

A TRAINING GUIDE ON BEE FARMING IN THE OKU COMMUNITY FOREST

This bee farming training guide is prepared by
**Cameroon Gender and Environment Watch
(CAMGEW)**
With technical support from
Oku Honey Cooperative Society

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This training is more practical with trainees learning-by-doing. This guide is prepared to give additional knowledge to trained persons on bee farming.

PREFACE

Cameroon Gender and Environment Watch (CAMGEW) is a non profit created in October 2007 with authorisation number N° 000998/RDA/JO6/BAPP to solve environmental and women's problems in Cameroon. CAMGEW works locally and thinks globally, integrating gender in solving environmental problems in Cameroon. CAMGEW believes that the future of our mother planet-earth is in our hands and also that the planet can be sustained by putting social and environmental justice at the centre of development. CAMGEW seeks to achieve her objectives by liaising with other like minded organisations worldwide. She has resolved to function according to core values of honesty, engagement and dedication in total respect of its constitution. **CAMGEW has as mission** to fight poverty; promote sound environmental management, gender balance and economic sustainable development.

Oku Honey Cooperative Society is a local cooperative that carries out training in bee farming; she also construct, colonise and mount beehives; and buy and process honey to various end products from members for sell to customers. She buys honey upfront and shares profit made among her members.

Bee farming training objective

This activity is realized within the framework of the project "Participatory Oku Community Forest management through forest regeneration and apiculture for livelihood improvement" Considering that participation of forest community in forest management is part of participatory forest governance, CAMGEW through this project engages local people to own beehives in the forest after receiving training for them to better manage the forest. Ownership of hives by people in Oku will give them a source of livelihood from the sell of honey harvested and make them see the importance to protect the forest.

CAMGEW is not only interested to train those who are involved in bee farming, she is interested to have new groups trained on bee farming and provide them with hives to improve their lives and see the need participate in the protection of the forest.

In a long run CAMGEW hope to continue to work with trained groups in a network to maintain and increase their number of beehives in the forest, assist in honey harvesting, processing and marketing.

Acknowledgement

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GENERAL KNOWLEDGE ABOUT BEES

TYPES OF BEES: There are many different types of bees. Carpenter bees, Bumble bees, Honey bees (*Apis Mellifera*), Stingless bees (*Melipona*). There are about 25.000 species of bees worldwide. The honey bee is the type of bee present in Oku that produces honey. The stingless bee is found in Europe but produces honey too.

LIFE CYCLE OF A BEE

The life stages of a bee are egg, larva, pupa and adult.

Egg

The egg looks like a small sausage seed. The queen always lays one egg in each cell, which is facing up. Eggs are very difficult to see. Hatching of the eggs takes 3 days.

Larvae

The larva is a white worm without legs and eyes. During the first two days after hatching all larvae are fed with royal jelly. From the third day onwards only queen larvae are fed with royal jelly. Worker and drone larvae are fed with pollen, honey and nectar. Larva duration depends on the development of the bee (worker, queen or drone). Worker bees pay continuous attention to the larvae. After 5, 5½ or 6 days the larvae cells are capped and the larvae will become a pupa.

Pupa

A silk cocoon encloses the larvae in each cell. During the pupal stage the worm-like larvae will transform in a bee. The pupa does not eat or move; it remains in the cell until fully developed. The duration of the pupal stage is 12 days for a worker, 7½ days for a queen and for a drone 14 days).

Adult

Adult bees are workers, drones, and queens. Around 50.000 workers, 200 to 500 drones and 1 queen live in a well-established colony.

A BEE COLONY: A bee colony consists of workers, drones and one queen.

Worker

Most bees in a colony are workers. They are female bees but lack the ability to reproduce. Workers are smaller than the queens, have pollen baskets on their hind legs and different type of glands. The functions of worker bees are diverse and differ from the age of the bee. The first three weeks a worker bee takes care of activities inside the hives, cleaning, feeding larvae and feeding queen. During this period worker bees start with orientation flights, guarding, wax secretion, comb building and nectar ripening. The following three weeks, worker bees develop as foraging bees collecting nectar, pollen, propolis and water.

Queen

The queen is a fully developed female, the only bee in a colony producing eggs (up to 2000 per day). There is only one queen in a colony. Her abdomen is much larger compared to worker bees.

Her wings are only reaching half her abdomen. In a colony a queen is usually found on the brood comb with several worker bees facing to her. A queen can live up to 4 years, producing eggs daily. A new queen will be produced in a special queen cell if the original queen is ailing or infertile. If a queen leaves a colony (swarming), half of the bees will follow her.

Drones

Drones are the male bees within a colony. Drones are much larger than worker bees and their abdomens are rectangular. The eyes of the drones cover the whole head. They make a noisy sound when flying. The major task of drones is fertilizing the queen. Drones do not have a sting.

The chart below compares the types of bees in a colony.

Colony of bees

	Worker	Queen	Drone
Sex	Female	Female	Male
Size	Small	Large	Medium
Eye Size	small	small	Big
Egg hatches after	3 days	3 days	3 days
Larvae status	6 days	5½ days	6½ days
Cell sealed	12 days	7 days	14½ days
Number in hive	20000-60000	1	0-200
Development time	21 days	16 days	24 days
Produced in	Worker/honey cell 1	Queen cell	Enlarged cell
Lifespan	40 – 140 days	Up to five years	90 days

Cells

Whether larvae will develop into a worker, a queen or a drone depends on the type of cell the egg is laid. Workers are produced in worker cells, the same cells used for honey and pollen storage. Drones are produced in larger cells, or in worker cells with enlarged capping. Queen cells are much larger and usually found vertical on the lowest part of the comb.

BEE PRODUCTS

Pollination

Pollination of plants through bees ensures the production of fruits and seeds. Honey bees account for 80% of all insect pollination.

Pollen

Pollen produced by plants is collected on the hind legs of the bees. Pollen is rich in proteins, vitamins and minerals. Pollen can be defined as field pollen and beebread. Field pollen can be harvested by using pollen traps. Intensive pollen trapping may decrease bee population though, with as much as one third of a colony.

Honey

Bees produce honey from nectar collected from plants, and it is their food. Honey quality is graded according to colour, taste, and moisture content, HMF. Honey is used for human consumption.

Beeswax

Honey is stored in comb. Wax is produced out of the wax glands, which are found under the abdomen of the worker bees. Bees wax is used for candles, polish, food processing, cosmetics, medicine etc.

Propolis

Honey bees collect propolis from trees, flowers and floral buttons; the sticky resin is mixed with wax to make sticky glue. The bees use this to seal cracks and repair their hive. As propolis is very antiseptic and bees use it to disinfect hives, protect the colonies from diseases. It is used by humans as a health aid, and as the basis for fine wood varnishes. Propolis, the same as pollen is collected on the hind legs of the bees.

Royal Jelly

Royal jelly is produced in glands of young worker (nurse) bees, to feed young larvae and the adult queen bee. Royal jelly can only be harvested as queen rearing is practiced. Royal jelly is used in the food industry, cosmetic and pharmaceutical industry.

Bee Venom

Bees defend themselves using a sting and venom. Only female bees can sting. The sting is situated at the end of the abdomen and after stinging it will remain behind continuing pumping venom into the skin of the victim. The bee releases an alarm pheromone to mark the victim and attract other bees to act defensively towards the victim. Bee venom is used in the pharmaceutical industry to improve different health problems in humans.

APIARIES

Apiary sides

An apiary is a place where beehives are kept. The number of hives depends on the bee forage and water availability but must not exceed 20 hives. Bees forage up to 3 km so apiaries should be situated within a minimum distance of 3 km from bee forage places.

- Hives in small groups
- Bees prefer to work up hill
- Bees prefer to work along rows of produced crops
- Near good nectar forage places (forest, trees, nectar producing crops)
- Recommended distance from house 100 m.
- Near water source but not near large rivers as bees must cross the river to collect food.
- In shade, no direct sun, enough air circulation
- Hives entrances should not be placed into prevailing wind.
- Fencing around larger apiary sides avoiding disturbances with animals and humans.

Apiary management

- Keep the apiary clean; cut grass and prune trees. This will prevent disturbing insect ants from entering the hive.
- Keep quiet in the apiary place.
- Increase nectar sources like trees.
- Observe the beehives, are bees gathering nectar, pollen, propolis, are they irritated.
- Inspect hives regularly, preferably every two weeks. Inspect on Brood In All Stages (BIAS; eggs, larvae, capped cells) cells filled with honey, pollen, any problems, pests)
- Remove old combs from empty hives

HIVES

Apiary sides

An organic hive is made of natural material with exception of small materials and roofing. For proper management, hives should have one side that can be opened, this can be situated at the back at or at the top. Hives can be made from: Clay and mud Log hives, Bark hives, Kenya Top Bar Hives, Baskets

FORAGING

As nectar secretion is dependent on many factors (climate, weather, and soil), certain tree species may not be good nectar producers when introduced into a new region. Check to see if a tree species is a good nectar producer under the conditions in the area where it will be growing, before advocating its use as a nectar source for bees.

Nectar flow

Rainfall, temperature and sunlight affect the plants and thus determine the actual nectar flow. The quality, or sugar content of nectar also varies among the different plant species. Weather also has an effect on quality. High rainfall promotes nectar secretion, but such nectar is often very low in sugar content. Conditions promoting optimum nectar flow are adequate rainfall previous to flowering and dry, sunny conditions during the flowering period. Some good forage trees:

PROTECTIVE WEAR AND EQUIPMENT

When working with bees, people need to protect themselves to avoid getting stung. Veils can be made of metal or plastic screen, of nylon mesh, or of mosquito netting. A veil is usually made to fit over a wide brim hat, which serves to hold it away from the face and neck. Elastic rubber bands, or strips cut from an old tire tube can be used to hold them onto the hat. The mesh material of the veil should preferably be dark. This limits reflection, which gives better sight when working in bright sunlight. As with veils, gloves are good confidence boosters for beginners.

Bee loving trees

Acacia baileyana, Calistemon citrinus, Gemelina arborea, Ligustrum lucidum

Acacia spp., Croton megalocarpus, Grevillea robusta, Malus spp,

Albera caffra, Calodendrum capense, Guazuma ulmifolia, Melaleuca spp

Albizia lebbek, Ceratonia siliqua, Halleria Lucida, Pithecellobium dulce

Avicennia spp., Erythrina spp, Inga vera, Prosopis juliflora

Azadirachta indica, Eucalyptus camaldulensis, Jacaranda, Prunus serotina

Bauhinia variegata, Eucalyptus citriodora, Kigelia africana, Rhizophora spp.

Burchillia bubalina, Eucalyptus globutus, Langunaria pattersonii, Syzygium cumini

Calliandra calothyrsus, Gliricidia sepium, Leucaena, Leucocephala

Gloves can be made of leather or of heavy, light-coloured cloth. Gauntlets that reach the elbow and have elastic to hold them tight, give protection to the wrists. The smoker is used to produce smoke, which causes the bees to consume honey, reducing their tendency to fly and sting. Smoke also directs bees away from the area around the hive where the beekeeper is working. The smoker consists of a firebox with a grate to hold the smoldering material, a nozzle to direct the smoke, and a bellows. The firebox should hold enough fuel so that it does not have to be refilled frequently when working with the bees. Heavy smoke will affect the honey quality negatively. A hive tool is the most useful piece of beekeeping equipment. It can be used to pry up the inner cover, pry apart frames, scrape and clean hive parts, and do many other jobs.

HANDLING BEES

Most bees will not attack if left alone. If provoked, a bee will sting in defense of its colony or itself.

To avoiding bee stings:

- Avoid perfumes, scented lotions and alcohol when working with bees.
- Sweat angers bees so if you are sweating bath before working with bees.
- Avoid wearing brightly coloured or patterned clothing. Wear light coloured clothing.
- Handle bees gently; move in slow motion.
- Attend to bees in the evenings.
- Do not stand in front of the beehive entrance, so that bees can freely enter the hive without any disturbance.
- Remove the sting by scratching (scraping) with your nail. Never pull out the sting between thumb and finger as you might squeeze the venom sac, resulting in pushing the venom inside your body.

SWARMING

Swarming is natural colony division or reproduction, which happens when a colony is getting too large within the hive and abundant forage, is available. A honey-bound brood nest is another factor in stimulating swarming. Queen cells or swarm cells are usually located around the edges of the comb. A few days before a new queen emerges the old queen leaves the colony with half of the workers. Swarms usually fly in the same direction and look for suitable places to start a colony site. If the colony was very big, an after swarm can occur after the initial swarm. Then the new virgin queen leaves the hive with again half of the colony.

Absconding

Absconding is the abandonment of a nest site by a colony, usually due to excessive disturbance of the colony by predators or beekeepers, or diminishing resources in an area (forage, water, too much sun, too windy etc.). Absconding is common in tropical species and races of the honeybee. Leaving honey at harvesting for the colony can reduce absconding.

Attracting swarm

In a (new wooden) hive:

- Burn two sheets of newspaper inside the hive.
- Smear the hive with wax and propolis.
- Place the hive in a tree on a tracking route
- Rubbing with aromatic plants (lemon grass)
- Place some new empty combs inside the hive

Sweeping the swarm into a hive when it is found clustered in a branch can catch swarms. If the queen is in the hive the swarm is likely to stay as well. If the bees fly away again the queen might not be there and sweeping the colony in the hive needs to be repeated.

Hiving a swarm

If the swarm is on a low limb or bush, remove some of the top bars of the hive, put the hive under the swarm, and shake the swarm directly into the hive. It is also possible to cover such a swarm with a large bag, shake the swarm into the bag, and transport it to the hive. If the swarm is clustered on a high limb, cut the limb and lower it carefully with a rope. It is necessary for the queen to be in the hive if the bees are to stay. If the bees return to the original cluster site or cluster in another place, most likely the queen is in the cluster. Try again to shake or dump the cluster in the hive. Although it is not necessary to find the queen, it is helpful to see her and know

where she is. A small screen-wire cage or a matchbox is handy to enclose the queen. Catch her from behind by both wings and guide her into the cage. If she is caught by one wing or by one leg she may twist and hurt herself. Never grasp the queen by the abdomen. This area is soft and you can injure the reproductive organs.

Harvesting Honey

- Wear protective clothing and make sure you have all the equipment needed.
- Use clean equipment (knife and buckets)
- Only harvest combs that are for at least $\frac{3}{4}$ sealed to obtain ripe honey.
- Harvest in the evenings.
- Use as little smoke as possible.
- Leave some honey remaining for the colony.
- Do not harvest combs containing brood.

Honey storage

- When sealed comb is harvested, place it in a bucket and close the bucket properly.
- The bucket should be clean and free from foreign odours.
- To reduce moisture content in the honey, the sealed comb can be placed in a warm room 30-35°C only if relative humidity is low outside (meaning only during dry seasons).

PRACTICAL TRAINING INFORMATION

INTRODUCTION

What is a hive? A hive is container provided by a bee keeper for the shelter and protection of a bee colony. The bee keepers interest in bee hive is to get honey. Hives can be made out of grass, logs, barks of trees, clay and a range of other materials; depending on what is locally available. Bees will live in any style in a hive that suits their needs. Hives have either fixed comb or movable comb.

Why keep bees in hives?

A hive is for convenience of a beekeeper. Hive enables beekeepers to assert ownership over a colony and keep bees for honey in a place known to them so as to make harvesting easier.

Which type of beehive is best?

The best hive is one that is appropriate given the materials that are available locally, and the skills and financial resources of the beekeeper. The simpler and cheaper a hive is to made, the more people will be able to take part in beekeeping. An expensive system does not necessary result in higher output. To avoid unnecessary debts and dependences on external support, beekeepers should be able to make or buy cheap hives made from local materials. This independence will give you the freedom to get started in beekeeping and expand your business management task of the beekeeper. To do this you need to:

- Have hives
- Establishing an apiary in a suitable location and place the hive in the right order
- Baiting the hives to attract wild colonies and swarms
- Watching the hive to know when they become colonized
- Visiting the colonies to check whether they are under threat from predators, pests or diseases, or at risk from fire.
- Cleaning the apiary of weeds and overhanging vegetation to ensure that bees have a clear flight path to their hive
- Open the hive and harvest when there is surplus honey
- Ensured the bees are not disturbed too much for they may abscond
- You must have a beekeepers record or diary. List months along the top of a table and tasks down the side. Shade the months when the tasks need to be completed. Expand the diary to include important activities that may occur.

BEE HIVE CONSTRUCTION

Tools and material needed:

- Cutlass
- Dry bamboos (Indian and raffia)
- Tied ropes
- Thatched grass
- Pincher and two equal rings made of rattan or its equivalent
- Hive Design: Cylinder shaped

The Traditional Hive

It is constructed of bamboos. The bamboos must be dry. The bamboos are first of all split into equal halves and burst in the middle with a pincher to enable a fresh bamboo split be inserted at the middle of the splitted dry bamboos to form a cylinder.

When all the bamboos have been inserted to the fresh bamboos to the required size, it is then design in a cylinder manner and a 'tie-tie' is used to tie the extremes of the hive. Some small sticks are then crossed at the posterior end of hive extending some three to four decimeter inward. This is made so that the bees can establish the brood combs on it and it also determines the level at which harvesting combs ends. The crossed sticks also help to hold the combs from collapsing during transportation.

After constructing the body of the bee hive, the two covers are then made. The covers are in a disc shape so that it can fit into the cylinder or circular ends of the hive. The front cover has a small rounded hole at the centre which serves as a bee entrance into the hive.

A small circular ring is also made some few centimeters in the inner-parts of the hive. This determines the level at which the covers are fitted. It also prevents the covers from falling into the bee hive; and finally it is the main thing on which the hive is made to stand firm.

The covers are made either from the soft inner parts of bamboo or from bamboos itself or fiber stems. After constructing the hive, it is protected with thatched grass. The hive is tied all round with a layer of grass on the outer part. In all cases, the grass layer tied outside the hive also provides a dark environment inside the hive and this is favourable for comb building by the honey bees.

It should be noted that the traditional hives in Oku has a circular design like a hollow cylinder.

TRAPPING AND HAVING BEES

Trapping bees is usually carried out during the swarming season from October to May and swarming season also coincides with the harvesting season. The following activities are carried out in order to get bees into the hive after construction:

1. **Smoking the hive:** Before the hive is taken to the bush or forest, dry wax is burnt inside or caniba wax. The idea behind smoking is to give the hive a characteristic honey smell which will attract the bees if they happen to be swarming across the area. After burning the wax in the hive, it is covered and then place in position or site suitable for colonization.
2. **Transporting the hive:** After smoking the hive it is then transported to the areas where swarming is common. The hive is then kept in a fork sticks, trees or rock to protect it from ants. The hive is mostly placed on the tree so that the swarm can easily see when swarming.
3. **Protecting the hive:** The hive is protected from rain by covering it with grass or iron sheet. Heavy weights are placed on top of the iron sheet or grass to secure it from wind. The hive is therefore left in this order until it gets colonized.

When the hive is colonized, it is then transported to the forest or any other areas where there are multifarious plants. The bees will visit these plants when they bloom to harvest pollen and nectar.

Transporting the hives with bees in it is a careful process and it is usually done in the evening or nights when all the foragers must have returned from the field and are resting in the hive. This is done only at this period to avoid losing some of the bees in the field for they may die as a result of heat during transportation.

Colony and hive management

1. Each hive must be individually identified;
2. Detail information on apiary should be kept by every bee farmers to enable proper assessment and control;
3. The use of chemical synthetic repellents during harvesting should be avoided;
4. The destruction of bees in combs as a resort of night harvesting of honey and bee products should be avoided;
5. All common management should be aimed at increasing honey yield, quality, control, colony sustainability and pest control

HONEY HARVESTING

One may ask how long it takes to harvest honey and the answer will only be that as soon as bees enter a hive, they begin to build combs and source for laying eggs. The honey is for feeding the queen, drones and their young ones or for feeding the whole colony. The honey is their main source of food. In the same way as a man has a reason of abundant food in barns against the season of scarcity, bees also have a period of honey flow and one of scarcity too. As man should not deprive the bees during the period of scarcity, he has to wait for the period when there is plenty of honey called honey flow period.

Like in Oku this is the period one can reap the fruits of his labour. Harvesting period start in the months of April to June and some years are usually having dry season harvest done in the months of February and March. Tropical bees are very aggressive, so the best time to be harvesting honey in Oku should be in the evening hours from 5pm and in the morning periods as from 6:30 to 8am. This is good time because most of the bee keepers do harvesting without protecting themselves with bee suit. But above all harvesting in broad day light is preferable and is the best because you can be seeing the internal part of the hive and even the combs before cutting. While we recommend the mornings and the evening time is because insects in general are less active in cool weathers. During this time the bee keepers should have somebody to in handling equipment and brushing off bees from combs while separating broad combs from ripped honey before filling the containers.

The bee keepers with assistance where their bee suits, veils, globs and rainboats, he light his smoker puff some smoke round the entrance behind the hive. He open the lid behind continue to puff in smoke into the hive so that bees leave the combs and removes it and passes it to his assistance that will now brush off the bees and examine whether ripped combs and broad combs and separate them into the containers they carried along. Harvesting is done up to a certain level because not all the combs are harvested. After this operation is completed, the bee's keepers cover the back lid and tatch the hive and they will carry their honey home. The ripped honey is taken to their organization where it is weighed and the processing will now take place.

PROCESS OF HONEY HARVESTING

Tools and materials needed: bee suit, veil, gloves, rainboots, or raincoats, knives, cutlass, dry clean plastic containers and a smoker.

Preparation for harvesting: Some few weeks before harvesting, the hive should be open to check if there is honey in it. The tools and materials are then prepared before time.

Preparing the smoker: The local smoker used in Oku is made from the moss plant which is usually found growing on tree backs in the forest. The moss is harvested and tied in an oblong form with dry grass at the middle for easy lighting with fire. Small sticks are placed at the side of the moss plants while tying. The sticks are placed so that the smoker should be firm. The modern smoker is a metal cylinder with attached bellows in which the fire is lit. Smoke blown from the smoker's nozzle is directed in the hive.

HARVESTING PROCEDURE

Lighting the smoker: The first thing to do on approaching the hive is to light the smoker. The smoker is lighted on the upper flat surface. After lighting the smoker, some of the moss plant is placed on top of the lighted fire; the flame of the fire is then put off and the fire remains glowing. The fire is then blown from time to time making sure that it doesn't produce flame. Before opening the hive blow the smoker into the hive from behind for traditional hive and on the entrance for modern hive and wait for a few seconds. This is to disturb them from communication. After which the hive is then opened.

Smoking the bees: Smoking the bees is very essential in honey harvesting. Smoke helps to keep bees under control. When the bees are smoked they go out. Bees that have eaten well are less prone to stings. This is why bees are first smoke before harvesting. Smoking also helps to mask the initial release of alarm pheromones. After the hive had been opened more smoke is blown into the hive. The bees will move away and leave the honey combs towards the brood combs. This is observed in a hive that bees start building combs from the posterior end of the hive going backward and the first combs are usually the brood combs. The honey combs are blind. That is why in traditional hive we open from the back; and the top bar hive are open from behind.

HONEY HARVESTING

Types of honey harvested

Capped honeycomb with honey:

Good quality honey should only be harvested when the honeycomb is sealed. Whitish wax covers the comb, which seals the honey completely from outside air. In this way honey can be stored for a long period. Sealed honey does not have high moisture content, usually below 19%.

Capped honeycomb with pollen:

Pollen is found in combs near the brood but also it can be found in between the honey cells. The pollen is easily detected because of its variety of colours. Pollen is fermented and usually mixed with nectar/honey to become sticky. Pollen is the food for honeybee larvae and young worker bees to make royal jelly. Pollen in combs can be consumed by humans and is very nutritious.

Capped honeycomb with worker brood:

Brood is usually found near the entrance of the hive. Brood comb is sealed with a brownish mixture substance, which unlike capped honey can let air go through. In between the sealed brood some of the young worker bees have already emerged.

Honeycomb with drone broods:

Usually drones brood is established in cells bigger than worker brood. If drones are established in worker cells, the cells are enlarged, capped with a domed cap. This suggests the absence of a queen, and the presence of a worker bee laying eggs. Drone broods in worker cells are often neglected and the larvae die.

Old comb:

Old comb turns dark in colour and gets very heavy. A comb used by bees for more than two seasons gets hard and heavy. When bees abscond the hive, it is recommended to remove the very old comb from the hive as new combs optimise overall honeybee colony health and reproduction.

NB: The liquid honey from these groups should be processed separately in order to have best quality honey. The best honey comes from new white combs which should be extracted separately and packed.

Harvesting was usually carried out at night or towards evenings. With recent training given bee farmers, harvesting is now done at day time in order to bring out good quality honey. Harvesting is done using a cutlass. The cutlass is used to cut the honey combs from the walls of the hive in case of traditional hive and from the bars in case of top bar hive.

He opens the lid behind continues to puff in smoke into the hive so that bees leave the combs and removes it and passes it to his assistance that will now brush off the bees and examine whether ripped combs and brood combs and separate them into the containers they carried along. Harvesting is done up to a certain level because not all the combs are harvested. After this operation is completed, the beekeepers cover the back lid and thatch the hive and they will carry their honey home. The ripped honey is taken to their organization where it is weighed and the processing will now take place.

HARVESTING PROBLEMS

- The main problem faced during harvesting or even when working with bees is bee stings. Bees' stings react adversely to human body's chemistry. Bee's sting can actually kill and this is why working with bees can sometimes be dangerous. The immediate solution to bee sting is to scrape the sting off by either using a fingernail or a harvesting cutlass as soon as possible. This will reduce the amount of venom that will go into the wound. Smoking the area stung will mask the alarm odour thereby reducing the incident of being stung by many more bees.
- Another problem faced during harvesting in a traditional hive is to determine the honey combs and the brood combs to be removed during harvesting. With traditional hive some of the brood combs are removed. It is understood here that the brood are going to mature and will be the next generation to serve the colony, so harvesting the brood combs is just the same as killing the whole bee colony.
- Most traditional hives abscond after harvesting. This is because all the honey is removed leaving nothing for the bees. The consequence of this practice is that the brood will die because the bees have no food to feed them. The best way to solve this problem is to leave at least one honey comb in the hive since we do not feed the bees. This has been the problem of the past for education and training to farmers has helped to improve harvesting problems.

BEE DISEASES AND PESTS

In the Central and West African region only few diseases are common. In Cameroon the diseases that is common is:

SAC BROOD DISEASE

This disease affects bees that are 1-3 days old after hatching. The young bees swell dies and dry up. This is a viral disease with no treatment. This causes drastic reduction in bees' population. This disease can be prevented by sealing all holes and entrances into the bee hive because the main entrance is free of all diseases. If you discover young and dry bees cut the comb and burry or burn.

PEST

1) Wax moth

Moth lays eggs in the honey comb and the eggs hatch in to larva. This larva produces a thread-like substance which destroys the wax. Prevention can be done by sealing all cracks in the hive and removing all notice combs with this attack and burning or burying them.

2) Ants

The ants eat brood and honey and suck abdomen of bees. This causes total absconcion of the hive by the bees. There is no solution for this. All bees leave the hive when these ants are present. Prevention can be done by clearing around the bee hives. Mixed mud, cow dung and wood ash and round rub round the hive stand. Ants found on top of the hive with soft object are swept away.

3) Rats

Rats cause total absconcion of bees in a hive and prevention can be done the same as for ants.

4) Honey Badger

It eats honey, combs and bees. This is the worst pest for bees. This is treated by setting a trap with broods or honey put on it and the badger will come to eat and be trapped.

5) Bee Pirates

It is like a bee and has yellow abdomen. It has more than 100 stings. It eats bees. They are trapped using water in a dish with a mirror inside. When it sees image of the bee inside the water it will go down to catch.

6) Birds and Lizards

To prevent this make your landing deck to be 2cm.

7) Man

Some people eat bees and some cut down bee loving trees. Eating bees is rejecting the availability of honey and destroying biodiversity. Cutting trees encourages climate change and rejecting the production of flowers that bees depend on for nectar used to produce honey. To prevent this let us stop eating bees and cutting or degrading forest resources.

8) Fire, Theft, Poor harvesting, spider

If you are stung by a bee do the following

- Use tobacco powder to remove the sting
- Use African Iodine and rub on it to remove sting
- Suck the sting using your mouth
- Rub the stung part with bitter leaf or cocoyam

NB: Except that the sting is killed it will never die.

Don'ts

- When going to the apiary avoid all smelling oils, wear clean cloths and if you have been working clean-up yourself (bees like sweat and urine)
- Avoid black colors
- Something white is preferable

EXTRACTING AND PROCESSING HONEY

What is honey? Honey is the sweet substance produced by honey bees from nectar and from secretion from living parts of plants, which bees collect, transforms and combine with specific substances, and store in honey combs.

HONEY EXTRACTION

It is best to process honey as soon as it is harvested say 24hours after harvesting. Honey processing needs time and patience to achieve the best results.

Honey is food and **MUST** be handled hygienically and all equipment **MUST** be perfectly clean. Honey is hygroscopic and will absorb moisture, therefore all honey processing equipment **MUST** be perfectly dry. Too much water in honey will cause it to ferment.

Honey is found in the cells of the combs. Bees use wax to build combs and use wax to seal or cap the cells of the combs. There are many ways of extracting honey, traditionally many people squeeze honey with their hands which is not hygienic because it contaminates honey and encourages fermentation.

Boiling also destroys some nutrient and honey loses its aroma (flavor). Better method of extracting honey involves the use of mosquito mesh, cotton cloth, solar extractor or honey extractor.

The best methods to use when there is a big consignment of honey harvested are solar and honey extractors. Here it consists of wooden box which carries a galvanized metal plate and a piece of glass. The metal plate and glass generate a temperature on the sun and melt the bee comb so that both honey and wax flow into the container inside the box, and with honey extractor fresh honey comb harvested at correct time and within 24hours do not require a solar extractor or any heat from the sun.

Honey extractor consist of a wooden frame with a set of catergorised wire mesh of three sets to let the fresh clean honey and some wax drain through the three set into a collecting basin and into a plastic container for storage. The finest clean honey must only be stored in a clean plastic or rubber container. The honey extractor remove fresh honey from combs at high speed so that honey is propelled out of the combs into the wall of the extractor and then turn dram to the bottom of rubber dram of plastic containers. The already drained honey should be store in clean plastic and rubber containers for marketing.

How is honey important to the human body?

Health experts put the benefits of honey to the human body very high. Honey is good for our body and health. Honey is healthy food, it contains natural sugar and as it is digested it does not requires complex digestive processes. Honey contains various substances like sugar, vitamins, enzymes, antibiotics, etc. The sugar in honey is easily assimilated by the body and do not have adverse effects like pure sugar. Honey is sweet and do not cause obesity. Honey is taken with warm water, tea, lemon drink or any straight substance. Honey has now been found to be useful in the following ways:

• Relieves pain from joints	• Helps in the treatment of arthritis
• Keep the body strong	• It makes the bones strong
• Improve sight	• Nourishes white blood cells in the body
• Reduces stress	• Make people look younger
• Help us to sleep well at night	• Purifies the blood in the body
• Make hairs grow	• It clears diarriah
• Heals wounds	• It clears sore throat
• Relieves cold and catarrh	• Helps to heal burns
• Clean snuffy nose	• It improves fertility
• Clears cough	• It relieves tension
• Helps breathing	• Clears constipation
• Improves food digestion	

BEEKEEPING SUSTAINS LIVELIHOODS

10 GOOD REASONS



Pollination 1

Bees pollinate flowering plants - this activity is vital for life on earth. Adequate pollination leads to good quality seeds and fruits, and is essential for maintaining biodiversity.



Sustainable 6

Beekkeeping is non-extractive and sustainable. Beekeepers are friends of the natural environment, willing to collaborate to conserve forests and vegetation where bees live and forage.



Useful products 2

Honey is valued by all societies as a healthy food or medicine. Beeswax is used in cosmetics and candles, and has many other uses. Pollen and propolis may be also harvested from bees.



Benefits for several sectors 7

Where there are beekeeping activities, other people in the community generate income by making equipment, from selling bee products, and making secondary products.



Land use 3

Bees visit flowers anywhere, so wild, cultivated and protected areas all have value for beekeeping. Beekeeping does not use up land that could be used for crops.



Comparative advantage 8

In areas of developing countries where there are abundant natural resources and healthy bee populations, there are good possibilities to market organic-certified honey.



Low cost 4

Beekeeping can be very low cost. Hives and other equipment can be made locally and bees are freely available. Bees do not depend upon the beekeeper for food.



Resilient income 9

Beekeeping is resilient when disasters happen. Displaced communities can make hives and gain benefit in a relatively short time. It is not necessary for beekeepers to own land or to be settled permanently.



Income creation 5

Where beekeepers have good market access, beekeeping easily generates a profit.



Gender and age inclusive 10

Bees can be kept by women and men of all ages. Bees do not need daily care and can be attended to as other work allows.

This Information Poster has been prepared by Bees for Development who work to assist people in developing countries by providing information and advice about apiculture. We believe that apiculture is a feasible way to help people to escape their way out of poverty, while at the same time maintaining natural biodiversity. Apiculture gives some of the world's poorest people the opportunity to harvest commodities (honey and beeswax) that can have immense quality and value. These people usually have little access to beekeeping information, even though the sector is fast growing, as markets change and honey bee pests and diseases are spread worldwide. Bees for Development's philosophy is to provide information on how to look after bees, and harvest from them in sustainable ways. Our focus is on using and growing species where possible, and building on traditional techniques to find methods that work according to resources available. Bees for Development works worldwide, assisting beekeepers in every continent.



This poster has been produced in English as part of the Right A initiative, a healthy living and rural income source project. The Creative Commons license is being used on this poster to support the Right A initiative that aims at to contribute to sustainable development.



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