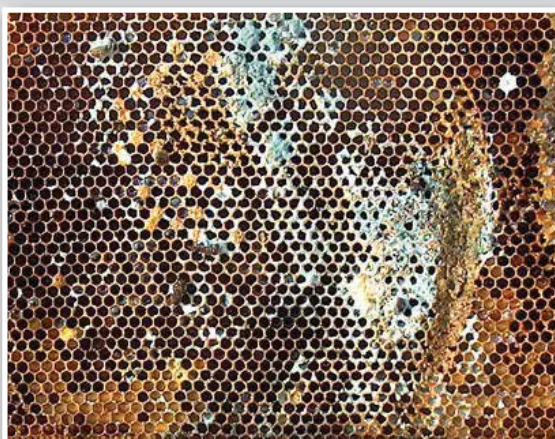
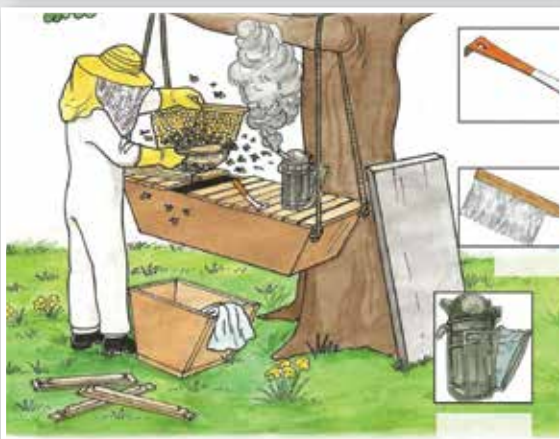


ACTION FOR LIVELIHOOD ENHANCEMENT IN NORTHERN UGANDA (ALENU)

AGROECOLOGICAL GUIDE FOR BEE FARMING Trainer's Guide



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ACKNOWLEDGEMENTS AND DISCLAIMER

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- 1) Ministry of Agriculture, Animal Industry and Fisheries: National bee training manual.
- 2) Beginner guide on bee keeping
- 3) APC bee keeping manual.
- 4) African organic training manual.

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GLOSSARY

Term	Meaning
Absconding	This is where the colony abandons the hive due to reasons such as chemical application, disturbance, lack of forage, etc.
Apiary	The site where colonized hives are kept.
Apiary inspection	Routine observation of what is happening around the apiary.
Apiculture	The practice of keeping bees.
Bee bread	The mix of pollen and honey stored in the hive as food for bees
Bee brood	Eggs, larvae, and pupae found in the combs
Bee brush	A specialized brush used to brush off bees from combs during inspection or harvesting.
Bee calendar	
Bee forage	Bee friendly plants that provide pollen, nectar, propolis for the colony
Bee keeper's Calendar	Activities carried out by the bee keeper on his apiary throughout the year
Bee protective wear	An overall, bee veil, bee gloves and gum boots worn by a bee keeper for protection against bee stings
Bee smoker	A device used to produce smoke during hive inspection or harvesting as a way of calming the bees
Beeswax	Wax produced by bees
Bee venom	A defensive substance produced by worker and queen bees
Build-up	A season when the weather is favourable with forage abundance
Catcher box	A mini hive with 5 – 6 top bars used to catch swarms

Comb	A structure made by bees for storing honey, pollen and rearing the brood
Comb knife	A knife used for cutting honey combs from top bars during harvesting
Dearth	A season of forage scarcity
Hive	A home for bees
Hive baiting	The act of luring bees into a hive by use of bee attractants
Hive inspection	Observation of what is happening both inside and outside the hive
Hive tool	A tool used for opening the hive and loosening the top bars glued together by propolis
Honey	A sweet liquid made by bees from nectar or honey dew, stored in combs
Honey bee colony	A group of honey bees living together comprising of workers, queen and drones
Honey flow	A time when plants produce too much nectar and flower at the same time
Honey processing	The process of getting honey from combs
Nectar	A sweet fluid from flowers that bees use to make honey
Propolis	Resinous substance from plants used by bees to seal spaces in the hive or reduce hive entrance.
Pollen	Grains from flowers used by bees as food
Royal jelly	Food for the queen and larvae
Top bar hive	A type of hive with bars on top

ABOUT ALENU PROJECT

Under the Development Initiative for Northern Uganda (DINU), a Government of Uganda programme supported by the European Union (EU) and supervised by Office of the Prime Minister, Caritas Switzerland has received a grant to implement the Action for Livelihood Enhancement in Northern Uganda (ALENU). ALENU is implemented by a consortium consisting of four NGOs (Caritas Switzerland, Advance Afrika, Agency for Accelerated Regional Development, and Gulu Women Economic Development and Globalization).

Objectives and Results

ALENU is a 40-month action that focuses on improving livelihoods through increased and diversified food production, enhanced market opportunities and better maternal and child nutrition in six districts of the West Nile and Acholi sub-regions. Its **overall objective** is, “to consolidate stability in Northern Uganda, eradicate poverty and under-nutrition and strengthen the foundations for sustainable and inclusive socio-economic development.” And the **specific objective** is, “to increase food security, improve maternal and child nutrition, and enhance household incomes through support to diversified food production and commercial agriculture and through improving household resilience (notably to climate change) and women empowerment. The three main result areas are: **Result 1.1**: Increased production of diversified food; **Result 1.2**: Increased market accessibility; and **Result 1.3**: Improved nutritional status

Districts and Sub Counties

Agago (Wol and Lokole); Amuru (Amuru and Lamogi); Omoro (Odek and Lakwana); Nebbi (Erussi and Atego); Pakwach (Pakwach and Panyimur); Zombo (Kango and Athuma)

Main Activities

Result 1.1: Increased production of diversified food

Select HHs; develop Family Development Plans; develop seasonal Production and Marketing Plans; set up group demonstration gardens; conduct farmer field school sessions; facilitate outreaches by local government extension staff; organize seasonal agro-input fairs; build capacity of agro-input suppliers; form commodity-based cooperatives; train VSLA Mentor; train Farmer Group (FG) members in VSLA; link SACCOs/ progressive FGs with formal banks.

Result 1.2: Increased market accessibility

Provide FGs with Business Development Services; organize/ promote sub-county farmer markets; facilitate learning visits to model farmers/private sector actors; create added value for commodities; organize a multi-stakeholder platform and annual cross-sector dialogues; achieve progress in certification, quality control, branding and contracting.

Result 1.3: Improved nutritional status

Train VHTs/Health Workers on good nutrition practices, child health, family planning and WASH; empower cultural and religious leaders to sensitise community; increase access to prevention and curative health services; improve nutrition and sanitation practices at HH level; train VHTs on family planning, provide family planning services; conduct annual couples conference and community dialogues on family planning/GBV; conduct community dialogues for out-of-school adolescents on sexuality/ family planning, provide health services; advocate for supplies of FP commodities; facilitate debating clubs and youth peer groups in schools; collaborate with faith-based medical bureau.

Approaches

- **Holistic Family-Centered Approach:** All household members will benefit from a combination of bundled services customized to meet their specific needs, address their vulnerabilities and strengthen their capacities at the collective and the individual level and in view of reducing poverty and malnutrition.
- **Village Savings and Loan Association (VSLA) and Linkage Banking:** Provide simple savings and loan facilities in a community that does not have easy access to formal financial services. Strong VSLAs will be registered at district level and linked to formal financial institutions or federated into SACCOs for better financial inclusion.
- **Farmer Field School (FFS) with Peer-to-Peer Demonstration-based Extension Approach:** Promote practical knowledge among smallholders on improved technologies through participatory, experimental, problem solving and discovery-based learning and hence increase yields, food adequacy and

collective marketing for better market positioning.

- **Market Systems Development (MSD) and Value Chain Approach (VCA):** Make markets work for the benefit of the poor by tackling the underlying causes of market failure and strengthening the functions of market actors as well as the rules and norms that govern the market system.
- **Agro-ecology:** Apply ecological and social concepts and principles to the design and management of food and agricultural systems to optimize the interactions between plants, animals, humans and the environment while taking into consideration the social aspects that need to be addressed for a sustainable and fair food system (FAO).

Key stakeholders

Stakeholder	Role
Target farmers and their households	Main beneficiaries, participate in selection of market commodities and peer-extension agents (CBTs, Poultry Paravets, Agroecology Champions, VSLA Mentor and Market Committee Members), various capacity building activities and monitoring and learning meetings
Local Governments	Oversee implementation of activities and align the Action with the district priorities, involved from planning stage and play a major role throughout the implementation as advisors, extension workers, or beneficiaries of capacity building
Community members	(VHTs, cultural and religious leaders, senior women and male teachers, youth Mentors), contribute to changing attitudes and practices, involved at all project cycle stages.
Private sector	Expand market system and offer production inputs (seeds, tools, etc.), loans, services (market information, advisory service, quality control, vet services etc.), transport and, as traders and processors, purchase the products of target farmers and farmer groups
Advance Afrika, AFARD, Gwed-G	Local implementing partners, in charge of implementation based on a mix of geographical and technical division of responsibilities
Caritas Switzerland	Consortium coordinator and donor, ensures independent project supervision, in charge of MEL and quality assurance including capacity building of co-applicants, and the development of a network of strategic contacts with development partners
Ugandan Government	Supervising (OPM) and contracting authorities (National Authorizing Officer/ Ministry of Finance, Planning and Economic Development)
EU	Main donor

Beneficiaries total 35'900 individuals (farmers and their household members, local government officers, community and private sector members, and the staff of implementing partners).

1

Introduction: Why Bee Farming

Bee keeping, also called Apiary is an important activity by many farmers in Uganda. Once properly managed, it is more secure compared to crop farming which is so much dependent on weather patterns. This manual is a guide to profitable bee keeping and farmers will find it useful.

A. Learning objectives

By the end of this session, the learners will:

- Know the importance of bee keeping.
- Know the different types of castes in a bee colony.
- Understand the roles played by the different castes in a bee colony.
- Understand the economic importance of bee keeping in the society.
- Learn the importance of the various bee products.

B. Duration

1 hour & 30 minutes

C. Learning aids

- Flip charts,
- masking tape,
- marker pen,
- notebooks,
- pen,
- picture of bees.

D. Activities

Introduction (20 minutes)

Bee keeping is a very important undertaking because of its capacity to continuously supply food and income to the farmer. The demand for apiary products is on the rise and the prices keep on getting better. Apart from honey, other hive products of commercial value are bee wax, royal jelly, and bee venom. Bees also play a vital

role in agricultural production through pollination of crops.

Good management of hives is critical for increased honey yields. Therefore, for successful management, beekeepers must understand the bee biology and their behaviour. This guide contains practical information that is highly useful to the beekeeping farmers.

Exercise 1.1

Group work exercise of 5 – 6 participants

The demand for apiary products is on the rise and the prices keep on getting better. Make a list of other bee products and briefly explain their importance to man

IMPORTANCE OF BEE KEEPING (30 min)

- They are a source of income after the sales on honey and other bee products such as wax, propolis, candle, shoe polish and body jelly.
- They are source of food such as in Acholi region some areas its mixed with simsim (Sesame) paste and eaten
- Bees pollinate crops which is important in agricultural production.
- They are medicinal where it is used to treat complication such a vomiting, diarrhea, stomach upset, wounds, cough, and toothaches.
- They are used for cultural purposes where they are occasionally served in some weddings.

Group work exercise

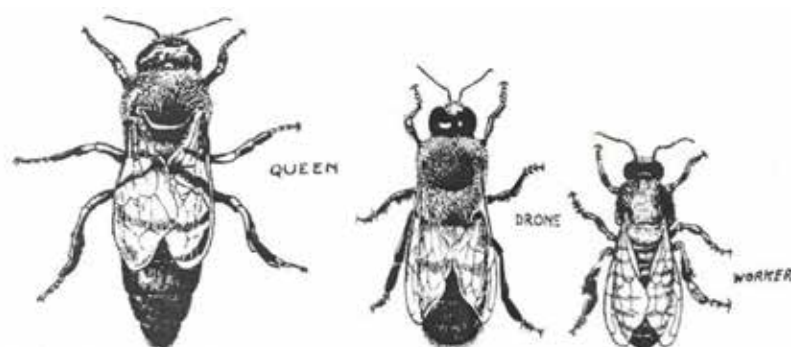
In groups of five to six members, discuss the economic importance of bee keeping in your society.

After the discussion, elect a group representative to share your findings to the class

THE BEE COLONY (40 min)

A bee colony has 3 categories of bees: a queen, drones, and workers. Each of these bee categories has a specific role and characteristics. They construct a home out of wax and in this wax comb, the immature bees develop as well as storing pollen and honey.

Naturally, bees usually live in a sheltered cavity, such as a hollow tree or rock crevice.



The queen, drone and worker bees

The Queen

There is only one queen bee in the colony (family). As a mother of the colony, her purpose in life is to lay eggs. She may lay several hundred eggs (approximately 2000) in one day. These eggs may hatch into drones (males), workers, or new queens. The queen can determine type of egg she is going to lay. She lays only the type that she feels the colony needs.

It takes 16 days for queen to develop from an egg into an adult. About the 17th day after hatching, the queen flies from the hive and mates with one or more drones. This is the only time in her life that the queen mates, though she may live up to 5 years.

The queen is larger than the worker and longer than the drone. Her wings are shorter in proportion to her body length than those of the drone or worker. She has a long tapering abdomen. When undisturbed, a mated, laying queen will usually be found on or near the comb containing the eggs in the hive.

The Drone

The number of drone bees in a colony varies seasonally. There may be none when the bees have little food, but up to 1000 during the honey collecting season. When the honey season is over and food and water become scarce, the drones are expelled from the hive.

It takes 24 days for drone to develop from an egg into an adult. The drone does not work in the hive. The duty of the drones, the male bees in the colony, that is only male in the hive is to mate the queen and it dies after mating.

Drones are larger and fatter than the queen or the workers. Their bodies are not long as the queen's. The drone has a short tongue he uses to take food from workers and from stored honey in the hive. He does not have legs fit to carry pollen and he is unable to produce wax. He has no stinger to defend himself.

The worker

There are 5,000 to 75,000 worker bees in a colony. They do the entire house and field work. Some workers go out of the hive to bring in water, pollen, nectar, and propolis (bee glue).

Other workers remain in the hive to guard against the enemies. Still others clean the hive, build wax comb, nurse the young, and control the temperature of the hive. Workers eat honey to produce heat in cold weather and fan their wings to keep the hive cool in the hot weather.

It takes 21 days for a worker to grow from an egg into an adult. During the honey-

collecting period, workers have special legs equipped with pollen baskets. They also have glands that produce wax and the scent necessary for carrying out their many duties. Workers are smaller than either the drones or the queen. They have the stinger which when it stings the stinger remains behind and the bee dies.

Exercise 1.2

Group work exercise

Form 2 groups of five to six members.

Group A, describe the different types of castes in a bee colony.

Group B, explain the roles played by the different castes in a bee colony.

Different types of bee hives

1. Traditional hives

These include:

- i. Woven basket hives which vary in size (approx. 90cm X 30cm) and type of materials used (papyrus, bamboo, banana fibres, banana dry leaves, grass, twigs, sticks, cow dung, etc. The front covers (30cm) usually have 4 – 6 holes through which bees enter while the back is completely closed off. The size of the holes usually range between 8 – 10mm in diameter.

Advantages of woven basket hives

- a. They are cheap to make
- b. The materials for making are locally available
- c. High quantities of propolis production compared with other types
- d. Don't require technology or much skills to make

Disadvantages of woven basket hives

- a. Combs are fixed and must be broken during harvesting
- b. Inspection is difficult
- c. Difficult to harvest and as a result, too much smoke is required
- d. Absconding and swarming is common

ii. Log hives

These are cylindrical in shape curved out of bee friendly trees. The front covers usually have 4 – 6 holes through which bees enter while the back is completely closed off. The size of the holes usually range between 8 – 10mm in diameter.

Advantages of log hives

- a. They are cheap to make
- b. The materials for making are locally available
- c. High quantities of wax production
- d. High rate of colonization
- e. Durable with good practice
- f. Don't require technology or much skills to make

Disadvantages of log hives

- a. Combs are fixed and must be broken during harvesting
- b. Inspection is difficult
- c. Difficult to harvest and as a result, too much smoke is required
- d. Swarming and absconding are common

iii. Clay hives

These are types of hives made out of baked clay usually of cylindrical or oval shapes. The cylindrical shaped hives have holes for entrance at one end while the cylindrical ones will have the entrance at the bottom with the top covered with a piece of wood.

Advantages of clay hives

- a. They are cheap to make
- b. The materials for making are locally available
- c. High quantities of wax production
- d. High rate of colonization
- e. Don't require technology or much skills to make

Disadvantages of clay hives

- a. Difficult to transport
- b. Combs are fixed and must be broken during harvesting
- c. Inspection is difficult
- d. Difficult to harvest and as a result, too much smoke is required
- e. Swarming and absconding are common

2. Improved hives

- i. Kenya Top Bar hives

Type of hive with bars arranged at the top of the box. The bars usually are 3.2cm wide and 48cm long. They have fabricated water proof covers to protect them from rain.

Advantages of Kenya Top Bar hives

- i. Easy to inspect
- ii. High colonization rate when baited
- iii. Colony division is easy
- iv. It is possible to harvest only ripe honey
- v. Durable with good practice

Disadvantages of Kenya Top Bar hives

- i. Expensive to make or buy
- ii. Requires high skill and technology to make
- iii. Combs can easily break during transportation

KTB Catcher box

This is usually a mini KTB hive (a quarter of actual KTB hive) used for catching swarms. They usually have 5 – 7 top bars.

3. Modern hives

Examples of modern hives include Langstroth hives. They use frames instead of top bars. The frames are arranged vertically of top of the brood chamber, also known as super.

Advantages of Langstroth hives

- i. High honey production yield
- ii. Easy to harvest
- iii. Easy to inspect
- iv. Durable
- v. Ideal for bee breeding and queen rearing

Disadvantages of Langstroth hives

- i. Expensive to make or buy
- ii. Requires high skill and technology to make
- iii. Minimal propolis production
- iv. Some of the construction material isn't available locally

Group Practical Exercise

In groups of 3 – 4 members, make 3 – 4 bee hives of your choice

2

Hive Set-up, Colony Movement and Hive Inspection

A. Learning objectives

By the end of this session, the learners will:

- Understand how to identify a good apiary site
- Learn hive hanging and placing.
- Learn how to attract bees into an empty hive.
- Know how to keep hives clean and apiary hygiene.
- Understand the importance of the various bee products

B. Duration

3 hour & 30 minutes

C. Learning aids

- Flip charts,
- masking tape,
- marker pen,
- notebooks, pen,
- lemon grass/wax/propolis, bee hive, water, buckets, bee suits and handouts.

D. Activities

HOW TO PREPARE A NEW HIVE (40 min)

You can prepare the hive so that the bees can accept it by rubbing any of the following substance (or a mixture of them) on the inside of the hive:

1. Propolis
2. Beeswax
3. Lemon grass

Before using them, you can soften it in hot water, near fire or in the sun.



A farmer baiting his hives using lemon grass before set up.

WHERE TO SET UP AN APIARY (40 min)

It is well known that bees can be kept anywhere. However, if the interest is to increase honey yields and profit margin, the place where hives are placed is very important to the beekeeper. African bees are defensive in nature hence they must be kept away from the public or a place where they cannot sting anyone.

A good apiary management starts by choosing a good site to place or hung a hive. If you choose a poor site then people and animals may be stung, if the place is insecure then honey and hives may be stolen. The following are important for an apiary site.

- The site must be easy to reach for effective monitoring.
- It should be free from direct sun heat, under a shade.
- It should be near fresh water which can be a stream, pond or even a dripping tap. If none is available, improvising a source of water is necessary.
- It should be near a food source for the bees, such as trees, nectar bearing plants like coffee, and cash crops that need pollination (3-4km away). These increase honey yield.
- The site should be away from areas where children play from and make noise. Noise can disturb the bees and make them aggressive.
- The site should not be near the road about 300m away
- Should be near good plantations such as coffee.
- Should be near home for security from theft.
- Apiary site should be at least 200m from homesteads and 100m from farm animals to prevent
- The apiary site should be well fenced.

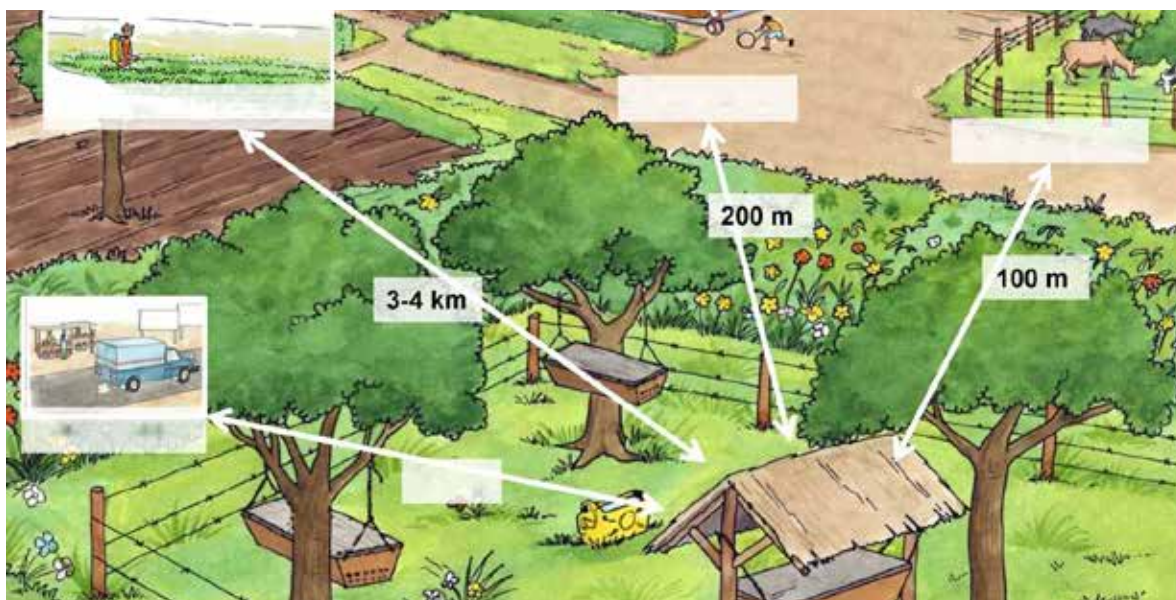


Photo showing recommended distances for an ideal apiary site.

HOW TO HANG THE HIVE (40 MIN)

- You can place your hive off the ground on a wooden frame, rock, brick stand or on live stands/trees. Stands should be made strong and must hold the hive in a level position.
- The hive can also be hung by a wire between two trees from a branch or placed on a made stand.

While hanging a hive, consider the following.

- Place hives so that they are easy to approach from behind.
- Place hives on a sturdy stand.
- Place hives where they are easy to monitor and harvest.
- The stand legs should be greased or oiled to avoid infestation by termites.
- The stand legs must be strong enough to hold the hives.

For the hives that shall be hanged, the following factors should be considered.

- Hang hives using strong galvanized wires to protect from pests.
- Hang hives under the shade
- Suspend hives using wires so that predators such as honey badger cannot push over them.
- Remember to always hang hives at positions that can ease harvesting.

Whichever method is chosen, it is important to remember the following.

- Cut the grass short around the hives.
- Remove all the small stones around the hives as they may cause damage to the beekeeper.
- Proper positioning of the apiary.



A properly hanged hive on a stand after baiting eases colonization.

Exercise 2.1

Form 4 groups

- Group A, describe how you would prepare a new hive and attract bees into it.
- Group B, explain the different factors that you would consider for your apiary site
- Group C, describe the different steps that you would follow when hanging and placing a hive

HOW TO MOVE THE BEES INTO A NEW HIVE (1 hour)

Capturing a swarm

If bees sometimes do not occupy the hive on their own, they have to be moved in the hive. Bees easily occupy hives when they are swarming. Swarming is a process of producing a new colony. Bees swarm for different reasons:

- a. When they are overcrowded before the honey season; they will start swarming.
- b. When the hive is destroyed, food sources or water become scarce
- c. The sudden failure of the queen to lay eggs, a hot or poorly ventilated beehive, lack of space for egg laying and honey storage.

A swarm may be found hanging on tree or under hangs of buildings. Once you have located a swarm, it should be caught immediately and transferred to a hive. Brush or shake the bees off into the basket, empty calabash, or a cardboard box. Then, shake the bees into the empty new hive.



A beekeeper capturing the swarm

After capturing, the swarm can be transferred into the beehive

Unless forced from their home ruthlessly, bees in a swarm rarely sting. However, to make the transfer safe, NEVER brush the bees without smoking but have a veil and smoker ready. After the swarm has been captured, it must be shaken into the new hive and be left undisturbed for a few days. Shortly, the bees will settle down and start storing the food and caring for the young ones. Bees can best be transferred during the honey season (swarming season). This normally occurs around the onset of the dry spell after the rainy season.

Dividing colonies

- Choose the most productive colony with brood, pollen, honey
- Divide colonies after observing signs of swarming
- Prepare your new hive
- Wear your bee protective gear and have your lit smoker ready
- Destroy all queen cells except 2
- Transfer the comb with queen cells into the new hive.
- Transfer one or two combs with sealed brood and a little unsealed brood
- Transfer one or two combs with honey and pollen
- The first queen to hatch out will destroy the other queen cells
- Brush all the bees on the combs you transfer into the new hive
- Brush in more bees from 2 – 3 other combs
- Check not to transfer the old queen into the new hive
- Put the brood combs in the middle while honey combs on either sides to warm the brood nest
- After dark, move the new colony to its new site

Uniting weak colonies

- Identify two colonies to be united
- Smoke both hives thoroughly
- Remove and kill the undesirable least productive queen
- Dust both colonies with cassava flour or spray them with sugar water so they get busy cleaning themselves instead of fighting
- Place the caged queen in the queenless hive next to the brood nest
- Transfer all top bars with combs and bees into the hive, smoking each and every comb
- Alternate the combs from both colonies until all brood combs are united
- Put honey combs on either sides
- Uncage the queen when you notice that there is no fighting
- Leave united colonies undisturbed for at least 2 – 4 weeks

INSPECTING THE COLONY (40 MIN)

Once the hives have colonized, it is important to monitor the hives in order to check the performance of the hives. Observe the following guidelines while carrying out inspection.;

- Don't stand on the flight path of the bees.
- Work gently without excessive noise and banging.
- Puff smoke gently around the entrance of the hive and remove the lid gently.
- Use the hive knife to separate the bars that are glued by propolis.
- Keep the bars in order and try not to disturb the bees so that they don't release pheromone that sends the bees at attack.
- Don't try to work with so many hives at the same time.
- Don't visit the hive on the warm part of the day as it disorganizes the colony. Visit them in the evening hours when the weather is calm.
- Wear protective clothing with the veil to protect the face.

During inspection of the hives, note the following.

- Is the queen present, if she is present and hiding, you can notice the newly laid eggs?
- Is the colony healthy, check on any indication of diseases?
- Is the queen laying enough eggs?
- Check on the food stores (pollen and honey) and find out if the rooms are enough for the bees.
- Health of bees.
- Actions taken.

Exercise 2.3

Form 2 groups

Group A,

describe the guidelines you would follow when carrying out a colony inspection

Group B,

list the different key points you would note down while inspecting a colony

Practical Exercise (2.4)

Form groups of 5 – 10 participants for a practical session on capturing and moving a swarm into a new hive.

Must put on your bee suits and have your smokers ready for the job

Bee friendly plants

In order to boost forage for your bees, plant some bee friendly plants such as coffee, calliandra, sunflower, simsim, maize, beans, pumpkins, cassava, avocado, mangoes, bottle wash pant, etc.

General advice on planting bee friendly plants around your apiary

- i. Don't use pesticides.
- ii. Use local native plants because they are well adapted to your local climatic conditions and can thrive with minimum attention.
- iii. Plant several colours of flowers around your apiary. Bees find blue, purple, violet, white, and yellow flowers most appealing.
- iv. Plant flowers in clumps. Flowers clustered into clumps of one species will attract more pollinators than individual plants just scattered around.
- v. Plant flowers that bloom in sequence

Examples of bee friendly plants include coffee, calliandra, sunflower, simsim, maize, beans, pumpkins, cassava, avocado, mangoes, bottle wash pant, water melon, cucumber, squash, eucalyptus, strawberries, etc.

Home work (Exercise 2.5)

Pick at least 10 different flowers that bees like from your home /garden / neighbourhood/community

3

Absconding and Swarming

A. Learning objectives

By the end of this session, the learners will:

- Understand swarming and absconding
- Understand how absconding and swarming can be prevented.

B. Duration

1 hour

C. Learning aids

- Flip charts,
- masking tape,
- marker pen, notebooks, pen,
- record book sample and handouts.

ABSCONDING (30 min)

This is where the colony moves away from the hives for some other reason such as.

- Application of chemicals
- Disturbance of the colony by the animals.
- Invasion of hives by the pests such as lizards, black ants.
- Leaking hives.
- Too much heat in the hive.
- However, the following are some of the ways absconding can be prevented in a hive;
- Demarcation of areas for bee keeping areas to prevent intruders.
- Put hives away from areas where they can be disturbed.
- Close monitoring to keep the colony safe against pests.

SWARMING (30 min)

This is basically where many bees leave a colony due to the following factors.

Reproduction of new queen in a hive

- When colony becomes too crowded.

However, the following are some the ways of preventing swarming from taking place.

- Colony division
- Making sure that the queen has enough room to lay eggs by doing colony division.

Exercise 3.1

Form 2 groups

Group A, What is absconding?

Explain the factors that would lead your bees to abscond.

Group B, What is swarming?

Explain the different factors that would lead your colonies to swarm

Explain the different methods of preventing swarming

4

Bee Pests, Predators and Diseases

A. Learning objectives

By the end of this session, the learners will:

- Learn the different pests, predators, and diseases.
- Understand the effects of pests, predators and diseases on bee keeping.
- Know methods to control bee pests and diseases.

B. Duration

2 hours

C. Learning aids

- Flip charts,
- masking tape,
- marker pen, notebooks,
- pen, record book sample and handouts.

BEE PESTS AND PREDATORS (1 hour)

These are living organisms that disturb the colony and affect the production of ideal quality honey. Some of the examples include.

- Wax moth. These lay eggs in the hive then their larvae feed on the brown comb and destroy the wax and it can be controlled by uniting a strong colony. The weak colony should be united to form a strong one.



- Birds such as honey guards and bee eaters eat the bees hence reducing the colony population. The birds can be prevented using scare crows to chase them away.
- Man. This can cause damage on the hives such as throwing stones at the hive. and is usually considered as the worst enemy. This can be prevented by the hive being set in a fenced place
- Safari and other ants. These affect the bees, brood and honey during the season. They can be controlled by clearing around the hives and grease the wires regularly.



- Lizards. These sit at the entrance of the hives and eat the worker bees that move in and out of the hives.



- Empty hives attracts mice, squirrels, lizards and dormice. They can be prevented by keeping the hives clean
- Mould develops in the hives because of moisture in the hives which shows that the hive is sited in a damp place. To prevent this, avoid siting hives in a damp place.



- Hive beetles. They enter the hive through the opening of the hive and they feed on the brood. They are more common during the rainy season. They should be hand-picked and destroyed when got in the hives.



- Other pests are acarine mite, tropileaps, varroa mite, bee louse and pirate wasps.



Hive invaded by black ants.

BEE DISEASES (1 hour)

These affect the development of the brood. It is important for a bee keeper to always check for some of these abnormalities in a hive. Some of them include:

- American foul brood. These causes the bees to die in larvae and pupae stage. If found, the top bars should be burnt, and the hive scorched and washed so well.
- Sac brood. This is a disease that affects the bees at pupae stage and kills them. It can be prevented by removing and destroying the affected brood, feed the bees each day.
- Nasema. This is a disease that causes poor brood nest development and is often accompanied by diarrhea which can be noticed by seeing yellow diarrhea at the entrance of the hive. It is treated by the use of medicines.

- Paralysis. This is a viral disease that causes death and it can also prevent the ability of the newborn bees to fly.

Exercise 4.1

Form 3 groups

Group1,

list the different bee pests, predators and diseases affecting bee keepers

Group2,

discuss the effects of bee pests, predators and diseases on your bee keeping business.

Group3,

discuss the different methods you are using to control bee pests, predators and diseases on your apiary

5

Quality Honey Harvesting, Processing and Storage

A. Learning objectives

By the end of this session, the learners will:

- Understand the process of harvesting good quality honey.
- Understand the different method used to check honey quality.
- Know how to process honey for use and sale
- Understand the different methods of honey processing.

B. Duration

4 hours

C. Learning Aids

- Flip charts, masking tape, marker pen, bee suit, airtight bucket, smokers, bee brush, stainless steel knife, hive tool, water, spoon, notebooks, pen, record book sample, honey samples (range from other regions), jars, combed honey,

HONEY (40 min)

This is a primary product of the hive. Bees make honey from nectar which a sugary secretion from flowers. Good honey must have water content of less than 19%. Because of the different flowers that bees collect nectar from, different honeys will smell and taste differently.

What affects the good quality of honey product?

- Honey shall be clean and clear- no dirt, dead wax, dust, wood or ashes.
- Honey shall have good taste. Not smoky like smell.
- Honey shall have good smell. – Over smoking during harvesting affects its smell.
- Honey shall have good color though it depends on the nectar source and age of the comb. Usually dark honey has stronger flavor and light-colored honey delicate flavor.
- The presence of pollen can make honey appear muddy or cloudy but its highly nutritious and good for the body.

Moisture content of honey is locally determined by:

- Drop a droplet of honey onto the soil, the honey spreads and disperse, then water level is too high. Honey should seat on the soil as a globule.
- Put a matchstick in honey and if water content is high then the head will be damp, and it will not burn.

A hive is ready for honey harvesting when:

- The hive becomes heavy, bees become more aggressive and noisier as they protect their stores.
- The worker bee population at the entrance to the hive also increases as they crowd there.

Considerations while harvesting honey from hives

- Harvesting should be done during evening hours around 6pm before the dark. Don't harvest during the day unless the apiary is located far from the public.
- Use bee suits, smoker when harvesting as the bees become more aggressive.
- You need to be 2 people to conveniently harvest honey, not alone.
- Harvest combs that are 2/3 seal full of honey. Unsealed honey is usually full of water.
- Don't harvest during rainy season as the honey draws moisture from air and becomes too watery.
- Use a clean knife to cut the light-colored comb leaving about 2cm for the bees to rebuild on.
- Carry along an airtight bucket.
- Make sure there is no dirt in the honey.
- Separate the light-colored combs from the dark colored ones since some people pay more money for certain specific colors.



How one should dress in bee suit and tools needed for bee keeping and honey harvesting

STEPS IN HONEY HARVESTING PROCESS (1 hour)

- Light the smoker and put on the bee suits.
- Smoke the hive sideways to prevent the queen from releasing pheromone.
- Open the lid gently and put a side.
- Use hive knife to open the rails that are glued by propolis.
- Hold the comb in vertical direction to avoid breaking.
- Lift the comb, quickly brush the bee back into the hive using a bee brush.
- Cut the light-colored comb with a knife leaving 1cm of the comb which serves as an orientation line for a new comb.
- Place the capped honey in a clean dry container with airtight lid.
- Put the uncapped comb in a separate container.
- Make sure there is no dirt or bees in the honey.
- While harvesting, pick propolis glue for future use.
- Before closing the hive, push the unripe combs behind the last brood or pollen comb and put the cropped to bars behind these.
- Carry the containers out of reach of the bees still round.

HONEY PROCESSING (1 hour)

FLOATING METHOD

This method is the simplest but it is a slow process which needs time and patience and it should be done indoors.

The containers to be used should be airtight to avoid absorption of water from the air which increases the water level in the honey.

- An airtight bucket is covered with a sieve cloth
- Remove the wax caps of the capped honey cells with uncapping knife.
- The combs are then broken and placed on an airtight bucket or container covered with a sieve cloth to sieve into the bucket.
- After some hours, the wax that has floated on top can be skimmed off.
- The honey is then strained through a sieve cloth and left for 3 days to settle.
- Any form of wax particles that are left floating can be skimmed off and then honey is ready for storage and packaging.



cloth Honey after sieving.



Broken comb set for sieving on sieve

STORAGE OF HONEY (45 min)

Proper storage of honey is very vital in order to maintain its quality. Honey can be stored in the following:

- Clean glass jar
- Air tight bucket
- Well covered jerrycan
- Plastic coated metal containers.

NOTE: 1. All the above storage facilities should be put on pallets during storage
2. All practical sessions need one full day.

Exercise 4.2

Form 2 groups

Group1,

explain how you harvest good quality honey on your apiary.

Group2,

explain the key points you would consider while harvesting honey from your hives

Practical exercise (4.3)

Form 2 groups of 5 members for the honey harvesting exercise

6

Records Keeping

A. Learning objectives

By the end of this session, the learners will:

- Understand the importance of record keeping.
- Know the different types of records kept at a bee farm
- Know the importance of record keeping.

B. Duration

1 hour

C. Learning Aids

- Flip charts, masking tape, marker pen, notebooks, pen, record book sample and handouts.

RECORD KEEPING (30 min)

Record keeping is important in bee keeping because it helps the beekeeper to track the progress of the bee keeping enterprise. The following are some of the reasons why record keeping is important.

- It allows the farmer to identify where he has made mistake in colony handling.
- Enables the farmer to monitor the progress of the colony.
- Enables the farmer to know the costs of inputs during seasonal production.
- Enhances planning.
- It helps the farmer in grading the performance of the colony.
- It facilitates the sales of honey and other bee products.

TYPES OF RECORDS KEPT ON A BEE FARM (30 min)

- **Colony records.**- this is a record about the performance of the colony and entails the following; date of colonization, forage and weather conditions, age of the queen, date of last harvest, yield per hive, colony strength and growth rate, pests and diseases, hives name and number, type of hive and characteristics of the hive.

- **Operational records.** These are where the expenses are recorded, it entails the following: visit to the apiary site, cash flow-how much was spent, purchases, labor costs, transport costs, servicing costs to mention.
- (provide and include a simple form on how a record should look like).

Exercise 5.1

Form 2 groups

Group1,

explain why it is important to keep records for your bee keeping business

Group2,

with examples, explain the different types of records kept for your bee keeping business

An example of a colony records sheet

Hive No.	Date of colonization	Date of last inspection	Date of last harvest	Kilos harvested	Date of today's inspection	Observations	Action taken
DINU 001	1/11/2018	1/3/2019	1/7/2020	10	16/11/2020	Laying queen present, 22 honey combs, very aggressive	18 combs to be harvested
DINU 002	1/12/2018	1/4/2019	1/7/2020	11.5	16/11/2020	Queen present, 2 brood combs, 5 honey combs	

Examples of operational records sheet

Visitor's book

Date	Visitor's name	Contact	Purpose for visit	Comments	Signature
16/11/2020	Steven Balyejjusa	0785716893, mercysfarm@gmail.com	Preparation for mead (honey wine) training	Bee keeper ready with enough combs to start the training	

Cash book

Date	Particulars	Debit	Credit
10/11/2020	Sold 10kg of honey at Sh10,000 each		100,000

7. BEE KEEPING CALENDAR

ACTIVITY	MONTH											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Prepare land for apiary/ hive siting and carry out site clearing/slashing/cleaning/ fencing	X	X	X			X	X					
Buy beehives and bee colonies				X	X			X	X			
Prepare beehives for baiting, siting and colonization				X	X			X	X			
Catch wild bee swarms				X	X			X	X			
Carry out apiary/hive/colony inspection and respond to the findings of the inspector	X	X	X	X	X	X	X	X	X	X	X	X
Harvest beehive products	X	X	X			X	X					
Sell beehive products	X	X	X	X	X	X	X	X	X	X	X	X
Feed bees	X	X	X			X	X					
Water bees	X	X	X			X	X					

Exercise 6.1

Form 3 groups

Describe the bee keeping calendar for your apiary

8. BEE KEEPING ECONOMIC ANALYSIS

The profitability of bee keeping is dependent on two factors, namely:

- Yield. This may vary depending on the season, forage and water availability, management practices, etc
- Other bee products. Every bee farmer needs to diversify into other product although prices may fluctuate.

The maths

5 Local Colonized Hives		5 KTB Colonized Hives	
Cost Estimate (Ugx) Per Year	Projected Sales (Ugx) Per Year	Cost Estimate (Ugx) Per Year	Projected Sales (Ugx) Per Year
Hives $= 5 \times \text{Sh}70,000$ $= \text{Sh}350,000$	Honey $5 \text{ Kg} \times 5 \text{ hives}$ $= 25\text{kg/season}$ $= 25 \times$ $\text{Sh}20,000 \times 2$ season $= \text{Sh}1,000,000$	Hives $= 5 \times \text{Sh}150,000$ $= \text{Sh}750,000$	Honey $10 \text{ Kg} \times 5 \text{ hives}$ $= 50\text{kg/season}$ $= 50 \times \text{Sh}20,000$ $\times 2 \text{ season}$ $= \text{Sh}2,000,000$
Hanging wires (7m) $= 7 \times \text{Sh}2,000$ $= \text{Sh}14,000$	Bees wax $10\% \text{ of } 25\text{kg}$ $= 2.5\text{kg} \times$ $\text{Sh}15,000 \times 2$ season $= 75,000$	Hanging wires (7m) $= 7 \times \text{Sh}2,000$ $= \text{Sh}14,000$	Bees wax $10\% \text{ of } 50\text{kg}$ $= 5\text{kg} \times \text{Sh}15,000$ $\times 2 \text{ season}$ $= \text{Sh}150,000$
Bee kit $= 400,000$	Propolis $0.5\text{kg} \times$ $\text{Sh}20,000 \times 2$ season $= \text{Sh}20,000$	Bee kit $= \text{Sh}400,000$	Propolis $0.25\text{kg} \times$ $\text{Sh}20,000 \times 2$ season $= \text{Sh}10,000$
Used oil $1\text{ltr} \times \text{Sh}2,000$ $= \text{Sh}2,000$		Used oil $1\text{ltr} \times \text{Sh}2,000$ $= \text{Sh}2,000$	
Labour $\text{Sh}20,000$		Labour $\text{Sh}30,000$	
Total cost = $\text{Sh } 786,000$	Sales = $\text{Sh } 1,095,000$	Total cost = $\text{Sh } 1,196,000$	Sales = $\text{Sh } 2,160,000$

Exercise 7.1

Form 2 groups

Group1,

in your own words recap the first 4 days of the training

Group2,

in your own words recap the last 3 days of the training

