seasonal price variations but also longer term price trends. Knowledge of supply and demand may even enable farmers to anticipate future price changes.



Questions and answers

Q1: How can a farmer tell when the prices of banana are going to increase?

A1: Prices for banana increase for various reasons. During festive seasons, the prices go up because the demand is high. During drought periods or disease outbreaks, when production is reduced, prices go up. In general, prices go up when production goes down, or when demand is high.

Q2: There is usually high banana production in November (because of the favourable weather), and yet the prices are also high around this time – why is this?

A2: The high demand is because of the festive events at this time of year, which increases the prices even though supply is good.

Q3: At certain times of year we have a lot of banana in our villages, but we can't sell them outside the villages because the roads are too bad during the rains. What can we do about this?

A3: You should approach the local leaders to ask the district heads to work on the road so that buyers can reach you.

Session 2: Collective marketing

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 2 hours

Preparing for the session

Write the topic of the day (Collective marketing) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What is the meaning of collective marketing?
- What are the advantages of collective marketing?
- What are the challenges of collective marketing?

Conducting the session

1. Have a volunteer participant briefly recap the previous session.
2. Open the day's session by displaying the flipchart with the title of the session.
3. Display the questions guiding the day's session one by one, and have participants brainstorm on each of them. Write down the responses on the flipchart. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.
4. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Market information), and the date, time and venue for the session. Ideally the venue will be the same as the current session.



Content

What is collective marketing?

Collective marketing is when smallholder farmers join together to bulk their produce for marketing purposes.

Advantages of collective marketing

- Economies of scale. If farmers combine their produce, they can get better prices from traders who want to buy larger quantities.
- Cost sharing. Farmers can share costs of, for example, transport to take their produce to more distant markets, where they may get a better price.
- Reduced transaction costs. If farmers can reach distant markets, the number of middlemen will be reduced, and this will reduce transaction costs. This will mean better profits for farmers as well as cheaper prices for consumers.
- Improved quality. Working together, farmers can sort and grade their produce, and sell the higher quality produce to certain traders who will pay more for it. Also, farmers can work together to improve the overall quality of their produce, for example through group training in crop management or pest and disease management.
- Incentive to increase production. As farmers are better able to market their produce, and get better prices, there will be an incentive for them to increase production to raise their profits.
- Improving access to credit. Farmers are more likely to be given a loan by a bank if they are working in a group. The group provides collateral for the loan. The group itself can also provide loans to members if it sets up a savings and credit initiative.
- Communal equipment and services. It is much cheaper and easier for government and development agencies to organize training and agricultural extension services for groups of farmers rather than for individual farmers. If all farmers find it difficult to attend training sessions, individuals from the group can pass on advice and training to their fellow group members. Farm inputs can also be purchased collectively. It is usually much cheaper to buy tools, seeds and farm chemicals in bulk.

Challenges of collective marketing

- Regulating the supply of bananas. Collective marketing organizations usually allow members to contribute as many bananas as they have available. This may cause a problem if the market becomes saturated, and not all the bananas can be sold.
- Ensuring quality. Some members may contribute bananas of a lower quality than is acceptable, which can cause tensions in the group.
- Free-riding on others' investments. Benefits from investments, such as price information from a market information system or increased marketing opportunities for the entire group, can sometimes be taken advantage of by those who did not invest. This can discourage investment.
- Liability. Some buyers might shy away from buying from collective marketing groups because it could prove to be more difficult to hold a group responsible in case of a breach of the marketing contract.
- Collective marketing requires accessible collecting centres near the road and these may not be available or may be expensive.

Questions and answers

Q1: If we market as a group, who pays the taxes?

A1: Everyone in the group takes a share of all the costs incurred during the marketing, and this includes the taxes.

Q2: What if my bananas are ready ahead of the agreed marketing day?

A2: The group should allow you to sell individually if this happens. You should also inform the group's marketing committee.

Q3: Can someone from outside the group join us to sell their bananas?

A3: This will depend on what the group has agreed and written down in its constitution. It may be useful to be able to invite others to market with you, at times when high volumes are needed.

Q4: Can our group focus on other initiatives alongside banana production and marketing?

A4: This depends on the group's desires and objectives. If the group sees other, potentially profitable opportunities, they might decide to try them. For example, a banana farmers' group could sell other crops alongside bananas, and could decide to initiate a credit and savings initiative.

Q5: Sometimes buyers want to buy bananas on credit rather than pay cash. How can we get them to pay cash?

A5: When you are negotiating marketing agreements with potential buyers, ensure that the terms of payment are clear, i.e. whether the group can accept credit sales or can only accept cash sales. If you make an agreement with the buyer to pay cash upon taking the bananas and he or she fails to comply, then you have a choice to either continue with the marketing agreement or find another buyer who can pay cash.

Q6: How should we collect the bananas together, since our farms are not in the same place?

A6: The group should decide on a convenient central place which all group members and the buyer can reach, and meet there on the agreed day to collect and market the bananas.

Session 3: Market information

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 5 hours (one meeting of 3 hours and one meeting of 2 hours)

In the first part of the session, the group learns about market information, and selects at least two group members to collect market information on behalf of the group. Using a simple banana market survey form, these people will then go out and collect the information. In the second part, they report back to the group about the information they collected.

Preparing for the session

Print as many copies of the banana market survey form (Appendix 1) as the number of participants.

Write the topic of the day (Market information) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What is market information?
- How does market information help farmers?
- What are the sources of market information?

Conducting the session

1. Have a volunteer participant briefly recap the previous session.
2. Open the day's session by displaying the flipchart with the title of the session.
3. Display the questions guiding the day's session one by one, and have participants brainstorm on each of them. Write down the responses on the flipchart. Encourage participants to provide examples where appropriate. Where necessary, supplement the discussion.
4. Explain the use of surveys to collect market information. Introduce the banana market survey form (Appendix 1). Go through the form with the participants and discuss how the information could be used.
5. Ask for volunteers to take the forms to a nearby market and carry out the survey with banana buyers. If the group has appointed a marketing officer, he or she should be one of the survey team.
6. At the second meeting, have the volunteers report back to the group on the survey. The information collected should be brought back, synthesized and reported back to the group. The information can be used by the group to identify:
    - Potential buyers for the collective banana sales
    - The prevailing market prices
    - Potential demand for banana, and types of banana in high demand
    - The grading system for banana at the marketing points.

7. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Marketing-oriented farm visits), and the date, time and venue for the session.

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Market information

Market information is facts and figures that will help farmers, consumers and others involved in the marketing process to make better decisions and minimize their risks. Market information may include the price of inputs, the current selling price of produce, potential buyers of the produce, quantities of produce required by different buyers, etc.

How does market information help farmers?

- Increases farmers' bargaining power
- Enables farmers to access more markets
- Improves farmers' decision making in terms of:
    - What to produce
    - How much to produce
    - Price to charge
    - How to promote the product
    - When and where to sell the product.

Sources of market information for farmers

- Traders/buyers
- Input trader
- Fellow farmers
- Media (newspapers, radio, television, farmer bulletins)
- Family and friends
- Agricultural extension officers
- Non-government organizations
- Farmers' groups own surveys: these should be done every season.

Session 4: Marketing-oriented farm visits

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 5 hours (one meeting of 2 hours and one meeting of 3 hours)

During this session, the group carries out an analysis of their farm capabilities to decide whether they have the potential to engage in collective marketing of their bananas. After the first meeting, a marketing team visits all the participants' farms and collects information on their bananas, which they then present to the group during the second meeting.

Preparing for the session

Write the topic of the day (Marketing-oriented farm visits) on the flipchart ahead of the training.

Print out the form for collecting information during the marketing-oriented farm visits (Appendix 2). Print the same number as the number of participants.

Conducting the session

1. Have a volunteer participant briefly recap the previous session.
2. Open the day's session by displaying the flipchart with the title of the day's session.
3. Explain to the participants about the marketing-oriented farm visits. The visits will be carried out by the facilitator and the group's marketing team, which comprises the marketing officer and two other volunteer group members. The team will visit each participant's farm, and collect information using the form (Appendix 2).
4. Discuss the form with the participants. Explain that the information required includes:
    - The quantities of banana each member can provide for collective marketing
    - The cultivars and the grades of banana each group member can provide
    - The distance of each farmer to the proposed banana collection centres.
5. Ask for volunteers and choose the members of the marketing team. Agree on a plan for the farm visits, i.e. the date and time when each of the farmers will be visited.
6. In the second meeting, the marketing team should present synthesized results from the farm visits to the general group. The results will include:
    - The expected average prices for farmers' banana bunches (by grade)
    - The cultivars being grown
    - The quantities due for harvest in a month's time, by grade
    - The distance to the proposed collection centres
    - Any anticipated marketing challenges envisioned by the farmer.



7. In preparation for the next session, have the group discuss and agree on potential buyers who can be invited to the session to negotiate terms for collective marketing. Potential buyers may include buyers that the marketing team met in Session 3 while conducting market surveys, or any other traders known to be operating within the area.
8. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Negotiating with buyers), and the date, time and venue for the session.

Content

Tips for trainers

Extension workers sometimes try to 'push' farmers into accepting recommendations. However, when decisions about what to grow or how to sell are imposed this rarely leads to success. Farmers do not feel that the decisions are theirs, they are not committed to them and they feel a lower sense of responsibility. If things do go wrong it is easy for farmers to blame the person who persuaded them to do the 'wrong' thing.

Helping farmers to make their own decisions is a more difficult and slower process but, in the long run, it will be more successful than trying to tell farmers what to do. When groups of farmers take on ownership of their plans they are more enthusiastic, show more determination to overcome problems and take greater pride if their plan proves successful. They are much more able to overcome problems in the future and to actively seek solutions for themselves.

To make decisions, farmers must be well informed. They need to know what choices they have. They will have to discuss what they can do to improve their marketing and agree on what to do and on who is responsible for the individual tasks. The role of the facilitator is to guide this process by presenting the results, and letting the farmers take the lead in deciding how they will engage in the market given the facts presented to them.

It is possible that after conducting this session, farmers decide to opt out of collective marketing.

Session 5: Negotiating with buyers

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 3–5 hours

In this session, farmers engage with potential buyers to discuss marketing arrangements, before deciding on which buyer they will work with to sell their produce.

Preparing for the session

Contact potential buyers, brief them on the possibility of entering a marketing arrangement with the farmers' group, and invite them to the session at the agreed date and time. If they agree to attend, discuss with them the information they will need to share with the group. Aim for between two and four potential buyers.

Remind the potential buyers who agreed to attend the session at least 3 days before the meeting, and reconfirm with them the time and the venue 1 day before the meeting.

Write down on the flipchart the key issues that will be discussed between the farmer group and the potential buyer during the meeting. These include:

- The banana grading procedure preferred by the buyer
- How often the buyer prefers the group to supply the produce
- The price offered by the buyer for the various grades of banana
- The preferred delivery/collection system, i.e. collection centres or collect from individual farms
- Payment terms, i.e. cash sales, payment by cheque or credit sales.

Conducting the session

1. Have a volunteer participant briefly recap the previous session.
2. Introduce the day's topic, and display on the flipchart the issues to be discussed between the potential buyers and the group. Have the group discuss briefly and agree on their preferences ahead of meeting the potential buyers.
3. Introduce the first potential buyer to the group and facilitate discussion based on the issues on the flipchart. The discussion should last not more than 1 hour.
4. The buyer leaves, and the group discusses whether the buyer's terms are acceptable and they would like to enter into an agreement with him or her.
5. The process is repeated with any other potential buyers attending the session.
6. When a suitable buyer has been found, the group communicates that they would like to carry out a marketing trial with the buyer (Session 6).
7. Wrap up the training session as follows:
    - Briefly recap the day's session
    - Communicate the topic of the next session (Marketing trials), and the date, time and venue for the session.

Session 6: Marketing trials

Personnel: One facilitator and one assistant (training team)

Supplies: Box of markers, flipchart, masking tape, refreshments

Time: 10 hours (one classroom-based session and one or several marketing trials)

Preparing for the session

Write the topic of the day (Marketing trials) and the questions that will guide the day's training on the flipchart ahead of the training. The questions are:

- What is a marketing trial?
- How do we carry out a marketing trial?
- Who are the potential buyers of our produce? Where are they located?
- What quantities of the produce does each group member have available for collective marketing?
- How shall we grade our produce?
- How shall we price our produce?

Conducting the session

1. Have a volunteer participant briefly recap the previous session.
2. Open the day's session by displaying the flipchart with the title of the day's session.
3. Display the questions guiding the day's session one by one, and have participants discuss them.
4. Arrange a marketing trial with a buyer who was selected in the previous session. Each member contributes bananas, which are graded and priced as agreed with the buyer, and delivered or collected at the agreed place and time.
5. The group meets after the trial to discuss any problems encountered, and ways to solve them.
6. The trial can be repeated with other potential buyers. When the group agrees the trial was successful and they are happy with the arrangements, a contract can be signed.

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What is a marketing trial?

A marketing trial allows farmers to try out collective marketing before fully committing to a contract-based arrangement. The trial allows the group to assess whether they can successfully market collectively, and to iron out any problems ahead of signing a contract.

Procedure for conducting a marketing trial

1. Farmers volunteer one or two bunches of bananas to be used in the marketing trial. Draw up a marketing inventory so the group knows who contributed the bananas, and the quantity and grade.

2. The group agrees a price range for each grade of bananas. The group also agrees on the banana collection centres, depending on which farmers are contributing bananas.
3. Contact the buyer who was selected during the previous session with information about the quantities of banana, the grades and the collection centre. Invite him or her to come and purchase the bananas at the agreed time and date.
4. The farmers deliver the agreed quantity and grade of bananas to the collection centre, where the buyer collects and pays for the bananas. The facilitator should be present when the transaction is taking effect.
5. The group meets to discuss the success of the marketing trial, and any problems that were encountered, and discusses ways to improve the arrangements.

References (module 5)

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Appendix 1: Banana market survey form

Name of respondent	
District	
County	
Parish	
Village	
Phone number(s)	

Where do you buy your bananas from?	What are the major cultivars that you purchase? a. ..... b. ..... c. .....
How may bunches do you normally buy? ..... (per day/week/month)	What is the distance between where you buy and where you sell? Nearest ..... km Furthest ..... km
Who do you sell your bananas to?	In which months are bananas most available? In which months are bananas most scarce?
How do you determine the price of a banana bunch?	How do you grade the bunches of bananas?
At what price do you buy bananas when they are most available according to your grading system?	At what price do you buy bananas when they are least available according to your grading system?
Do you always have enough bananas to satisfy your market? Yes ( ) No ( )	Explain your answer
What challenges have you found with the people from whom you buy bananas?	What challenges have you found with the people to whom you sell bananas?

Thanks for your cooperation

Appendix 2: Form for collecting information on the potential for collective marketing

[Name of Farmer group]

Month ..... Year .....

Name of farmer	Location	Banana acreage	Distance to proposed collection centre	Cultivars grown	Bunches of banana due for harvest in a month						Marketing challenges
					Grades of banana			Expected price per bunch (Ugsh)			
					Small	Medium	Large	Small	Medium	Large	

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