

BEEKEEPING LEVEL II

Learning Guide #1

**Unit of Competence: Assist in Harvesting &
Processing Bee Products**

**Module Title:- Assisting in Harvesting &
Processing Bee Products**

LG Code: AGR BKG1 M10 LO1-LG-1

TTLM Code: AGR BKG1 TTLM 0919v1

**Lo1 Extract, process and store
honey**

Instruction Sheet	Learning Guide #1
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Cleaning , drying, sanitizing and checking all equipment for serviceability and use.
- Selecting ripe honey combs for extraction.
- Selecting and checking Suitable Personal Protective Equipment (PPE).
- Identifying Occupational Health and Safety (OHS) hazard.
- Complying quality assurance and food safety requirements throughout process of extracting honey.
- Inspecting frame.
- warming comb to assist extraction process.
- Uncapping cells using a hand knife or machine to avoiding damage.
- Placing frames in extraction unit.
- Heating and straining to remove wax, air bubbles, pollen and bees.
- Checking moisture content of honey and taking appropriate action.
- Taking action to reduce risk of fermentation of honey.
- Storing cleaned honey in suitable containers to meet customer requirements.
- Labeling and storing honey according to enterprise, food safety and quality assurance requirements.

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to: –**

- Clean , dry, sanitize and check all equipment for serviceability and use.
- Select ripe honey combs for extraction.

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- Select and check Suitable Personal Protective Equipment (PPE).
- Identify Occupational Health and Safety (OHS) hazard.
- Comply quality assurance and food safety requirements throughout process of extracting honey.
- Inspect frame.
- warm comb to assist extraction process.
- Uncap cells using a hand knife or machine to avoiding damage.
- Place frames in extraction unit.
- Heat and straining to remove wax, air bubbles, pollen and bees.
- Check moisture content of honey and taking appropriate action.
- Take action to reduce risk of fermentation of honey.
- Store cleaned honey in suitable containers to meet customer requirements.
- Label and storing honey according to enterprise, food safety and quality assurance requirements.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” **in page -**.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio

1.1. Cleaning beekeeping equipment.

These notes refer to routine cleaning only. Contact your seasonal bee inspector for advice on equipment clean-up after AFB. Our notes mention washing soda. This is **not** the same as caustic soda. See [Dry Pak washing soda](#). We suggest a regular strength of half a cup (100g) to one pint or 500ml of warm water. **Work safely!** Wear rubber gloves and eye protection when scrubbing with washing soda. Dispose of any waste responsibly. Beehive scrapings are great



Cleaning a Seagrove board

Smoker Remove any loose debris. Warm the inside with a blowlamp for 30 seconds, just enough to soften caked-on debris. Wearing work gloves, scrape the inside clean. Scrape inside the lid. Allow to cool. Make sure the lid opens and closes easily. Burn the scrapings.

Hive tools Scrub clean in washing soda solution. Many beekeepers store their hive tools in a plastic tub of washing soda solution, with a snap on lid.

Plastic feeders Remove from the hive promptly, or they will go mouldy. Clean in a dishwasher.

Wooden feeders Ashforth/Miller/Brother Adam. Scrape off any dry sugar. Scrub clean with warm water. If in any doubt, check they don't leak before using again (Fill with cold water).

Bee suit Wash your bee suit regularly. Seasonal bee inspectors wash their bee suits every day. Follow the maker's instructions. Bee suits can harbor stings. The alarm pheromones make the bees angry. I zip up my Sherriff bee suit with the veil tucked inside, and wash at 60 deg C maximum. Hang up to dry thoroughly before storing, or they may go moldy. If your suit becomes moldy, try soaking it in bio washing powder overnight, and washing in bio powder.

Gloves See our page on [Beekeeping Gloves](#). Leather gloves are unwieldy to use, difficult to clean and they attract stings. Follow the maker's washing instructions. I wash gloves at 40 deg C maximum. Any hotter and they will probably shrink.

Honey extractor Remove the cage and wipe clean. Rinse out the drum with warm water. Dry thoroughly and reassemble. Check cage spins freely. Never leave the extractor in the garden for the bees to clean. The bees will go crazy, and will start robbing.

Honey jars I wash 50 x 454g jars at a time in the dishwasher on a quick cycle. Allow to dry. I use a wooden crown board as a tray, holding 25 x 454g jars.

Honey jar lids I use gold plastic lids straight from the bag.

Timber framed wire queen excluders I use a Thorne's [10-slot wire excluder cleaner](#). Scrape the frame clean.

Zinc excluders Scrape clean on a flat work bench. Do not use a blowlamp. The zinc may melt.

Glass quilts Scrape wooden frame clean. Scrub glass clean with washing soda solution and rinse.

Correx varroa trays Scrape off debris. Scrub clean with washing soda solution and rinse.

Crown boards Scrape clean, scorch with blowlamp.

Mesh floors Scrape woodwork clean. Do not blowlamp galvanized mesh. Zinc fumes are toxic. Scrub mesh clean with washing soda solution.

Metal and plastic frame ends I freeze 500g margarine boxes full of frame ends overnight, then empty them into a 15lb honey bucket or similar, kept for the purpose. Fit the lid and shake vigorously for 30 seconds. See before and after pictures.

Porter bee escapes Working outdoors and wearing gloves, I clean two escapes at a time, holding back to back with pincers. Pour a kettle full of hot water into the spring mechanism. Be careful!

Extractor cleaning

A honey extractor is one of the most expensive individual pieces of equipment a beekeeper is likely buy [†]. If you're lucky, your association might own one or more extractors and make them available to borrow or hire. However you get hold of one, after use they need to be thoroughly cleaned before storing (or returning) them.

Don't, whatever you do, follow the advice on some websites or beekeeping forums (fora?) and leave the extractor outside "*for the bees to clean*". **This is a very bad idea.** The [feeding frenzy](#) that results is a perfect way to spread disease.

Patience, cold water, more patience and a hairdryer

The used extractor will have quite a bit of residual honey adhering to the sidewalls and floor. You can scrape this out using a flexible silicone spatula but it's a messy process and almost guaranteed to cover you from wrist to [oxter](#) in honey. It's far easier to:

- close the honey gate securely

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- tip the extractor up at a steep angle so the honey runs towards the gate
- turn the heating up in the room and leave it overnight

The following morning the majority of the honey will have drained down towards the honey gate, this can then be bottled for home consumption or used for mead or [marmalade making](#). It's not unusual to get a pound or more of honey like this ... it'll be a bit frothy and might be less well-filtered but it will still be delicious.

1.2. How often should I Clean My bee process and store equipment

I've covered how to clean your equipment, but how often should you do this? It depends upon you and the equipment really.

1. The Bee Suit

You can get away with cleaning the bee suit every 3-4 uses. In reality, I guess it depends upon how dirty your suit gets when you work with your bees.

Plus, it depends upon how much you sweat. Also, consider how you feel about putting it on each time.

Now, my husband is the type that he could care less how clean it is. He'll wear it until I snatch it from him and refuse to let him wear it until it's clean again.

Granted, you do wear clothing under the suit so I can kind of see his point.

However, for me, I prefer to wash mine every use or two. So it is personal preference. And for the people out there like my husband, try to be patient if you have loved ones around you like me. We only wash everything to death because we care.

2. The Veil

I would wash the veil as frequently as I wash the suit. I understand it gets nastier faster probably because you can't help but sweat a lot in your face when working with bees, and you don't have layers of clothing between the veil and your sweat.

So if you feel like it needs to be washed after every use, since it is being hand washed, I don't think it would hurt much. You'll know if you're over washing items because the fibers will start to wear out. Just keep an eye out for that.

3. Your Tools

The hive tool and smoker need to be washed on an 'as needed' basis. You'll know when they need it.

But again, it will be based around your personal preferences. I'm the type that doesn't like to work with a lot of left over material on my tools.

However, my husband could care less. So it's up to you.

4. The Hives

You all can breathe a sigh of relief. I'm not going to tell you I wash our hives every time we're done with them (though you were probably expecting it, weren't you?)

No, instead, you only put them in the 'gas chamber' once a year and that is at the very end of the season. There is no need to do anything besides just clean up the propolis on the hives in between uses during the same season.

But I do recommend storing your bee equipment where it has plenty of shelter. Make sure it is in a building, a barn (we actually store our equipment in our pole barn), or if you don't have room for it just yet make sure it has a tarp over it to protect it from the elements. This will help with the longevity of your equipment for sure.

Well, I really hope that this information will help you all to protect your bee equipment. As I said, it is quite the investment so it needs to be taken care of.

But I want to hear from you. How do you clean your beekeeping equipment? Do you have any special tricks to getting things super clean and sanitized?

1.3. Clean honey storage containers

Storing honey in containers means that you will at some time scoop or pour out honey. Some honey may run down the sides of your honey container after pouring or scooping out what you need. Honey on the sides of the container will attract ants to the honey. To prevent this, use a wet cloth to wipe off any honey on the sides of honey storage containers.

Self-Check -1	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discus bee extract, process and store cleaning way?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information sheet 2	Selecting ripe honey combs for extraction
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2.1. Meaning of rip honey

The nectar collected by field bees is stored in wax cells in the hive where it is converted into honey. During this process the moisture content is reduced to 14–21%. When the honey is ripe, bees cap the cells with beeswax. The higher the humidity or colder the climate, the more difficult it is for house bees to reduce the moisture content. Honey with a moisture content over 21% is likely to ferment and spoil.

2.2. Selection of ripe honey combs.

When the honey is ready it has to be removed immediately. Honey can be considered as ripe when 75% the comb is sealed. What are indications for honey harvesting?

- ☐ ☐ There is strong aroma of honey smelling
- ☐ ☐ Clustered bees around the entrance
- ☐ ☐ Bees become ideal/less traffic at entrance
- ☐ ☐ Consider the colander of the area from the previous observation
- Finally open & check ripe & sealed honeycombs

Early cropping is important

To force the bees to collect 2nd round honey either for their Owen or for 2nd harvest. The hive is opened in the appropriate manner. After the inner cover is removed, the honey super is assessed by visual examination of the frames, to see that it is at least three quarters sealed and thus ready for removal. Smoke is blown down between the frames. Then the super is lifted a few centimeters at front or back, and allowed to drop back into position. Then, when most of the bees are out of the bees are out of the super, the honey combs will be taken off. In such manner, the honey frames will be harvested and brought to honey house. It may avoid the consumption of the store by

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the bees particularly if there is rain. If harvesting is at late flowering leave some provision to the bees. Or if you remove all the honey immediately feed them with sugar After harvest- extract & strain the honey while it is liquid

Honey Harvest

- 1) beekeepers suite - mesh helmet and folding veil would do it, with some layers of clothes
- 2) smoker with fuel (dry branches, leaves, etc.) and a lighter
- 3) frame super - where frames with honey combs will be put for transportation
- 4) sting resistant gloves
- 5) hive tool - to move the frames, scrape wax, etc.

Honey Extraction

- 1) heated knife - to unseal honey cells
- 2) uncapping fork - to unseal honey cells missed by the heated knife
- 3) tub for wax/honey
- 4) extractor! - fancy cylindrical piece of equipment, used to extract honey
- 5) food-grade bucket - to catch honey out of the extractor
- 6) double sieve - catches wax and impurities as honey is poured from extractor
- 7) containers - final destination of honey before consumption

After the honey combs with frames are brought to the honey house, the seals honey combs should be uncapped in order to be extracted easily, to let the easy flow of honey from the comb cells. There are many types of uncapping equipment available for commercial operator, from steam and electrically heated to mechanically operated units. All are suitable, and the type to be used must be decided by the individual conditions. Originally uncapping was and in some cases is still done by dipping sharp knives in hot water or scooping the combs with wide fork. The next step was the introduction of the steam-heated knife. This was soon followed by an electric knife. In our country, the uncapping fork is now commonly used. The uncapped honey will be extracted by the manually or electrically operated centrifugal honey extractor. There are many types of honey extract developed with various capacity of frame holding.

2.3. Honey Extraction Room and Equipments

2.3.1. Extracting room

Most commercial-scale beekeepers use a hot room to lower the viscosity of the honey. This increases the flow rate of the honey and so helps extract it from combs. The extracting room must be easy to clean and concrete floors with proper drains are almost mandatory. The room must be bee tight. Modern facilities are usually built without windows and cooled with fans and air conditioning. They are entered through a door large enough to admit forklifts and other equipment such as pallet jacks. This means a door usually eight feet wide and seven feet high. In colder areas, the room is usually heated with hot water run through pipes in the floor or gas heaters mounted near the ceiling.



2.3.2. Honey extraction equipments

Extracting honey requires a number of specialized items of equipment. Depending on the scale of your operations, all these items may be in one integrated extracting unit, or you may have a number of smaller, separate pieces of equipment that require you to physically move the frames and honey from one part of the extraction process to the next. Commonly-used equipment includes:

i. Uncapping machine or Hand-held knives/ uncapping fork

Uncapping machine is a specially-built stainless steel machine that uses two vibrating spring-loaded knives to uncap both sides of the comb at the same time. The cutting

depth is adjustable. The blades are heated by steam or hot water. Uncapping machines are chain-driven with forward and reverse controls. They are powered by an electric motor. An uncapping machine can uncap about eight frames a minute. They are very popular with both commercial and small beekeepers.



Uncapping machine

Uncapping fork is a hand tool used to open the sealed cells of ripened honey before the farmed honeycombs are placed in the honey extractor.



Uncapping fork

There are four types of knives that can be used. Skilled operators can uncap 1-3 combs a minute with a hand-held knife. Depending on the design, hot water-heated knives are immersed in hot water or hot water is circulated through a jacket in the knife. An electrically-heated knife is heated by an electric element for continuous use. A steam knife has a jacket which circulates steam, also for continuous use.



ii. Honey extractor

A honey extractor is a mechanical device used in the [honey extraction](#). A honey extractor extracts the [honey](#) from the [honey comb](#) without destroying the comb. Extractors use the principle of centrifugal force to remove honey from combs. They consist of a drum with a reel inside to hold the frames. Frames are placed on the reel that is rotated at speed to spin the honey out of the uncapped cells. With this method the wax comb stays intact within the [frame](#) and can be reused by the bees. They are operated either manually or by [centrifugal](#) force



The extractors are made of food-grade plastic or stainless steel. Older extractors were made of galvanized iron and mild steel. If you are using one of these older extractors, it must be painted with a food-grade covering, usually a two-part special paint.

The capacity of extractors varies from very small ones that can extract only one frame at a time right up to the very largest extractors that can deal with over 180 frames in the same load.

The size of the extractor you buy will depend on the number of hives you own. If you have up to 50 hives, a two, four or nine frame extractor should be suitable. The more hives, the larger the extractor is better!

Honey extractors are described by the design and the number of frames they hold. Common types are:

1. Single frame slinger: it extracts one frame at a time and is hand operated.
2. Two, three and four frame hand-operated extractors: - are the next sizes available. To extract the honey from both sides of the frame, the frame must be removed and turned around so that the side to be extracted faces the wall of the drum. The more sophisticated version of these extractors has baskets that hold the frames. These swing to reverse the frames so you do not have to remove them from the

baskets to extract both sides of the combs. These reversible extractors can be either electric-powered or hand-driven.

3. Semi-radial extractors:-are fitted with baskets that swing so both sides of the combs can be extracted when the baskets are turned. The baskets are at an angle to the drum so more frames can be extracted in the same diameter extractor compared with using a non-reversible extractor. These come in sizes of 9 frames, 12 frames or 21 frames. Special double baskets are available that can increase the frame capacity of these extractors. All are power-driven by electric motors.

4. Radial extractors:- the frames fit into frame holders so that when the reel is spun, both sides of the comb are extracted at the same time. The diameter of the drum is utilized to the maximum with this method. The reels can spin either horizontally or vertically, taking 180 or more frames. Some types of radial extractors can be loaded with frames and unloaded by pushing the frames in and out using a conveyer, whereas other types require you load and unload all the frames by hand.

iii. Capping spinners to separate honey and wax cappings

iv. Sump or other vessel (to hold the honey spun out of the combs and separated from the wax capping).

v. capping scratcher

vi. strainers to remove large particles of beeswax and foreign matter

vii. storage tank to hold honey



viii. honey and wax draining trays

ix. Buckets

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xii. Protective clothing : The protective clothing used during honey extraction include:

- bee-proof overalls
- gloves
- ear protection
- Steel capped boots/shoes.

Self-Check -1	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss the rapines honey bee?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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3.1. Selecting and checking Personal Protective Equipment (PPE)

Consists of the following items:

1. Veil: for covering head and face and giving protection from stings.
2. Overall: for covering the rest of the body
3. Gloves: for covering the hands
4. Boots: for covering the feet.

3.2. Identifying Occupational Health and Safety (OHS)

The sting

The worker sting is a highly modified for its defensive purpose.

The sting is found in the sting chamber, invisible, last segment. The entire pack of the sting is divided into two regions.

Factors affecting the sting of a worker honey bee

1. Genetic make up

Some are highly aggressive Eg. Tropical bees

Some bees are highly gentle/docile/. Eg. European bees

2. Condition of time

☐ When there is scarcity of forage or less nectar flow

☐ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions of stings

In human reactions to stings take place on three levels

1. Localized reaction
2. Systematic reaction

3. Anaphylactic

1. Localized reaction

In the first kind of reaction the initial localized swelling is followed by more extensive swelling a few hours later and the affected area may be red, itchy and tender for 2-3days.

2. Systematic reaction

A systematic reaction generally occurs within a few minutes of stinging and it may involve a whole body rash wheezing, nausea, vomiting, abdominal pain and fainting.

3. Anaphylactic reaction

In this reaction symptoms can occur within a seconds, and they include difficulty in

- ☐ Breathing
- ☐ Confusion
- ☐ Vomiting
- ☐ Falling blood pressure that can load to loss of consciousness and death from

circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason. Those who are extremely sensitive may die from a single sting.

First aid for sting

☐ ☐ The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.

☐ ☐ An ice-cold compress applied after sting has been removed will relieve the pain

☐ ☐ Anti-histamine;

o In the form of (1) Ointment (2) Injection

☐ ☐ Adrenaline injection

In addition to these;

☐ ☐ Work with bees in the late or in the evening

☐ ☐ Avoid working bees in rainy, windy time

☐ ☐ Smoke under the frame and wait two minutes before opening

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- ☐ While moving in the apiary, move slowly and quietly
- ☐ Avoid crashing
- ☐ Wash your protecting materials (glove, overall, etc) after three operation times.
- ☐ When bee stings develop into large swelling and rash, medical advice should be sought straight away.
- ☐ Anyone who is acutely allergic to bee sting and knows that unconsciousness may occur a few minutes after a sting, must immediately inform someone, so that they may be transported as soon as possible to a doctor or a hospital for emergency injection treatment.

Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

Self-check 3	Written test
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Name: _____

Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers.

1. What are the importance of PPE ?(6 points)

Note: Satisfactory rating -6 points

Unsatisfactory – below 6 points

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Information Sheet-4	Identifying Occupational Health and Safety (OHS) hazard
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4.1. Identifying Occupational Health and Safety (OHS)

The sting

The worker sting is a highly modified for its defensive purpose.

The sting is found in the sting chamber, invisible, last segment. The entire pack of the sting is divided into two regions.

Factors affecting the sting of a worker honey bee

1. Genetic make up

Some are highly aggressive Eg. Tropical bees

Some bees are highly gentle/docile/. Eg. European bees

2. Condition of time

☐ When there is scarcity of forage or less nectar flow

☐ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions of stings

In human reactions to stings take place on three levels

1. Localized reaction

2. Systematic reaction

3. Anaphylactic

1. Localized reaction

In the first kind of reaction the initial localized swelling is followed by more extensive swelling a few hours later and the affected area may be red, itchy and tender for 2-3days.

2. Systematic reaction

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A systematic reaction generally occurs within a few minutes of stinging and it may involve a whole body rash wheezing, nausea, vomiting, abdominal pain and fainting.

3. Anaphylactic reaction

In this reaction symptoms can occur within a seconds, and they include difficulty in

- ☐ Breathing
- ☐ Confusion
- ☐ Vomiting
- ☐ Falling blood pressure that can load to loss of consciousness and death from circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason.

Those who are extremely sensitive may die from a single sting.

First aid for sting

☐☐The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.

☐☐An ice-cold compress applied after sting has been removed will relieve the pain

☐☐Anti-histamine;

o In the form of (1) Ointment (2) Injection

☐☐Adrenaline injection

In addition to these;

☐☐Work with bees in the late or in the evening

☐☐Avoid working bees in rainy, windy time

☐☐Smoke under the frame and wait two minutes before opening

☐☐While moving in the apiary, move slowly and quietly

☐☐Avoid crashing

☐☐Wash your protecting materials (glove, overall, etc) after three operation times.

☐☐When bee stings develop into large swelling and rash, medical advice should be sought straight away.

☐☐Anyone who is acutely allergic to bee sting and knows that unconsciousness may our a few minutes after a sting, must immediately inform someone, so that they may be

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transported as soon as possible to a doctor or a hospital for emergency injection treatment.

Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

Self-Check -5	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss the OHS hazard?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-5	Complying quality assurance and food safety requirements throughout process of extracting honey.
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5.5. Honey Standards

5.5.1. Bee-Stock Sources

While pedigree of the bees is not crucial to organic honey production, their handling in a manner that prevents contamination of future organic honey crops with residual honey or bee feed from non-compliant sources is crucial.

5.5.1.1. Acceptable sources of bees include:

- Colonies in existing organic hives;
- Colonies confined to brood chambers only covered by a queen excluder;
- Divided colonies from conventional hives on brood combs only;
- Package bee colonies;
- Nucleus colony ("nucs");
- Captured wild or migratory swarms on brood comb only.

The use of colonies that have combs containing existing honey produced from nectar collected from non-complying foraging areas is prohibited.

5.5.2. Principal Feed Source Areas

Organic honey must be produced by naturally foraging colonies that are located at least 2 miles distant, in straight-line flight, from any pollution source which could cause the honey to become contaminated by, or as a result of, returning foraging bees (e.g. synthetic-chemical sprayed agriculture, industrial centers, urban centers, etc.).

A detailed map of all forage areas is required from all applicants.

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5.5.3. Feed Supplements

Each bee-keeper is required to have a supplemental feeding plan, if starvation is imminent. This would include planning for sources of honey, sugar, syrup, fruit concentrate or other food source for non-flow periods.

If the hives are moved to non-compliant nectar and pollen sources, any organic honey must be removed before the hives are moved. In addition, the first honey extracted after the re-entry period back to the compliant apiary location must be treated as conventional honey.

The use of non-compliant feed supplements during honey flow is prohibited.

5.5.4. Health-Care Practices

Bottom boards may be scraped routinely to remove accumulations of wax and other debris that serve as food and shelter for wax moths.

Colonies infected with American Foulbrood must be destroyed.

Beekeepers are allowed to use the antibiotic oxytetracycline (terramycin) as a preventive measure against the spread of American Foulbrood into colonies. Antibiotic applications may be made only after the end of honey production, and must be terminated 30 days prior to the start of new organic honey production.

Menthol is allowed for control of Tracheal Mites (*Acarapis Woodi*).

Folic acid, formic acid, and lactic acid are allowed for the control of Varroa Mites with the following restrictions:

- Folic acid may be used after the end of the season's honey production. Its use must be discontinued 30 days before the addition of honey supers. The need for folic acid must be documented and approval obtained from QAI prior to its use;
- Formic acid has not been approved by the EPA for use against mites in the U.S. The need for formic acid must be documented and approval obtained from QAI prior to its use;

- Lactic acid may be used after the end of the season's honey production. Its use must be discontinued 30 days before the addition of honey supers. The need for lactic acid must be documented and approval obtained from QAI prior to its use.

5.5.4.1 The following practices are prohibited:

- Use of sugar syrup, or oil (shortening) based extender patties for administering antibiotics for American Foulbrood control;
- Use of synthetically compounded materials for health care.

5.5.5. Hives & Apiary Yard Locations:

Apiary "yards" should be located near abundant, forageable pollen and nectar crops; yards should be located in areas of low ant activity;

- Hives (if paintable) should be painted with non-toxic paint and in a suitable color for the climatic conditions;
- Comb foundations are to be made of pure beeswax, and frames are to be made from wood. Plastic frames, foundations or combs are prohibited;
- Additional supers (boxes of production combs above the brood chambers) are encouraged for successful colonies;
- Each individual hive must have a numbered I.D. code that relates to the bottom board, brood chamber boxes, queen excluder (if used), honey supers, and cover(s);
- Use of wet comb (extracted, but wet with honey) from conventional hives is prohibited.

5.5.6. Harvesting

5.5.6.1. Accepted methods for removing bees from the honey supers during harvesting include:

- Bee escapes with a natural smoke agitator;

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- Bee brush and transfer boxes;
- Forced-air bee blower.

The use of "fume boards" with non-compliant or unregistered repellents of any kind during harvesting is prohibited. Examples of these prohibited products include butyric anhydride (Bee Go and Honey Robber) or benzaldehyde

Self-Check -5	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are honey standard?
2. What are the procedure during honey harvesting?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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6.1. Perform a Basic Beehive Inspection

The approach for inspecting your beehive doesn't vary much from one visit to another. Beekeepers always follow certain procedures and always look for certain things. After a few visits to the hive, the mechanics of all this become second nature, and you can concentrate on enjoying the miraculous discoveries that await you.

Removing the first frame of the hive

Always begin your inspection of the hive by removing the *first frame* or *wall frame*.

That's the frame closest to the outer wall. Which wall? It doesn't matter. Pick a side of the hive to work from, and that determines your first frame. Here's how to proceed:

1. Insert the curved end of your hive tool between the first and second frames, near one end of the frame's top bar.
2. Twist the tool to separate the frames from each other.
3. Repeat this motion at the opposite end of the top bar.
4. Using both hands, pick up the first frame by the end bars.

Now that you've removed the first frame, gently rest it on the ground, leaning it vertically up against the hive. It's okay if bees are on it. They'll be fine. Or, if you have a frame rest (a handy accessory available at some beekeeping supply stores) use it to temporarily store the frame.



Use your hive tool to pry the wall frame loose before removing it.



Carefully lift out the first frame and set it aside. Now you have room to manipulate the other frames.

Working your way through the hive

Using your hive tool, loosen frame two and move it into the open slot where frame one used to be. That gives you enough room to remove *this* frame without the risk of injuring any bees. When you're done looking at this frame, return it to the hive, close to (but not touching) the wall. Do *not* put this frame on the ground.

Work your way through all ten frames in this manner, moving the next frame to be inspected into the open slot. When you're done looking at a frame, always return it snugly against the frame previously inspected. Use your eyes to monitor progress as the frames are slowly nudged together.

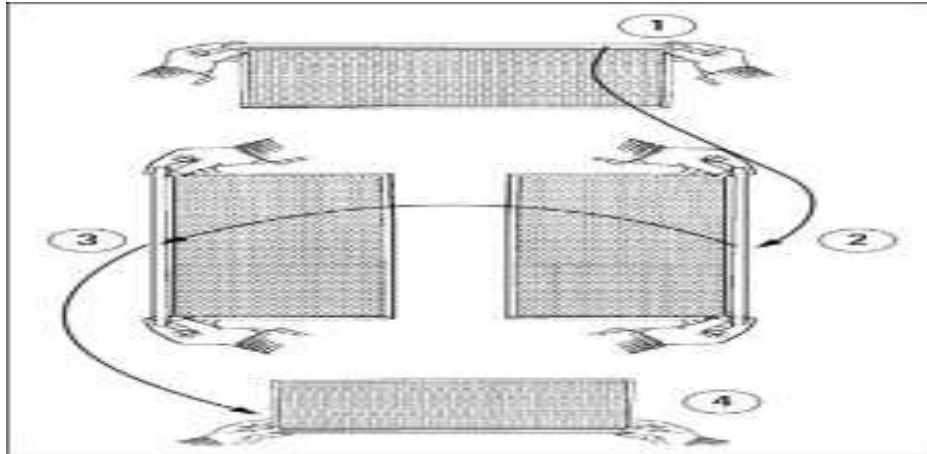
Holding up beehive frames for inspection

Holding and inspecting an individual frame the proper way is crucial. Be sure to stand with your back to the sun, with the light shining over your shoulder and onto the frame. The sun illuminates details deep in the cells and helps you to better see eggs and small larvae.

Here's an easy way to inspect both sides of the frame:

- ☐ Hold the frame firmly by the tabs at either end of the top bar.
- ☐ Turn the frame vertically.
- ☐ Then turn the frame like a page of a book.
- ☐ Now smoothly return it to the horizontal position, and you'll be viewing the opposite side of the frame.





Knowing when it's time for more smoke

A few minutes into your inspection, you may notice that the bees all have lined up between the top bars like racehorses at the starting gate. Their little heads are all in a row between the frames. Kind of cute, aren't they? They're watching you. That's your signal to give the girls a few more puffs of smoke to disperse them again so that you can continue with your inspection.

Understanding what to always look for in your hive

Each time that you visit your hive, be aware of the things that you always must look for. Virtually all inspections are to determine the health and productivity of the colony. The specifics of what you're looking for vary somewhat, depending upon the time of year.

Checking for your queen bee

Every time that you visit your hive you're looking for indications that the queen is alive and well and laying eggs.

Rather than spending time trying to see the queen, look for *eggs*. Although they're tiny, finding the eggs is much easier than locating a single queen in a hive of 60,000 bees. Look for eggs on a bright, sunny day.

Storing food and raising the bee brood

Each deep frame of comb contains about 7,000 cells (3,500 on each side). Honeybees use these cells for storing food and raising brood. When you inspect your colony, noting what's going on in those cells is important because it helps you judge the performance and health of your bees.

Inspecting the brood pattern

Examining brood pattern is an important part of your inspections. A tight, compact brood pattern is indicative of a good, healthy queen. Conversely, a spotty brood pattern (many empty cells with only occasional cells of eggs, larvae, or capped brood) is an indication that you have an old or sick queen and may need to replace her.

Recognizing foodstuffs in your beehive

Learn to identify the different materials collected by your bees and stored in the cells. They'll pack pollen in some of the cells. Pollen comes in many different colors: orange, yellow, brown, gray, blue, and so on. You'll also see cells with something "wet" in them. It may be nectar. Or it may be water.

Self-Check -6	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss frame inspection?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Introductions

Before we begin, let me first introduce Her Majesty: *Apis mellifica* (honey bee in Latin)! Also, here are some hard working worker bees, bees with pollen on their legs and one cutie stuck in the nectar with pollen! They collectively make a honey harvest possible!



Harvest

Light the smoker. Use dry branches, hay or newspaper. The smoke dulls the bees' receptors, and prevents them from releasing the *alarm odor*, a volatile pheromone. The smoke also makes bees gorge on honey, which further pacifies them! Just think about it: how mad would you be if someone got into your house and stole your preciousness?!



Prepare Supers

The frames with honey comb are transported in supers. Have them handy. You may also want to have a cloth to cover the super with frames



full of honey to prevent bees or other insects from getting to them

Open Sesame

Using the hive tool, lift the hive lid and blow some smoke in the hive. Open lid slowly. Our bees were pretty calm, but that is not always the case!



Honey Frame Inspection

Pull the frames out of the super and inspect the honey combs. Depending on how busy the bees were, how warm it was and if the hive didn't swarm, you may have anywhere between 20 to 100 pounds of honey! Inspect frames. Uncapped cells with some nectar in it are not harvested; only sealed frames are.



Inspect All Supers

Depending on the hive configuration, there might be multiple supers to inspect. Take the super off the hive and move it to a clean surface. Repeat.



Scrape Extras

If there are any extra cells in between the supers and frames, scrape it off with a hive tool. Make sure to taste it right there - there is nothing like nectar, honey and wax freshly harvested!



Extraction

Now the best part! Take the frame of capped honey. Mount the frame above the tub for wax and honey. Use the heated knife to unseal the cells. Lean the heated knife on the edges of the frame and under 30 degree angle and move "fast" - don't linger too long, it burns the honey! Repeat for both sides of the frame. The heated knife takes off most of the caps. For the leftover ones, use the uncapping fork and gently shave off the caps.



Let 'em Spin!

Preheat the extractor. Place the uncapped frames in the extractor, as you uncap them. Once all the frames are secured, close the lid and start the extractor. It should start slowly, and then speed it up. Within 10-15 minutes, all the honey will be out of the honeycomb, stuck to the bottom and sides of the extractor!



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Let 'em Spin! Preheat the extractor. Place the uncapped frames in the extractor, as you uncap them. Once all the frames are secured, close the lid and start the extractor. It should start slowly, and then speed it up. Within 10-15 minutes, all the honey will be out of the honeycomb, stuck to the bottom and sides of the extractor!



Self-Check -7	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss the procedure of honey bee harvest?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Question

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8.1. Uncapping machine

Uncapping machine is a specially-built stainless steel machine that uses two vibrating spring-loaded knives to uncap both sides of the comb at the same time. The cutting depth is adjustable. The blades are heated by steam or hot water. Uncapping machines are chain-driven with forward and reverse controls. They are powered by an electric motor. An uncapping machine can uncap about eight frames a minute. They are very popular with both commercial and small beekeepers.



Uncapping machine

8.2. Hand-held knives/ uncapping fork

Uncapping fork is a hand tool used to open the sealed cells of ripened honey before the farmed honeycombs are placed in the honey extractor.



Uncapping fork

There are four types of knives that can be used. Skilled operators can uncap 1-3 combs a minute with a hand-held knife. Depending on the design, hot water-heated knives are

immersed in hot water or hot water is circulated through a jacket in the knife. An electrically-heated knife is heated by an electric element for continuous use. A steam knife has a jacket which circulates steam, also for continuous use.



Self-Check -8

Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Identify the materials and equipment used for bee harvesting ?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Place the uncapped combs vertically in the baskets of the extractor that support them. In the nonreversible type of extractor, you must reverse the combs by hand to extract the honey from the other side of the comb. Reversible extractors have baskets that pivot to extract first one then the other side of the comb without lifting and reversing frames.

Either the hand- or power-driven extractors are turned slowly at first. If the extractor is turned too rapidly, the weight of the honey may break the combs. The combs are spun until about half the honey is removed from the first side. Then the combs are reversed and spun until the second side is completely extracted. Finally, the combs are reversed a second time and the remaining honey from the initial side is removed. The time required to throw honey from the combs depends on the density and temperature of the honey. Watch the side of the tank to see when the honey stops flowing from the combs to determine when extraction is complete.

As honey is spun out of the combs, in the smaller extractors it runs down the side of the drum to a honey gate and in the larger ones it goes through an outlet into a sump. Larger extractors have a jacket built into the extractor reel to warm the honey as it runs over to make straining easier.

Once all the honey has been extracted, the frames are ready to be put back in the supers for returning to the hives to be refilled by the bees or stored for later use. This is a good time to cull sub-standard combs. You should remove combs with broken frames or wires, broken combs, excess drone comb and old, black combs.

Self-Check -9	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. During honey harvesting time how the frame would be put in to the extraction unit?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

10.1. Straining honey

All extracted honey must be strained or the equivalent. The best and most convenient time to strain is immediately following the extracting process, while the honey is still liquid. If the honey is to be packed by the beekeeper in consumer containers, then it must be strained in a manner which will meet at least the minimum grade standards. A double course honey strainer is commonly used in our country to strain honey after extraction.



Extraction should take place as soon as harvested strain the honey immediately following extraction

Honey from traditional hive

- ☐ Harvest only ripe honey
- ☐ Separate pure & ripe honey from brood & pollen combs
- ☐ Thoroughly crush the combs immediately after harvesting
- ☐ Allow to drain using different sieve sizes
- ☐ Warming for further purification

- ☐ Both traditional & box hive honeys
- ☐ it is not advisable to heat honey b/se affects its quality

So heating should be

- ☐ in water bath
- ☐ lowest possible temperature
- ☐ shortest possible time
- ☐ continuous stirring

Fermentation

Fermentation causes a great damage if honey within a short period.

To prevent honey fermentation

- harvest ripe honey only
- keep in air tight ended container
- store below <11oc

10.2. Harvesting Beeswax

Beeswax is one of the important high value bee product

Beeswax is used for more than 300 purposes

For - cosmetics - Parma cuticles 31

Polish- others

Annual production of beeswax is estimated to be 5000 tons

From this only <10% is used for export purpose

The remain large portion is wasted different level.

This is mainly due to lack of knowledge on how to process and utilize the beeswax.

Most of the beeswax is damaged by wax moth & waste at beekeepers gate.

In traditional beekeeping, beekeepers cut damp large amount of beeswax. Processed beeswax can stay 10-20 years without deterioration of its quality it cannot be attacked by wax moth

10.3. Processing of crude beeswax /safe/

1st pick large particles (leaves & sticks of Gesho (Rhamno perinoids) then sock with water for 12-24 hrs to dissolve water soluble impurities and for easy release of the wax from the cocoon then transfer the beeswax to a bowl after squeezing the water from the beeswax melt the beeswax by adding water up to the level of beeswax .

During melting

- -it should not be piously heated
- it has to be stirred continuously
- After complete melting strain the beeswax using sack or kaki fabric
- Applying mechanical force to efficiently recover the beeswax
- Then allow to settle solidifier for 12 hour
- Then remove the beeswax block
- Scrap the impurities from the bole



Old combs from traditional & box hives can be processed following the same procedures

Other bee products

There are high value bee products other than traditional products (honey & beeswax)

These are

- ☐ propels
- ☐ royal jelly
- ☐ pollen & others

Among these propolis can be produced and market traditional & box hives

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Self-Check -10	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss other products of bee products? 3 points
2. Write the procedure of wax melting? 3 points

Note: Satisfactory rating - 6 points

Unsatisfactory - below 6 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

11.1. What is honey?

Honey is a fluid, viscous or crystallized substance, produced by bees from the nectar of blossoms or secretions of pests living on plants that bees collect, transform or combine with substances of their own, which they then store and leave to mature.

11.2. The chemical properties of honey

Its main components are water and sucrose. Sucrose is composed of glucose and fructose, and it is the glucose-to-fructose ratio that determines some of honey's most noticeable physical characteristics, such as how long it will take to crystallize, for example. Water is always present in honey, and the amount is critical to the beekeeper when processing or storing extracted honey. The beekeeper should always check their honey to ensure that this moisture/water presence is within bounds. A more detailed definition of the composition of honey would be as follows:

- Honey is composed mainly of sugars and water.
- The average honey is 79.6% sugar and 17.2% water.
- The main sugars are fructose (38.2%) and glucose (31.3%).
- Other sugars include maltose (7.3%) and sucrose (1.3%).
- Honey also contains acids (0.57%) that contribute to its resistance to damage by micro organisms (Eg. Succinic, gluconic, acetic citric and butyric acids).
- , protein (0.26%), a small amount of minerals (0.17%) such as K, Na, Ca, Hg ,Fe, Cu, Mn, Cl, P and S and the mineral content varies depending on variety of plant, soil types, and climatic condition

- Enzymes- sets honey apart from all other sweetening agents (Eg- invertase ,diastase , Glucose oxidase and acidic phosphate)
- A number of other minor components, including pigments, flavor and aroma substances, sugar alcohols, colloids and vitamins. This group of materials constitutes about 2.2% of the total composition.

11.3. Physical properties of honey

Hygroscopic – the ability of honey to absorb or remove moisture.

Viscosity - resistance to flow and affected by moisture/ water / content, the quantity of non-sugar and the temperature. The more moisture contents the less viscosity of honey and the warm the temperature the less viscosity.

Color – it varies from nearly colorless to dark brown. The types of plant, the mineral content, and post and pre harvest treatment affect the color of the honey

Crystallization (granulations) or supersaturating of honey happens if honey is stored at temperature below the hive temperature. The rapidity of granulation depends on glucose to water ratio, fructose to glucose and viscosity.

11.4. Moisture content of honey

Honey is hygroscopic, that is, it will absorb moisture from the atmosphere or damp surfaces that it comes into contact with. It is the moisture and wild yeast in honey that causes fermentation to begin. This can seriously affect the quality and longevity of your product. The following table shows the different levels of moisture in honey and its liability to ferment.

Moisture %	Liability to ferment
Less than 17.1	Safe regardless of yeast
17.1–18 Safe	if yeast count < 1,000/g
18.1–19 Safe	if yeast count < 10/g

19.1–20 Safe	if yeast count < 1/g
Above 20	Always in danger

The following table presents the World Health Organization's requirements for the moisture and other compositions of honey:

Composition	Percentage
Glucose and fructose	Not less than 65%
<i>Moisture content</i>	<i>Not more than 21%</i>
Sucrose	Not more than 5%
Water soluble solids	Not more than 0.1%
Mineral content	Not more than 0.6%
Acidity	Not more than 40 milli equivalents of acid per kilo
Diastase activity	Not less than 8 on the Goethe Scale
Hydroxy methylferfural	Not more than 40mg HMF per kilo

11.4.1. Estimating the level of moisture in honey

A simple way to test the density of honey and therefore estimate the moisture content of your honey is to place the honey in a jar, leaving a small amount of air and put the lid on it. Turn the jar upside down. The longer it takes for the bubble to rise to the 'top', the denser the honey and the lower the moisture content



In Laboratories and very large commercial operations, a device known as refractometer is used to determine the moisture content of honey. This is not practical for most beekeepers although some beekeepers do use them.

11.4.2. Removing excess moisture from honey

High-moisture honey may ferment. After honey supers are removed from the colony, they should be held in a warm, dry area until extraction. The best time to remove excess moisture from honey, if necessary, is while the honey is still in the comb. Either store the supers in a warm room at 75°–80°F (23–26°C) for a couple of days or stack them over a light bulb so that the heat passes up through the frames and warms the honey. Shield the light bulb so that honey and wax will not drip directly onto the bulb. An electric fan can be used to circulate the air in the room.

Alternatively, you can use a clean vacuum cleaner to force air directly through a stack of supers; cut a hole in a super just large enough to permit the entry of the vacuum hose. Above this super, stack seven or eight supers of honey and turn on the vacuum so that it will force a large volume of warm, dry air through the combs. The amount of moisture removed will be related to the relative humidity and volume of circulating air. In large commercial operations, supers usually are placed in hot rooms before extraction. Warming honey will also speed up the extraction process. Honey held for a few days at

room temperatures between 80°F (26°C) and 90°F (32°C) is ideal for quick complete extraction.

Fermentation can also be prevented by heating the honey to a temperature of 55 to 60 °C over a period of 8 hours, followed by rapid cooling. However, heating honey for much longer will diminish its taste, smell, enzyme content and health value.

Self-Check -11	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss the chemical properties? 3 points
2. Define the following ? 3 points each
 - ❖ Hygroscopic
 - ❖ Viscosity

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-12	Taking action to reduce risk of fermentation of honey.
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Fermentation

Fermentation causes a great damage if honey within a short period.

To prevent honey fermentation

- harvest ripe honey only
- keep in air tight ended container
- store below <11oc

Self-Check -12	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What kind of measurement done to prevent honey fermentation ? 5 points

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Name: _____

Short Answer Questions

Score = _____
Rating: _____

Date: _____

13.1. Bottling honey

Once your honey has set for a day or two you can begin bottling. The warmer the temperature the easier the honey flows. Bottle your honey in a warm room or raise the temperature for this process. To fill small pots and jars easily, use a container with a valve. Raise the honey pails up to a convenient height like a table or counter top. Place garbage bags underneath the honey gate to catch any honey drips. Have your bottles ready and slowly open the honey gate on the pail and fill your bottles. Continue until all the honey is gone. After you have filled your honey containers, you need to label it.

The containers in which honey is handled /Stored/ can be glass or plastic jars, plastic buckets with well-sealing lids or metal containers that have been coated on the inside with liquid paraffin or plastic, or that have been treated with food-safe varnish. Containers made from copper, iron, and zinc should not be used as they can be dissolved into honey and affect flavor and color (possibly reaches toxic levels)

13.2. Storing honey

Storage temperatures and the length of storage can affect honey quality. Changes in processed honey are kept to a reasonable level if the following storage principles are followed.

- only use food grade honey containers
- reject any damaged honey containers
- clean all honey containers with hot water or steam
- drain all honey containers and allow them to dry before use
- ensure all bulk honey containers have food grade seals and are completely full
- Store honey out of direct sunlight (Both sunlight and artificial light further affect honey stored in clear glass bottles), preferably in a covered storage area where

the temperature between 70°–75°F (21°–24°C). Unprocessed honey is best stored below 50°F (10°C). For long-term storage, keep liquid honey in a freezer at 0°F (–18°C).

- label the storage containers with the type of honey, floral source, date extracted and tracing identification data
- Store honey at temperatures of. Even at room temperature, honey gradually becomes darker and changes flavor and composition. Differences will be visible in less than one year.
- Keep only finely crystallized or creamed honey in a refrigerator or in similar cool environments.

Self-Check -13	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the principle of honey storage ? 5 points

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

14.1. Labeling Requirements for Honey

Everything you need to know about honey labels as simply as possible. Labels must follow the relevant federal and state guidelines. If you want to participate in specific such as becoming a Certified Honey Producer or selling honey at NC state farmers markets, you must meet additional label requirements. A well-designed honey label can go a long way towards attracting customers to your honey. But your honey labels must also contain all the required information, or your honey runs the risk of being removed from a store's shelves or a farmer's market booth. Read on to make sure your labels are in compliance.

14.2. Honey Labeling

Honey is a natural sweetener created from flower nectar by bees, bumblebees, honey wasps and some other insects. Though completely original in its natural form, some mass scale honey producers are giving antibiotics to bees or contaminating the honey in other ways for different purposes. That's why honey buyers and importers have to be extra careful about the quality of the honey they are purchasing. Honey labels are very important in this respect. They tell us where the product came from, who manufactured it and if there are any other ingredients added. If the honey is labeled "Honey", or marked with more informative labels about the honey's source, such as "Lavender Honey", "Clover Honey", etc., you don't need to include the ingredients section on the label, since honey is the only ingredient in a pure, natural honey. However, If you add sweeteners or some other ingredients, then you need to make that clear. On FDA website you'll find detailed information about the requirements for proper labeling.

Self-Check 14	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define the following? 3 points

- ❖ honey labeling
- ❖ honey storing

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

BEEKEEPING LEVEL II

Learning Guide #2

**Unit of Competence: Assist in Harvesting &
Processing Bee
Products**

**Module Title:- Assisting in Harvesting &
Processing Bee
Products**

LG Code: AGR BKG1 M10 LO2-LG-2

TTLM Code: AGR BKG1 TTLM 0919v1

Lo1 Extract, process and store wax

Instruction Sheet	Learning Guide #2
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Cleaning, drying, sanitizing and checking equipment for serviceability and use.
- Selecting crude bees wax for extraction of bees wax
- Suitable PPE are selected and checked prior to use.
- Identifying Occupational Health and Safety (OHS) hazard.
- Complying quality assurance and food safety requirements throughout process of extracting honey.
- Soaking crude bees wax.
- Allowing soaked crude bees wax to boiling water and melt.
- Placing melted waxes in extraction unit.
- Heating and straining to remove wax, air bubbles, pollen and bees
- Removing fine debris, pollen and bees by using manufacturer's instruction
- Storing cleaned bees wax in suitable containers to meet customer requirements.
- Labeling and storing bees wax according to enterprise, food safety and quality assurance requirements.

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to: –**

- Clean, drying, sanitizing and checking equipment for serviceability and use.
- Select crude bees wax for extraction of bees wax
- Suitable PPE are selected and checked prior to use.
- Identify Occupational Health and Safety (OHS) hazard.
- Comply quality assurance and food safety requirements throughout process of extracting beeswax.
- Soak crude bees wax.
- Allow soaked crude bees wax to boiling water and melt.
- Place melted waxes in extraction unit.
- Heat and straining to remove wax, air bubbles, pollen and bees
- Remove fine debris, pollen and bees by using manufacturer's instruction
- Store cleaned bees wax in suitable containers to meet customer requirements.
- Label and storing bees wax according to enterprise, food safety and quality assurance requirements.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.
3. Read the information written in the "Information Sheets 1". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the "Self-check 1" **in page -.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to "Information Sheet 2". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio

1.1. Cleaning beekeeping equipment.

These notes refer to routine cleaning only. Contact your seasonal bee inspector for advice on equipment clean-up after AFB. Our notes mention washing soda. This is **not** the same as caustic soda. See Dry Pak washing soda. We suggest a regular strength of half a cup (100g) to one pint or 500ml of warm water. **Work safely!** Wear rubber gloves and eye protection when scrubbing with washing soda. Dispose of any waste responsibly. Beehive scrapings are great



Cleaning a Seagrove board

Smoker Remove any loose debris. Warm the inside with a blowlamp for 30 seconds, just enough to soften caked-on debris. Wearing work gloves, scrape the inside clean. Scrape inside the lid. Allow to cool. Make sure the lid opens and closes easily. Burn the scrapings.

Hive tools Scrub clean in washing soda solution. Many beekeepers store their hive tools in a plastic tub of washing soda solution, with a snap on lid.

Plastic feeders Remove from the hive promptly, or they will go moldy. Clean in a dishwasher.

Wooden feeders Ashforth/Miller/Brother Adam. Scrape off any dry sugar. Scrub clean with warm water. If in any doubt, check they don't leak before using again (Fill with cold water).

Bee suit Wash your bee suit regularly. Seasonal bee inspectors wash their bee suits every day. Follow the maker's instructions. Bee suits can harbor stings. The alarm pheromones make the bees angry. I zip up my Sherriff bee suit with the veil tucked inside, and wash at 60 deg C maximum. Hang up to dry thoroughly before storing, or they may go moldy. If your suit becomes moldy, try soaking it in bio washing powder overnight, and washing in bio powder.

Gloves See our page on [Beekeeping Gloves](#). Leather gloves are unwieldy to use, difficult to clean and they attract stings. Follow the maker's washing instructions. I wash gloves at 40 deg C maximum. Any hotter and they will probably shrink.

Honey extractor Remove the cage and wipe clean. Rinse out the drum with warm water. Dry thoroughly and reassemble. Check cage spins freely. Never leave the extractor in the garden for the bees to clean. The bees will go crazy, and will start robbing.

Honey jars I wash 50 x 454g jars at a time in the dishwasher on a quick cycle. Allow to dry. I use a wooden crown board as a tray, holding 25 x 454g jars.

Honey jar lids I use gold plastic lids straight from the bag.

Timber framed wire queen excluders I use a Thorne's [10-slot wire excluder cleaner](#). Scrape the frame clean.

Zinc excluders Scrape clean on a flat work bench. Do not use a blowlamp. The zinc may melt.

Glass quilts Scrape wooden frame clean. Scrub glass clean with washing soda solution and rinse.

Correx varroa trays Scrape off debris. Scrub clean with washing soda solution and rinse.

Crown boards Scrape clean, scorch with blowlamp.

Mesh floors Scrape woodwork clean. Do not blowlamp galvanized mesh. Zinc fumes are toxic. Scrub mesh clean with washing soda solution.

Metal and plastic frame ends I freeze 500g margarine boxes full of frame ends overnight, then empty them into a 15lb honey bucket or similar, kept for the purpose. Fit the lid and shake vigorously for 30 seconds. See before and after pictures.

Porter bee escapes Working outdoors and wearing gloves, I clean two escapes at a time, holding back to back with pincers. Pour a kettle full of hot water into the spring mechanism. Be careful!

Extractor cleaning

A honey extractor is one of the most expensive individual pieces of equipment a beekeeper is likely buy [†]. If you're lucky, your association might own one or more extractors and make them available to borrow or hire. However you get hold of one, after use they need to be thoroughly cleaned before storing (or returning) them.

Don't, whatever you do, follow the advice on some websites or beekeeping forums (fora?) and leave the extractor outside "*for the bees to clean*". **This is a very bad idea.** The [feeding frenzy](#) that results is a perfect way to spread disease.

Patience, cold water, more patience and a hairdryer

The used extractor will have quite a bit of residual honey adhering to the sidewalls and floor. You can scrape this out using a flexible silicone spatula but it's a messy process and almost guaranteed to cover you from wrist to [oxter](#) in honey. It's far easier to:

- close the honey gate securely

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- tip the extractor up at a steep angle so the honey runs towards the gate
- turn the heating up in the room and leave it overnight

The following morning the majority of the honey will have drained down towards the honey gate, this can then be bottled for home consumption or used for mead or [marmalade making](#). It's not unusual to get a pound or more of honey like this ... it'll be a bit frothy and might be less well-filtered but it will still be delicious.

1.2. How often should I Clean My bee process and store equipment

I've covered how to clean your equipment, but how often should you do this? It depends upon you and the equipment really.

1. The Bee Suit

You can get away with cleaning the bee suit every 3-4 uses. In reality, I guess it depends upon how dirty your suit gets when you work with your bees.

Plus, it depends upon how much you sweat. Also, consider how you feel about putting it on each time.

Now, my husband is the type that he could care less how clean it is. He'll wear it until I snatch it from him and refuse to let him wear it until it's clean again.

Granted, you do wear clothing under the suit so I can kind of see his point.

However, for me, I prefer to wash mine every use or two. So it is personal preference. And for the people out there like my husband, try to be patient if you have loved ones around you like me. We only wash everything to death because we care.

2. The Veil

I would wash the veil as frequently as I wash the suit. I understand it gets nastier faster probably because you can't help but sweat a lot in your face when working with bees, and you don't have layers of clothing between the veil and your sweat.

So if you feel like it needs to be washed after every use, since it is being hand washed, I don't think it would hurt much. You'll know if you're over washing items because the fibers will start to wear out. Just keep an eye out for that.

3. Your Tools

The hive tool and smoker need to be washed on an 'as needed' basis. You'll know when they need it.

But again, it will be based around your personal preferences. I'm the type that doesn't like to work with a lot of left over material on my tools.

However, my husband could care less. So it's up to you.

4. The Hives

You all can breathe a sigh of relief. I'm not going to tell you I wash our hives every time we're done with them (though you were probably expecting it, weren't you?)

No, instead, you only put them in the 'gas chamber' once a year and that is at the very end of the season. There is no need to do anything besides just clean up the propolis on the hives in between uses during the same season.

But I do recommend storing your bee equipment where it has plenty of shelter. Make sure it is in a building, a barn (we actually store our equipment in our pole barn), or if you don't have room for it just yet make sure it has a tarp over it to protect it from the elements. This will help with the longevity of your equipment for sure.

Well, I really hope that this information will help you all to protect your bee equipment. As I said, it is quite the investment so it needs to be taken care of. But I want to hear from you. How do you clean your beekeeping equipment? Do you have any special tricks to getting things super clean and sanitized?

1.3. Clean honey storage containers

Storing honey in containers means that you will at some time scoop or pour out honey. Some honey may run down the sides of your honey container after pouring or scooping out what you need. Honey on the sides of the container will attract ants to the honey. To prevent this, use a wet cloth to wipe off any honey on the sides of honey storage containers.

Self-Check -1	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss wax cleaning way?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Question

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2.1. Beeswax

Bees wax is produced from four pairs of wax glands in the abdomen of the worker bee. Bees need to consume a lot of honey to produce wax. Bees consume over three kilograms of honey to produce one kilogram of wax. That is why foundation wax is provided to bees and wax is given to bees after honey extraction. This method, in addition to saving time, minimizes the time honey bees would need if they were to produce wax themselves.

2.2. Characteristics of bees wax

Wax is dry and brittle when cold. When it is hot it is soft and malleable. When liquid wax solidifies it shrinks and the volume decreases by 9.6%. When wax is first produced it has whitish color and the color changes when it is mixed with pollen. The color of wax may be white, yellow or orange. Wax has its own distinct aroma.

2.3. Contents of bees wax

Beeswax is a mixture of over 300 complicated elements. This makes it difficult to artificially produce wax. Beeswax is directly and indirectly used in medications and in cosmetic productions. This requires maintenance of quality and prevention of wax from adulteration.

2.4. Processing and Handling of bees wax

Bees wax may be harvested from frame, transitional and traditional hives. Out of honey harvested from transitional and traditional hives, 8%-10% is wax while that of frame hive is 0.5%-1%. Most of the honey produced at national level is used for making *tej* and *birz*. Most of the wax is used in the process of making drinks and wax is obtained in the

filtering process of the drinks. When colony absconds, wax can be harvested from the hives. Because there is no realization of proper harvesting and processing of bees wax, most of the wax harvested is not effectively used.

The following cares should be taken when melting beeswax.

1. Use low temperature which slowly melts beeswax.
2. Bees wax is inflammable and direct contact with fire should be avoided.
3. Add water to the beeswax or use the indirect heating method similar to that of melting honey.
4. Do not add water to melted beeswax.
5. Use any melting bowl to melt beeswax.

2.5. Processing of bees wax

There are various ways of processing beeswax: Solar, evaporation, pressing and by simple melting using bowl and water.

2.6. Solar Processing of bees wax

The energy from the sun can be used to melt wax. Solar extractor box is used to convert sunlight to heat which melts the wax. Wax processed this way has the best quality in that it retains most of its elements. It may be difficult to apply this in the rainy season.

2.7. Processing Using Sacks

Beeswax collected from *tej beverage cottage industries* and old honey combs are first separated from foreign particles. It is then soaked in water for 24 hours. This is done to remove pollen and to separate the wax from other particles. This is then washed and mixed with water and when all of it melts, it is placed in fiber sack. Container is placed to collect the wax which is squeezed out of the fiber sack. Two people, one from each edge, hold the sack over the container and twist the edge of the fiber sack in opposite directions. This should be done while the wax is still hot.

If the volume of wax to be squeezed is big more people can be involved and they can use big sized sticks to press it down from kept in a room free of pollutants and chemicals. Processed wax has a very long shelf life. The middle, assisting the ongoing

squeezing process. Such squeezed wax should be left to cool down. The container in which the squeezed wax is collected should be narrower from its base and wider at the top. Impurities tend to collect at the bottom and such shape makes collecting the pure wax easy. Finally, take the solid wax and use knife or sharp object to scrap off impurities from the Fig. wax extraction using sisal sacks base. The processed wax should be

2.8. Uses of Beeswax

It has been over 5000 thousand years since mankind started to use beeswax. It has also been in the market as a commodity for thousands of years. Documents indicate that in Ethiopia, there has been marketing of wax for over three thousand years. Because beeswax is easy to carry and transport and because it has a long shelf life, beeswax was used as currency to purchase goods to pay taxes, compensation and for remuneration.

1. Beeswax in Cosmetics

It is one of the components in the cosmetic industries of the world. Hair cream, pomade, lipsticks, face-cream and the like can be prepared and distributed for use.

2. Beeswax in Medicine

Twenty five to fifty percent of all the beeswax produced in the world is used for pharmaceuticals. Wound lotions, medicated lotions, insect repellants, coating for pills and dental medicine are among those made with beeswax.

3. Beeswax in Polishes

Beeswax is used to make home and office floor and furniture polishes. It is also used to make shoe and car polish and in the making of different varnishes.

4. Beeswax in Stationeries

Beeswax is used to make writing carbon, pen ink and photograph printing ink. Other uses of beeswax include its use in making chewing gums, candles, making explosives, threads, moulds and swimming goods. It is good preservative of dead body of humans

Self-Check -02	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the characteristics of bee wax?

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-3	Suitable PPE are selected and checked prior to use
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3.1. Selecting and checking Personal Protective Equipment (PPE)

Consists of the following items:

1. Veil: for covering head and face and giving protection from stings.
2. Overall: for covering the rest of the body
3. Gloves: for covering the hands
4. Boots: for covering the feet.

3.2. Identifying Occupational Health and Safety (OHS)

The sting

The worker sting is a highly modified for its defensive purpose.

The sting is found in the sting chamber, invisible, last segment. The entire pack of the sting is divided into two regions.

Factors affecting the sting of a worker honey bee

1. Genetic make up

Some are highly aggressive Eg. Tropical bees

Some bees are highly gentle/docile/. Eg. European bees

2. Condition of time

☐ When there is scarcity of forage or less nectar flow

☐ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions of stings

In human reactions to stings take place on three levels

1. Localized reaction
2. Systematic reaction

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3. Anaphylactic

1. Localized reaction

In the first kind of reaction the initial localized swelling is followed by more extensive swelling a few hours later and the affected area may be red, itchy and tender for 2-3days.

2. Systematic reaction

A systematic reaction generally occurs within a few minutes of stinging and it may involve a whole body rash wheezing, nausea, vomiting, abdominal pain and fainting.

3. Anaphylactic reaction

In this reaction symptoms can occur within a seconds, and they include difficulty in

- ☐ Breathing
- ☐ Confusion
- ☐ Vomiting
- ☐ Falling blood pressure that can load to loss of consciousness and death from

circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason. Those who are extremely sensitive may die from a single sting.

First aid for sting

☐ ☐ The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.

☐ ☐ An ice-cold compress applied after sting has been removed will relieve the pain

☐ ☐ Anti-histamine;

o In the form of (1) Ointment (2) Injection

☐ ☐ Adrenaline injection

In addition to these;

☐ ☐ Work with bees in the late or in the evening

☐ ☐ Avoid working bees in rainy, windy time

☐ ☐ Smoke under the frame and wait two minutes before opening

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- While moving in the apiary, move slowly and quietly
 - Avoid crashing
 - Wash your protecting materials (glove, overall, etc) after three operation times.
 - When bee stings develop into large swelling and rash, medical advice should be sought straight away.
 - Anyone who is acutely allergic to bee sting and knows that unconsciousness may occur a few minutes after a sting, must immediately inform someone, so that they may be transported as soon as possible to a doctor or a hospital for emergency injection treatment.
- Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

Self-Check -03	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the suitable ppe?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-4	Identifying Occupational Health and Safety (OHS) hazard
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4.1. Identifying Occupational Health and Safety (OHS)

The sting

The worker sting is a highly modified for its defensive purpose.

The sting is found in the sting chamber, invisible, last segment. The entire pack of the sting is divided into two regions.

Factors affecting the sting of a worker honey bee

1. Genetic make up

Some are highly aggressive Eg. Tropical bees

Some bees are highly gentle/docile/. Eg. European bees

2. Condition of time

☐ When there is scarcity of forage or less nectar flow

☐ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions of stings

In human reactions to stings take place on three levels

1. Localized reaction

2. Systematic reaction

3. Anaphylactic

1. Localized reaction

In the first kind of reaction the initial localized swelling is followed by more extensive swelling a few hours later and the affected area may be red, itchy and tender for 2-3days.

2. Systematic reaction

A systematic reaction generally occurs within a few minutes of stinging and it may involve a whole body rash wheezing, nausea, vomiting, abdominal pain and fainting.

3. Anaphylactic reaction

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In this reaction symptoms can occur within a seconds, and they include difficulty in

- ☐ Breathing
- ☐ Confusion
- ☐ Vomiting
- ☐ Falling blood pressure that can load to loss of consciousness and death from circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason. Those who are extremely sensitive may die from a single sting.

First aid for sting

☐ ☐ The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.

☐ ☐ An ice-cold compress applied after sting has been removed will relieve the pain

☐ ☐ Anti-histamine;

o In the form of (1) Ointment (2) Injection

☐ ☐ Adrenaline injection

In addition to these;

☐ ☐ Work with bees in the late or in the evening

☐ ☐ Avoid working bees in rainy, windy time

☐ ☐ Smoke under the frame and wait two minutes before opening

☐ ☐ While moving in the apiary, move slowly and quietly

☐ ☐ Avoid crashing

☐ ☐ Wash your protecting materials (glove, overall, etc) after three operation times.

☐ ☐ When bee stings develop into large swelling and rash, medical advice should be sought straight away.

☐ ☐ Anyone who is acutely allergic to bee sting and knows that unconsciousness may our a few minutes after a sting, must immediately inform someone, so that they may be transported as soon as possible to a doctor or a hospital for emergency injection treatment. Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

Self-Check -04	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are Factors affecting the sting of a worker honey bee?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-5	Complying quality assurance and food safety requirements throughout process of extracting beeswax.
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5.1. Determining elements of the industry quality assurance requirements.

These include Hazard Analysis Critical Control Point (HACCP) charts, mission statement, work instructions, corrective action and monitoring procedures, standard operating procedures, and enterprise and industry policies and welfare code of practice

- Establishment design: good premises and equipment design avoid contamination.
- Control of operation: purchasing (food animals/food materials) processing and distribution should be design to prevent or reduce contamination.
- Establish maintenance and sanitation: adequate maintenance sanitation, pest control and proper waste disposal.
- Transportation: hygiene food transportation enables to reduce food contamination.
- Training: offering periodical training changes the attitude of personnel towards hygiene
- Application of HACCP, SOP, enables hygiene food production
- Good manufacturing practice GMP and good hygienic practice GHP also guarantee hygiene food production

5.2. Identifying food safety hazard

Food safety refers to the condition and practice that preserve the quality of food to prevent contamination and food borne illnesses (all measure taken to prevent food borne infection and in toxification and, is the assurance that food will not cause harm to the consumer when it is prepared and /or eaten or is not spoiled.

Food can transmit disease from person to person as well as a growth medium for bacteria that can cause food poisoning.

Hazards in food can be due to biological/microbiology or non microbiological

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A) biological or microbiological

Parasite c.bovis, c. cellulosa, echnococcosis, trichenella, toxoplasm

Bacteria bacillus, clostridia, staphylococcus, salmonella, shigella and TB

Virus hepatitis and polio

Poisons animals fishes, craps

Poisons plant: alkaloids, glycosides, saponine, gossyp

B) Non microbial food contaminant

Residues	chemicals
preservative	Hormone
pesticides	colorant
additives s	antibiotics

5.3. Determining critical control points for work area.

HACCP stands for hazard analysis/**critical control points**. It is a method to establish for an existing production process what control measures are essential to assure the safety of the products made. The same method can be applied for other quality characteristics, but the emphasis generally is on safety.

It establishes specific control measure at each identified critical control point of production, from harvesting to process and to consumption of final product.

The term **critical control point** is a point, step or procedure in food process at which control can be applied and as a result of which, a food safety hazard can be prevented, reduced or eliminated at acceptable level.

A typical CCP can consist of the following:

- Heat process where time and temperature relations must be maintained to destroy a specific pathogen.
- Freezing and time to freeze before pathogens can grow
- Maintenance of a certain pH at a level that prevents pathogen growth
- Employee hygiene

Overall, two types of CCPs are recognized: the first is to ensure controlling a hazard and the second is to minimize a hazard.

HACCP should be applied separately to every manufacturing process actually in operation; this means a separate system for every product or group of closely related products.

The main features of the method are what the name says: make an analysis of the potential hazards, identify critical points in the process, and establish criteria for control.

HACCP is also a control system applied after the analysis has been made.

It involves corrective measures where needed, e.g., via feedback or control loops that adjust process variables if needed; a simple example is adjustment of a heating temperature.

An HACCP study may reveal that the process should be changed to allow efficient control.

The HACCP system has seven principles

1. Conduct hazard analysis
2. Determine CCP in the process
3. Establish critical limit for preventive measure associated with each identified CCP
4. Monitor the process
5. take corrective action
6. Record keeping
7. Verification

Completing record keeping.

Any employee who works in dairy processing industry or dairy production farm should kept record on animal welfare and milk quality.

The record will be

- Area where they purchase
- Name of the owner of the animal or product

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- Age of the animals
- Anti-mortem defect
- Behavior change
- Handling techniques

5.4. Standards for food hygiene and safety

The general rules for food hygiene in the European Union are laid down in Directive 93/43/EEC. This directive lays down general rules for hygiene control, covering meat processing though not primary production. Food hygiene is defined as 'all measures necessary to ensure the safety and wholesomeness of foodstuffs'. The HACCP system is made mandatory. Member States are able to these regulations define the requirements for the production process of products to be labeled as organic. Standards for organic production methods can be regarded as combining both environmental and animal welfare standards. These regulations also cover other ethical and safety issues, like restrictions on the use of genetically modified organisms in agricultural production. The guiding principle throughout will be that food operators bear full responsibility for the safety of the food they produce.

The implementation of hazard analysis and control principles and the observance of hygiene rules, to be applied at all levels of the food chain, must ensure this safety.

Within the overall framework of general hygiene regulation, more than 20 Directives cover different aspects of meat hygiene.

As an example, Regulation 2377/90/ EEC lay down procedures for establishing maximum residue limits for veterinary medicinal products in foods of animal origin. Maximum allowable residue-levels of veterinary medical products are defined in Regulation 675/92/ EEC and subsequent regulations. Regulation 315/93/EEC defines contaminants, how they should be handled (through, for example Good Manufacturing Practice (GMP)) and, where appropriate, maximum allowable levels.

Directive 86/363/ EEC specifies maximum levels for pesticide residues in foods of animal origin.

Taking corrective action

Establish corrective actions to be taken when monitoring indicates a deviation from the established critical limits for each CCP. The actions should eliminate the hazard created by deviation from the plan. If the hazard cannot be removed and the product may be unsafe, the product should be removed. In general, the action(s) must show that the CCP was brought under control.

The corrective actions include:

- (1) Determining the disposition of the non-compliant product;
- (2) Fixing or correcting the cause of the non-compliant product;
- (3) Maintaining records of the deviation and the corrective actions; and
- (4) Assuring that no hazardous product enters commerce.

Self-Check -05	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the seven HACCP system principles?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-6	Soaking crude bees wax.
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6.1. Crud bees wax soaking.

Wax cannot be obtained from very old combs using a solar wax extractor. This is because such combs contain large members of cocoons and pupa cases discarded by successive generations of developing honey bees and there soak up the wax as it is melted. Wax from such combs can be obtained by breaking them up and soaking them in water for 24 hours, then tying the combs in a piece of sack and boiling them in a container full of water. Some wax will float to the surface, but the bag of wax must be agitated to obtain the maximum harvest. If left to cool overnight a round cake of solid beeswax will form on the surface of the water. This method is only applicable to very old combs.

Self-Check -06	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. How crud wax are soaking?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Name: _____

Score = _____
Rating: _____
Date: _____

Short Answer Question

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7.1. Melt beeswax

Beeswax is a wonderful material to work with, but it can be dangerous when it's hot. Melt it down slowly using low heat for the best results. With a few simple materials, you can easily prepare a double boiler, a crock pot water bath, or a solar oven to slowly to evenly warm up your beeswax. Make sure you're constantly monitoring the melting beeswax so that it doesn't scorch. Remember to never allow it to reach its flash point of 400 °F (204 °C), which is when it will ignite. If you melt your beeswax with a "low and slow" mindset, you'll end up with a lovely golden liquid that you can pour out into molds or turn into any sort of project you desire.

7.2. Melting in a Double Boiler



1. Find a large stock pot and a smaller metal bowl that will fit inside. If you already have a double boiler, you'll use the 2 pots it comes with. If not, pick out a large stock pot for the base. Then, find a metal saucepan or bowl that fits comfortably inside your stock pot. Find one that can rest on the lip of the stock pot so that it doesn't touch the bottom. Try a wide metal bowl or a smaller saucepan with a long handle. If you use a saucepan, rest the handle on the lip of the stock pot while the pan portion floats in the water. [\[1\]](#)

- Only use a metal bowl for the smaller piece; don't use plastic or glass, which might melt or shatter.

- You won't be putting any wax inside the stock pot, so it's okay to use a pot you prepare food in. However, you will be placing the beeswax directly into the smaller saucepan or bowl, so choose an old one that you won't be using for food preparation.
- If you're using a tall metal pitcher or another bowl that does touch the bottom of the stock pot, place a metal cookie cutter at the bottom and set the smaller bowl on top of this. The cookie cutter will elevate the bowl off of the heat source.



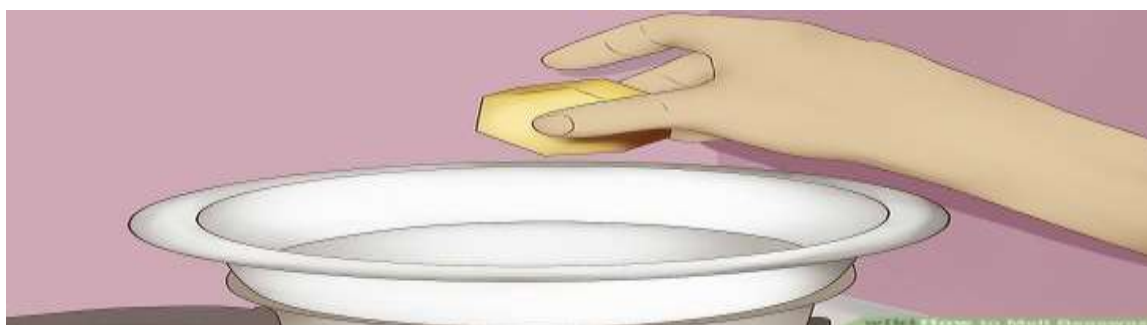
2. Line the bottom of the large stock pot with water. Depending on which type of bowl you're nesting inside the larger pot, you may need more or less water. Fill the bottom of your stock pot with enough tap water so that it's at least 2 to 3 in (5.1 to 7.6 cm) deep.^[2]

- If you're floating a small saucepan inside the larger pot, fill the stock pot so it's about $\frac{3}{4}$ full.
- If you're using a metal bowl that rests on the lip of the stock pot, stick with about 2 to 3 in (5.1 to 7.6 cm) of water.
- For a purpose-built double boiler, check the user manual for instructions on how much water to use



3. 3 Heat the water on the stove until it boils. Set the large stock pot filled with water on a stovetop burner and adjust the heat to “high.” Keep it there and wait for it to reach a rolling boil.^[3]

- Make sure your stock pot sits sturdily on the burner. Hot wax is dangerous, so you’ll want to prevent it from accidentally getting knocked over.
- Since water boils at 212 °F (100 °C), using a double boiler will make it difficult for the wax to exceed this temperature and reach its flash point.



4. Place solid pieces of beeswax into the smaller bowl. To speed up the melting process, cut or break the wax into smaller chunks. Aim for cubes or slivers around 1 to 2 in (2.5 to 5.1 cm) wide. Then, set these into your small metal bowl or saucepan.^[4]

- Smaller pieces of wax melt faster than larger blocks.

5. Nest the smaller bowl inside the stock pot after reducing the heat. Reduce the burner’s heat to “medium” or “medium-high” to keep the water going at a steady simmer.^[5] Then, place the top half of your double-boiler into the bottom half. If you’re

using a smaller bowl or saucepan, make sure its bottom touches the water but not the bottom of the stock pot; you don't want to expose the beeswax to the heat source.

- Never expose beeswax directly to the heat source. Doing so can cause the wax to melt unevenly and may scorch the wax or cause a fire.



6. Allow the solid beeswax to melt slowly over the simmering water.

Constantly monitor the beeswax as it melts. After about 2 to 3 minutes, you'll start to notice the wax beginning to melt. You may have to wait anywhere from 10 minutes to an hour for the wax to completely melt.^[6] Keep an eye on the water level, too. If it begins to evaporate away, pour more water into the stockpot periodically. Don't let the double boiler to become completely dry at any point during the process.

- You don't need to stir the pieces of wax; the melted liquid will quickly solidify upon contact with a colder utensil.
- Feel free to use a thermometer to monitor the temperature of your beeswax as it melts. It should melt around 144 to 150 °F (62 to 66 °C). Don't allow it to exceed 170 °F (77 °C) as it will get discolored and lose its aroma past this point.
- Never leave the beeswax unattended as it melts.



7. Pour the melted wax into a mold as soon as it completely liquefies. Prepare your molds or other project materials so that they're ready to use as soon as the wax has melted. Once every piece of solid beeswax melts away, remove it from the heat and immediately pour it into the molds. [\[7\]](#)

- Use care when handling the hot wax. Wear oven gloves to protect your hands from the hot steam and any splashes of wax.
- If you're pouring the hot wax into glass, make sure it is heat resistant so it doesn't crack.

Method 2

Using a Crock Pot Water Bath



1. Pour 2 to 3 in (5.1 to 7.6 cm) of water into the basin of your crock pot. If you have a wide, shallow crock pot, try about 2 in (5.1 cm) of water, or add 3 in (7.6 cm) or more for a narrow, tall crock pot. Start with enough water so that it

won't all evaporate while you're melting the beeswax. You can use tap water, or, to speed up the process, heat the water in a kettle first.

- It's also possible to melt the beeswax directly in the basin of the crock pot without creating a water bath, since the temperature can remain low. If you choose to do this, make sure that the crock pot basin is made from a nonstick material or line it with aluminum foil.
- Using the water bath is generally preferred, since it protects the wax from direct heat and makes pouring the liquid wax much easier.^[8]



2. Place a small metal bowl inside the crock pot. Choose an old metal bowl that you won't be using for food preparation. Select a bowl that's tall enough so that water won't seep in, but not so tall that you can't close the lid of the crock pot. Make sure the bowl sits directly on the bottom of the crock pot's basin; it doesn't need to be elevated.

- If you're making candles, you may be able to use your candle containers for this. Just make sure you're using metal or heat-resistant glass.^[9]



3. **Set pieces of the solid beeswax into the small bowl.** Since beeswax melts slowly in a crock pot water bath, use smaller pieces to help speed up the melting process. Break larger pieces of wax into small chunks of about 1 to 2 in (2.5 to 5.1 cm) wide, then set these into the small bowl. each. [\[10\]](#)



4. **Cover the crock pot and allow the wax to melt completely.** Turn on the crock pot and set it to the “low” temperature option. Put the cover on to seal the steamy water and heat inside the crock pot. While the beeswax melts, check on its progress every 10 to 15 minutes to make sure it doesn’t reach too high a heat. Depending on how much wax you’re melting, plan to wait at least 1 hour for it to fully liquify. [\[11\]](#)

- If you’d like, try monitoring the temperature of the beeswax using a thermometer. It will melt around 144 to 150 °F (62 to 66 °C), but you shouldn’t let it get past 170 °F (77 °C).
- Get your project materials ready while the wax melts down.



5. Pour the melted beeswax into molds once it's melted down. Keep an eye on the beeswax as it gets close to being completely liquefied. As soon as it reaches this point, you can take the lid off of the Crockpot and pour out the wax into candle molds or whatever else you're using for your project.^[12] Make sure to use oven gloves as you handle the hot bowl to protect your hands from the steam and splashes of hot wax.

- If you want to keep it liquefied for a little while longer, remove the lid and switch the crock pot to its "warm" setting.

Self-Check -07	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the seven HACCP system principles?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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8.1. Molding beeswax

Beeswax collected should be molded in the following manner:

1. Use a container with a rounded bottom and a mouth wider than the bottom with a very smooth inner surface. Many plastic containers are suitable.
2. Place a small quantity of water (about a tablespoonful) in a cooking pot and put on the fire. Do not melt beeswax in a dry container. It should not be exposed to fire because it burns easily and can be damaged by too much heat. Melt beeswax and all bee combs outdoors.
3. Add all the beeswax and watch carefully as wax melts down. Remove it from the fire immediately after the last lump of wax has melted.
4. Pour melted beeswax into the mould and place in a cool, dry place to cool.
5. Remove the cakes of beeswax next morning.
6. The dark material collected at the bottom can be removed with a knife and can be sold to a shoemaker. The clean raw beeswax is ready for the market.

Self-Check -08	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the procedure of wax molding?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

9.1 Purification/filtering beeswax

Lastly, if you happen to be filtering quite a bit of wax or already know you're a messy cook like I am, you might want to put a drop cloth down on the floor in front of the stove and on any counter where you might be working. I always think I'm not going to drop any pieces of wax but a few days after filtering or making something with the wax, I always find spots of wax on my floor and have to scrape them up. It's just easier to put something down on the floor to catch the drops.

Depending on how old the wax is and where it came from will determine what method you use for filtering beeswax. If you have capping wax with some honey on it, you can put the wax in a pot of water and gently melt it. When it's all melted, the wax will float on top and harden as it cools and the honey will separate out into the water. Once the wax is completely hardened, run a butter knife around the perimeter of the wax and then lift the wax out.

The process for filtering beeswax with a lot of debris is similar to the process for filtering capping wax. Since most of our wax comes from bee removals, we have a lot of debris in our wax and use the method shown in this post.



Supplies for Filtering Beeswax

Fine cheesecloth or other loosely woven fabric

Beeswax

Large pot (It's helpful to have one that is reserved for beeswax.)

Water

String

How to Filter Beeswax



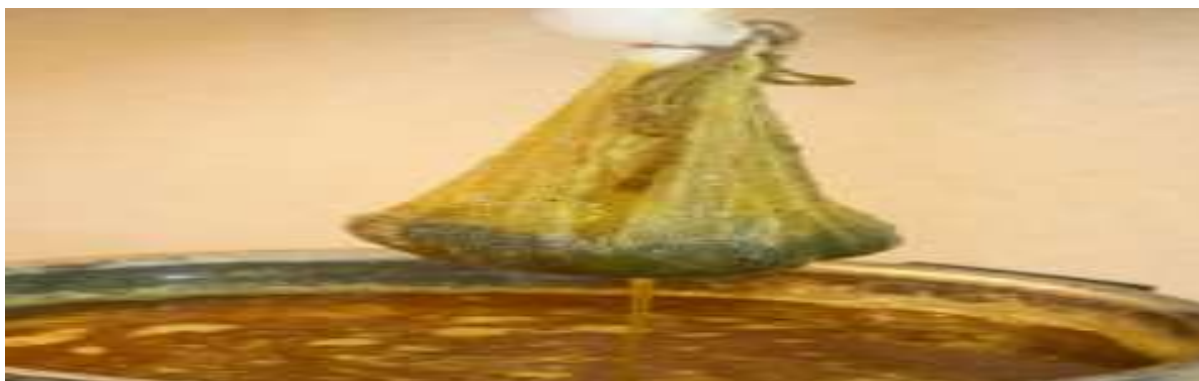
Wrap the wax in cheesecloth and tie with a string. We use several layers of cheesecloth when there is a lot of debris.



Put the cheesecloth in a large pot of water and gently heat



As the wax melts it will leech out of the cheesecloth but the debris will be contained.



When the wax is melted, remove the cheesecloth with the debris and let the pot cool



Once the wax is hard, run a butter knife around the perimeter of the wax and lift the wax out of the water. Now you can remelt the clean wax and make smaller pieces of it or use it in projects. To remelt the wax, put it in a clean heat safe jar or pitcher and put it in a pot of water. Boil the water to melt the wax, kind of like a double boiler. You can also use a traditional double boiler. I like to pour the clean wax into a silicone muffin tin and then let it harden. Each puck is about 2.5 ounces and is a good size to work with and it's very easy to get the beeswax pucks out of the mold once they've cooled. You can also use other things like small milk or cream cartons. We've tried several different things but have found that using a silicone muffin tin to use as a mold works best for us.

Self-Check -10	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss the procedure of wax purification?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

11.1. Purifying

Beeswax is made by honey bees (Apidae). It is secreted by glands in the abdomen of worker bees and used to make the honeycombs of the hive. This material is produced by refining wax from the honeycomb. There are many species of honey bee but the main ones are the European honey bee and the Oriental honey bee. Honey and wax are taken from them in many different countries. The European honey bee is widely kept in Europe, Africa, North America and many other parts of the world; it has been kept in Japan since its introduction in the Meiji Period (1868-1912). The Oriental honey bee is kept i n China, India and such Southeast Asian countries as Indonesia, Thailand and Myanmar. The special feature of the wax produced by them is its low acid value. In addition to the imported European honey bee, the indigenous species *Apis indica* var *japonica* *radoszkowski* is also kept in Japan but the amount of wax produced from it is not very large.

Beeswax was already used as a cold cream in ancient Egypt 4,000 years ago and afterwards its use expanded as a raw material for cosmetics, medicines, abrasives and so forth. It is now one of the major raw materials used in cosmetics. Though the compositions of Oriental beeswax and European beeswax are a little different, the main components of both are esters of higher fatty acids and higher monohydric alcohols, and they also include free fatty acids, hydrocarbons and other substances. The special features of Oriental beeswax are that it contains glycosides which are not found in European beeswax, it has a large number of lower alcohols of below C30 and there is only a small amount of free acid. Continued to Metabolism

Self-Check -05	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the method of removing drib of wax ?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-12	Storing cleaned bees wax in suitable containers to meet customer requirements.
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12.1. Storage

Beeswax should only be stored in its rendered, clean form. Before rendering, it will quickly be attacked by wax moths, which are able to destroy large quantities of wax in short periods of time (see Figure 4.6). Clean wax in large blocks is not attacked by wax moths. The honey guide of Africa (Indicator minor) is uniquely adapted to digesting wax with an intestinal flora of *Micrococcus cerolyticus* and the yeast *Candida albicans* (Friedman et al., 1957). However, the honey guide rarely consumes or steals large amounts of wax while it may destroy wax foundation sheets. Storage should be in cool dry places and never in the same room with any kind of pesticide. Wax will slowly crystallize over time and as a consequence become harder, but this process is reversible without any damage, just as with crystallized honey. The white bloom, i.e. dust, that sometimes appears on the outside of a wax cake or candle consists of small wax crystals. When melted or pressed with the rest of the wax it reverts to normal beeswax without any residues or impurities. Wax can be stored for very long periods of time without losing its major characteristics as items from Egyptian graves more than 2000 years old have shown.



Wax comb destroyed by wax moths before it was rendered into clean wax.

The storage requirements of products made with beeswax are affected by the added ingredients. Polishes containing only mineral or non vegetable oils can last for years,

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but cosmetic emulsions, which are mixtures of water and oil have a very limited shelf-life ranging from a few weeks to a few months (and longer if refrigerated). Unless some alcohols, propolis or other preservatives are added, emulsions are an excellent environment for microorganisms to flourish. Clean ingredients, a clean working environment and proper storage are very important to maintain the quality of products and prolong their storage life.

11.2. Quality control

Beeswax, when sold in solid blocks should always both be clean and have the colour and odour characteristics described in section 4.7. Though adulteration is easy (usually with cheap paraffin waxes), its detection is only possible with chemical tests, but it will very likely be detected by any larger buyer long before it reaches an industrial user. Adulteration renders the whole batch useless for most purposes and constitutes a considerable loss to the buyer. Therefore, such practices usually result in a buyer ceasing to buy from the supplier and possibly from the country from which the wax came.

Quality standards for wax are set in most countries according to their pharmacopoeias. A few industries like the Japanese cosmetic industry but also the American Wax Importers and Refiners Association specify their own limits (see ITC, 1978). In addition, for each industrial product in which beeswax is being used, there are other industry standards to be observed. These have to be obtained from the respective industry representations or trade publications. Such standards may vary considerably from country to country and manufacturer to manufacturer.

To detect adulteration, a number of tests may have to be conducted. The simplest is to determine the melting point, by measuring the temperature at which the first liquid wax appears during very slow heating. It should be between 61 and 66°C or preferably between 62 and 65 °C. However, values within this range are not a guarantee of purity.

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Determining the saponification cloud point is an officially accepted, sensitive method for determining adulteration. The method is limited to detecting quantities greater than 1 % of high melting (80-85 0C) paraffin waxes, or more than 6% of low melting (50-55 0C) paraffins. The test measures the amount of hydrocarbons which saponify (turn into soap) in a specific amount of ethanol and give a clear solution. If the solution becomes clear at or below 65 0C, the wax is probably unadulterated with paraffin. If it is adulterated, the solution will turn clear only at a higher temperature. Some of the details of this test are described by Tulloch (1973) for the American Wax Importers and Refiners Association and in section 4.11.15. The saponification cloud point is not suited to detect adulteration with carnauba wax, but gas liquid chromatography (GLC) can detect the 6% of free C32 alcohol (an alcohol molecule with 32 carbon atoms) contained in Carnauba wax. Beeswax only contains very little (Tulloch, 1980).

Tulloch (1980) also suggests that GLC can be used to detect adulteration of beeswax with as little as 1 % of petroleum hydrocarbons from low melting paraffins, but not for detecting low levels of high melting paraffin waxes.

Pharmacopoeia list ester values from 66 to 82 but most beeswaxes range between 72 and 80. Tulloch (1980) suggests values of 70 to 80 are most typical. Acid values range from 16.8 to 24 and ratios between ester and acid values are fairly stable and narrow, mostly between 3.3 and 4.2. The ratios can change after excessive heating and can exceed 4.2 with heating to 100 0C for only 24 hours, while the ester and acid values might remain within set limits. Ester and acid values in waxes from other Apis species may be significantly different (Ikuta, 1931 and Phadke et al., 1969).

In Africa, adulteration of beeswax with dark and sticky Trigona (Meliponidae) wax has been reported (Smith, 1951). Such wax is of little value in most industrial and beekeeping applications, since the resins are difficult to remove.

For standard testing methods, references can be obtained from Crane (1990), ITC (1978), Apimondia, pharmacopoeias and industry associations.

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Self-Check -05	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the storage system of wax?
2. Define
 - I. Honey quality?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-13	Labeling and storing bees wax according to enterprise, food safety and quality assurance requirements.
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13.1. Classification, Labeling and Packaging Regulations

13.1.1 EU's Classification, Labeling and Packaging Regulations (known as CLP).

CLP (European Regulations (EC) No 1272/2008 on Classification, Labelling and Packaging of substances and mixtures) actually came into force in 2009 (January) in all EU Member States, which also includes the UK. It was agreed by the EUL (European Union Level) that as from the 1st June 2015 these rules would apply including the UK. EN15494 provides some standardized fire safety warnings that most manufacturers choose to include, communicating perhaps the greatest risk posed by a candle. CLP only applies to Home Fragrancing Products (Not – Cosmetics) which are classed under separate rules. CLP effects the following Products:- Reed Diffusers, Wax Melts, Scented Sachets, Room Spray, Candle etc. (Including any other products that may fall in to this category) Many fragrances ingredients, are known eye/skin irritants, skin sensitizers or are environmentally hazardous substances, if present at concentrations above the cut-off values listed in section 16 on the MSDS, they trigger health or environmental warning statements and/or pictograms which should then be clearly stated on any labelling/packaging.

13.1.2. Small Packaging Exemptions

CLP provides certain exemptions for substances and mixtures contained in packaging that is small (typically less than 125ml) or is otherwise difficult to label. The exemptions allow the supplier to omit the hazard and/or precautionary statements or the pictograms from the label elements normally required under CLP. Please Note:- The information provided is based on our understanding of the New CLP Legislation so far. We have

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tried to simplify as much as we can for your understanding, we will continue to update, as we gain further in-depth information on any additional requirements.

13.1.3. CLP Labeling Technical Support

We are fully equipped with up to date CLP software that has enabled us to provide all necessary information regarding labeling requirements that conform to the new CLP regulations. All relevant information is available to download direct from the website, which will also include standard Product Labeling information for the following products: Candles based @ max 10% ratio and Reed Diffusers @ max 20% ratio formulation including the SDS for the finished product and the SDS, IFRA & Allergen Declarations for the fragrance oil. Please Note: The information will be provided in good faith and is to the best of our current knowledge but may be subject to change. Furthermore, it only represents the CLP contribution of the fragrance components and does not take into consideration any other ingredients that may be contained within the final product. The ultimate responsibility for the classification and labeling of the final product lies with the person placing it on the market. We recommend that this is determined using the information contained within the SDS of the neat fragrance in conjunction with that of the other ingredients within the final product.

13.1.4. Product Label (CLP) & Safety Precaution Information

Alternatively you can download the product Label Information file for Candles @ 10% ratio and Reed Diffusers @ 20%. On our website listed under each fragrance type. Please also remember that all products including Candles, Diffusers, Rooms spray etc. also require standard safety precaution information for use:- Please see examples of the information you will need to add to your labels including. Direction of Use & Precautions for use/safety information for Candles & Reed Diffusers

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13.1.5. Custom SDS (CLP) Documents

You can download any of the documents relating to the CLP regulations which can be edited so you may add your own details, Company Logo, fragrance name etc.. This can be done using a PDF editing software or Adobe Illustrator. If you are unable to edit the documents we are now offering a service to do this for you. The administration charge for this service is £10. For further information about this service or to request Custom Documents Please Email Us for a quote Please Note:-We require the following information from you:

Labeling — Each container of beeswax shall be suitably labelled to give the following information:

- (i) name and address of manufacturer (or dealer);
- (ii) name or type of wax;
- (iii) net contents in appropriate SI units;
- (iv) Country of origin or “made in Kenya”.
- (v) Batch no. or Lot no.
- (vi) Date of extraction.

Once we receive this information we will send you a PayPal request for payment. All document will be emailed to you direct in 5 to 7 working days. Please contact us if you are unsure about the new legislation.

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Self-Check -13	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Elaborate Classification, Labeling and Packaging Regulations for labeling bee wax ?
2. Write the basic information of bee wax labeling?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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BEEKEEPING LEVEL II

Learning Guide #3

**Unit of Competence: Assist in Harvesting &
Processing Bee
Products**

**Module Title:- Assisting in Harvesting &
Processing Bee
Products**

LG Code: AGR BKG1 M10 LO3-LG-3

TTLM Code: AGR BKG1 TTLM 0919v1

Lo3 . Trap and store pollen

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Instruction Sheet	Learning Guide #3
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Assessing colony for suitability of pollen collection.
- Selecting and using PPE.
- Identifying OHS hazards associated with working bees.
- Cleaning and sanitizing equipment used in process of collecting pollen.
- Constructing and installing Suitable pollen trapping mechanism in hive.
- Washing hands and cleaning clot for Personal hygiene
- Collecting pollen at appropriate frequency depending on use as bee feed or for human consumption.
- Assessing risk of theft by ants and steps are taken to reduce likelihood occurring.
- Assessing and stopping risk of colony decline and pollen collection.
- Transporting pollen to temporarily stored container for processing.
- Cleaning pollen to remove foreign material.
- Making pollen to appropriate air dried to prevent fermentation and deterioration.
- Intending pollen storage.

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to: –**

- Assess colony for suitability of pollen collection.
- Select and use PPE.
- Identify OHS hazards associated with working bees.
- Clean and sanitize equipment used in process of collecting pollen.
- Construct and install Suitable pollen trapping mechanism in hive.
- Wash hands and cleaning clot for Personal hygiene

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- Collect pollen at appropriate frequency depending on use as bee feed or for human consumption.
- Assess risk of theft by ants and steps are taken to reduce likelihood occurring.
- Assess and stopping risk of colony decline and pollen collection.
- Transport pollen to temporarily stored container for processing.
- Clean pollen to remove foreign material.
- Make pollen to appropriate air dried to prevent fermentation and deterioration.
- Intend pollen storage.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” **in page -.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio

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Information Sheet-1	Assess colony for suitability of pollen collection
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1.1. Pollen

Pollen is the male part of a flower. Each pollen grain contains vegetative nucleus. Different pollen grains from different plants have different structures and colors.

1.2. Contents of Pollen

Studies show that there are over 180 elements in pollen. Pollen is 35% protein and there are 22 types of amino acids in it. One unit of pollen has more amount of protein than one unit of meat or one unit of eggs. All vitamins known to date are contained in pollen. In addition, it contains 27 types of minerals, various carbohydrates, oils, enzymes and hormones.

1.3. Uses of Pollen

Pollen is the main protein source of bees to grow their broods. Honey bee pollen has medicinal and food value. It is used to create resistance to disease, to prolong age, to moderate and enhance the health of glands and blood veins, to keep the heart, kidneys and the liver healthy. It is used as antidote for water, air and chemical contamination and poisoning.

1.4. Production and Storage of Pollen

Pollen can be collected by pollen traps installed at the entrances of all types of hives. Traps to be installed at traditional and transitional entrances have to be modified to fit the particularities of the hives. Bees carry balls of pollen dust at their hind legs. The balls are removed by the traps and are collected in a container placed for the purpose. In a good flowering season, a strong colony can produce an average of 100 gm of pollen. Studies show that initiating bees to produce more pollen does not have significant effect on the amount of honey the colony produces. The collected pollen is dried and put to use. Pollen should be stored in glass bottles or plastic bags until it is sold or used. Pollen can be mixed with honey or eaten alone. At national level,

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collecting pollen has started in some governmental apiaries. This is a practice which should be picked up by the private sector as well.

Self-Check -01	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the content of pollen ?
2. Write the basic use of pollen?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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2.1. Selecting and checking Personal Protective Equipment (PPE)

Consists of the following items:

1. Veil: for covering head and face and giving protection from stings.
2. Overall: for covering the rest of the body
3. Gloves: for covering the hands
4. Boots: for covering the feet.

2.2. Identifying Occupational Health and Safety (OHS)

The sting

The worker sting is a highly modified for its defensive purpose.

The sting is found in the sting chamber, invisible, last segment. The entire pack of the sting is divided into two regions.

Factors affecting the sting of a worker honey bee

1. Genetic make up

Some are highly aggressive Eg. Tropical bees

Some bees are highly gentle/docile/. Eg. European bees

2. Condition of time

☐ When there is scarcity of forage or less nectar flow

☐ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions of stings

In human reactions to stings take place on three levels

1. Localized reaction
2. Systematic reaction
3. Anaphylactic

1. Localized reaction

In the first kind of reaction the initial localized swelling is followed by more extensive swelling a few hours later and the affected area may be red, itchy and tender for 2-3days.

2. Systematic reaction

A systematic reaction generally occurs within a few minutes of stinging and it may involve a whole body rash wheezing, nausea, vomiting, abdominal pain and fainting.

3. Anaphylactic reaction

In this reaction symptoms can occur within a seconds, and they include difficulty in

- ☐ Breathing
- ☐ Confusion
- ☐ Vomiting
- ☐ Falling blood pressure that can load to loss of consciousness and death from circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason. Those who are extremely sensitive may die from a single sting.

First aid for sting

☐☐The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.

☐☐An ice-cold compress applied after sting has been removed will relieve the pain

☐☐Anti-histamine;

o In the form of (1) Ointment (2) Injection

☐☐Adrenaline injection

In addition to these;

☐☐Work with bees in the late or in the evening

☐☐Avoid working bees in rainy, windy time

☐☐Smoke under the frame and wait two minutes before opening

☐☐While moving in the apiary, move slowly and quietly

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- ☐ ☐ Avoid crashing
 - ☐ ☐ Wash your protecting materials (glove, overall, etc) after three operation times.
 - ☐ ☐ When bee stings develop into large swelling and rash, medical advice should be sought straight away.
 - ☐ ☐ Anyone who is acutely allergic to bee sting and knows that unconsciousness may occur a few minutes after a sting, must immediately inform someone, so that they may be transported as soon as possible to a doctor or a hospital for emergency injection treatment.
- Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

Self-Check -02	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. what are the suitable PPE for ?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-3	Identifying Occupational Health and Safety (OHS) hazard
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3.1. Identifying Occupational Health and Safety (OHS)

The sting

The worker sting is a highly modified for its defensive purpose.

The sting is found in the sting chamber, invisible, last segment. The entire pack of the sting is divided into two regions.

Factors affecting the sting of a worker honey bee

1. Genetic make up

Some are highly aggressive Eg. Tropical bees

Some bees are highly gentle/docile/. Eg. European bees

2. Condition of time

☐ When there is scarcity of forage or less nectar flow

☐ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions of stings

In human reactions to stings take place on three levels

1. Localized reaction

2. Systematic reaction

3. Anaphylactic

1. Localized reaction

In the first kind of reaction the initial localized swelling is followed by more extensive swelling a few hours later and the affected area may be red, itchy and tender for 2-3days.

2. Systematic reaction

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A systematic reaction generally occurs within a few minutes of stinging and it may involve a whole body rash wheezing, nausea, vomiting, abdominal pain and fainting.

3. Anaphylactic reaction

In this reaction symptoms can occur within a seconds, and they include difficulty in

- ☐ Breathing
- ☐ Confusion
- ☐ Vomiting
- ☐ Falling blood pressure that can load to loss of consciousness and death from

circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason. Those who are extremely sensitive may die from a single sting.

First aid for sting

☐☐The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.

☐☐An ice-cold compress applied after sting has been removed will relieve the pain

☐☐Anti-histamine;

o In the form of (1) Ointment (2) Injection

☐☐Adrenaline injection

In addition to these;

☐☐Work with bees in the late or in the evening

☐☐Avoid working bees in rainy, windy time

☐☐Smoke under the frame and wait two minutes before opening

☐☐While moving in the apiary, move slowly and quietly

☐☐Avoid crashing

☐☐Wash your protecting materials (glove, overall, etc) after three operation times.

☐☐When bee stings develop into large swelling and rash, medical advice should be sought straight away.

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☐☐ Anyone who is acutely allergic to bee sting and knows that unconsciousness may occur a few minutes after a sting, must immediately inform someone, so that they may be transported as soon as possible to a doctor or a hospital for emergency injection treatment.

Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

Self-Check -03	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Identify OHS hazard?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information sheet 4	Cleaning, drying, sanitizing and checking all equipment for serviceability and use.
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4.1. Cleaning beekeeping equipment.

These notes refer to routine cleaning only. Contact your seasonal bee inspector for advice on equipment clean-up after AFB. Our notes mention washing soda. This is **not** the same as caustic soda. See [Dry Pak washing soda](#). We suggest a regular strength of half a cup (100g) to one pint or 500ml of warm water. **Work safely!** Wear rubber gloves and eye protection when scrubbing with washing soda. Dispose of any waste responsibly. Beehive scrapings are great



Cleaning a Seagrove board

Smoker Remove any loose debris. Warm the inside with a blowlamp for 30 seconds, just enough to soften caked-on debris. Wearing work gloves, scrape the inside clean. Scrape inside the lid. Allow to cool. Make sure the lid opens and closes easily. Burn the scrapings.

Hive tools Scrub clean in washing soda solution. Many beekeepers store their hive tools in a plastic tub of washing soda solution, with a snap on lid.

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Plastic feeders Remove from the hive promptly, or they will go mouldy. Clean in a dishwasher.

Wooden feeders Ashforth/Miller/Brother Adam. Scrape off any dry sugar. Scrub clean with warm water. If in any doubt, check they don't leak before using again (Fill with cold water).

Bee suit Wash your bee suit regularly. Seasonal bee inspectors wash their bee suits every day. Follow the maker's instructions. Bee suits can harbor stings. The alarm pheromones make the bees angry. I zip up my Sherriff bee suit with the veil tucked inside, and wash at 60 deg C maximum. Hang up to dry thoroughly before storing, or they may go moldy. If your suit becomes moldy, try soaking it in bio washing powder overnight, and washing in bio powder.

Gloves See our page on [Beekeeping Gloves](#). Leather gloves are unwieldy to use, difficult to clean and they attract stings. Follow the maker's washing instructions. I wash gloves at 40 deg C maximum. Any hotter and they will probably shrink.

Honey extractor Remove the cage and wipe clean. Rinse out the drum with warm water. Dry thoroughly and reassemble. Check cage spins freely. Never leave the extractor in the garden for the bees to clean. The bees will go crazy, and will start robbing.

Honey jars I wash 50 x 454g jars at a time in the dishwasher on a quick cycle. Allow to dry. I use a wooden crown board as a tray, holding 25 x 454g jars.

Honey jar lids I use gold plastic lids straight from the bag.

Timber framed wire queen excluders I use a Thorne's [10-slot wire excluder cleaner](#). Scrape the frame clean.

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Zinc excluders Scrape clean on a flat work bench. Do not use a blowlamp. The zinc may melt.

Glass quilts Scrape wooden frame clean. Scrub glass clean with washing soda solution and rinse.

Correx varroa trays Scrape off debris. Scrub clean with washing soda solution and rinse.

Crown boards Scrape clean, scorch with blowlamp.

Mesh floors Scrape woodwork clean. Do not blowlamp galvanized mesh. Zinc fumes are toxic. Scrub mesh clean with washing soda solution.

Metal and plastic frame ends I freeze 500g margarine boxes full of frame ends overnight, then empty them into a 15lb honey bucket or similar, kept for the purpose. Fit the lid and shake vigorously for 30 seconds. See before and after pictures.

Porter bee escapes Working outdoors and wearing gloves, I clean two escapes at a time, holding back to back with pincers. Pour a kettle full of hot water into the spring mechanism. Be careful!

Extractor cleaning

A honey extractor is one of the most expensive individual pieces of equipment a beekeeper is likely to buy [†]. If you're lucky, your association might own one or more extractors and make them available to borrow or hire. However you get hold of one, after use they need to be thoroughly cleaned before storing (or returning) them.

Don't, whatever you do, follow the advice on some websites or beekeeping forums (fora?) and leave the extractor outside "*for the bees to clean*". **This is a very bad idea.** The [feeding frenzy](#) that results is a perfect way to spread disease.

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Patience, cold water, more patience and a hairdryer

The used extractor will have quite a bit of residual honey adhering to the sidewalls and floor. You can scrape this out using a flexible silicone spatula but it's a messy process and almost guaranteed to cover you from wrist to [oxter](#) in honey. It's far easier to:

- close the honey gate securely
- tip the extractor up at a steep angle so the honey runs towards the gate
- turn the heating up in the room and leave it overnight

The following morning the majority of the honey will have drained down towards the honey gate, this can then be bottled for home consumption or used for mead or [marmalade making](#). It's not unusual to get a pound or more of honey like this ... it'll be a bit frothy and might be less well-filtered but it will still be delicious.

4.2. How often should I Clean My bee process and store equipment

I've covered how to clean your equipment, but how often should you do this? It depends upon you and the equipment really.

1. The Bee Suit

You can get away with cleaning the bee suit every 3-4 uses. In reality, I guess it depends upon how dirty your suit gets when you work with your bees.

Plus, it depends upon how much you sweat. Also, consider how you feel about putting it on each time.

Now, my husband is the type that he could care less how clean it is. He'll wear it until I snatch it from him and refuse to let him wear it until it's clean again.

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Granted, you do wear clothing under the suit so I can kind of see his point.

However, for me, I prefer to wash mine every use or two. So it is personal preference. And for the people out there like my husband, try to be patient if you have loved ones around you like me. We only wash everything to death because we care.

2. The Veil

I would wash the veil as frequently as I wash the suit. I understand it gets nastier faster probably because you can't help but sweat a lot in your face when working with bees, and you don't have layers of clothing between the veil and your sweat.

So if you feel like it needs to be washed after every use, since it is being hand washed, I don't think it would hurt much. You'll know if you're over washing items because the fibers will start to wear out. Just keep an eye out for that.

3. Your Tools

The hive tool and smoker need to be washed on an 'as needed' basis. You'll know when they need it.

But again, it will be based around your personal preferences. I'm the type that doesn't like to work with a lot of left over material on my tools.

However, my husband could care less. So it's up to you.

4. The Hives

You all can breathe a sigh of relief. I'm not going to tell you I wash our hives every time we're done with them (though you were probably expecting it, weren't you?)

No, instead, you only put them in the 'gas chamber' once a year and that is at the very end of the season. There is no need to do anything besides just clean up the propolis on the hives in between uses during the same season.

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But I do recommend storing your bee equipment where it has plenty of shelter. Make sure it is in a building, a barn (we actually store our equipment in our pole barn), or if you don't have room for it just yet make sure it has a tarp over it to protect it from the elements. This will help with the longevity of your equipment for sure.

Well, I really hope that this information will help you all to protect your bee equipment. As I said, it is quite the investment so it needs to be taken care of.

But I want to hear from you. How do you clean your beekeeping equipment? Do you have any special tricks to getting things super clean and sanitized?

4.3. Clean pollen storage containers

Storing pollen in containers means that you will at some time scoop or pour out pollen. Some pollen may run down the sides of your pollen container after pouring or scooping out what you need. pollen on the sides of the container will attract ants to the pollen. To prevent this, use a wet cloth to wipe off any pollen on the sides of pollen storage containers.

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Self-Check -4	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss bee extract, process and store cleaning way?

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-5	Complying quality assurance and food safety requirements throughout process of extracting honey.
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5.1. Determining elements of the industry quality assurance requirements.

These include Hazard Analysis Critical Control Point (HACCP) charts, mission statement, work instructions, corrective action and monitoring procedures, standard operating procedures, and enterprise and industry policies and welfare code of practice

- Establishment design: good premises and equipment design avoid contamination.
- Control of operation: purchasing (food animals/food materials) processing and distribution should be design to prevent or reduce contamination.
- Establish maintenance and sanitation: adequate maintenance sanitation, pest control and proper waste disposal.
- Transportation: hygiene food transportation enables to reduce food contamination.
- Training: offering periodical training changes the attitude of personnel towards hygiene
- Application of HACCP, SOP, enables hygiene food production
- Good manufacturing practice GMP and good hygienic practice GHP also guarantee hygiene food production

5.2. Identifying food safety hazard

Food safety refers to the condition and practice that preserve the quality of food to prevent contamination and food borne illnesses (all measure taken to prevent food borne infection and in toxification and, is the assurance that food will not cause harm to the consumer when it is prepared and /or eaten or is not spoiled.

Food can transmit disease from person to person as well as a growth medium for bacteria that can cause food poisoning.

Hazards in food can be due to biological/microbiology or non microbiological

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A) biological or microbiological

Parasite c.bovis, c. cellulosa, echnococcosis, trichenella, toxoplasma

Bacteria bacillus, clostridia, staphylococcus, salmonella, shigella and TB

Virus hepatitis and polio

Poisons animals fishes, crabs

Poisons plant: alkaloids, glycosides, saponine, gossyp

B) Non microbial food contaminant

Residues	chemicals
preservative	Hormone
pesticides	colorant
additives	antibiotics

5.3. Determining critical control points for work area.

HACCP stands for hazard analysis/**critical control points**. It is a method to establish for an existing production process what control measures are essential to assure the safety of the products made. The same method can be applied for other quality characteristics, but the emphasis generally is on safety.

It establishes specific control measure at each identified critical control point of production, from harvesting to process and to consumption of final product.

The term **critical control point** is a point, step or procedure in food process at which control can be applied and as a result of which, a food safety hazard can be prevented, reduced or eliminated at acceptable level.

A typical CCP can consist of the following:

- Heat process where time and temperature relations must be maintained to destroy a specific pathogen.
- Freezing and time to freeze before pathogens can grow
- Maintenance of a certain pH at a level that prevents pathogen growth
- Employee hygiene

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Overall, two types of CCPs are recognized: the first is to ensure controlling a hazard and the second is to minimize a hazard.

HACCP should be applied separately to every manufacturing process actually in operation; this means a separate system for every product or group of closely related products.

The main features of the method are what the name says: make an analysis of the potential hazards, identify critical points in the process, and establish criteria for control.

HACCP is also a control system applied after the analysis has been made.

It involves corrective measures where needed, e.g., via feedback or control loops that adjust process variables if needed; a simple example is adjustment of a heating temperature.

An HACCP study may reveal that the process should be changed to allow efficient control.

The HACCP system has seven principles

1. Conduct hazard analysis
2. Determine CCP in the process
3. Establish critical limit for preventive measure associated with each identified CCP
4. Monitor the process
5. take corrective action
6. Record keeping
7. Verification

Completing record keeping.

Any employee who works in dairy processing industry or dairy production farm should kept record on animal welfare and milk quality.

The record will be

- Area where they purchase
- Name of the owner of the animal or product

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- Age of the animals
- Anti-mortem defect
- Behavior change
- Handling techniques

5.4. Standards for food hygiene and safety

The general rules for food hygiene in the European Union are laid down in Directive 93/43/EEC. This directive lays down general rules for hygiene control, covering meat processing though not primary production. Food hygiene is defined as 'all measures necessary to ensure the safety and wholesomeness of foodstuffs'. The HACCP system is made mandatory. Member States are able to these regulations define the requirements for the production process of products to be labeled as organic. Standards for organic production methods can be regarded as combining both environmental and animal welfare standards. These regulations also cover other ethical and safety issues, like restrictions on the use of genetically modified organisms in agricultural production. The guiding principle throughout will be that food operators bear full responsibility for the safety of the food they produce.

The implementation of hazard analysis and control principles and the observance of hygiene rules, to be applied at all levels of the food chain, must ensure this safety.

Within the overall framework of general hygiene regulation, more than 20 Directives cover different aspects of meat hygiene.

As an example, Regulation 2377/90/ EEC lay down procedures for establishing maximum residue limits for veterinary medicinal products in foods of animal origin. Maximum allowable residue-levels of veterinary medical products are defined in Regulation 675/92/ EEC and subsequent regulations. Regulation 315/93/EEC defines contaminants, how they should be handled (through, for example Good Manufacturing Practice (GMP)) and, where appropriate, maximum allowable levels.

Directive 86/363/ EEC specifies maximum levels for pesticide residues in foods of animal origin.

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Taking corrective action

Establish corrective actions to be taken when monitoring indicates a deviation from the established critical limits for each CCP. The actions should eliminate the hazard created by deviation from the plan. If the hazard cannot be removed and the product may be unsafe, the product should be removed. In general, the action(s) must show that the CCP was brought under control.

The corrective actions include:

- (1) Determining the disposition of the non-compliant product;
- (2) Fixing or correcting the cause of the non-compliant product;
- (3) Maintaining records of the deviation and the corrective actions; and
- (4) Assuring that no hazardous product enters commerce.

Self-Check -13	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Elaborate Classification, Labeling and Packaging Regulations for labeling bee wax ?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Name: _____

Score = _____
Rating: _____

Date: _____

Short Answer Questions

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Information Sheet-7	Collecting pollen at appropriate frequency depending on use as bee feed or for human consumption.
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7.1. Pollen collection

Extreme care should be taken that pollen is not contaminated by bees collecting from flowers treated with pesticides. During, and for several days or weeks after treatment of fields or forests in an area of several square kilometers (in a circle of at least 3-4 2 km diameter) around the apiary, no pollen should be collected. This is independent of the method of pesticide application. Even systemic pesticides have been shown to concentrate in pollen of, for example coconut (Rai et al., 1977). Since a pollen pellet is collected from many flowers, even small quantities of pesticides per flower can be accumulated rapidly to reach significant concentrations. Though pollen pellets are collected before they enter the hive, treatment of colonies for bee diseases, can contaminate the pollen pellets. Though, for example, cleaning of debris from the hive and bees regurgitating syrup, nectar or honey during collection of the pellets. Pollen pellets are removed from the bees before they enter the hive. There are many designs of pollen traps some easier to clean and harvest, others more efficient or easier to install. The efficiency rarely exceeds 50%, i.e. less than 50% of the returning foragers loose their pollen pellets. Bees are ingenious in finding ways to avoid losing their pellets, like small holes or uneven screens and may even rob pollen from the collecting trays, if access is possible. Under some circumstances, pollen collection methods and regimes may interfere with normal colony growth or honey production. Therefore, standard beekeeping manuals should be consulted for the timing of collections (Dadant, 1992). Pollen should be collected daily in humid climates but less frequently in drier climates. To avoid deterioration of the pollen and growth of bacteria, moulds and insect larvae, pollen should be dried quickly. Ants can remove considerable amounts from pollen traps. Krell (personal observations) reports that losses can be up to 30% in temperate climates. Pollen needs to be dried to less than 10% moisture content (preferably 5 % or 8% according to some laws) as soon as possible after harvesting. A

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simple method uses a regular light bulb (wE and 1 10V or 20W and 220V) suspended high enough above a pollen carton or tray so that the pollen does not heat to more than 40 or 45 0C.

Beebread is usually found on brood combs or combs near the brood nest. Available quantities are normally very small and inadvertently the brood comb and sometimes the whole colony are destroyed during harvest. A team of Russian scientists described a nondestructive means of extracting beebread from combs, harvesting 300-600 kg per year from 1500 colonies (Nakrashevich et al., 1988). Some races of bees will store large quantities of beebread when colonies have become queen less, or the brood nest and/or plenty super space, are above an empty box with combs. Such manipulations will be more difficult or impossible with most traditional bee hives but modifications may be worthwhile. As mentioned earlier, beebread can also be made at home from bee-collected pollen(see section 3.12.2). Other social bees usually store their pollen in special containers separate from the brood combs. These "pollen pots" can therefore be harvested without destroying the nest, but caution is necessary not to deplete the food sources completely.



Pollen tray of a modified OAC trap (Waller, 1980) with two types of pollen chamber permitting better ventilation and pollen removal without disturbance of the colony. Returning foragers are forced to crawl through a double screen of 5-mesh wire (5 wires per inch) with 4-7 mm distance between screens.

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Self-Check -07	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Discuss the procedure of pollen collection or harvesting?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

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8.1. Factors influencing pollen viability

Pollen viability may be affected at different stages of development, from early in the anther till late on the stigma. The most direct interaction between pollen grains and the environment occurs after release from the anther. As expected, most of the factors that influence pollen viability do so at this stage. However, in some cases the occurrence of various stresses during pollen development inside the anther may strongly affect pollen viability.

There are different factor that can be affect pollen. therefore the are

-  Humidity
-  Temperature
-  storage
-  UV-B radiation
-  Transport
-  Other factor

Self-Check -08	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the factor affecting pollen production?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-9	Cleaning pollen to remove foreign material Assessing and stopping risk of colony decline and pollen collection Transporting pollen
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9.1. Risk Assessment for pollen

Abstract. A method for assessing the risk for honeybees from pesticide exposure via pollen is proposed. Four pesticides, selected as markers, were monitored in pollen samples collected in two sampling areas, one located in an intensive agricultural area and the other far from direct pesticide impact. Analytical results were consistent with use patterns of the chemicals and their physico-chemical and persistence properties. For a preliminary estimate of bee exposure via pollen, both by ingestion and by contact, an exposure index was developed, based on physico-chemical properties, persistence and application rates. On the basis of the exposure estimates and acute toxicological data (ingestion and contact LD50), Toxicity Exposure Ratios (TERs) were calculated as indicators of the risk for honeybees due to this particular exposure route. TER values were compared to Hazard Quotient (HQ), calculated as the ratio between application rate and the LC50 value, according to European guidelines, showing a satisfactory agreement. The advantage of the above described procedures is that the environmental fate of the chemicals, and not only application rates, are taken into account. This approach may represent a preliminary tool for a comparative screening of the risk for pollinator insects due to this particular exposure route.

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Self-Check -09	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the risk assessment associated with pollen collection?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-10	Making pollen to appropriate air dried to prevent fermentation and deterioration
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10.1. Drying Pollen

The pollen is best dried in an electric oven, where humidity can continuously escape. Then it is purified by a special machine, similar to the seed cleaning machine. The maximum temperature is 30°C and the drying time should be as short as possible in order to avoid vitamin losses. Fresh, bee collected pollen contains about 20-30 g water per 100 g. This high humidity is an ideal culture medium for micro-organisms like bacteria and yeast. For prevention of spoilage and for preservation of a maximum quality the pollen has to be harvested daily and immediately placed in a freezer. After thawing pollen can be kept only for a few hours and should be further processed as soon as possible. After drying the water content should be 6 g water per 100 g pollen. Today pollen is dried generally in electric ovens, where humidity can continuously escape. The prescribed maximum temperature was 40°C. However this temperature seems to be high. The effect of different methods of preservation (freezing, drying at about 40°C and lyophilisation) on selected parameters attributed to the biological quality of bee pollen were tested in Poland. Freezing caused no substantial changes in the chemical composition of the pollen loads, so this technique should be recommended when the preservation of the pollen load for nutrition or therapeutic purposes is important. Lyophilisation markedly decreased vitamin C and provitamin A content, but drying at 40°C revealed the most disadvantageous effect. A pollen freeze drying machine is described in the literature, but its effect on pollen quality has not been tested.

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Self-Check -10	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. How pollen drying are done?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-11	Intending pollen storage
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11.1. Pollen Storage

Pollen, like other protein rich foods, loses its nutritional value rapidly when stored incorrectly. Fresh pollen stored at room temperature loses its quality within a few days. Fresh pollen stored in a freezer loses much of its nutritive value after one year. Longer, improper storage leads to the loss of a few particular amino acids, which cause deficiencies in brood rearing (Dietz, 1975). When dried to less than 10% (preferably 5%) moisture content at less than 45°C and stored out of direct sunlight, pollen can be kept at room temperature for a several months. The same pollen may be refrigerated at 5°C for at least a year or frozen to –15°C for many years without quality loss as tested by feeding to honeybee colonies and recording brood rearing rate (Dietz and Stephenson 1975 and 1980). Since sunlight, i.e. UV radiation, destroys the nutrient value of pollen, other more subtle characteristics probably suffer worse damage. Storage of dry pollen in dark glass containers, or in dark cool places, is therefore a requirement.

11.2. Quality control

Only a few countries, such as Switzerland and Argentina, have legally recognized pollen as a food additive and established official quality standards and limits. Though sold in many health food stores, pollen is not considered an additive by the US FDA (Food and Drug Administration) and it does not have to comply with special standards. It is, however in the producer's own best interest to maintain the highest standards of cleanliness for his product. The Argentinean standards require microbiological characteristics of not more than 1SOx1OoUFC/g aerobic microbes, 1OoUFC/g fungi and no pathologic microorganisms. The moisture content should not exceed 8% (controlled by vacuum drying at 45 mm Hg and 65oC). Other limits include a pH of 4-6, protein content of 15-28% Kjeldahl (N x 6.25) of dry weight, total hydrocarbons of 45-55 % of dry weight and a maximum ash content of 4% of dry weight (determined at 600 oC). Pollen used for cosmetic purposes should have the same, if not a better quality than that destined for consumption as food. The first quality

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control is assessment of gross contamination with foreign substances, i.e., parts of bee and hive debris. Further controls might include measurement of moisture content and a bacterial count. Determination of various agrochemicals, including drugs used inside bee colonies are possible and may be required in some circumstances. These analyses require sensitive, expensive chromatographic equipment.

Self-Check -11	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Elaborate pollen storage ?
2. Write the basic information of quality of pollen?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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BEEKEEPING LEVEL II

Learning Guide #4

**Unit of Competence: Assist in Harvesting &
Processing Bee
Products**

**Module Title:- Assisting in Harvesting &
Processing Bee
Products**

LG Code: AGR BKG1 M10 LO4-LG-4

TTLM Code: AGR BKG1 TTLM 0919v1

Lo4 Collect and store propolis & bee venom.

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Instruction Sheet	Learning Guide #4
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Acquiring suitable colony selection
- Cleaning and sanitizing tools and equipment used in collection of propolis.
- Selecting and checking Suitable PPE.
- Identifying Occupational Health and Safety (OHS) hazard.
- Constructing and installing Suitable propolis trapping mechanism in hive.
- Stimulating of propolis production by manipulation of environmental conditions.
- Complying quality assurance and food safety requirements throughout collection and storage of propolis.
- Collecting of propolis.
- Selecting and extracting of propolis.
- Storing extracted propolis

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to: –**

- Acquire suitable colony selection
- Clean and sanitizing tools and equipment used in collection of propolis.
- Select and checking Suitable PPE.
- Identify Occupational Health and Safety (OHS) hazard.
- Constructing and installing Suitable propolis trapping mechanism in hive.
- Stimulate of propolis production by manipulation of environmental conditions.
- Comply quality assurance and food safety requirements throughout collection and storage of propolis.
- Collect propolis.
- Select and extracting propolis.

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- Store extracted propolis

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” **in page -.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio

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1.1. Propolis

The word “propolis” is compound, derived from the Greek words πρό (pro = before) and πόλις (polis = city), which means the last defense point before the city (or the hive). Propolis is a mixture of various amounts of beeswax and resins collected by the honeybee from plants, particularly from flowers and leaf buds. Since it is difficult to observe bees on their foraging trips the exact sources of the resins are usually not known. Bees have been observed scraping the protective resins of flower and leaf buds with their mandibles and then carrying them to the hive like pollen pellets on their hind legs. It can be assumed that in the process of collecting and modeling the resins, they are mixed with some saliva and other secretions of the bees as well as with wax. Propolis is a sticky and gummy resins material which bees collect from different plants. The color of propolis ranges from light brown to dark blue.

1.2. Composition of Propolis

At 25-45 degree centigrade propolis is soft, pliable and sticky. Under 15 degree centigrade it is in a solid state and is brittle. It melts at 60-70 degrees. It quickly dissolves in alcohol and benzene and is soluble in water. It has over 200 compounds in it. Propolis has many uses for bees and human beings.

1.3. Uses of Propolis for Bees

Bees use propolis to cover holes and cracks in their beehives. When it is cold, bees use propolis to decrease the size of the entrance of their hives. They also use it to strengthen the firmness of honey combs. Whenever something dies in the hive and they cannot take the corpse out, they seal the dead body with propolis to control the rotten odor.

1.3.1. Uses of Propolis (for Human Beings)

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Propolis is anti bacteria and anti fungus and it serves to make various types of medicines and cosmetic products, creams and lotions. It is used in the treatment of different kinds of infections like that of the intestine, mouth, tooth and the throat.

1.4. Methods of Harvesting and Handling of Propolis

Propolis can be harvested from all types of hives. When hives are opened for inspection, it can be harvested along the way. It is many times found around bee entrances, at base and super junctions and between frames. With the intention of harvesting propolis, holes and cracks are made in the hives to make bees produce propolis for the purpose of sealing them. In frame hives, it possible to install materials with holes made just for the purpose. The materials are fiat sheet metal, plastic sheet, mesh wire, and nylon cloth. When bees seal these holes with propolis, the material should be placed in a refrigerator or in a cold place. Propolis solidifies and it becomes easy to remove it.

In transitional beehives, it is possible to harvest propolis by placing bars that is wider than the bars with normal size.

Openings are made at the entrance of the traditional hives in order to harvest the propolis which is used to cover the entrance as seen in picture.

By initiating bees to produce propolis, it is possible to harvest annual average of 300 gm from frame hives and 200 gm from traditional hives. The amount of propolis harvested is determined by the type and amount of plants as well as the climatic condition of the area. Researches indicate that making bees produce more propolis has no negative impact on the amount of honey they make. When propolis is harvested it should be free of impurities like wood dust, wax, dust or dung. Harvested propolis can be packed with plastic sheet and stored in a cold place and can eventually be sold. Although there is no local market for it, products are sold to foreign markets. Propolis is the highest bee product sold to international market next to honey and beeswax.

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Self-Check -01	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Elaborate harvesting stage of prpolis?
2. Write the basic uses of prpolis ?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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2.1. Cleaning beekeeping equipment.

These notes refer to routine cleaning only. Contact your seasonal bee inspector for advice on equipment clean-up after AFB. Our notes mention washing soda. This is **not** the same as caustic soda. See [Dry Pak washing soda](#). We suggest a regular strength of half a cup (100g) to one pint or 500ml of warm water. **Work safely!** Wear rubber gloves and eye protection when scrubbing with washing soda. Dispose of any waste responsibly. Beehive scrapings are great

Smoker Remove any loose debris. Warm the inside with a blowlamp for 30 seconds, just enough to soften caked-on debris. Wearing work gloves, scrape the inside clean. Scrape inside the lid. Allow to cool. Make sure the lid opens and closes easily. Burn the scrapings.

Hive tools Scrub clean in washing soda solution. Many beekeepers store their hive tools in a plastic tub of washing soda solution, with a snap on lid.

Plastic feeders Remove from the hive promptly, or they will go mouldy. Clean in a dishwasher.

Wooden feeders Ashforth/Miller/Brother Adam. Scrape off any dry sugar. Scrub clean with warm water. If in any doubt, check they don't leak before using again (Fill with cold water).

Bee suit Wash your bee suit regularly. Seasonal bee inspectors wash their bee suits every day. Follow the maker's instructions. Bee suits can harbor stings. The alarm pheromones make the bees angry. I zip up my Sherriff bee suit with the veil tucked inside, and wash at 60 deg C maximum. Hang up to dry thoroughly before storing, or they may go moldy. If your suit becomes moldy, try soaking it in bio washing powder overnight, and washing in bio powder.

Gloves See our page on [Beekeeping Gloves](#). Leather gloves are unwieldy to use, difficult to clean and they attract stings. Follow the maker's washing instructions. I wash gloves at 40 deg C maximum. Any hotter and they will probably shrink.

Honey extractor Remove the cage and wipe clean. Rinse out the drum with warm water. Dry thoroughly and reassemble. Check cage spins freely. Never leave the extractor in the garden for the bees to clean. The bees will go crazy, and will start robbing.

Honey jars I wash 50 x 454g jars at a time in the dishwasher on a quick cycle. Allow to dry. I use a wooden crown board as a tray, holding 25 x 454g jars.

Honey jar lids I use gold plastic lids straight from the bag.

Timber framed wire queen excluders I use a Thorne's [10-slot wire excluder cleaner](#). Scrape the frame clean.

Zinc excluders Scrape clean on a flat work bench. Do not use a blowlamp. The zinc may melt.

Glass quilts Scrape wooden frame clean. Scrub glass clean with washing soda solution and rinse.

Correx varroa trays Scrape off debris. Scrub clean with washing soda solution and rinse.

Crown boards Scrape clean, scorch with blowlamp.

Mesh floors Scrape woodwork clean. Do not blowlamp galvanized mesh. Zinc fumes are toxic. Scrub mesh clean with washing soda solution.

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Metal and plastic frame ends I freeze 500g margarine boxes full of frame ends overnight, then empty them into a 15lb honey bucket or similar, kept for the purpose. Fit the lid and shake vigorously for 30 seconds. See before and after pictures.

Porter bee escapes Working outdoors and wearing gloves, I clean two escapes at a time, holding back to back with pincers. Pour a kettle full of hot water into the spring mechanism. Be careful!

Extractor cleaning

A honey extractor is one of the most expensive individual pieces of equipment a beekeeper is likely to buy [†]. If you're lucky, your association might own one or more extractors and make them available to borrow or hire. However you get hold of one, after use they need to be thoroughly cleaned before storing (or returning) them.

Don't, whatever you do, follow the advice on some websites or beekeeping forums (fora?) and leave the extractor outside "*for the bees to clean*". **This is a very bad idea.** The [feeding frenzy](#) that results is a perfect way to spread disease.

Patience, cold water, more patience and a hairdryer

The used extractor will have quite a bit of residual honey adhering to the sidewalls and floor. You can scrape this out using a flexible silicone spatula but it's a messy process and almost guaranteed to cover you from wrist to [oxter](#) in honey. It's far easier to:

- close the honey gate securely
- tip the extractor up at a steep angle so the honey runs towards the gate
- turn the heating up in the room and leave it overnight

The following morning the majority of the honey will have drained down towards the honey gate, this can then be bottled for home consumption or used for mead or [marmalade making](#). It's not unusual to get a pound or more of honey like this ... it'll be a bit frothy and might be less well-filtered but it will still be delicious.

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2.2. How often should I Clean My bee process and store equipment

I've covered how to clean your equipment, but how often should you do this? It depends upon you and the equipment really.

1. The Bee Suit

You can get away with cleaning the bee suit every 3-4 uses. In reality, I guess it depends upon how dirty your suit gets when you work with your bees.

Plus, it depends upon how much you sweat. Also, consider how you feel about putting it on each time.

Now, my husband is the type that he could care less how clean it is. He'll wear it until I snatch it from him and refuse to let him wear it until it's clean again.

Granted, you do wear clothing under the suit so I can kind of see his point.

However, for me, I prefer to wash mine every use or two. So it is personal preference. And for the people out there like my husband, try to be patient if you have loved ones around you like me. We only wash everything to death because we care.

2. The Veil

I would wash the veil as frequently as I wash the suit. I understand it gets nastier faster probably because you can't help but sweat a lot in your face when working with bees, and you don't have layers of clothing between the veil and your sweat.

So if you feel like it needs to be washed after every use, since it is being hand washed, I don't think it would hurt much. You'll know if you're over washing items because the fibers will start to wear out. Just keep an eye out for that.

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3. Your Tools

The hive tool and smoker need to be washed on an 'as needed' basis. You'll know when they need it.

But again, it will be based around your personal preferences. I'm the type that doesn't like to work with a lot of left over material on my tools.

However, my husband could care less. So it's up to you.

4. The Hives

You all can breathe a sigh of relief. I'm not going to tell you I wash our hives every time we're done with them (though you were probably expecting it, weren't you?)

No, instead, you only put them in the 'gas chamber' once a year and that is at the very end of the season. There is no need to do anything besides just clean up the propolis on the hives in between uses during the same season.

But I do recommend storing your bee equipment where it has plenty of shelter. Make sure it is in a building, a barn (we actually store our equipment in our pole barn), or if you don't have room for it just yet make sure it has a tarp over it to protect it from the elements. This will help with the longevity of your equipment for sure.

Well, I really hope that this information will help you all to protect your bee equipment. As I said, it is quite the investment so it needs to be taken care of.

But I want to hear from you. How do you clean your beekeeping equipment? Do you have any special tricks to getting things super clean and sanitized?

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Self-Check -02	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the cleaning equipment of prpolis production?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

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3.1. Selecting and checking Personal Protective Equipment (PPE)

Consists of the following items:

1. Veil: for covering head and face and giving protection from stings.
2. Overall: for covering the rest of the body
3. Gloves: for covering the hands
4. Boots: for covering the feet.

3.2. Identifying Occupational Health and Safety (OHS)

The sting

The worker sting is a highly modified for its defensive purpose.

The sting is found in the sting chamber, invisible, last segment. The entire pack of the sting is divided into two regions.

Factors affecting the sting of a worker honey bee

1. Genetic make up

Some are highly aggressive Eg. Tropical bees

Some bees are highly gentle/docile/. Eg. European bees

2. Condition of time

☐ When there is scarcity of forage or less nectar flow

☐ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions of stings

In human reactions to stings take place on three levels

1. Localized reaction
2. Systematic reaction
3. Anaphylactic

1. Localized reaction

In the first kind of reaction the initial localized swelling is followed by more extensive swelling a few hours later and the affected area may be red, itchy and tender for 2-3days.

2. Systematic reaction

A systematic reaction generally occurs within a few minutes of stinging and it may involve a whole body rash wheezing, nausea, vomiting, abdominal pain and fainting.

3. Anaphylactic reaction

In this reaction symptoms can occur within a seconds, and they include difficulty in

- ☐ Breathing
- ☐ Confusion
- ☐ Vomiting
- ☐ Falling blood pressure that can load to loss of consciousness and death from

circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason. Those who are extremely sensitive may die from a single sting.

First aid for sting

☐☐The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.

☐☐An ice-cold compress applied after sting has been removed will relieve the pain

☐☐Anti-histamine;

o In the form of (1) Ointment (2) Injection

☐☐Adrenaline injection

In addition to these;

☐☐Work with bees in the late or in the evening

☐☐Avoid working bees in rainy, windy time

☐☐Smoke under the frame and wait two minutes before opening

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- ☐ While moving in the apiary, move slowly and quietly
- ☐ Avoid crashing
- ☐ Wash your protecting materials (glove, overall, etc) after three operation times.
- ☐ When bee stings develop into large swelling and rash, medical advice should be sought straight away.
- ☐ Anyone who is acutely allergic to bee sting and knows that unconsciousness may occur a few minutes after a sting, must immediately inform someone, so that they may be transported as soon as possible to a doctor or a hospital for emergency injection treatment.

Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

Self-Check -03	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Select and check Personal Protective Equipment?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-4	Identifying Occupational Health and Safety (OHS) hazard
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4.1. Identifying Occupational Health and Safety (OHS)

The sting

The worker sting is a highly modified for its defensive purpose.

The sting is found in the sting chamber, invisible, last segment. The entire pack of the sting is divided into two regions.

Factors affecting the sting of a worker honey bee

1. Genetic make up

Some are highly aggressive Eg. Tropical bees

Some bees are highly gentle/docile/. Eg. European bees

2. Condition of time

☐ When there is scarcity of forage or less nectar flow

☐ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions of stings

In human reactions to stings take place on three levels

1. Localized reaction

2. Systematic reaction

3. Anaphylactic

1. Localized reaction

In the first kind of reaction the initial localized swelling is followed by more extensive swelling a few hours later and the affected area may be red, itchy and tender for 2-3days.

2. Systematic reaction

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A systematic reaction generally occurs within a few minutes of stinging and it may involve a whole body rash wheezing, nausea, vomiting, abdominal pain and fainting.

3. Anaphylactic reaction

In this reaction symptoms can occur within a seconds, and they include difficulty in

- ☐ Breathing
- ☐ Confusion
- ☐ Vomiting
- ☐ Falling blood pressure that can load to loss of consciousness and death from

circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason. Those who are extremely sensitive may die from a single sting.

First aid for sting

☐☐The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.

☐☐An ice-cold compress applied after sting has been removed will relieve the pain

☐☐Anti-histamine;

o In the form of (1) Ointment (2) Injection

☐☐Adrenaline injection

In addition to these;

☐☐Work with bees in the late or in the evening

☐☐Avoid working bees in rainy, windy time

☐☐Smoke under the frame and wait two minutes before opening

☐☐While moving in the apiary, move slowly and quietly

☐☐Avoid crashing

☐☐Wash your protecting materials (glove, overall, etc) after three operation times.

☐☐When bee stings develop into large swelling and rash, medical advice should be sought straight away.

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□□ Anyone who is acutely allergic to bee sting and knows that unconsciousness may occur a few minutes after a sting, must immediately inform someone, so that they may be transported as soon as possible to a doctor or a hospital for emergency injection treatment.

Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

Self-Check -04	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Identify Occupational Health and Safety (OHS)?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-5	Constructing and installing Suitable propolis trapping mechanism in hive.
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5.1. Identification of propolis trap

Propolis can be harvested from all types of hives. When hives are opened for inspection, it can be harvested along the way. It is many times found around bee entrances, at base and super junctions and between frames. With the intention of harvesting propolis, holes and cracks are made in the hives to make bees produce propolis for the purpose of sealing them. In frame hives, it possible to install materials with holes made just for the purpose. The materials are fiat sheet metal, plastic sheet, mesh wire, and nylon cloth. When bees seal these holes with propolis, the material should be placed in a refrigerator or in a cold place. Propolis solidifies and it becomes easy to remove it.



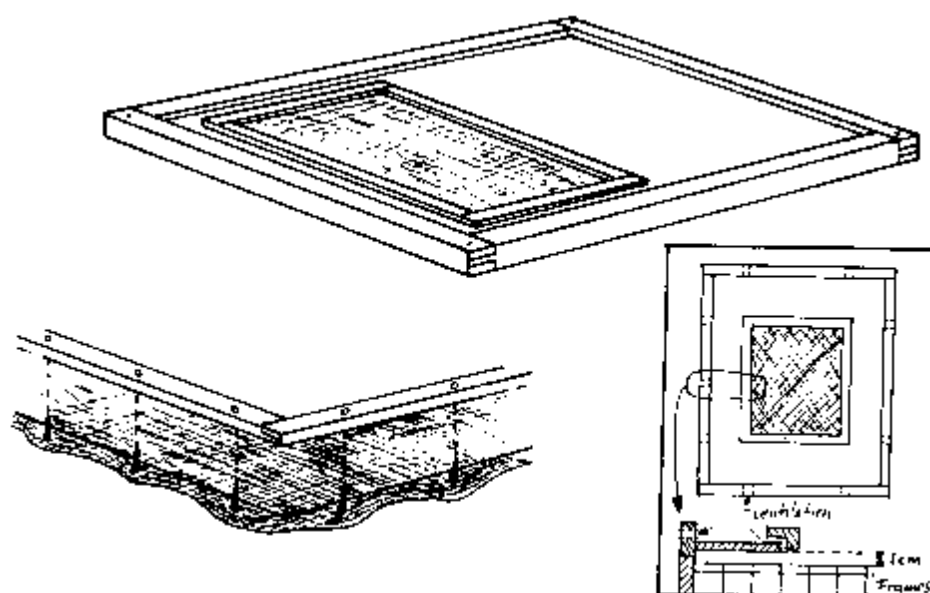
In transitional beehives, it is possible to harvest propolis by placing bars that is wider than the bars with normal size.

Openings are made at the entrance of the traditional hives in order to harvest the propolis which is used to cover the entrance as seen in picture

By initiating bees to produce propolis, it is possible to harvest annual average of 300 gm from frame hives and 200 gm from traditional hives. The amount of propolis harvested is determined by the type and amount of plants as well as the climatic condition of the area. Researches indicate that making bees produce more propolis has no negative

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impact on the amount of honey they make. When propolis is harvested it should be free of impurities like wood dust, wax, dust or dung. Harvested propolis can be packed with plastic sheet and stored in a cold place and can eventually be sold. Although there is no local market for it, products are sold to foreign markets. Propolis is the highest bee product sold to international market next to honey and beeswax.



A simple design of a propolis trap made from nylon, fly or mosquito screen. The screen is removable and can be quickly replaced with a new one during harvest

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Self-Check -05	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. how was propolis trapping ?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-6	Stimulating of propolis production by manipulation of environmental conditions.
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6.1. Environmental factors influencing propolis production

Many environmental and biological factors can influence the amount and quality of propolis production by honey bees. Here we report on environmental factors that influence propolis production in southern Minas Gerais, where one of the most marketable types of propolis in the world, green propolis, is produced. We used three apiaries with a total of 40 colonies of Africanized honey bees. The apiary sites differed mainly in plant diversity and local honey bee colony density. Propolis samples were collected weekly over a period of 10 months. We found that moderate rainfall and temperature promote the production of high quality (green) propolis. We also found that plant diversity influences the quantity and quality of propolis production.

Self-Check -06	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. how was environmental factor affect propoli production (OHS)?

Note: Satisfactory rating - 9 points

Unsatisfactory - below 9 points

Answer Sheet

Name: _____

Score = _____

Rating: _____

Date: _____

Short Answer Questions

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Information Sheet-7	Complying quality assurance and food safety requirements throughout process of extracting beeswax.
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7.1. Determining elements of the industry quality assurance requirements.

These include Hazard Analysis Critical Control Point (HACCP) charts, mission statement, work instructions, corrective action and monitoring procedures, standard operating procedures, and enterprise and industry policies and welfare code of practice

- Establishment design: good premises and equipment design avoid contamination.
- Control of operation: purchasing (food animals/food materials) processing and distribution should be design to prevent or reduce contamination.
- Establish maintenance and sanitation: adequate maintenance sanitation, pest control and proper waste disposal.
- Transportation: hygiene food transportation enables to reduce food contamination.
- Training: offering periodical training changes the attitude of personnel towards hygiene
- Application of HACCP, SOP, enables hygiene food production
- Good manufacturing practice GMP and good hygienic practice GHP also guarantee hygiene food production

7.2. Identifying food safety hazard

Food safety refers to the condition and practice that preserve the quality of food to prevent contamination and food borne illnesses (all measure taken to prevent food borne infection and in toxification and, is the assurance that food will not cause harm to the consumer when it is prepared and /or eaten or is not spoiled.

Food can transmit disease from person to person as well as a growth medium for bacteria that can cause food poisoning.

Hazards in food can be due to biological/microbiology or non microbiological

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A) biological or microbiological

Parasite c.bovis, c. cellulosa, echnococcosis, trichenella, toxoplasma

Bacteria bacillus, clostridia, staphylococcus, salmonella, shigella and TB

Virus hepatitis and polio

Poisons animals fishes, crabs

Poisons plant: alkaloids, glycosides, saponine, gossyp

B) Non microbial food contaminant

Residues	chemicals
preservative	Hormone
pesticides	colorant
additives	antibiotics

7.3. Determining critical control points for work area.

HACCP stands for hazard analysis/**critical control points**. It is a method to establish for an existing production process what control measures are essential to assure the safety of the products made. The same method can be applied for other quality characteristics, but the emphasis generally is on safety.

It establishes specific control measure at each identified critical control point of production, from harvesting to process and to consumption of final product.

The term **critical control point** is a point, step or procedure in food process at which control can be applied and as a result of which, a food safety hazard can be prevented, reduced or eliminated at acceptable level.

A typical CCP can consist of the following:

- Heat process where time and temperature relations must be maintained to destroy a specific pathogen.
- Freezing and time to freeze before pathogens can grow
- Maintenance of a certain pH at a level that prevents pathogen growth
- Employee hygiene

Overall, two types of CCPs are recognized: the first is to ensure controlling a hazard and the second is to minimize a hazard.

HACCP should be applied separately to every manufacturing process actually in operation; this means a separate system for every product or group of closely related products.

The main features of the method are what the name says: make an analysis of the potential hazards, identify critical points in the process, and establish criteria for control.

HACCP is also a control system applied after the analysis has been made.

It involves corrective measures where needed, e.g., via feedback or control loops that adjust process variables if needed; a simple example is adjustment of a heating temperature.

An HACCP study may reveal that the process should be changed to allow efficient control.

The HACCP system has seven principles

1. Conduct hazard analysis
2. Determine CCP in the process
3. Establish critical limit for preventive measure associated with each identified CCP
4. Monitor the process
5. take corrective action
6. Record keeping
7. Verification

Completing record keeping.

Any employee who works in dairy processing industry or dairy production farm should kept record on animal welfare and milk quality.

The record will be

- Area where they purchase

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- Name of the owner of the animal or product
- Age of the animals
- Anti-mortem defect
- Behavior change
- Handling techniques

7.4. Standards for food hygiene and safety

The general rules for food hygiene in the European Union are laid down in Directive 93/43/EEC. This directive lays down general rules for hygiene control, covering meat processing though not primary production. Food hygiene is defined as 'all measures necessary to ensure the safety and wholesomeness of foodstuffs'. The HACCP system is made mandatory. Member States are able to these regulations define the requirements for the production process of products to be labeled as organic. Standards for organic production methods can be regarded as combining both environmental and animal welfare standards. These regulations also cover other ethical and safety issues, like restrictions on the use of genetically modified organisms in agricultural production. The guiding principle throughout will be that food operators bear full responsibility for the safety of the food they produce.

The implementation of hazard analysis and control principles and the observance of hygiene rules, to be applied at all levels of the food chain, must ensure this safety.

Within the overall framework of general hygiene regulation, more than 20 Directives cover different aspects of meat hygiene.

As an example, Regulation 2377/90/ EEC lay down procedures for establishing maximum residue limits for veterinary medicinal products in foods of animal origin. Maximum allowable residue-levels of veterinary medical products are defined in Regulation 675/92/ EEC and subsequent regulations. Regulation 315/93/EEC defines contaminants, how they should be handled (through, for example Good Manufacturing Practice (GMP)) and, where appropriate, maximum allowable levels.

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Directive 86/363/ EEC specifies maximum levels for pesticide residues in foods of animal origin.

Taking corrective action

Establish corrective actions to be taken when monitoring indicates a deviation from the established critical limits for each CCP. The actions should eliminate the hazard created by deviation from the plan. If the hazard cannot be removed and the product may be unsafe, the product should be removed. In general, the action(s) must show that the CCP was brought under control.

The corrective actions include:

- (1) Determining the disposition of the non-compliant product;
- (2) Fixing or correcting the cause of the non-compliant product;
- (3) Maintaining records of the deviation and the corrective actions; and
- (4) Assuring that no hazardous product enters commerce.

Self-Check -07	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss food safety hazard ?

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-8	Collect propolis
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8.1. Collection

The average production of propolis per colony per year has been described as 10 to 300g (Ochi, 1981 and Andrich et al., 1987) but the production depends on the bees, the climate, the forest resources and the trapping mechanism. According to personal observations, it may occasionally be considerably higher. If there is any selection by queen breeders and beekeepers, it has been against heavily propolizing bees, since they make work in the apiary more difficult. Bees which produce larger quantities of propolis could be selected if required.

Contamination of propolis with wax, pieces of wood, paint and other debris should be avoided. The cleanest collection methods employ special traps placed on top of a hive, below the covers (see Fig. 5.2 to 5.5) or next to lateral walls inside the hives. Thus bees do not mix as much wax with the propolis and no contamination occurs during harvesting. Trap harvesting is also faster and may be more productive. Traps are basically screens or special plates with small holes which simulate cracks in the hive walls. Bees try to seal the holes and thus fill the trap with propolis. The most economic trap design is an inner cover with a large hole, covered with regular nylon fly screen, secured in place by the points of nails and a perforated frame. However, to avoid contamination with wax, the screen should not touch the top of the frames. The total area exposed by a screen may have to be varied according to the bees and local conditions. Trap harvested propolis usually fetches a better price because of its cleaner and therefore of better quality. Light, and in particular air circulation are important to stimulate propolis use. Accordingly, traps placed on top of hives should be covered but the hive cover needs to be propped open slightly to increase air circulation and to allow in some light (see Fig. 5.4). In tropical regions it may be necessary to prevent the entry of too much rain. Also, when using a type of bee sensitive to disturbances or likely

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to abscond, the lid should not be opened too far otherwise bees might escape. Newly established colonies should be given some time to establish themselves before they are used for trapping. Propolis is removed from traps by cooling the plastic sheets or fly-screens for a few hours in a refrigerator or freezer. Once cooled, the propolis becomes brittle and can be removed from the screens by simply flexing and brushing them, pulling over a table edge or by using a special high pressure air device designed by Pechhacker and Huettinger (1986). The trap is then ready for re-use. Before the advent of recent trap designs, most propolis was collected by scraping the "bee glue" off walls, frames, entrances and covers. Marletto (1983) noted that the propolis collected from the cover or top frames was usually cleaner than that collected near the entrance. Even contaminated scraped material can be used and purified by repeated extraction and filtering. In order to avoid contamination with too much wax, scrapings from frames or bottom boards and lids should be kept separate from each other and from propolis collected with traps. Chunks and pieces should never be combined into large balls. Enquiries should be made with potential buyers to see how they prefer propolis. Large pieces often have to be ground or broken into smaller chunks first.

Self-Check -08	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss prpolis collection ?

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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There are a few basic extraction methods which can be varied by using different solvents. The selection of the solvent depends on the final use of the extract and on technical feasibilities. Most active ingredients seem to be soluble in propylene glycol and ethanol.

Fewer ingredients are soluble in water, but even water extracts show at least some bactericidal and fungicidal effects, as well as wound healing properties. Acetone extracts have been used for production of shampoos and lotions. Once the specific chemicals or chemical groups and their biological effects are better understood, better and more specific extracts can be prepared for equally specific applications.

The antimicrobial action of alcohol extracts is influenced by the extraction method, e.g. the duration of the soaking period or the amount of heating. The concentration of the alcohol used and nature of stirring during extraction seem to have less of an influence (Obregon and Rojas, 1990). Debuyser (1984) reports extractions with a 70% solution of alcohol as the most active, without stating what kind of activity is being referred to. In general, it can be said that the longer the propolis is soaked in alcohol the more ingredients will be dissolved. Soaking beyond two or three weeks however, does not seem to increase the extent of extraction.

In scientific and non-scientific literature alike, the method for determining propolis concentration in the extract is not always specified. A scientific method should consider the ratio of the dry weight of dissolved matter to the weight of the solvent (A) or quantify ppm (parts per million) of active ingredients. However, a more practical way appears to be using the ratio (by weight) of total propolis placed into the solvent to the weight of the solvent (B). The latter method is certainly less precise, because of the incomplete dissolution of propolis, and the final concentration therefore depends very much on the

extraction method, the solvent and the quality of the propolis. Thus, for standardization, in addition to concentration, a description of the solvent, the temperature and the duration of extraction is required. However, the practical method (B) results in less active ingredients for the same concentration determined according to the scientifically measured concentration (A). Standardization will also require measurable parameters for control as for example, certain stable compounds which are extracted in proportions similar to the total concentration of active ingredients (for other standards see section 5.11). A quantitative standardization is needed for future commercialization of propolis and its extracts.

Five and ten percent solutions using the latter method (B) i.e. the ratio of the total weight of propolis to the weight of the solvent, are most commonly used in small-scale production. Frequently however, the weight of alcohol is assumed to be equal to that of water, i.e. 1 ml of alcohol is assumed to weigh 1 g. Yet, absolute ethanol weighs approximate 20% less than the same volume of water. These weight differences can also result in large differences in concentrations of active ingredients. Fortunately, the exact dosage of propolis is not usually of great importance. However, commercialization requires dealing with precise values. No uniformity exists yet in cosmetic applications either, since many recipes are based on propolis extract paste and others on liquid extracts of various concentrations. Cosmetic applications however, often contain not more than 1 % of the preferred propolis extract which can mean as little as 0.05 % to 0.06% of the active ingredients.

A few extraction methods for commercial use of propolis are described below. Additional solvents may be used in order to extract special components. Medicinal and food technology processes or studies are almost always conducted with ethanol or aqueous extracts. Glycol extracts are practical for many cosmetic applications because of their improved dissolution in water based emulsions.

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Self-Check -09	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss propolis extraction ?

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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Information Sheet-10	Store extracted propolis
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10.1. Storage

In general, propolis is fairly stable, but proper storage is important. Propolis and its extracts should be stored in airtight containers in the dark, preferably at less than 100C-120C and away from excessive and direct heat. For similar reasons, very old propolis from the hive should not be mixed with fresher propolis. Over 12 months of proper storage, propolis will lose very little or none of its antibacterial activities. Alcohol extracts may be stored even longer. Lyophilization (freeze drying) of extracts has been described as a method which preserves the antibacterial characteristics, but nothing has been written about effects of long-term storage of such materials. This method may gain importance for larger scale use and certain formulations, but it is possible that some of the synergistic characteristics of propolis may be lost during lyophilisation. The shelf-life of propolis containing products depends very much on their composition and has to be determined for each case. The more the other components of a product are susceptible to decomposition, the shorter will be the shelf life of that product. This is the reason for compromises that are necessary in the selection of artificial and/or natural and traditional ingredients, preservatives and larger production for extended markets. However, propolis and its extracts function as a mild preservative due to their antioxidant and antimicrobial activities and thus may actually prolong the shelf live of some products.

10.2 Quality control

Since propolis comes in many colours, odours and composition, it is very difficult to give precise guidelines. Most fresh propolis has a pleasant resinous odour. Wax content and visual contamination should obviously be as low as possible. Old propolis becomes very hard and brittle and may also be very dark. However, frozen or recently frozen propolis is also very brittle. Official quality standards exist for propolis in various East European

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countries, but most standards refer to the cleanliness or adulteration of the raw product and sometimes, its extracts. Maximum and minimum limits for certain chemical groups are set, but few standardised tests are available to determine the biological activities of various components. Tikhonov et al., (1978) describe the average contents of the principal ingredients as possible standards for raw propolis (Table 5.4). Official quality standards exist in Romania and the former USSR (Crane, 1990). Franco and Kurebayashi (1986) suggested methods for quality control and Hollands et al., (1988) for testing coccidiostatic effects. Vakikonina et al., (1975), Petri et al., (1984) and Bianchi (1991), describe the discoloration of a 0.1N potassium permanganate solution as a reliable test for the antioxidant effect of propolis and its extracts, and the detection of some adulterants (see 5.16.13). Bacteriological tests can be carried out and the results compared with those from samples of known purity and origin, but these tests apply to only a small proportion of all the various beneficial activities of propolis. None of these tests have yet been widely accepted as providing a reliable evaluation of the overall quality of propolis or its extracts. Most likely, only a range of tests will ever give a reliable evaluation of the numerous diverse characteristics of propolis. Because of its recent manipulation and harvesting by bees, fresh trap-collected propolis is of the highest quality and the least contaminated, if collected on a regular basis. Plant origin however, may be important for certain applications and therefore propolis collected in a certain region or during a certain season may be preferred.

Self-Check -10	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write and discuss propolis storage ?
2. What are the measurement of propolis quality?

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

BEEKEEPING LEVEL II

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Learning Guide #5

**Unit of Competence: Assist in Harvesting &
Processing Bee
Products**

**Module Title:- Assisting in Harvesting &
Processing Bee
Products**

LG Code: AGR BKG1 M10 LO5-LG-5

TTLM Code: AGR BKG1 TTLM 0919v1

Lo5. Produce and harvest royal jelly

Instruction Sheet	Learning Guide #5
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

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- Assessing hive production suitability Royal jelly
- Stimulating production royal jelly.
- Selecting and using PPE.
- Identifying OHS hazards.
- Cleaning and sanitizing equipment for collecting royal jelly.
- Washing hands and cleaning cloth for personal hygiene.
- Selecting Wax
- Removing larvae.
- Removing royal jelly.
- Filtering royal jelly.
- Placing harvested royal jelly
- Checking, cleaning and returning equipment.
- Making and maintaining records

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to:** —

- Assess hive production suitability Royal jelly
- Stimulate production royal jelly.
- Select and using PPE.
- Identify OHS hazards.
- Clean and sanitizing equipment for collecting royal jelly.
- Wash hands and cleaning cloth for personal hygiene.
- Select Wax
- Remove larvae.
- Remove royal jelly.
- Filter royal jelly.
- Place harvested royal jelly
- Check, clean and return equipment.

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- Make and maintain records

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” **in page -.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio

Information sheet 1	Assessing hive production suitability for Royal jelly
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1.1 Introduction

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Royal jelly is secreted by the hypopharyngeal gland (sometimes called the brood food gland) of young worker (nurse) bees, to feed young larvae and the adult queen bee. Royal jelly is always fed directly to the queen or the larvae as it is secreted; it is not stored. This is why it has not been a traditional beekeeping product. The only situation in which harvesting becomes feasible is during queen rearing, when the larvae destined to become queen bees are supplied with an over-abundance of royal jelly. The queen larvae cannot consume the food as fast as it is provided and royal jelly accumulates in the queen cells (see Figure).

The exact definition of commercially available royal jelly is therefore related to the method of production: it is the food intended for queen bee larvae that are four to five days old. The differentiation between queen and worker bees is related to feeding during the larval stages. Indeed, all female eggs can produce a queen bee, but this occurs only when, during the whole development of the larvae and particularly the first four days, they are cared for and fed "like a queen". Queen rearing, regulated by complex mechanisms within the hive, induces in a young larva a series of hormonal and biochemical actions and reactions that make it develop into a queen bee. A queen bee differs from a worker bee in various ways:

in its morphology: the queen develops reproductive organs while the worker bee develops organs related to its work such as pollen baskets, stronger mandibles, brood food glands and wax glands.

in its development period: on average the queen develops in 15.5 days while worker bees require 21 days.

in its life span: the queen lives for several years as compared to a few months for the worker bee,

and its behaviour: the queen lays up to several thousand eggs a day while workers lay eggs only occasionally. Unlike workers, the queen never participates in any common hive activities.

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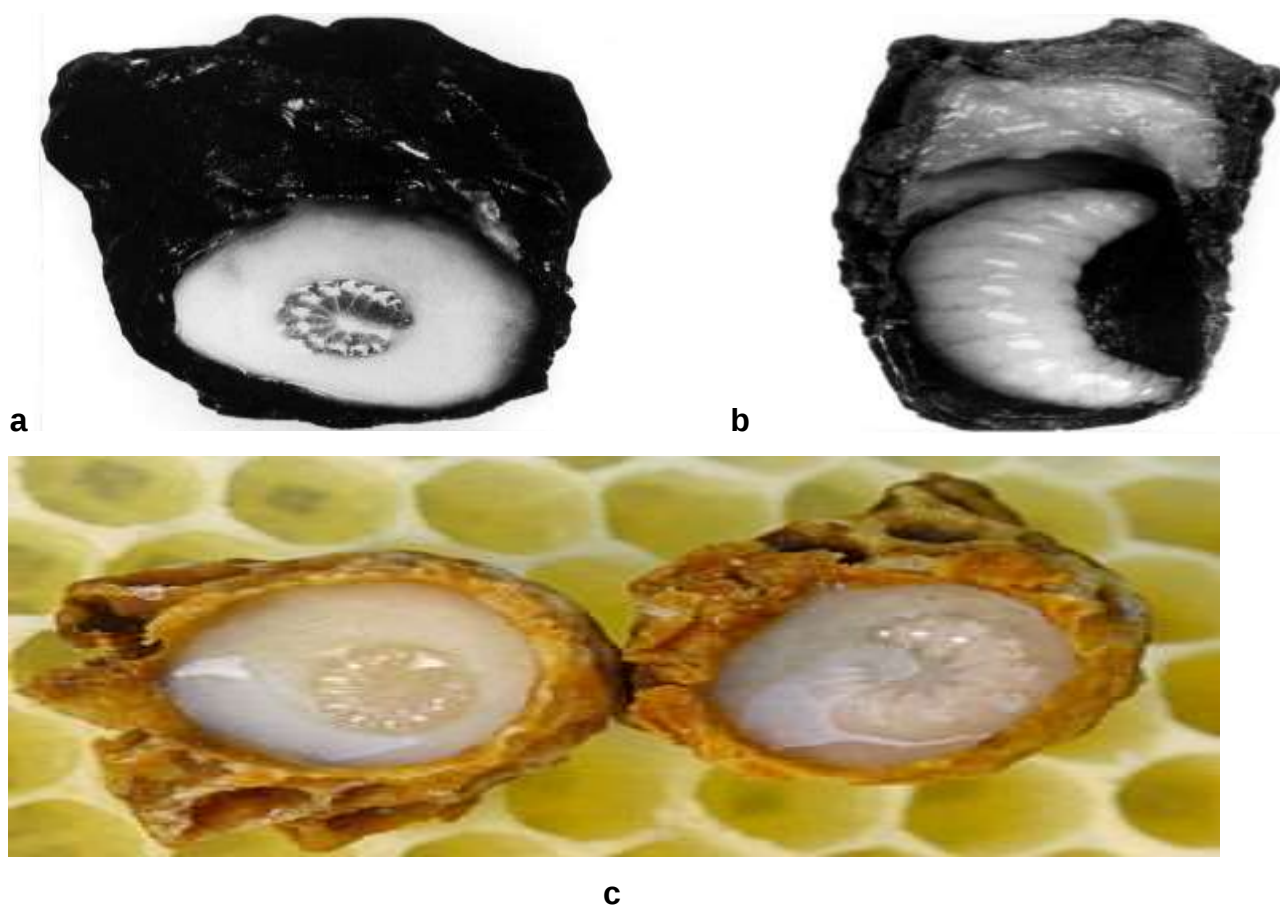


Figure: a) A 3-day old queen larva floating in royal jelly. The cell is almost ready for harvesting. b) A 5- day old queen larva in a newly sealed cell just before pupation. Not much royal jelly is left.

1.2. Physical characteristics of royal jelly

Royal jelly is a homogeneous substance with the consistency of a fairly fluid paste. It is whitish in colour with yellow or beige tinges, has a pungent phenolic odour and a characteristic sour flavour. It has a density of approximately 1.1 g/cm³ (Lercker et al., 1992) and is partially soluble in water. Aqueous solutions clarify during basification with soda. Viscosity varies according to water content and age - it slowly becomes more viscous when stored at room temperature or in a refrigerator at 5°C. The increased viscosity appears to be related to an increase in water insoluble nitrogenous compounds, together with a reduction in soluble nitrogen and free amino acids (Takenaka et al., 1986). These changes

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are apparently due to continued enzymatic activities and interaction between the lipid and protein fractions. If sucrose is added, royal jelly becomes more fluid (Sasaki et al., 1987). Such changes in viscosity have also been related to the phenomena which regulate caste differentiation in a bee colony (see also 6.4.1). Certain debris in royal jelly, is a sign of purity as, for example, the ever present fragments of larval skin. Wax fragments too, are encountered more or less regularly, but their presence is largely dependent on the collection method. Stored royal jelly often develops small granules due to precipitation of components.

1.3 The composition of royal jelly

Numerous chemical analyses of royal jelly have been published over the years. Only recently though, have highly refined technologies given detailed analyses of the unusual composition and complexity of this somewhat acidic substance (pH 3.6 to 4.2). The principal constituents of royal jelly are water, protein, sugars, lipids and mineral salts. Although they occur with notable variations (Table 6.1) the composition of royal jelly remains relatively constant when comparing different colonies, bee races and time.

2.1. Production royal jelly

Royal jelly is secreted from the glands in the heads of worker bees and is fed to all bee larvae, whether they are destined to become drones (males), workers (sterile females), or queens (fertile females). After three days, the drone and worker larvae are no longer fed with royal jelly, but queen larvae continue to be fed this special substance throughout their development. Major royal jelly proteins (MRJPs) are a family of proteins secreted by honey bees. The family consists of nine proteins, of which MRJP1 (also called royalactin). MRJP1 is the most abundant, and largest in size. The five proteins constitute 83–90% of the total proteins in royal jelly. Royal jelly has been used in traditional medicine since ancient times, and the MRJPs are shown to be the main medicinal components. They are synthesised by a family of nine genes (*mrjp* genes), which are in turn members of the *yellow* family of genes such as in the fruitfly (*Drosophila*) and bacteria. They are attributed to be involved in differential development of queen larva and worker larvae, thus establishing division of labour in the bee colony.

2.2. Cultivation of royal jelly

Royal jelly is harvested by stimulating colonies with movable frame hives to produce queen bees. Royal jelly is collected from each individual queen cell (honeycomb) when the queen larvae are about four days old. These are the only cells in which large amounts are deposited; when royal jelly is fed to worker larvae, it is fed directly to them, and they consume it as it is produced, while the cells of queen larvae are "stocked" with royal jelly much faster than the larvae can consume it. Therefore, only in queen cells is the harvest of royal jelly practical. A well-managed hive during a season of 5–6 months can produce approximately 500 g of royal jelly. Since the product is perishable, producers must have immediate access to proper cold storage (e.g., a household refrigerator or freezer) in which the royal jelly is stored until it is sold or conveyed to a collection center. Sometimes honey or beeswax is added to the royal jelly, which is thought to aid its preservation.

3.1. Selecting and checking Personal Protective Equipment (PPE)

Consists of the following items:

1. Veil: for covering head and face and giving protection from stings.
2. Overall: for covering the rest of the body
3. Gloves: for covering the hands
4. Boots: for covering the feet.

3.2. Identifying Occupational Health and Safety (OHS)

The sting

The worker sting is a highly modified for its defensive purpose.

The sting is found in the sting chamber, invisible, last segment. The entire pack of the sting is divided into two regions.

Factors affecting the sting of a worker honey bee

1. Genetic make up

Some are highly aggressive Eg. Tropical bees

Some bees are highly gentle/docile/. Eg. European bees

2. Condition of time

☐ When there is scarcity of forage or less nectar flow

☐ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions of stings

In human reactions to stings take place on three levels

1. Localized reaction
2. Systematic reaction
3. Anaphylactic

1. Localized reaction

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In the first kind of reaction the initial localized swelling is followed by more extensive swelling a few hours later and the affected area may be red, itchy and tender for 2-3days.

2. Systematic reaction

A systematic reaction generally occurs within a few minutes of stinging and it may involve a whole body rash wheezing, nausea, vomiting, abdominal pain and fainting.

3. Anaphylactic reaction

In this reaction symptoms can occur within a seconds, and they include difficulty in

- ☐ Breathing
- ☐ Confusion
- ☐ Vomiting
- ☐ Falling blood pressure that can load to loss of consciousness and death from

circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason. Those who are extremely sensitive may die from a single sting.

First aid for sting

☐☐The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.

☐☐An ice-cold compress applied after sting has been removed will relieve the pain

☐☐Anti-histamine;

o In the form of (1) Ointment (2) Injection

☐☐Adrenaline injection

In addition to these;

☐☐Work with bees in the late or in the evening

☐☐Avoid working bees in rainy, windy time

☐☐Smoke under the frame and wait two minutes before opening

☐☐While moving in the apiary, move slowly and quietly

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- Avoid crashing
 - Wash your protecting materials (glove, overall, etc) after three operation times.
 - When bee stings develop into large swelling and rash, medical advice should be sought straight away.
 - Anyone who is acutely allergic to bee sting and knows that unconsciousness may occur a few minutes after a sting, must immediately inform someone, so that they may be transported as soon as possible to a doctor or a hospital for emergency injection treatment.
- Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

Information Sheet-4	Identifying Occupational Health and Safety (OHS) hazard
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4.1. Identifying Occupational Health and Safety (OHS)

The sting

The worker sting is a highly modified for its defensive purpose.

The sting is found in the sting chamber, invisible, last segment. The entire pack of the sting is divided into two regions.

Factors affecting the sting of a worker honey bee

1. Genetic make up

Some are highly aggressive Eg. Tropical bees

Some bees are highly gentle/docile/. Eg. European bees

2. Condition of time

☐ When there is scarcity of forage or less nectar flow

☐ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions of stings

In human reactions to stings take place on three levels

1. Localized reaction

2. Systematic reaction

3. Anaphylactic

1. Localized reaction

In the first kind of reaction the initial localized swelling is followed by more extensive swelling a few hours later and the affected area may be red, itchy and tender for 2-3days.

2. Systematic reaction

A systematic reaction generally occurs within a few minutes of stinging and it may involve a whole body rash wheezing, nausea, vomiting, abdominal pain and fainting.

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3. Anaphylactic reaction

In this reaction symptoms can occur within a seconds, and they include difficulty in

- ☐ Breathing
- ☐ Confusion
- ☐ Vomiting
- ☐ Falling blood pressure that can load to loss of consciousness and death from

circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason.

Those who are extremely sensitive may die from a single sting.

First aid for sting

☐ ☐ The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.

☐ ☐ An ice-cold compress applied after sting has been removed will relieve the pain

☐ ☐ Anti-histamine;

o In the form of (1) Ointment (2) Injection

☐ ☐ Adrenaline injection

In addition to these;

☐ ☐ Work with bees in the late or in the evening

☐ ☐ Avoid working bees in rainy, windy time

☐ ☐ Smoke under the frame and wait two minutes before opening

☐ ☐ While moving in the apiary, move slowly and quietly

☐ ☐ Avoid crashing

☐ ☐ Wash your protecting materials (glove, overall, etc) after three operation times.

☐ ☐ When bee stings develop into large swelling and rash, medical advice should be sought straight away.

☐ ☐ Anyone who is acutely allergic to bee sting and knows that unconsciousness may our a few minutes after a sting, must immediately inform someone, so that they may be

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transported as soon as possible to a doctor or a hospital for emergency injection treatment.

Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

Information Sheet-5	Cleaning and sanitizing equipment for collecting royal jelly
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5.1. Cleaning beekeeping equipment.

These notes refer to routine cleaning only. Contact your seasonal bee inspector for advice on equipment clean-up after AFB. Our notes mention washing soda. This is **not** the same as caustic soda. See [Dry Pak washing soda](#). We suggest a regular strength of half a cup (100g) to one pint or 500ml of warm water. **Work safely!** Wear rubber gloves and eye protection when scrubbing with washing soda. Dispose of any waste responsibly. Beehive scrapings are great.

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