Livestock

1. Apiculture
2. Broiler
3. Egg Production
4. Rabbit Production
5. Small Ruminant Production
6. Swine Production

TECHNOLOGY PACKS

APICULTURE

November 2015

Background

Production decisions concerning how much effort and resources to invest and which farming practices to follow, have consequences and create opportunities for the farm affecting production levels, input costs, time constraints, and the potentially size of the operation. They also may have implications for resource use and environmental quality.

Numerous information exist on the various aspects of production and handling/ marketing of crops and livestock, the majority of which are outdated, not easily understood and lacking the where with all for addressing present day challenges such as good agricultural practices (GAPs) and food safety and climate change that impact on the environment and rural livelihoods. These issues are also closely related to the importance of the role of primary producers in increasing the earnings of all actors along the value chain in supporting the development of a commercially viable and sustainable agricultural industry.

The production of high quality and easily understood information packages is critical as this forms a basis for farmers to obtain financing from lending institutions and to efficiently increase their production through the availability of modern technology. This will also result in a reduction of rural unemployment and will greatly help in alleviating poverty and other associated social ills.

TECHNOLOGY PACKS

APICULTURE

November 2015

Prepared by

Ansari Hosein, CARDI (Caribbean Agricultural Research and Development Institute)

Published by

Ministry of Agriculture, St. Lucia

CARDI
P.O. Bag 212, Frederick Hardy Building
University of the West Indies
St Augustine Campus,
St. Augustine Trinidad and Tobago, W.I.

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Introduction

This Technological Package (Tech Pack) deals with the production, harvesting and postharvest management of honey bees (apiculture). Also included as an Appendix is an example of a Colony Record Card.

The mention of any commercial products in the Tech Pack is for the purpose of citing examples and is not meant to either endorse or discredit any particular product. Use of chemical products should strictly comply with local regulations and all instructions provided by the manufacturer.

In St Lucia, the predominant type of bee is the European Honey Bee of the genus *Apis*. Within the hive, there are three castes of bees—the queen, drone and worker.

The queen. There is one queen per hive and she can live for 3 - 5 years. The queen will mate only once with several drones and remain fertile for life. The main activity of the queen is to lay eggs, and she will lay up to 2,000 per day. After 2 years, there will be a decline in the number of eggs laid. The queen does not go out to collect pollen, nectar, water or propolis. As a young larva, the queen will be fed on a diet of royal jelly.

The drone. The function of the drone is to inseminate the queen. After mating, the drone dies.
The worker. All worker bees are female, but they do not reproduce. These bees are responsible for all the chores in the colony, such as cleaning the hive, feeding the brood, caring for the queen, doing guard duty, foraging and scouting. The duty is dependent on the age of the worker.

Production Practices

SITE SELECTION

- Apiaries should be at least 300 feet (100 m) from housing developments. For back yard hives or those close to roadways, plant a hedge and maintain it at a height which will force bees to fly at a higher altitude above and away from the passage way of people.
- There should be nearby sources of nectar and pollen.
- Hives must be near a fresh supply of water. If the source of water is more than ¼ mile (400 m) away, then a fresh supply of water must be provided.
- Place hives to the leeward side of the site where air flow is away from the colony. This helps to minimise the build-up of stagnant air and humid conditions which slow the curing process for honey. Therefore wet, high rainfall areas that are prone to flooding are not appropriate sites.
- Place hives in an east to west direction.
- Establish hives on elevated terrain to encourage better airflow and air drainage and keeping the humidity low.
- It is preferable that the site be fenced.

HOUSING AND EQUIPMENT

Bee hives

The most common bee hive consists of a box with removable frames inside (Langstroth hives, Plate 1). Hive pieces are generally separated by a space of about ¼ inch (8 mm). With this space allocation, you can harvest honey, search for the queen and remove eggs from a strong colony to a weak one without damaging the hive, bees or other combs. The honey in the frames can also be harvested without damaging the combs in a centrifugal honey extractor. In this way, the bees do not have to build replacement combs, thereby saving time and energy.

At the base of the hive is a bottom board with a landing board which leads to the hive entrance. The space left at the entrance of the hive should be around ¼ inch (7 - 8 mm). The bees will re-shape the entrance if it is too small or too large.

The top section of the hive has an inner and an outer cover with supers in the middle. The brood chamber is at the bottom and is used for raising eggs and larvae. The queen bee is confined to the brood chamber through the use of a queen excluder. There is therefore no "contamination" of the honey by pollen or brood. The upper chamber or supers are only accessible to the worker bees and are used for storing honey. Most hives have up to 10 - 13 frames.

Hives can be built, purchased from a commercial supplier or bought from an existing beekeeper. If purchasing from an existing beekeeper, ensure that the hive or colony is inspected by a person from the Ministry of Agriculture for signs of disease. Timber used for making hives should be termite proof, resistant to weathering from the sun and rain, warp proof and non-bee repellent.

Ensure there are no holes anywhere except at the main entrance. Bore a small hole 1 inch (2 cm) wide on the side of the hive to remove excess heat and cover with a mesh. This should be able to be plugged if temperatures drop too low.

Place hives under shade and paint them white to keep the bees cool. Protect from ants and weeds.

Recently, in St Lucia, the Top Bar hive is thought to be more cost effective in terms of installation and maintenance. However, the Top Bar hive is known to result in a greater percentage of wax than honey in comparison to the Langstroth hive.

In the Top Bar hive, the top bar of the Langstroth frame is modified so that bees build their combs hanging down from the centre of the bar. In this way, combs are not supported on all four sides and may break more easily, so care is needed when removing and replacing during management practices.

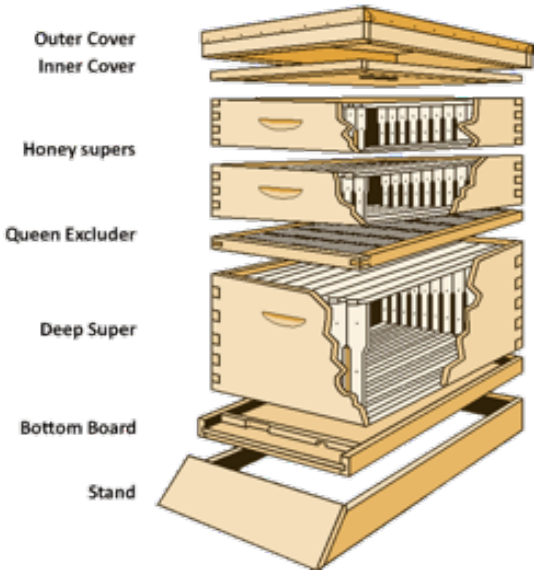

Plate 1 Components of a Langstroth hive
(Photo source: http://www.sonomabees.org/beekeeping-basics)

Smoker

- The smoker produces smoke that calms bees rendering them docile and is therefore a critical tool required for any activity that involves interaction with bees (Plate 2).
- The smoker must carry enough dry material to last at least 40 minutes. Use material such as wood shavings, wood chips, grapefruit leaves (also repels the Varroa mite), dried and green grass, pine needles and any other material that produces white smoke.
- Do not use oil or kerosene in the smoker as these can be detrimental to bees.

Plate 2 A smoker
(Photo source: http://ucanr.edu/blogs/bugsquad/index.cfm?tagname=smoker)

Hive tool/knife

These are used to pry up frames during honey harvesting. The knife can also be used to remove frames especially those glued onto hive by bees. Both the hive tool and knife can be used for separating two combs joined together or to cut out honey combs from frames during harvest. When cutting, combs should be cut neatly with a knife (Plate 3).

Plate 3 A beekeeper using a hive tool
Photo source: (http://www.gardenfork.tv)

Brush or quill

The quill tends to be the safer and gentler option compared to the artificial brush as it can gently remove bees off combs. If a brush is used, it must have soft hairs.

Feeder

Feeders can be made of jars or any container. This must be positioned upside down and adjusted in such a way that allows substances to trickle slowly allowing for easy risk-less access to water by bees. Some devices developed for birds may also be used.

Protective clothing

These include bee suits, gloves, veils and boots, which all help to prevent or minimise being stung by bees. During the light hours, wear light coloured gear (preferably white, yellow or green) and during the night, dark colours should be worn. All parts of the body must be covered by the suit including head, hands and feet. The veil is used to protect the head, face and neck. The netting is sewn firmly around a hat and secured at the back with a piece of fabric. Use gloves made of good flexible white leather to protect the hands and fingers. Footwear such as long boots helps to protect legs and feet. If no boots are available, a pair of light coloured shoes and thick white socks can be worn. Dark socks and shoes can be worn in the night when the vision of bees is poor (Plate 4).

Plate 4 A beekeeper in full protective clothing
Photo source: (http://www.wisegeek.com/what-is-a-beekeeper-suit.htm)

APIARY MANAGEMENT

The production of high quality apiary products, ranging from bees for pollination services to honey and bees wax products, depend on the following good management practices.

- For a backyard apiary, there must be no more than five hives. This is mainly a safety

precaution. It reduces the risk of bees attacking residents living nearby.

- After installing the hive, source bees through colonisation (attracting bees through baiting) or by purchasing packaged bees. Before baiting, ensure that installed hives are safe and free of ants, spiders, lizards or any other potential threats to bees. Baiting involves the use of substances including syrup, lime juice, honey or granulated sugar, which can be plastered on inner walls of hives to attract bees. In St. Lucia, one of the more effective and commonly used baits is the actual honey comb which can be placed in newly installed hives.
- Install the brood chamber on the first day. As the colony, expands and more combs are built, place the super with the queen excluder between the super and brood chamber.

Inspecting colonies

This ensures that the beekeeper is aware of any problems as they arise. Keepers will also be able to keep track of whether honey is being produced and capped regularly, whether the colony may be preparing to swarm or know if there is an attack of pests and diseases. Each comb must be inspected.

Follow these general guidelines when inspecting hives and harvesting honey.

- Work in pairs and ensure that hive tool, knife, brush or quill and smoker are all available.
- Wear protective clothing. Each pair member should ensure that the other member is well protected and vice versa.
- One person should operate the smoker and the other work the hives.
- Ensure that smokers have sufficient fuel for the duration of the inspection period.
- Puff the smoke gently around hive, then through the main entrance for about 3 minutes and wait for 2 minutes for bees to completely gorge themselves in honey.
- Pry open the roof or lid of hive using the hive tool. Tap on the top-bars of the top-bar hives to determine which combs are empty. The empty ones will make the most noise. The hive tool can be used to pry out the top bars from the empty side first.
- Examine one comb at a time. For brood combs, beekeepers must ensure that cells are filled regularly and sealed well. Also look for queen, drone and worker cells. This is an indication of preparation to swarm. Look at the honey combs and determine the number of cells that are fully capped (containing honey ready for harvesting), uncapped or partially capped, which is an indication of unripe honey. Remove and replace if comb is full of ripe honey. If there are more than 10 brood combs, remove the excess as this can lead to large brood populations and subsequent congested conditions, which leads to bees absconding.
- Excess combs can be placed in hives with weak colonies to help build these colonies.

SWARMING MANAGEMENT

Swarming occurs when a portion of a colony leaves a hive in search of new, convenient or more favourable hive territory. With swarming, both bee and hive resources are reduced as bees carry

resources of the old colony to assist with the building up of the new colony. Swarming management must lead to as little interference to the life of bees as this can lead to absconding, which is even more undesirable as it results in the exit of an entire colony.

What causes bees to swarm?

The main cause of swarming is over congestion of the queen bee from high brood populations in hives. This occurs in the peak brood rearing season between late April and late June. In reaction to this, workers begin to build queen cells to rear queens for the purpose of swarming. In the Langstroth system these can be seen at the base of the comb and for the top bar hives this can be seen at the sides of the comb.

To prevent swarming focus on avoiding congestion in the hive.

- Replace full honey combs near the brood nest with empty combs.
- Never leave honey combs in small hives for too long.
- Provide shade to keep bees cool.
- Divide the colonies: when dividing colonies ensure adequate food resources are available for bees, whether provided naturally by pollen and nectar resources of the site or provided by the beekeeper (combs containing honey or placing syrup in the hive). Only combs with nine or more combs should be divided.

ROBBING AND PRESERVATION

Bees from different colonies may rob other bees of their resources. These robber bees may be seen flying around corners or cracks in the hive. Practice the following to reduce robbing.

- Combs must never be left exposed for long periods during brood nest management.
- During bad weather feed must be placed in the hive for bees in the morning and evening.
- The entrance of the hive must be designed to enable bees to reduce its size quickly if necessary.
- Do not spill honey near the hive as this attracts robbers and other predators.
- Repellents such as petrol can be used on cracks to discourage robbers from approaching hives.

INSPECTING THE QUEEN BEE

When inspecting queens, note the following.

- A highly productive queen bee can lay between 2000 - 3000 eggs a day. A rapid increase in population before the main honey flow period from February to September, guarantees a good crop. Look for sudden changes in the size of queen bees as a drop in body size can be an indication that something adverse is going to happen.
- Defects in her wings and legs can reduce her productivity.
- The age of the queen is also important. Colonies with young queens usually swarm less and

can produce up to 30% more honey than queens 2 years and older.

- Bee behaviour must be monitored so that when beekeepers are dividing colonies to build new ones, bees can be sourced from colonies with more favourable behaviour trends including less swarming or lower aggressiveness.

FEEDING BEES

Bees can be fed by the beekeeper or it can be done naturally.

In times of both intense rain and periods of dryness, apiaries experience a period where food becomes scarce as bees stop all foraging and food collecting activity. In such instances, feed can be given by the beekeeper. A large colony can use up to 3 lb (1.4 kg) of syrup or honey per day.

In St. Lucia, there are a number of natural sources of nectar and pollen. Sun flower is a good source of pollen and rich nectar, often attracting swarms of bees. Table 1 below shows a list of other common plants which provide pollen.

Water for bees

Water is important for bees as they use it to dilute brood food and to cool the hive. It can be provided by natural water bodies including lakes and rivers, etc. or by placing containers filled with water close to hives. Straw or other floating materials should be placed on the water for bees to land on so that they do not drown. If water is more than ¼ mile (400 m) away, apiaries must be provided with a source of water.

Table 1 Common sources of nectar available in St. Lucia

Category	Common name	Scientific name
Fruit plants	Citrus	*Citrus spp.*
	Cashew nut	*Anacardium occidentale*
	Coffee	*Coffea spp.*
	Avocado pear	*Persea americana*
	Curcurbits	*Curcurbitacae*
	West Indian cherry	*Malpighia punicifolia*
	Mango	*Mangifera indica*
	Pomerac	*Eugenia malaccensis*
	Guava	*Psidium guajava*
Ornamental and forests	Corallita	*Antigonon leptopus*
	Ti marie	*Mimosa pudica*
	Logwood	*Haematoxylon campechianum*
	Cedar	*Cedrela mexicana*

Category	Common name	Scientific name
	Gri-gri	*Martenezia caryotaefolia*
	Immortelle	*Erythrina micropteryx*
	Mahogany	*Swietenia spp.*
	Black mangrove	*Avicennia nitida*
	White mangrove	*Laguncularia racemosa*

HEALTH AND DISEASE MANAGEMENT

The main challenges experienced by beekeepers in St. Lucia are the Varroa mite and the recently identified Chalk Brood Disease. The section below suggests management of ants, lizards and use of chemicals by crop farmers. Table 2 lists the two main health problems that may affect the colony.

Table 2 Symptoms and treatment of pests and diseases of bees

Pests & Diseases	Symptoms	Control/Management
 **Plate 5 Varroa Mite (Varroa destructor) Source: https://agdev.anr.udel.edu/maarec/honey-bee-biology/honey-bee-parasites-pests-predators-and-diseases/honey-bee-parasites/nggallery/image/39**  **Source: https://upload.wikimedia.org/wikipedia/commons/a/a6/Varroa_Mite.jpg**	• Unhealthy looking brood. • Mites can be seen after removing the cappings of the sealed cells. • Discarded larva. • Spotty brood pattern. • Mites may appear as brown or reddish spots on the white larvae. • Newly emerged bees appear deformed with stunted abdomens and deformed wings. • Mites may also be seen on adults. • May result in death of the entire honey bee colony. • Dead mites may be found near the entrance of the hive.	Use bio-pesticides, for example, ApiLife VAR™, Sucrocide™ and formic acid. Use Chemical (Synthetic) pesticides, for example: Apistan® and CheckMite®. (Always use pesticides as directed on the label.) Use screened bottom boards or wire mesh or other non-solid surfaces as a base for bee hives To reduce mite populations install an extra frame with drone size cells that attract mites. These frames are removed before drones and mites emerge from cells. As a prevention, purchase mite tolerant stock.

Pests & Diseases	Symptoms	Control/Management
 Plate 6 Chalkbrood Disease (Ascosphaera apis) Source: https://agdev.anr.udel.edu/maarec/honey-bee-biology/honey-bee-parasites-pests-predators-and-diseases/diseases-of-honey-bees/nggallery/image/107	Dead larva swollen to the size of cells in frames, presence of white threadlike mycelia covering cells and/or the harden shrunken and chalk like appearance of larvae.	In the early stage of infestation, the natural hygiene behaviour of bees can be stimulated by providing food for bees. In severe cases, pathogens can be reduced by removing the most infested brood combs. With hygiene behaviour being genetic, selection for queens with such tendencies can impact positively on hive resistance. Re-queening can also strengthen colonies. Ensure the colony has a strong worker population, and that the hive is well ventilated and free from accumulated moisture.

MANAGEMENT OF OTHER COMMON PESTS

Ants

When installing hives, ensure that they are rid of all ants. All types of ants, including large, small, red, brown or black are enemies of the bee and are attracted to nectar, honey, sugar and the bee's body. Ants can be controlled by coating hive foundation or the legs of stands with insect repellents, thick grease or used engine oil. Spreading wood ash or charcoal ash around the stands will also keep ants away. Place the base of the posts for the hive in a tin or plastic container filled with oil or water. Check regularly for debris and refill as necessary.

Lizards

Lizards eat bees and a serious lizard problem may lead to bees absconding. A simple and practical strategy is to nail metal cones, 30 inches (70 cm) high, on the legs of the hive stand to prevent lizards from reaching the hives. Control measures used for ants are also effective against some lizards. It will also be helpful to regularly mow the grass in the vicinity of the apiary.

Pesticide usage

This must be a joint effort between and among crop farmers and beekeepers. Chemicals being applied should be done only at the recommended rate. The method of application is also important.

Ground application is safer than air application. The form of the chemical used also affects toxicity. For instance, sprays are safer than dusts; emulsifiable concentrates are safer than wettable dust and granular forms are the least hazardous.

The time of application is critical. Chemicals must be applied at times of the day when bees are least likely to visit crops. For instance, both corn and pumpkin have pollen available at earlier times of the day and as a result more bees visit at this time. Therefore, application should be during later parts of the day and for most crops this can be done between 7 pm and 7 am.

Beekeepers should also know the nature of pollen and nectar sources within the chosen site as this can determine the risks in terms of the possible exposure of bees to pesticides and potential losses.

Beekeepers should be aware of the different chemicals used in surrounding cropping systems and the levels of toxicity to bees. This may justify relocating bees in the event that risks are high.

Mapping of apiaries by beekeeper organisations and making this information available to the agricultural community can inform management practices on the part of both crop farmers and bee keepers.

Harvest and Post Harvest Practices

HONEY

Bees make honey from nectar collected from flowers. The colour and flavour and even viscosity of the honey will vary depending on the source of nectar. Honey is easily digestible and is known to have antimicrobial qualities.

Moisture content of honey must be between 14 - 19%. Honey can be tampered with by adding refined sugars such as maltose, sucrose or fruit syrup. Hydroxymethylfurfural (HMF) can reflect the level of heat damage in honey. The recommended level must not exceed 80 parts per million (mg/kg) if honey is labelled as tropical honey. Fresh honey must have no more than 5 parts per million (mg/kg).

Follow these guidelines when harvesting honey.

- Wear protective clothing.
- Gently open hives and select combs that are two thirds sealed full of honey. Avoid combs with broods.
- Lift combs and blow smoke on both sides.
- Cut off the combs leaving about ½ inch (1 cm) comb on the bar and place capped honey in a clean dry container and cover.
- Leave at least eight combs for the bees.
- Before closing the hive, place the combs with unripe honey near brood combs and the harvested combs can be placed behind these.

Plate 7 Removing frame from super
(Photo source: http://www.coxshoney.com/general/honey-harvest-process)

Extraction

- Use a hot rod or knife to de-cap the honey comb.
- Place the de-capped comb, with the de-capped side facing downwards, on fine white linen or stainless steel sieves (more hygienic) that is tied to or placed over a plastic container.
- When all honey on the de-capped side has been drained, repeat the above process on the next side of the comb.
- Some farmers may opt to purchase a special centrifuge called a honey extractor. This will increase yields as the cells remain intact after extraction.

Storage conditions must be clean and dry. Exposure to moist air will result in fermentation and the deterioration of the quality of the product. Air- conditioning units or fans can be used to increase ventilation and reduce humidity. Warming can also be done to reduce air moisture. If the honey has high moisture content as a result of inadequate production or poor storage conditions, then

promote drying by leaving full untouched combs in a dry room. This reduces moisture even for capped honey.

Plate 8 Using a hot knife to remove caps off a honeycomb (Photo source: http://photos.dnronline.com/?p=7606) cess)

Plate 9 A beekeeper uses a simple centrifuge to extract honey from combs (Photo source: http://photos.dnronline.com/?p=7606)

Processing and packaging

After extraction, package honey in clean, dry, well sealed glass or plastic jars or place in metal containers that are coated with paraffin, plastic or food safe varnish.

Honey can also be warmed to make the honey more fluid and to ensure that moisture content is kept to 19% and under. This can be done by heating honey at a temperature between 130 – 140 °F (55 - 60 °C over a period of 8 hours. Heating may however reduce the quality associated with the fresh unheated product.

BEESWAX

Beeswax is harvested from various sources including the honeycomb and wax cappings removed from combs before honey is extracted and hive frames. Wax from wax cappings is considered to be of very high quality. Melting this collected wax is the first step to obtaining purified wax.

Processing and marketing

- Purification of wax is done through heat from natural sunlight, hot water or steam. Do not overheat when extracting impurities.
- Purified wax is poured into smaller plastic or metal containers to cool off slowly for about 1 day in a draft free area.
- At this stage if necessary, bleaching is done naturally through grating wax bits into fine pieces and exposing them to the sunlight. Thin wax sheets can also be made by dipping the

broad face of a smooth, wet board, ½ inch (1 cm) thick, into liquid wax. Dip again in water afterwards. The hardened wax can now be peeled off and spread over a mat for bleaching. Avoid mixing wax with paraffin, solid fat or oil residue as these diminish the value of and customers trust in wax products

- Large amounts can be collected, processed and sold through mass collection from apiaries (maybe through beekeeper associations or organisations).

ROYAL JELLY OR BEE MILK

Royal jelly is made of digested pollen and honey or nectar mixed with a chemical secreted by a nursing bee. It is high in B vitamins and may be used as a dietary supplement.

Production and processing

- With jelly production, there must be a designated production hive where jelly will be formed. Young brood honey and bread can be obtained from other hives to assist in the production of jelly in production hives. In the hives selected for the production of jelly, there must be no queen.
- After obtaining young brood, extra comb cups for producing jelly can be made either by cutting the underside of egg bearing combs or through providing artificial cups made of PVC or beeswax. The number of naturally made cups created can range between 10 - 50 dependant on the strength of the colony, number of young bees and available food resources. Artificial cups may also be attached to the underside of the frame and one egg or one day old larva can be placed into each of them. Such a procedure must be done carefully so that larvae will not drown in bee milk. A third method of increasing cups is the 'Introduction Cage' system where eggs are provided by a queen isolated in a grate with artificial PVC cups. Worker bees have access to the grate and through such an arrangement royal jelly can be accumulated and collected. Good colonies can take between 1 - 4 days before all cups are filled.

Harvesting and storage

- Each cup can contain about 5 grains (0.25 - 0.30 g) which can be harvested with a pipette, spoon or a suction pump.
- Jelly is kept at room temperature for only a few days.
- For a longer shelf life, freeze or add honey at a concentration of no more than 3 – 5%.
- If freeze dried, this can be pulverized and kept at room temperature.

PROPOLIS

This is a sticky glue made from resin collected from trees and mixed with wax. Bees use this to seal and sterilise the hive. It is also sometime used in wood varnishes and is also known for some health benefits.

Propolis nets, with 0.1 inch (2 - 3 mm) wide holes or slits, or frames can be used to collect propolis. These nets/frames are placed between hive frames, which bees then try to close off with propolis to protect against draft.

Propolis can also be harvested from old frame super parts of side slats or sides of top slats in top bar hives. Some beekeepers place calabashes or pots with large bee holes hanging in hives. Bees will close the entire opening with propolis.

Processing and storage
After harvesting, place in a cool place such as a freezer or cold water. When frozen, propolis can be removed from the net or frame.

Propolis must be purified of all beeswax, bees, bee parts and wood shavings and must be higher than 50% concentration. Frozen propolis must be ground immediately. Grounding can be assisted by first grating then pulverizing. Store in plastic buckets and not in cans.

BEE BREAD
This is produced from pollen, honey and fluids from bees. It has of high medicinal and nutritional value. Bee bread can be harvested from combs using a bee bread punch. When extracted, the bread should be dried to reduce moisture from 20 to 14%, so that mould growth is slowed. Fresh bread can be frozen, pressed together with honey or dried. Bee bread can be eaten in chunks or added to foods.

Bee Stings

In extreme cases bee stings can be deadly as stingers carry venom. To reduce the risk of being stung by bees:

- Wear protective gear
- Use the smoker when conducting any operation
- Do not consume alcohol before entering the apiary
- Do not wear cosmetic items containing beeswax
- Do not make any noise
- Do not stand in the flight path of bees
- Do not wear bright coloured clothing
- Do not make sudden movements near the hive
- Avoid crushing bees or bee stings or swatting bees.

A bee stinger can be removed by scraping away with a knife or the fingernail. Avoid pulling out the sting as more venom can be injected into the flesh. Treat with cold cloths to sooth pain. In severe cases, victims should be hospitalised or ephedrine can be applied in cases where a doctor's help cannot be obtained.

Record Keeping

There are two major records required for successful apiculture. These are colony records and operational records.

Characteristics of the colony which must be recorded are:

- The nature of colonisation, whether voluntarily or through capture
- The weight of hive which must be done monthly to track progress; this gives information on the productivity status of the queen
- Estimates of the number of bees bringing in pollen; if large numbers are taking in pollen then bees are rearing brood and the queen is laying more eggs
- Incidences of pests and diseases
- Temperature and rainfall.

Operational information which must be recorded are:

- Visits to apiary - date, time and observations
- Labour - quantity and task
- Costs including labour, transport, equipment servicing
- Yield of products e.g. Honey
- Income.

APPENDICES

APPENDIX: APIARY COLONY RECORD CARD

COLONY RECORD CARD (Front)

		Hive number: Card number:										
Date	Queen	Queen cells	Brood	Stores	Room	Health	Varroa	Temper	Supers	Feed	Weather	Comments

COLONY RECORD CARD (Back)

Date of inspection					
Queen	Presence of queen (Y/N)		Q Cells	No seen and removed	
Brood	Eggs seen?			No seen and left alone	
	Brood pattern OK?				
	How many frames covered by brood? e.g. 5 = equivalent of 5 frames available		Stores	Quantity stores available e.g. 5 = equiv of 5 frames available	
	Note if no brood				
Room	How much space for queen to lay? (e.g. enter 5 if equivalent of 5 brood frames available				
			Health	State for brood and adults	
Varroa	Number of varroa mites in colony N = none, L = low, M = medium, H= high				
			Temper, docility of the colony	10: calm, 8: agitated, 6: bees sting, 4: bees following	
Feed	How much given				
	Quarts (litres of light syrup)		Supers	e.g. + 3 = 3 supers added - 4 = 4 supers removed	
	Quarts (litres of heavy syrup)				
Comments	Anything of interest to add				