



BEEKEEPING: Level-I

Learning Guide

Unit of Competence: Support Beekeeping
Work

Module Title: Supporting Beekeeping Work



Learning Guide-01

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Beekeeping Work

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Work

LG Code: AGR BKGI M12LO1-LG-12

TTLM Code: AGR BKGI M12sTTLM 0919v1

LO: Identify basic bee colony management



Instruction Sheet	Learning Guide #12
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics-

- Identifying the required *Material and equipment* for transferring and transferring season.
- Explaining are Transferring procedures of bee colony to modern /transitional hive.
- Explaining and Follow up after transferring bee colony.

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 –

- Identify the required *Material and equipment* for transferring and transferring season.
- Explain are Transferring procedures of bee colony to modern /transitional hive.
- Explain and Follow up after transferring bee colony.

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 14.
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.



8. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the “Self-check 2” in page 16.
10. 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 2).
11. Read the information written in the “Information Sheets 3 . Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 3” in page 19.
13. 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 3).
14. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” in page 21. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
15. Read the “Operation Sheet 1” and try to understand the procedures discussed.
16. If you earned a satisfactory evaluation proceed to “Operation Sheet 2” in page 23. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
17. Read the “Operation Sheet 2” and try to understand the procedures discussed.
18. If you earned a satisfactory evaluation proceed to “Operation Sheet 2” in page 23. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
19. Read the “Operation Sheet 3” and try to understand the procedures discussed.
20. Do the “LAP test” in page 24 (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work.



Information Sheet-1	Identifies the required Material and equipment for transfer and transferring season
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1.1 Prepare materials, tools and equipment for beekeeping work

Bee keeping Equipment and their uses

Bee keeping equipment is material used (necessarily important) for bee keeping and also honey production.

Some of the most important bee keeping equipments are: -

1. **Beehive:** - Successful beekeeping means easy manipulation of the frames of brood and honey to provide a surplus of honey beyond that which the bees need to live on and rear their replacements. It is this surplus of honey which the beekeeper removes and marketed for his product. There are three different types" beehives.

2. **Frame wire-** it is used to support the honey comb in the frame

3. **Casting mould-** it is a metal caused with zinc. It is manually operated and used to make artificial comb foundation sheet.

4. **Transformer** -it is of 18-24 volts, it can reduce the 220v down to 18-24v.

This transformer is used for fixing comb foundation sheets on the frame wires but it is not used in areas where electrification is lacking particularly in most places of rural Ethiopia.

5. **Embedded knives-** is used as an alternative or hot iron bar to do the same purpose (as of transformer)

6. **Honey extractor (Centrifugal)-** it can be hand drive or electrically operated

7. **Honey presser-** it is used to extract honey be methods of hand pressing of the honey combs which are not framed

E.g. honeycomb harvested from traditional and Transitional hives.

8. **Uncapping fork** it is operated manually

This device is mainly used to decamp the cells, of ripened honey before the framed honey combs are placed in the extractor.

9. **Uncapping knife** - is also used for the same purpose, but it is electrically operated.

10. **Queen excluder** (Separating careen)



- Advisee used to form an appropriate partition between the brood and honey chambers so as to prevent the queen bee and drones from entering in to the honey super.

There are three types of queen excluder based on the materials they are made of.

I. Hard metal

II. Metal sheet Queen excluder

III. Plastic

11. Honey storage tank -This is made of stainless steel with a very tight lid, it has a tap

There are at least two types of them-

- The one, which has, get capacity of 50 kg and 30 kg.

12. Honey jars (glass or plastic)

- Each contains 500 gm. According to need

13. Chisel (bee keeper's tool)

- it is made up of iron metal and has sharp surface on one end.

- It is a hand tool of a beekeeper. One has to use or have in his/her hand before approaching bee hives.

- It is used to open the hive, clean propolis and other unnecessary materials seen in the hive. It can be made locally.

14. Bee brush- a soft bristled used to remove bee from a frame combs. (to draw bees into the hive)

15. Smoker- it is manually operated

- It subdues the bees and induces them to feed (engorge), Bees full of honey or other feeds are much easier to handle being

- Aggression is at a minimum while the colonies are disrupted in response to smoke.

- It is also believed that the smoke deadens the effect of alarm pheromones produced during the disturbance caused by entering up the hive.

16. Hand glove

17. Bee Veil Bee keepers protective clothes

18. Over all (bee suits)

19. Boots sheets.



20. Water Sprayer

Used to spray water on bees (especially at low land areas like Gambela) to reduce-

- Aggressiveness Immediate evacuation from their nest.

21. Honey weighing scale

- It is used for weighing honey harvested
- It is used also to keep production records of honey obtained from a hive and/or from an apiary

22. Honey strainer.

- It is a double course screen
- It is used in the normal processing of honey freshly extracted from the comb to remove the bits of wax that flow out of the extractor with honey.
- All honey as it comes from the extractor and before it goes into bottles (jars) should be run through a strainer to remove sediments and wax capping.







Personal Protective Equipment (PPE)

Personnel participating in beekeeping activities should, at a minimum, wear a beekeeping hat and veil, elbow length gloves that are leather or nitrile, and closed-toe/closed-heel shoes.

Before entering the beekeeping area, personnel shall wear clean protective clothing/personal protective equipment. The protective clothing should be without holes to prevent bees from entry.

Beekeeping hat and veil

- The ventilated hat should keep its shape and be firm enough to support the veils that fit over them and provide space that keeps the veil away from the face.
- Veils are required when working closely with the bees. A folding wire veil should be fitted to the hat to ensure good separation between the beekeeper's face and the bees outside the veil.
- Dark felt hats and floppy hats should be avoided.

Beekeeping gloves

- Gloves need to be strong, but pliable;
- Elbow length cloth sleeves attached to the gloves should be worn when gaining access to the inside of the hive; or
- A band of elastic should be sewn into the cloth sleeve at the elbow end to make it bee-resistant.

Footwear

- Closed-toe and closed-heel shoes should be worn.

Bee sting first aid

- **Reactions to bee stings**
 - Normal reaction includes: some pain, redness, itching, and swelling at the site
 - Mild to moderate reaction includes: persistent or spreading pain, itching or swelling, large or uncomfortable areas of pain, redness, itching or swelling, ongoing symptoms over several days.
 - Severe (Anaphylactic) reaction includes: Abdominal pain or vomiting, difficult or noisy breathing, swelling of the tongue, swelling or tightness

1.2.3 Check materials, tools and equipment for beekeeping work

Containers and processing equipment need to be made of material compatible with this very acidic food. No copper, iron, steel or zinc should be used as they dissolve into the honey and



may affect color and flavor, and might reach toxic levels. Instead, stainless steel, glass and food grade plastic can be recommended. Galvanized steel (zinc) may be used for surfaces which come into contact with honey only for short periods, such as in extractors. Used containers need to be free of any odours since honey will absorb these very quickly. Storage containers made of improper material can be coated completely with beeswax or food grade plastic liners to avoid any direct contact. There is, however, no adequate protection if the containers have been used previously for toxic chemicals

1.2.4 Handling techniques of materials, tools and equipment for beekeeping work

Honey containers

Improper honey containers also affect the quality of honey. So honey containers should be

- Odorless,
- There must not be exposed metals that makes to react with honey and brings a chemical changes,
- The containers has to be moisture proof,
- The shape of the containers must be proper for readily removable of a honey,
- The containers should have their own lid or cover,
- Recommended containers are - aluminum - stainless steel

- Plastics - glass.

Containers used for retailing have to be attractively labeled.

1.2.5 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.

1.6 Handling honey bees when opening a hive

In cooler area, beekeepers who can choose when they open their hives should work on a warm, dry, windless, Sunday; when most of the older bees aren't inside the hive. In any case, Hives should not be opened during cold temperature, windy and rainy days when all the foragers are inside the hives. Bees are especially likely to sting when there is no nectar flow.



Colony conditions which makes the bees more difficult to handle included the following; a very large population, presence of many old bees, previously alerting of the colony by disturbances of any kind, robbing by bees from other colonies, queen less or super sedure, and starvation.

1.7 Possible transferring time

If the transferring place is away from the reach of people and animals, it is quite possible to do the transferring during day time starting from morning to late afternoon. If the operation of transferring is near resident areas or at backyard, the possible and safe operation time is after all animals, school children and other walking living things are under their respective shelters. It is not advisable to do transferring alone. Two or more people can do better jobs and safe.

Self-Check -1	Written Test
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Directions: write short answer

- 1, list honey bee transferring equipment(4point)
- 2, write use of .Water Sprayer(2points)
- 3, write use of Bee brush (2points)
- 4, when does batter honey bee colony transferring time?(3points)

Note: Satisfactory rating – 4 points

Unsatisfactory - below 4 and 4 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____



Information Sheet-2	Explain Transferring procedures of bee colony to modern /transitional hive
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2.1 Bee packaging

It is a modern way of transporting bees from one place to another.

- Before an attempt to transport prepare final destination sites, boxes and hive stand.
- The bees after reaching the destination site, has to be transferred into box hives immediately.
- A swarm trapping and transporting box properly designed for the purpose is known as bee packaging box or nucleus hive.
- It has a separate feeder for the queen and worker bees during the journey. Such kind is an appropriate box for trapping and transporting bees to any distance across the country.
- But the queen has to be placed in a separate cage with ample food;
- Possible to transport as many colonies say 100 or 200 at a time.
- Better to drive at night to minimize heat stress
- Keep water and water sprayer with you.
- When relocating a hive over a long distance (more than 2 km), first of all plug up the entrance holes at night when all the foraging bees are in hive and make sure there is no other escape for the bees; transport it carefully to a well-shaded and protected place.
- When relocating a hive over a short distance (less than 2 km):
- If you simply move the hive directly to a place which is less than 2 km away from your original site, (that is 100 m or less), the “field bees” would return to the original place because of their sense of orientation. As a result you would lose them all. What you have to do is:
- First close the hive



- Take the hive to a place, which is 3 km away from both the old and the new proposed site.
- Leave it there for at least 2 weeks.
- Then transport it to the new site. During the 14 days at the temporary site the “field bees” will have forgotten the old site.
- If the hive is to be moved between 20 and 100 m you may also carry the hive to the new site straight away, but then you have to collect clusters of stray older bees at the original site repeatedly which are then shaken into the new hive.
- If you want to relocate your hive less than 20 m away, you can move it in steps of 2 m every third day until you have reached the new site.

2.2 Transferring bee colony from local hive into frame hive

Transferring bee colony from transitional /local hives to modern /moveable frame hive has the following stapes

- stape1.** Put the mat or flat material prepared on the transferring ground
- stape2.** Prepare the smoker with smoking materials inside and place near the edge of the mat
- stape3.** Put bee brush near by
- stape4.** Have water sprayer with water, good if you make it available
- stape5.** Bring the new nesting frame hive and place it on the mat having the size of 120 to 130 cm
- stape6.** Open the cover(lid) of the frame hive
- stape7.** The entrance of the frame hive should be towards the wider areas of the mat.
- stape8.** While bringing the old hived colony, do not roll or change the original position of the hive. Keep its position as it was until reaching the transferring place.
- stape9.** Hold local hive in the inclined position
- stape10.** Put the new nesting frame hive near and on operation mat.
- stape11.** The transferring has to be conducted with a steady and gentle manner of operation. This is mostly to avoid the magnitude of committing error in damaging the queen bee and minimizing jerking movement during removing combs from old nest.
- stape12.** The operation would start by opening the local hive lid.
- stape13.** Smoke around the edge of the hive soon after opening



the lid. It helps to clear or move away the bees from working areas.

stape14. Whenever removing combs for the queen bee on both sides of the comb and place it where appropriate. The brood and the honey comb are to be placed separately

stape15. Use bee brush now just to clear the bees from the combs removed.

stape16. If the queen bee is discovered by chance soon after the operation started, then catch the queen bee and put her in a cage and place her in the new frame hive. Then continue the operation. However, this time on wards, there is nothing to worry about the mood of working, but

stape17. At any time of operation after the queen is caught place her in queen cage and then put her in the new nesting frame hive.

stape18. Cover the frame hive now after placing the queen bee in

stape19. During the operation if the queen bee is not discovered immediately, the work should continue but in a gentle manner until no comb is left in the old hive.

stape20. During the operation in cooperation with other people, fix brood combs removed from old nest on frames of frame hive with the appropriate head position of the removed combs correctly upward. Use rope and needle to tie brood combs on frame top bars accordingly

stape21. When everything from the local hive is removed, hold the local hive with both hands up and forcefully knock down on the mat so that all the bees inside the old hive would fall, then search for the queen bee carefully.

stape22. Make sure that no bees are left in the old local hive.

Then take away the old local hive from the working site.

stape23. Allow the bees or indicate the direction of the hive entrance to run to where the queen bee is. Most of the time worker bees would search and reach her quickly.

stape24. There are rare incidences missing the queen bee during transferring. She may go with the swarm bees in to the new frame hive unseen or she may be out of the working areas resting on technicians' body or on tree branches or on other places. If its wings were clipped, it may fall down on the ground. If the queen bee is not in the new nesting hive, the worker bees are reluctant to join her going to the new hive. Even after the transferring has been successfully conducted, it is essential to check the remaining situation. So sometimes watch carefully to exploit the unexpected situations. It is possible to find two queens while transferring.



stape25. After completion of the transfer, place the new frame hive with the newly transferred bees in place of the old hive.

stape26. Finally clean working areas and materials that were used during the transfer.

2.3 Transferring of bee colony from local to transitional hives.

In most cases, transferring method and material requirement indicated in frame hive colony transfer can be applied to transitional hive transferring method as well.

But in the case of transitional hive transferring, there is no need of making and fixing comb foundation sheets on bars as done for frame hive. There is also no need of inserting frame wire. However, preparations required before the transfer is as follows:

- a. Clean and assure the presence of all top bars required
- b. If beeswax is available, melt and smear on the inner middle surface of the top bar just to indicate the start of building the comb.
- c. Fix brood combs removed from the old local hive on the top bars of transitional hives
- d. Prepare transferring mat and other materials required as indicated in frame hive transfer method.

2.4 Transferring procedure

Stape1. Bring transitional hive first and place it on the mat

stape2. Next, bring the local hive with bees and place it near transitional hive but in the inclined position and then open the lid to start removing the combs.

stape3. Smoke on bees to avoid them from working sites.

stape4. When ever remove the combs, look for the queen bee on both sides of the comb.

stape5. Brush the worker bees down into the transitional hive from the top bar that is temporarily picked.

stape6. If the queen bee is found at the first operation that took place before removing all the combs from the local hive, then put her in a cage and place her in the base floor of the transitional hive. The work then after would be simple and quick. If not found quickly, continue removing the combs in a very careful and gentle manner until the queen bee is found. When she is seen while removing the combs, the lead person of the operation should take out off the hand glove and catch the queen bee with bare fingers. This is simply to safely handle the queen bee the most important individual of the colony. See picture 76.

stape7. If the queen bee is not found until the end of removing the combs from the local hive, knock down the local hive on mat after holding with two hands and this helps to remove all



bees remaining inside. Search for the queen bee, catch and introduce her to the transitional hive after placing it temporarily in a cage.

stape8. Brood combs removed from local hive should be placed inside the new transitional hive by tying the combs with rope on top bars.

stape9. Place all the top bars in place. Direct the swarm bees to the new hive entrance (Fig 75).

stape10. When this operation is finished, look and investigate for unforeseen things around and then place the new transitional hive in a place where the former local hive was.

stape11. After the colony has settled well, try to check for the old combs introduced if not placed in order.

If there are old combs removed during the transferring time but not in use two important things to consider: Save these combs as they are by placing in a safe bag for later use that same day, or shortly after wards, melt and collect pure beeswax before it is attacked by wax-moth.

Self-Check -2	Written Test
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Directions: Answer all the questions listed below.

1, what is Bee packaging?(2points)

2, write stapes of colony transfer from local hive?(2points)

Note: Satisfactory rating – 4 points

Unsatisfactory - below 4 and 4 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____



Information Sheet-3	Explain and Follow up after transferred bee colony.
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3.1 Follow-up and support for settlement of colony transferred

After the transfer is done, starting next day, inspection of conditions to working bees is an important task. The bees unless irritated with materials in the hive they will start resuming the normal nest activities quickly. Bees going out of the new hive and coming with pollen load is a good sign of settling. If the transferred colony did stay in the new hive with no sign of movement, and if no bee is going out or coming in, then there would be a danger rather have the intention to escape to unknown destination. Some beekeepers in such a case would provide them with more food. Instead, close watching is important.

Indicator of bee settling

- ❖ Clean new hive
- ❖ Foragers load pollen
- ❖ Start to built honey comb

Some bee colonies when they are disturbed after transfer, they mostly crawl around hive entrance. Therefore, smoke at them and drive them to go into the hive again.

If the bee colony starts cleaning the hive, this is a good indication also that the colony has settled in the new nesting hive. The bee colonies have the behavior to remove all unnecessary things from the nest quickly.

If one is sure that the bees have resumed nest activity, releasing the queen bee from the cage mostly after one to two days is good for her to be acquainted with the new environment inside the hive

All old combs removed from local hive and placed into the new nesting hive, whether it is in frame or transitional hives, should be removed after the bees have settled well and start constructing their own new combs.

Another and most important aspect of transferred colony settlement to new hive is that the start of queen bee laying eggs and larval development when seen in combs cell . On the other hand, in the presence of newly constructed comb if no eggs are laid and no larval development is seen, then, there is a danger of losing the queen bee at transfer time or then after.



Such colony can be called queen less colony.

As a coping mechanism worker bees lay several eggs of their own in one cell which is not done by queen bee. The queen bee would lay only one egg per comb cell at a time.

During such unfavorable situation, where the colony is without queen bee, instead of losing the entire colony the best option of surviving the colony is to insert or place brood comb with fresh uncapped larvae by bringing from other colony so that they can develop queen bee from the fresh larvae introduced. This has to be done before worker bees lay their own eggs. At any time of the seasons, apiary inspection and application of best bee management practices is a rewarding job leading to sustainable end results.

Bee colony must be managed carefully during transferring such as

- Inspection and proper validation of bee management
- *Queen Excluders in Frame Beehives*
- *Feeding of bees during dry period*
- Splitting of colony
- Swarm control
- Absconding control
- Prevention of disease
- Pest and predator control etc
- **Apiary arrangement:** The arrangement of the apiary is important to help meet the needs of the bees and to help make beekeepers work easier. In most areas of the tropics it is necessary to put the hives on stands to protect the bees from ants and toads. The stands should be at least 45 cm above the ground. The legs can be placed in cans that contain used motor oil, or bands of grease can be placed around them to keep ants from the hives; fresh ashes spread around the legs also keep ants away. Since the KTBH consists of a single box, it can also be hung from a tree or from poles. This protects it from ants and toads and from bush fires as well.
- *Keeping weeds cut in the apiary also reduce the ant problem. Tall weeds can provide bridges to the hives for the ants*
- If there is no source of water for the bees within one kilometer, a container of water with floating sticks or protruding stones can be placed in the apiary.
- Hive arrangement within the apiary is also an important consideration. Avoid placing the hives close together in long straight rows. Such placement results in a lot of drifting or confusion of bees between colonies. Drifting can contribute to disease



transmission. To prevent drifting, the direction of the hive entrances can be varied, and lines of hives can be broken up with landmarks such as trees or shrubs. Hives should be at least 45 cm apart, and slightly tilted toward the entrance to aid the colony in removing residue that falls to the bottom. This also allows rainwater to run out. The placement of hives should allow the beekeeper to approach the colony and work it from behind. This is less disturbing to the colony since it does not interfere with the flight path of the foragers. It also allows the beekeeper a chance to smoke the colony before the guard bees at the entrance are alerted.

- Hives should not be in direct sun light during the hot periods of the day, nor should they be in constant heavy shade. The ideal site would receive sun in the morning so that the bees start to fly early, and shade in the afternoon so that the number of bees ventilating the colony and foraging for water is minimized.
- The apiary site should also allow for good air circulation so that it does not remain damp for long periods after wet weather. Avoid areas that flood during rainy periods. Areas under high trees often provide good apiary sites because they dry out quickly afterwards and are not excessively shady.
- Avoid areas of constant wind for apiary sites. Such winds hinder the bees from flying. If there are no natural windbreaks, they can be planted. Melliferous plants can serve a double purpose. Such living fences can also serve to keep livestock away from the hives.

Self-Check -3	Written Test
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Directions: answer the questing appropriately

1, Write sings of colony settling (4point)

Note: Satisfactory rating – 4 points

Unsatisfactory - below 4 and 4 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____



Name: _____

Date: _____



N.B You must identify and collect tools and equipments first for all operations

Operational sheet-1	Transferring bee colony from local hive into frame hive
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Transferring bee colony from transitional /local hives to modern /moveable frame hive has the following stapes

- stape1.** Put the mat or flat material prepared on the transferring ground
- stape2.** Prepare the smoker with smoking materials inside and place near the edge of the mat
- stape3.** Put bee brush near by
- stape4.** Have water sprayer with water, good if you make it available
- stape5.** Bring the new nesting frame hive and place it on the mat having the size of 120 to 130 cm
- stape6.** Open the cover(lid) of the frame hive
- stape7.** The entrance of the frame hive should be towards the wider areas of the mat.
- stape8.** While bringing the old hived colony, do not roll or change the original position of the hive. Keep its position as it was until reaching the transferring place.
- stape9.** Hold local hive in the inclined position
- stape10.** Put the new nesting frame hive near and on operation mat.
- stape11.** The transferring has to be conducted with a steady and gentle manner of operation. This is mostly to avoid the magnitude of committing error in damaging the queen bee and minimizing jerking movement during removing combs from old nest.
- stape12.** The operation would start by opening the local hive lid.
- stape13.** Smoke around the edge of the hive soon after opening the lid. It helps to clear or move away the bees from working areas.
- stape14.** Whenever removing combs for the queen bee on both sides of the comb and place it where appropriate. The brood and the honey comb are to be placed separately
- stape15.** Use bee brush now just to clear the bees from the combs removed.
- stape16.** If the queen bee is discovered by chance soon after the operation started, then catch the queen bee and put her in a cage and place her in the new frame hive. Then continue the operation. However, this time on wards, there is nothing to worry about the mood of working, but



stape17. At any time of operation after the queen is caught place her in queen cage and then put her in the new nesting frame hive.

stape18. Cover the frame hive now after placing the queen bee in

stape19. During the operation if the queen bee is not discovered immediately, the work should continue but in a gentle manner until no comb is left in the old hive.

stape20. During the operation in cooperation with other people, fix brood combs removed from old nest on frames of frame hive with the appropriate head position of the removed combs correctly upward. Use rope and needle to tie brood combs on frame top bars accordingly

stape21. When everything from the local hive is removed, hold the local hive with both hands up and forcefully knock down on the mat so that all the bees inside the old hive would fall, then search for the queen bee carefully.

stape22. Make sure that no bees are left in the old local hive. Then take away the old local hive from the working site.

stape23. Allow the bees or indicate the direction of the hive entrance to run to where the queen bee is. Most of the time worker bees would search and reach her quickly.

stape24. There are rare incidences missing the queen bee during transferring. She may go with the swarm bees in to the new frame hive unseen or she may be out of the working areas resting on technicians' body or on tree branches or on other places. If its wings were clipped, it may fall down on the ground. If the queen bee is not in the new nesting hive, the worker bees are reluctant to join her going to the new hive. Even after the transferring has been successfully conducted, it is essential to check the remaining situation. So sometimes watch carefully to exploit the unexpected situations. It is possible to find two queens while transferring.

stape25. After completion of the transfer, place the new frame hive with the newly transferred bees in place of the old hive.

stape26. Finally clean working areas and materials that were used during the transfer.



Operational sheet-2

Transferring bee colony from local hive into transitional hive

Stape1. Bring transitional hive first and place it on the mat

stape2. Next, bring the local hive with bees and place it near transitional hive but in the inclined position and then open the lid to start removing the combs.

stape3. Smoke on bees to avoid them from working sites.

stape4. Whenever remove the combs, look for the queen bee on both sides of the comb.

stape5. Brush the worker bees down into the transitional hive from the top bar that is temporarily picked.

stape6. If the queen bee is found at the first operation that took place before removing all the combs from the local hive, then put her in a cage and place her in the base floor of the transitional hive. The work then after would be simple and quick. If not found quickly, continue removing the combs in a very careful and gentle manner until the queen bee is found. When she is seen while removing the combs, the lead person of the operation should take out off the hand glove and catch the queen bee with bare fingers. This is simply to safely handle the queen bee the most important individual of the colony. See picture

stape7. If the queen bee is not found until the end of removing the combs from the local hive, knock down the local hive on mat after holding with two hands and this helps to remove all bees remaining inside. Search for the queen bee, catch and introduce her to the transitional hive after placing it temporarily in a cage.

stae8. Brood combs removed from local hive should be placed inside the new transitional hive by tying the combs with rope on top bars.

stape9. Place all the top bars in place. Direct the swarm bees to the new hive entrance

stape10. When this operation is finished, look and investigate for unforeseen things around and then place the new transitional hive in a place where the former local hive was.

stape11. After the colony has settled well, try to check for the old combs introduced if not placed in order.

If there are old combs removed during the transferring time but not in use two important things to consider: Save these combs as they are by placing in a safe bag for later use that same day, or shortly after wards, melt and collect pure beeswax before it is attacked by wax-moth.



LAP Test	Practical Demonstration
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Name: _____

_____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **8-12** hours.

Task 1: Transferring honey bee colony from local hive to movable frame hive.(5point)

Task 2: Identify bee colony equipments are normal to work .(5point)

Task 3: Transferring honey bee colony from local hive to transitional hive.(5point)

Instructions: write the appropriate answer for the following questions

1. List the honey bee colony transfer equipments.(5point)
2. Write sins of colony settling.(5point)



List of Reference Materials

- Deliverable: Manual on Beehive Construction and Operation University of Kassel (UNI KASSEL)Date:15-June 2018
- **BEGIN BEEHIVE MATERIALS RESEARCH SUMMARY Ivan Leroy Brown M Tech Industrial Design November 2018**
- ADVANCED BEEKEEPING MANUAL Ethiopian b e e k e e p e r s a s s o c i a t i o n JUNE 2011



Learning Guide-02

Unit of Competence: Support
Beekeeping Work

Module Title: Supporting Beekeeping
Work

LG Code: AGR BKGI M12LO2-LG-12

TTLM Code: **AGR BKGI**

M12sTTLM 0919v1

LO 2: Identify basic bee colony
management



Instruction Sheet

Learning Guide #12

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics-

- Explaining techniques of Bees handling
- Maintaining Hive and apiary.
- Making artificial foundation sheet.
- Identifying Inspection techniques of bee colony
- Identifying Time of inserting and removing queen excluder

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 –

- Explains techniques of Bees handling
- Maintains hive and apiary.
- Makes artificial foundation sheet.
- Identifies inspection techniques of bee colony
- Identifies time of inserting and removing queen excluder

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 17.
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.



8. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the “Self-check 2” in page 24.
10. 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 2).
11. Read the information written in the “Information Sheets 3 . Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 3” in page 28.
13. Read the information written in the “Information Sheets 4 . Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
14. Accomplish the “Self-check 3” in page 34
15. Read the information written in the “Information Sheets 5 Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
16. Accomplish the “Self-check 3” in page 36
17. 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 3).
18. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” in page 38. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
19. Read the “Operation Sheet 1” and try to understand the procedures discussed.
20. Read the “Operation Sheet 2” and try to understand the procedures discussed.
21. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” in page 38. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
22. Do the “LAP test” in page 39 (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work.



Information Sheet-1	Explain techniques of Bees handling.
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1. 1Hunting for Honey in the forest

Honey hunting or Bees Killing is a process where honey hunters/bees killers go in the forest, set fire on the tree hallow/bees nest, kill the bees and press the honey combs, to extract honey. This primitive method of harvesting honey has lot of negative impacts on human and the environment, therefore it should be discouraged.

1.1.1Traditional and modern beehives and beekeeping equipment

Honeybees that nest in the open produce far less honey than those confined in enclosures. There are good reasons for this. Colonies in the open are exposed to predators. Therefore have to employ numerous workers as guards to fight intruders. They have to consume large quantities of honey, which they use as fuel, to enable them to cluster to stop the wind which cools down their combs and to generate enough heat to maintain the proper temperature for brood development. During severely hot days, more bees have to use honey as fuel to enable them to fan and cool melting combs to avoid disaster. This temperature control can only be quite inefficient, because of the colony's exposed condition. The exposed colony therefore has to keep larger numbers of house bees, and will thus have fewer foraging bees available to bring in the needed nectar and other essentials from the field.

It has been seen that the bees' primary natural ranges are in the savannah and semi-arid lands, where temperature variations are extreme. Often the few nesting enclosures available to the bees are in ant-hills and rocks from which honeycombs cannot be easily harvested. Large trees are scarce; few have hollows large enough to house a colony. With the increased interest in beekeeping and the growing demand for bee products and services, bees can no longer be maintained in their few natural dwelling places, but must be provided with special artificial hollows in the form of beehives.



Because the honey hunters do not have training on beekeeping, they go in the forest, to harvest honey without properly dressing or wearing protective cloths. And in the processing of killing the bees by fire to take the honey combs, the bees become defensive, by stinging and chasing the hunters/farmers. When this happens, the hunters get sick

Traditional hives

Beekeeping is not new in Africa. It has been practiced from time immemorial, especially in the Sahel regions. In these large areas, wooden boards or timber are scarce, and therefore grass and mud have played major roles in providing material for beehive construction.

The grass hive

Dry grasses are woven together in a basket or cylindrical form, usually with entry points at both ends. The hive is installed high in tree-tops to avoid termites. Some beekeepers lower it carefully at harvest time, while others drop it carelessly by cutting the suspension rope. Owing to the weakness of the material, such hives' usefulness is usually less than one year, and they are used for seasonal beekeeping only.

The gourd hive

The gourd provides a natural hollow for bees, but most gourds are too small for an average bee colony, so that their use often induces swarming. There are two types of gourds. One is more or less pot-shaped, while the other has a long neck attached to the "pot" section. Both are installed by a suspension cord or by resting the mouth on a wooden peg.

Most gourd hives have to be broken into pieces before honey and brood combs can be removed. In the savannah areas, some tribes eat both honey and brood, and do not care to wait until there is a maximum of honey to harvest.

The log hive

Two main types of log hive are known. In some isolated areas of the West African coasts (e.g. Ghana and Guinea-Bissau), the ciba or palmyra palm (Borassus flabellifer) produces natural hollows for interested beekeepers to use as hives. When the plant dies, the beekeeper waits for termites to consume the soft inner pith. The tree is then felled and cut



into pieces and the ends are sealed with woven grass, a few small holes being left at the ends to provide entry and exit for the bees.

For the second type, found in East Africa (e.g. Kenya and Tanzania), a tree is felled and cut into cylindrical logs which are carefully scooped out to form hollows. They are then sealed, leaving some small holes for exit and entry. In Tanzania, the hive is split into halves, which the beekeeper attaches together before baiting and installation. At harvest time, the hive is split open and the honeycombs removed. The halves are then rejoined for the bees to start the next honey crop.

The East African log hive, while simple in construction, is however expensive and inefficient. Several cheap and more productive hives could have been made with wooden planks from the same tree if only it had not been crudely shaped into log sections first.

The barrel hive

Metal and wooden barrels are sometimes employed as beehives in some places in West Africa. In Guinea-Bissau, for instance, barrels containing pigs'-feet or wine, imported by the Portuguese, were adapted for use as hives. Some of these old barrels are deteriorating, however, and no new ones are available to replace them.

The clay-pot hive

The cheapest and most durable of all the traditional hives is the clay pot, very popular especially in the northern savannah of West Africa. The pot is similar to the type generally used to carry water or other liquids, modified to provide a wider mouth and a small mid-section hole for both exit and entry.

The pots, usually made by the elderly women, are bisque-fired, and the inner part is smoked as part of the baiting. They are then baited with cow dung or other waste and installed on the ground or on pegs in trees. In some areas, the pots are turned upside down directly on the ground, for beekeepers find that when they are installed on a flat plate or wood, bees glue the plate firmly to the hive with propolis, making harvesting tedious. This method of installation, however, has a serious drawback: frequent ant invasions force some bee colonies to abscond.



Traditional beekeeping utilizes cheap and plentiful local materials for hive construction, some of which would otherwise be wasted, e.g. the ciba palm. But such simple beehives cannot be easily manipulated because bees fix combs to the hive body. Combs cannot be inspected at all, and detached combs cannot be easily replaced. To counter this problem, traditional beekeepers should adopt the top-bar system as a simple, modern way to convert traditional hives into movable-comb hives.

Modern rives

The design of all modern beehives is based on the discovery, by the father of modern beekeeping, Lorenzo Lorraine Langstroth, that when bees build their combs they always leave exactly the same amount of space (the bee space) between them (see pp. 39-40). On the basis of this finding, Langstroth invented a hive with frames separated by this bee space, in which the bees could build their comb. The frames are so arranged that they can be removed individually without disturbing other combs and without crushing bees, and the sides and bottom of the frame provide very good support for the comb.

Langstroth also found that several communicating hive boxes can be stacked one above another, and that the queen can be confined to the lowest, or brood, chamber, by means of a queen excluder. In this way, the upper chambers (called supers) can be reached only by the workers, and therefore contain only honey-comb. This made hive inspection and many other management practices possible, and turned the art of beekeeping into a full-scale industry. Almost all commercial hives in use today operate on the Langstroth pattern, although they may contain from 10 to 13 frames.

Other bee enthusiasts have given their names to similar hives that are essentially modifications of the original Langstroth, and these frame hives are in general use throughout Europe, North America, Australia, and parts of South America and Asia, as well as in some northern and southern African countries. For technical and economic reasons set out on pp. 44-45, however, most African countries, mainly in the tropics, are not yet in a position to use frame hives, and for them the top-bar hive represents a satisfactory compromise, although it is admittedly less efficient and perhaps somewhat more difficult to use, especially for beginning beekeepers.



The top-bar hive

In the top-bar hive, the Langstroth frame is replaced by a simple modification of the top bar of the Langstroth frame, and the bees build their combs hanging down from the centre of the bar. Since the combs are not supported on all four sides as they are in the Langstroth frame, they can break more easily, but because they are fixed only to the top-bars and not to the hive body, it is still possible -- with care -- to remove and replace them at any time for inspection or other management practices.

While boxes built especially to receive top-bars give the best results, clay pots, barrels and most containers used by traditional beekeepers can easily be fitted with top-bars: the important thing is to maintain the proper, equal distance between the combs.

Cut any piece of wood to fit the size of the container's opening. The width of the wood must be exactly 32 millimetres (3.2 centimetres or 1 1/4 inches). This is a crucial measurement. The tropical honeybee builds a comb which has a thickness of 25 millimetres. This comb is usually attached to the centre of the top-bar. A space of 3.5 millimetres is thus left at either side of the comb. When two or more top-bars fixed with combs are placed side by side, the inner space becomes 7 mm (i.e. 3.5 mm plus 3.5 mm). This space, vital to the bees, is usually referred to as the "bee space". These bee spaces are also found between the combs and the hive body. They serve the bees as paths in which they can move freely.

Advantages and disadvantages of frame and top-bar hives

Advantages of the frame hive

- a) The comb is fixed firmly to the four sides of the frame. This facilitates easy harvesting, and the beekeeper has little fear of damaging the comb.
- b) The strength of the built-in comb also allows easy transportation, even over bad roads. It also affords easy control of a colony of bees without fear of breakage before the arrival at the new destination.
- c) Honey is extracted by means of the centrifugal honey extractor, which makes it possible to remove the honey without damaging the comb. Empty combs are returned to the hive for the



bees to refill with new honey, thus saving the insects from wasting time and energy to construct a replacement comb. Honey harvests are maximized, as the beekeeper can obtain several honey crops within the year. In Canada, for instance, a frame hive with a strong colony of bees may produce over 200 kg of honey per year. Thus, it is ideal for a serious large-scale honey production programmed.

d) During hive manipulations, very few bees are crushed between frames, whereas dozens of bees can easily be killed by careless handling of top-bars.

e) The hive is so designed (with queen excluder and supers) that the queen and brood are confined to the lower chamber. Supers contain only honey, and the lower brood chamber is undisturbed when honey is harvested.

f) Stealing a double- or triple-storey hive with a colony is a difficult feat for a thief. The Kenyan top-bar hive, on the contrary, can be carried away easily.

g) A swarm of bees can be hived with ease. Bees can easily pass through the numerous spaces between the frame and at the top of the hive.

h) Hive boxes can be stacked easily. This makes it easy to expand and contract the hive to meet the needs of the bee colony.

i) Drugs can be applied with ease through the openings.

Disadvantages of the frame hive in tropical Africa

a) A frame hive with two supers costs three times as much as a Kenyan 27-top-bar hive.

b) A high degree of craftsmanship is required to build the hive. Frame dimensions must be precise. Local village carpenters are not usually skilled enough for the job, and suitable tools for large-scale production of frame parts may not be available. Even if they are, it is never certain that the craftsmen have the patience to construct the hive correctly. Hives ordered for use in Ghana by the Technology Consultancy Centre failed to achieve the desired goals due to lack of precision in construction.

c) Wood for frame construction must be seasoned for at least a year. Very few carpenters or entrepreneurs can tie up their capital in this way.



- d) The need to keep a stock of frames to replace those removed during the honey harvest creates an additional cost.
- e) The need to import centrifugal honey extractors, decamping-knives, trays and other sophisticated equipment cannot be ruled out. In many countries, currency to order these from abroad cannot be obtained easily by local beekeepers.
- f) If frames are unguided, honeybees find it difficult to start the combs correctly on the frame. The beekeeper has to install a wired comb foundation which is not available. The only foundations that can be ordered from abroad cannot be successfully used by the tropical honeybee, because the African bee is smaller than the European bee, and the cell size on imported foundation is too large for African bees.
- g) A hive with supers is heavy and difficult to carry as a head-load; therefore, a vehicle may be required to move colonies if the need arises.
- h) Because the frames do not fit together as the top-bars do, it is very difficult for the beekeeper to control the numerous bees which pass through the spaces between the frames and the top of the hive. This problem is very serious with the transitional long hive, which has as many as 30 frames arranged in a single-storey rectangular box. Such a beehive needs a special large smoker, and even such a smoker may not be able to produce enough smoke to "cool" the aggressive bees. The new beekeeper, upon seeing hordes of bees escaping, may run away, leaving the hive uncovered.

In the light of these serious problems, it is advisable for the beginner to start with the simplest type of movable-comb hive, which is, of course, the top-bar hive.

Advantages of the top-bar hive

- a) This hive is cheaper and easier to produce than a frame hive. Any semi-skilled carpenter can make it. Only a few simple carpentry tools are required.
- b) There is little or no need to import anything. All materials required can be obtained locally.
- c) The hive can be opened easily and quickly. There is little or no need to employ a hive tool. Top-bars can be constructed to overlap the sides of the hive body slightly, and this makes it possible to use the thumb to pry up the top-bar.



- d) Top-bars occupied by combs can easily be detected, so that the hive is opened from the empty side. This avoids crushing the bees between the top-bars when lifting the first comb.
- e) Bees in the top-bar hive can easily be controlled when harvesting or inspecting the combs. The smoker puffs smoke through the opening created by the removal of one top-bar. Few bees can attack, since the beekeeper drives them away with smoke. When the top cover is removed from the transitional long hive, all the frames' 7-mm spaces are exposed, which permits numerous attackers to fly out and attack the beekeeper.
- f) The top-bar hive is lighter to carry, even when the colony is inside.
- g) More beeswax can be produced. Sales of beeswax increase the beekeeper's earnings and solve a great national problem. Beeswax is a multi-purpose industrial raw material required by factories and craftsmen.
- h) There is no need to employ a queen excluder, which at the moment is not available. In practice, the bees keep their brood chamber separate from the honeycombs. Clean honey can be taken away, leaving brood combs undisturbed.
- i) Honey production can be high. A well-managed hive with a good strong colony can produce between 50 and 120 kg of honey annually.
- j) Honeycombs adulterated with pollen can be of high value. Pollen is a nutritious food supplement; the only way the nutrition is passed on is through honey harvested from such combs.
- k) Only a few extra top-bars need be held in stock to replace worn-out or damaged bars.

In general, the top-bar hive is significantly cheaper and easier to use than hives with frames. The following disadvantages, however, cannot be overlooked.

Disadvantages of the top-bar hive

- a) A newly-constructed comb and all combs filled with honey must be handled with the utmost care. It is not advisable to move a top-bar hive, occupied by bees and combs, on lorries along bad roads full of potholes.



b) Honey can only be extracted by destroying honeycombs, either by using the solar wax alter to dissolve the comb cells or by crushing them and squeezing out the honey. Bees have to build up new ones in their place, and this involves time, material and resources of the honeybees.

c) Bees are often crushed between top-bars as the beekeeper rearranges the bars after removing them from the hive body. This problem can be serious when colonies are manipulated at night. When bees are crushed in this way, it is difficult to fix the last top-bar into place. Crushing bees is usually not a serious problem with frame hives.

d) A top-bar hive is relatively easy to steal, as it is light and compactly designed. It is more difficult to steal hives and supers arranged one above the other.

The hive entrance

The tropical honeybee colony seems to attach great importance to the design of the hive entrance. After colonizing a hive, the workers select among themselves suitable "masons" which use propolis to re-shape the entrance to conform with their own taste. They rebuild it, taking into consideration strategies to deal with their enemies. They close up the entrance if it is too large, leaving a space not more than 7 mm high. This prevents birds, reptiles and larger insects such as beetles and butterflies from entering. If the entrance gap is less than what the bees require (due to an increase in population and foraging activity), they will widen it by chewing the wood or removing propolis. The re-shaping of the entrance helps to protect a weak colony. It also helps to prevent water from entering from the outside platform even if the hive is tilted upward.

The landing board

The tropical honeybee seems to be satisfied without a landing platform, but one must be provided because some heavily-loaded foragers sometimes fall on their back when landing. If a lizard or a toad is close by, such a forager will be swallowed in no time.

The swarm-catcher is a small beehive, usually containing only five or six top-bars or frames. Thanks to its small size, it can be carried high up in a tree. The beekeeper then visits it frequently to find whether the box has attracted a swarm. If it has, the box is lowered or carried down and the bees, together with their combs, are transferred carefully into the



beehive, which is four to six times the size of the catcher box. The top-bar or frame of a swarm-catcher should have the same dimensions as that of the beehive to facilitate easy transfer of bees and combs from one to the other. The shape of the catcher box for Kenyan top-bar hives should not be different from that of the beehive. If it is, new combs built by the new swarm cannot be easily transferred into the main hive unless the beekeeper reshapes them to conform with the shape of the hive.

The queen cage is a small container designed to hold and carry the queen and a few "attendants", usually between six and ten worker bees. This is important only when the queen is being transported from one place to another. In the absence of a neatly-designed queen cage, a match-box can be used. It is important to perforate the box with tiny holes to give the bee the needed ventilation. This is done by simply heating a metallic rod and drilling it into the light wooden cover of the matchbox.

1.1.2 Equipment required by the beekeeper

The smoker is next in importance to the beehive itself. No honeybee will ever allow a beekeeper to harvest its honey without a fight. The tropical honeybee is noted for its aggressiveness, and the beekeeper is warned not to conduct any brood control or harvest without using his smoker.

The smoker has two main parts: the container, which is a metallic can, big enough to carry enough dry material to last at least 40 minutes; and the bellows section, which puffs air into the container to drive the smoke out of the can. The container is loaded with wood shavings, smoldering cow-dung or any dry material which provides white smoke. (No oil or kerosene should ever be used in a smoker.) The smoke renders bees docile, so that the beekeeper can work undisturbed.

A hive tool may be necessary to pry up and remove the frames from the beehive. The Kenyan top-bar hive may not need a hive tool, but a knife instead.

A knife may be required to pry open top-bars or frames which are usually glued to the hive body by the bees. The knife is also useful for cutting a portion of the comb attached to the hive body, separating two combs joined together, and cutting out the honeycomb from the



top-bar during the honey harvest. A knife can perform almost all the functions of the hive tool, but the hive tool cannot be used to cut bee combs as neatly as is required.

The brush or quill: Bees must sometimes be brushed gently into a container or a hive. A brush with soft hairs is useful for this, but if the beekeeper can easily obtain a strong, large quill like an ostrich or turkey feather, there is no need to acquire a brush. Indeed, the quill of a big bird is better than any artificial device for this purpose.

The feeder can be a jam jar or a special container turned upside down and so arranged that water trickles slowly from it for the bees to drink.

Protective clothing: Most traditional honey-tappers prefer to strip themselves naked than to wear clothes when harvesting honey at night, but the modern beekeeper is advised to acquire suitable protective clothes to keep the bees from reaching his flesh. Thus a bee suit, gloves, veil and a pair of boots should be acquired before the honey is harvested or any work involving the opening of the hive is undertaken. When working with bees during the daylight hours, light-colored clothing (preferably white, yellow or green) should be worn; for night work, dark colors are better.

The bee suit is sewn to cover all parts of the body except the head, hands and feet. Bee suits are worn to harvest honey and to control the brood nest during the daylight hours.

The veil is the most important. The beekeeper can easily make or purchase a straw hat (or any type of hat with a brim). Netting is sewn firmly around the hat and attached at the back by a piece of cloth. The veil protects the head, face and neck from attack.

Bee gloves must be sewn with good, flexible white leather to protect the hand and fingers from stings and help the beekeeper to scoop up bees with his hands if the need arises. Indeed, bee stings on the hand or fingers are among the most painful, and the beekeeper is urged to acquire gloves to ensure that he works with little or no difficulty.

A pair of long boots is also important to protect the feet from stings. When they are not available, a pair of light shoes and thick white socks can be worn. Dark or black socks should only be worn at night when the bees, vision is poor.



1.1 .3 Handling honey bees when opening a hive

In cooler area, beekeepers who can choose when they open their hives should work on a warm, dry, windless, Sunday; when most of the older bees aren't inside the hive. In any case, Hives should not be opened during cold temperature, windy and rainy days when all the foragers are inside the hives. Bees are especially likely to sting when there is no nectar flow.

Colony conditions which makes the bees more difficult to handle included the following; a very large population, presence of many old bees, previously alerting of the colony by disturbances of any kind, robbing by bees from other colonies, queen less or super secure, and starvation.

1.2 Bee packaging

It is a modern way of transporting bees from one place to another.

- Before an attempt to transport prepare final destination sites, boxes and hive stand.
- The bees after reaching the destination site, has to be transferred into box hives immediately.
- A swarm trapping and transporting box properly designed for the purpose is known as bee packaging box or nucleus hive.
- It has a separate feeder for the queen and worker bees during the journey. Such kind is an appropriate box for trapping and transporting bees to any distance across the country.
- But the queen has to be placed in a separate cage with ample food;
- Possible to transport as many colonies say 100 or 200 at a time.
- Better to drive at night to minimize heat stress
- Keep water and water sprayer with you.
- When relocating a hive over a long distance (more than 2 km), first of all plug up the entrance holes at night when all the foraging bees are in hive and make sure there is no other escape for the bees; transport it carefully to a well-shaded and protected place.
- When relocating a hive over a short distance (less than 2 km):



- If you simply move the hive directly to a place which is less than 2 km away from your original site, (that is 100 m or less), the “field bees” would return to the original place because of their sense of orientation. As a result you would lose them all. What you have to do is:
 - First close the hive
 - Take the hive to a place, which is 3 km away from both the old and the new proposed site.
 - Leave it there for at least 2 weeks.
 - Then transport it to the new site. During the 14 days at the temporary site the “field bees” will have forgotten the old site.
 - If the hive is to be moved between 20 and 100 m you may also carry the hive to the new site straight away, but then you have to collect clusters of stray older bees at the original site repeatedly which are then shaken into the new hive.
 - If you want to relocate your hive less than 20 m away, you can move it in steps of 2 m every third day until you have reached the new site.

1.3 Bees management

Every agricultural activity depends for its success on the execution of a series of coordinated operations determined by the cycle of the seasons and by the weather and other conditions prevailing at a particular moment. Land must be ploughed, fertilized and seeded; if the rainfall is insufficient, the crops must be watered and if it is excessive they must be protected against mildew; pesticides and herbicides may be needed; the time of harvesting must be chosen with care.

In beekeeping the purpose of colony management is to ensure that the maximum strength of the colony coincides with the maximum nectar flow, in order to obtain a maximum honey production. When no pollen and nectar are available, the colony must survive on its reserves, and economy of operation is therefore requires that breeding be reduced to a minimum, to be renewed again in anticipation of the honey flow. Many conditions must be met in order to achieve this purpose, perhaps the most important being a sound knowledge of the dates of the normal flowering periods of the honey plants in the area of operation.





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. What is box hive means? box3
points)
- B. It is modern hive
- C. it is traditional hive
- C. It is transitional hive
- D. nucleus hive

2. What time is advisable for bee transporting?(5 points)

3. Write advantage of: transitional hive, traditional hive and modern or movable frame hive (5points)
4. What is the reason honey bee transferring in Ethiopia?(5 points)

Note: Satisfactory rating - 3 and 5 points

Unsatisfactory - below 3 and 5 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____



Name: _____

Date: _____

Short Answer Questions

Information Sheet- 2	Maintain Hive and apiary
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2.1. Site selection: Productive beekeeping depends on good colony management and good beekeeping areas, in order to promote it as a profitable agricultural occupation, areas with good potential for beekeeping must be located and evaluated. Successful site selection is important to promote sustainable bee culture development and to save time, energy, and capital investment.

Apiary sites are often limited for a small-scale beekeeping venture. Choosing a site often involves balancing the needs of the bees against those sites available.

The following should be important in site selection and establishment of modern apiary.

- Referring to lists of known major honey plants in other countries or regions with similar vegetation patterns, agro-ecosystems, climate and edaphic conditions, determine whether similar plants are to be found in the area under study.
- The mere presence of flowering trees and shrubs in limited numbers, or a few hectares of land covered with good honey plants preferred by bees, does not necessarily indicate that the areas has potential for commercial beekeeping.
- Practical, large-scale beekeeping operations call for large areas, usually hundreds or thousands of hectares of nearby land bearing good forage with high population densities. Good honey plants are characterized by relatively long blossoming periods, generally in terms of several weeks or months; high density of nectar-secreting flowers per plant or unit area; good nectar quality with high sugar concentrations; and



good accessibility of the nectarines to the bees. The foraging land should be well proportioned, in terms of the width, so as to promote foraging efficiency.

- The supporting capacity of an area for honey production is best determined by monitoring weight changes in the bee colonies. Among other factors that affect the economic value of an area for beekeeping are average hive yields, prevailing honey prices in the area, as well as costs of colony management inputs.
- The large-scale planting of honeybee forages has never been proved to be a profitable approach in terms of net economic return, except in integration with other activities, such as reforestation, roadside plantings, animal pasture, etc.
- The area should have potential water around that satisfies the needs of bees.
- A chemical free area is necessary i.e. it should be away from air and water pollution.
- The site should be away from prevailing wind. The site should be accessible to ease travel, transport working tools and equipment.
- Environmental factors such as temperature, rainfall, altitude, and humidity.
- Seasonal factors such as major rainfall months, short rainfall months.
- Locate apiaries where they are out of flood danger from drainage areas.
- Place the hive so the entrance faces away from prevailing winds.
- Place bee colonies on concrete or stone foundations one foot or more above the ground for ease in handling and to protect the colonies from damage by termites and ants.

2.2. Honeybee Plants: In order to survive, prosper and be productive, honeybee colonies must have a supply of both nectar and pollen in adequate quantities. Not all plant species are equally good for beekeeping. Some supply both nectar and pollen abundantly when in bloom, and these are called Honey plants, because they are best suited for honey production. Plants producing nectar but little pollen are also considered to be honey plants. Other plants, however, may yield pollen but little or no nectar. These pollen plants are also important in beekeeping, especially at the time of colony build-up, when the bees need large amounts of the protein contained in pollen for their brood rearing.

Ideally, a good beekeeping area is one in which honey and pollen plants grow abundantly and with a relatively long blooming season. Such areas are, however, not always available or easy to find. The beekeeper therefore combines his skill in colony management with migratory practices in order to provide his bees with good, productive foraging environments. He must know the time and duration of the blossoming season of



every major honey plant, including the environmental factors affecting them, and make a reasonable assessment of the supporting capacity of each area, i.e. the number of colonies that can be put to productive work there.

2.3. Floral Calendars: A floral calendar for beekeeping is a time-table that indicates to the beekeeper the approximate date and duration of the blossoming periods of the important nectar and pollen plants in his area. The floral calendar is one of the most useful tools of the apicultural extension worker. It enables him to inform the beekeeper on what to expect in bee forage availability, and when, so that they can manage their colonies in the most rational manner. Beekeeping in any specific area cannot develop without an understanding of the calendar, and for migratory beekeeping, special calendars for the different foraging zones along the migration route are required.

Assembling a floral calendar for any specific area is simple but time consuming. It requires complete observation of the seasonal changes in the vegetation patterns and/or agro ecosystems of the area, the area, the foraging behavior of the bees, and the manner in which the honeybee colonies interact with their floral environment.

The steps normally taken in building up floral calendars are:

- The beekeeper makes a general survey of the area, drawing up a list of flowering plants found, special attention being paid to plants with a high floral population density per unit area or per tree.
- He places several strong honeybee colonies in the area, inspecting the hives regularly and observing changes in the amount of food stored within the hive to determine whether it is depleted, stable or increasing. Any food gains or losses can be monitored by weighing the hives.
- At the same time that he monitors the hives food stores he surveys areas in the vicinity of the apiary and within the flight range of the bees, to record the species of plants that the bees visit.
- He determines whether the plants are visited for nectar or for pollen. Pollen foragers will have pollen pellets attached to their hind legs. To determine whether the bees visit flowers for nectar, tasting it for sweetness or measuring the nectar concentration with a hand refract meter.
- He studies the frequency with which the bees visit each flower species, in relation to changes in the level of the colonies food stores. If there is a continuous increase in food stores, in direct response to the availability of the plants visited, the plants are good forage



sources. When the food stores remain stable, the plants can be depended up on to meet the colonies daily food requirements, but they cannot be classified as major honey sources.

- Once all the data on forage species have been assembled and repeatedly verified, they should be judged as they relate to the actual performance of the honeybee colonies. The calendar can then be drawn up in the form of circular or linear charts, showing the weekly or monthly availability of each plant and their flowering sequence.

Table: Important Honeybee Plants of Ethiopia

Botanical name	Common name	Propagation	Apicultural use
<i>Opuntia ficus indica</i>	Beles	Cutting	Major honeybee flora
<i>Becium grandiforum</i>	Mewatis, Tebeb (Tig)	Cutting, seed	Major
<i>Acacia nilotica</i>	Girar	Seed	Pollen source
<i>Euclea shimperi</i>	Dedeho	Seed	Nectar source
<i>Parkinsonia aculeta</i>		Seed, seedling	Good honeybee flora for arid areas
<i>Eucalyptus camadulensis</i>	Key bahirzaf	Seedling	Major
<i>Hypoestes</i>	Girbiya (Tig.)	Seedling	Major
<i>Vicia</i>	Gaya	Seed	Nectar source



dassycarpa			
Vernonia amydalina	Grawa	Seed	Major
Guizota scabra	Mechi	Seed	Nectar and pollen source
Maytenus ovatus	Atat	Seed	Nectar, pollen, Propolis
Sesbania sesban	Sesbania	Seed, seedling	Nectar, pollen
Cordia Africana	Wanza	Seed	Nectar, pollen
Rhus vulgaris	Yeregna kollo	Seed	Nectar, pollen
Euphorbia candelabrum	Qulqual	Cutting	Nectar, Pollen
Agave sisalana	Qacha	Seedling	Nectar, Pollen
Euphorbia tiruciae	Kinchib	Cutting	Nectar, Pollen
Lepidium satilvum	Feto	Seed	Nectar, Pollen
Schinus molle	Kundeberbere	Seed, seedling	Nectar



2.4 Apiary site preparation:

Prepare the selected area before installation of hives:

- Level the ground
- Fix the fence
- Make fire trench around the fence
- Soil treatment if necessary
- Clear weeds or unwanted vegetation
- Erect shelter
- Provide water if not presented around the site
- Erect weatherproof bee house
- Fumigate the house before the storage of hive materials
- Provide sanitary facilities periodically check for the presence of ants
- Windbreak: quick-growing trees or shrubs can be planted around the apiary to shade the hives. Melliferous plants should be chosen for this whenever possible. In many areas, castor bean is a good plant to use.
- Shrub rows that separate the hives from each other and from dwellings can help minimize stinging incident.

A. Installing the modern hive in the apiary

Make the ground even

Install the hive stand. Check the firmness of the hive stand. If it shakes provide filling materials below the leg, which is not grounding properly.

Arrange the frames inside the base hive. Check the bee space, between the frames and between the frames and the hive walls. If there is any unsuitable frame, replace it. After making sure of bee space, number the frames. Now, remove the frames, wire them and fix the comb foundation sheets.

B. Apiary arrangement: The arrangement of the apiary is important to help meet the needs of the bees and to help make beekeepers work easier. In most areas of the tropics it is necessary to put the hives on stands to protect the bees from ant and toads. The stands should be at least 45 cm above the ground. The legs can be placed in cans that contain used motor oil, or bands of grease can be placed around them to keep ants from the hives; fresh ashes spread around the legs also keep ants away. Since the KTBH consists of a single box,



it can also be hung from a tree or from poles. This protects it from ants and toads and from bush fires as well.

Keeping weeds cut in the apiary also reduce the ant problem. Tall weeds can provide bridges to the hives for the ants

If there is no source of water for the bees within one kilometer, a container of water with floating sticks or protruding stones can be placed in the apiary.

Hive arrangement within the apiary is also an important consideration. Avoid placing the hives close together in long straight rows. Such placement results in a lot of drifting or confusion of bees between colonies. Drifting can contribute to disease transmission. To prevent drifting, the direction of the hive entrances can be varied, and lines of hives can be broken up with landmarks such as trees or shrubs. Hives should be at least 45 cm apart, and slightly tilted toward the entrance to aid the colony in removing residue that falls to the bottom. This also allows rainwater to run out. The placement of hives should allow the beekeeper to approach the colony and work it from behind. This is less disturbing to the colony since it does not interfere with the flight path of the foragers. It also allows the beekeeper a chance to smoke the colony before the guard bees at the entrance are alerted.

Hives should not be in direct sun light during the hot periods of the day, nor should they be in constant heavy shade. The ideal site would receive sun in the morning so that the bees start to fly early, and shade in the afternoon so that the number of bees ventilating the colony and foraging for water is minimized.

The apiary site should also allow for good air circulation so that it does not remain damp for long periods after wet weather. Avoid areas that flood during rainy periods. Areas under high trees often provide good apiary sites because they dry out quickly afterwards and are not excessively shady.

Avoid areas of constant wind for apiary sites. Such winds hinder the bees from flying. If there are no natural windbreaks, they can be planted. Melliferous plants can serve a double purpose. Such living fences can also serve to keep livestock away from the hives.



Self-Check -2	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. list at least 3 honeybees flora plats that are found around your environment. (3 points)

2. what is site selection means for apiculture(3points)

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet-3	Make artificial foundation sheet.
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3.1 Beeswax:

Beeswax is an easily stored, non-perishable product. It is used in some areas by local craftsmen and artisans, tanners, leather workers and candle workers. Beeswax can also be used in the making of wood polishes. While in most areas there is a ready local market for honey, this is not always true for beeswax. In some areas it may be necessary to create a market for the wax.

Embossed wax foundation is a thin sheet of beeswax with the pattern of hexagonal cell bases impression on each side of it. It is used in frame hive beekeeping to encourage bees to build comb in the way that is most convenient for the beekeeper. A narrow, deep container is used for melting the bee wax.

3.2 Embossed comb Foundation provides following advantages:-

- a) It encourages bees to build straight combs within wooden frames. This allows easy and rapid manipulation of honey bee colonies.
- b) It saves bees' resources and labor in the construction of combs thereby allowing increased honey production;
- c) It facilitates honey extraction since combs in frames can be strengthened by reinforcement with wire

3.4 Method of foundations sheet production

1) Tray-style foundation press

This is a press into which molten beeswax is poured and molded on each side with the pattern of foundation. These presses can be made of metal, plaster of Paris, or plastic, and tend to produce rather thick sheets of foundation.

2) Roller methods

A flat sheet of wax is run through embossed rollers, resembling the clothes mangles used in laundries.



Some commercial foundation manufacturers have sophisticated machines in which liquid beeswax is poured straight on to a water-cooled roller embossed with the hexagonal cell pattern. The wax is solidified and printed simultaneously. The sheets of embossed wax are then cut into the rectangular sizes needed for frame hive beekeeping.

Fixing of comb foundation on the frames.

The embossed comb foundation sheet is trimmed and fitted into brood or super frames. For fixing the comb foundation sheet a narrow, deep groove (lengthways in the middle of the underside of the top-bar is done. Then place the wax sheet into the groove and apply some molten wax to the line of attachment using a spoon. The wax sheet will be held in place when the molten wax has cooled.

3.4 Requirements/consumable/ material or tool

- Bee wax
- Mould(wax printer)
- Wax molder
- Spoon
- Dish
- Omo (soft soap)
- alcohol
- Heater/ knife or electrical impeder Required

3.5 stapes for artificial foundation sheet making

Step1, container is taken for the melting the wax and other tools

Step2, heated in a water bath to 68°-72°C.

Step3, Beeswax is added to the container until it is filled to about 5.0 cm of the brim.



Step4, A long glass/water proof ply board/ smooth piece of wood sheet of width a little narrower than the melting container is dipped into the molten wax for about three seconds and then lifted out to cool

Step5, Thin sheets of wax formed on each side of the glass are peeled off and placed on a flat surface to harden. This is soaked in water for 24 hours before use

Step6, To facilitate the removal of the wax sheets from glass or wood, a weak solution of liquid washing soap is applied before dipping in the wax.

Step7, The sheets are passed one by one through a reeling mill which is hand /electric operated.

Step8, The rollers press the sheets to a uniform size and thickness and embossed hexagonal impression

Step9, Separate rollers are used for making comb foundation for *Apis cerana indica* and *A .mellifera*

Self-Check -3	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page

1. List out stages of foundation sheet preparation.(4 points)

2. Write the two methods of foundation sheet production(4points)

3. Write materials which used to of foundation sheet production(2points)

Note: Satisfactory rating – 5 points

Unsatisfactory - below 5 points

You can ask your teacher for the copy of the correct answers.



Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____



Information Sheet-4	Identify Inspection techniques of bee colony
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4.1 External examination of a hive

While an experienced beekeeper can usually have a fair idea of how his colonies are progressing by observing them from outside, the only means of knowing for sure whether everything is going smoothly is to open the hives and inspect each comb.

The general rules for hive inspection are:

- Look at each hive from a distance or from behind the hive entrance.
- Start from weak colonies to strong colonies.
- Hive entrance should be clear, clean from dead bees, ants, termites and straw.
- Observe the condition of the bees near hive entrance, if they are weak, crawling and bees with pollen loads and number of bees coming out for foraging.
- Take good notes on the ones needing further inspection by opening hive lid.
- Examine hive distance or spacing between hives, placement and position of hive and the wind direction.
- Check if there are watering and flowering plants.
- Examine the potential resources available and estimate the flow of pollen and nectar carrying bees.
- Evaluate the interest, working capacity and the handling of bees by farmers.
- Study on some recorded history of the sites.
- Check if all the colonies are under shade and how close to each other.

In cooler area, beekeepers who can choose when they open their hives should work on a warm, dry, windless, sunny day; when most of the older bees are not inside the hive. In any case, hives should not be opened during cold temperature, windy and rainy days when all the foragers are inside the hives. Bees are especially likely to sting when there is no nectar flow. Colony conditions which make the bees more difficult to handle include: a very large population, presence of many old bees, previously alerting of the colony by disturbances of any kind, robbing by bees from other colonies, queen less or supersedure, and starvation.

Always wear protective clothing. Open the hive when necessary, and then as briefly as possible. Always work at the back of a hive, away from the bees' flight paths in



front of the hive entrance. All movement should be smooth and deliberate, not jerky or rough. Do not bump or jar hives of frames. Keep boxes of frames of bees covered, to reduce the number of bees flying and to prevent robbing; manipulating cloth can be useful for this purpose.

The beekeeper should take into account the fact that bees react strongly to certain smells such as perspiration, alcohol, soap and perfume. Avoid carrying these strong smells. Do not keep animals near the bees. Since bees can be entangled in hair and woollen clothing, avoid wearing clothes made of these materials. Wear clothing of the lightest possible colour. When bees are aggressive they will always go for dark colours first.

Make sure that you have smoke when you want to open the hives. Always first blow the smoke at the flight entrance. Always make sure that you have enough fuel for the smoker at hand. If you have been stung you must kill the bee that has stung you and then scrape the sting out of your skin with a fingernail or a sharp object.









Internal Hive Inspection

Pry open the lid of the hive if it is propolized. Detach the frames from the side of the hives using hive tools or knife.

- Then remove the first comb and inspect it. If it is a brood comb, look at the cells to see whether the cells are filled regularly and well sealed, and specially whether the comb contains queen and the drone cells as well as the worker cells; this is a sign that the colony is preparing to swarm. If it is a honey comb, examine whether the cells are fully capped (containing ripe honey) or uncapped or partly capped (unripe honey)
- Replace the comb, give puff smoke, go on to the next operations and repeat it until all the combs have been inspected.

If more than ten brood combs are found, remove the excess because if too much brood is allowed to emerge, the hive will become overcrowded and the colony may abscond. These brood combs can be replaced in another hive to strengthen its colony if necessary.

Self-Check -4	Written Test
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Directions: Answer all the questions listed below. Encircle the letter

1, One of the following is **not** the general rules for hive inspection (4point):

- A .Look at each hive from a distance or from behind the hive entrance.
- B .Start from weak colonies to strong colonies.
- C. Start from strong colonies to strong colonies
- D. Hive entrance should be clear, clean from dead bees, ants, termites and straw

Note: Satisfactory rating – 4 points

Unsatisfactory - below 4 and 4 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____



Name: _____

Date: _____

Information Sheet-5	Identify Time of inserting and removing queen excluder
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5.1 Time of inserting and removing queen excluder

When & Why To Use A Queen Excluder

The most common use of a queen excluder is to place it directly above your top brood box. Then, all honey supers are **placed above the excluder. The excluder then is able to keep the queen in the brood chambers and excludes** her from getting into the honey super and laying eggs. Excluders are also used in hives where the beekeeper is operating a two queen hive.

I generally do not use queen excluders on my hives for several reasons.



1) To me, they are high maintenance. The bees often attach comb to the excluder thus reducing the passageway, 2) Drones can become stuck and reduce the passageway, I want my bees to be able to easily go in and out of the honey super, so I fear that the excluder discourages the bees from filling a super if they have to work their way through an excluder.

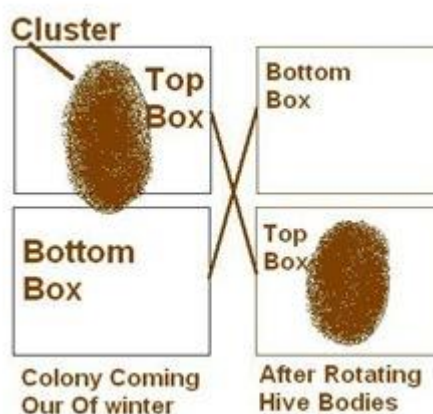
I am often asked whether a new beekeeper should use a queen excluder. For the most part, I would say yes. However, when that same new beekeeper calls me up and tells me his bees are not going up into the top super, I would recommend removing the excluder. This is why I am reluctant to recommend queen excluders. Some beekeepers call them honey excluders.

You probably want to know what I do to keep the queen out of my supers if I do not use queen excluders, right.

I monitor the location of my queens. This is why, in early spring, I rotate my two deep hive bodies. I want to work the queen down to the bottom of the hive as she typically will work her way up. Coming out of winter the bottom deep brood hive body is usually empty, and so by placing the queen below 10 frames of empty drawn comb, she can begin lying with plenty of room and this will slow her movement to the upper honey super. So, an experience beekeeper can keep an eye on the queen and move her back down as he see fit. Here's an illustration I drew up to help you see how to rotate your hive bodies in the spring.

On the other hand, a new beekeeper may not want to monitor and reposition the queen, or rotate the hive bodies so in this case, a queen excluder is a good practice. If you'd like to purchase a queen excluder, you can do so by clicking here to go to our website: honeybeesonline.com. Time of inserting is no constant. It varies in place to place within the same seasons. But beekeepers consider the present of bee forage at next time.

Even bee forage punt also considered .most of **September to October** in queen **excluder** between box. Add supers to those for bee. Harvest honey as mid September. Make harvest at end of And in late October also. swarm.



objective of bee keeper the time in Ethiopia From **some area June** Place the first and second super needing additional space early harvest from all at another round honey September, early October, Expect reproductive

- In dry period beekeepers reduce honey chambers so they remove queen excluders. Check if all the colonies are under shade and how close to each other.



In cooler area, beekeepers who can choose when they open their hives should work on a warm, dry, windless, sunny day; when most of the older bees are not inside the hive. In any case, hives should not be opened during cold temperature, windy and rainy days when all the foragers are inside the hives. Bees are especially likely to sting when there is no nectar flow. Colony conditions which make the bees more difficult to handle include: a very large population, presence of many old bees, previously alerting of the colony by disturbances of any kind, robbing by bees from other colonies, queen less or super reducer, and starvation.

Always wear protective clothing. Open the hive when necessary, and then as briefly as possible. Always work at the back of a hive, away from the bees' flight paths in front of the hive entrance. All movement should be smooth and deliberate, not jerky or rough. Do not bump or jar hives or frames. Keep boxes of frames of bees covered, to reduce the number of bees flying and to prevent robbing; manipulating cloth can be useful for this purpose.

The beekeeper should take into account the fact that bees react strongly to certain smells such as perspiration, alcohol, soap and perfume. Avoid carrying these strong smells. Do not keep animals near the bees. Since bees can be entangled in hair and woollen clothing, avoid wearing clothes made of these materials. Wear clothing of the lightest possible colour. When bees are aggressive they will always go for dark colours first.

Make sure that you have smoke when you want to open the hives. Always first blow the smoke at the flight entrance. Always make sure that you have enough fuel for the smoker at hand. If you have been stung you must kill the bee that has stung you and then scrape the sting out of your skin with a fingernail or a sharp object.



Self-Check -5	Choices Test
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Directions: Answer all the questions listed below. Encircle the letter

1 On of the following is not the general rules for hive inspection (4point):

- A .Look at each hive from a distance or from behind the hive entrance.
- B .Start from weak colonies to strong colonies.
- C. Start from strong colonies to strong colonies
- D. Hive entrance should be clear, clean from dead bees, ants, termites and straw

Note: Satisfactory rating – 4 points

Unsatisfactory - below 4 and 4 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____



Operational sheet	Makin Artificial foundation sheet
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Step1, container is taken for the melting the wax and other tools

Step2, heat in a water bath to 68°-72°C.

Step3, Beeswax is add to the container until it is filled to about 5.0 cm of the brim.

Step4, A long glass/water proof ply board/ smooth piece of wood sheet of width a little narrower than the melting container is drop into the molten wax for about three seconds and then lifted out to cool

Step5, Thin sheets of wax form on each side of the glass are peel off and place on a flat surface to harden. This is soak in water for 24 hours before use

Step6, To facilitate the removal of the wax sheets from glass or wood, a weak solution of liquid washing soap is apply before dipping in the wax.

Step7, The sheets are passé one by one through a reeling mill which is hand /electric operated.

Step8, The rollers press the sheets to a uniform size and thickness and embossed hexagonal impression

Step9, Separate rollers are used for making comb foundation for

Apis cerana indica and A .mellifera



LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **8-12** hours.

Task 1: Make Artificial foundation sheet using wax mold.(5point)

Task 2: Identifying Inspection techniques of bee colony.(5point)

Task 3: Explaining techniques of Bees handling.(5point)

Instructions: write the appropriate answer for the following questions

3. Demonstrate external and internal inspection of honey bee colony
.(5point)
4. Collect equipments that are used to make foundation sheet
.(5point)
5. Handle equipments that are used to make foundation sheet
.(5point)

List of Reference Materials

- Deliverable: Manual on Beehive Construction and Operation University of Kassel (UNI KASSEL)Date:15-June 2018
- BEEGIN BEEHIVE MATERIALS RESEARCH SUMMARY Ivan Leroy Brown M Tech Industrial Design November 2018
- ADVANCED BEEKEEPING MANUAL Ethiopian beekeeper association JUNE 2011



Learning Guide-03

Unit of Competence: Support

Beekeeping Work

Module Title: Supporting Beekeeping
Work

LG Code: AGR BKGI M12LO3-LG-12

TTLM Code: AGR BKGI M12sTTLM
0919v1

LO 3: Identify harvesting and extracting
of honey



Instruction Sheet-3

Learning Guide #12

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics-

- Identifying honey harvesting during season Indicators
- Harvesting Honeycombs from Fixed Comb hives or movable Comb hive
- processing Honey from **centrifugal extraction**

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 –

- Identifies honey harvesting during season Indicators
- Harvests Honeycombs from Fixed Comb hives or movable Comb hive
- processes Honey from **centrifugal extraction**

Learning Instructions:

23. Read the specific objectives of this Learning Guide.
24. Follow the instructions described in number 3 to 20.
25. 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.
26. Accomplish the “Self-check 1” in page 8.
27. 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).
28. 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.
29. Submit your accomplished Self-check. This will form part of your training portfolio.
30. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
31. Accomplish the “Self-check 2” in page 12.



32. 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 2).
33. Read the information written in the “Information Sheets 3 . Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
34. Accomplish the “Self-check 2” in page 12.
35. Read the information written in the “Information Sheets 4 . Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
36. Accomplish the “Self-check 3” in page 19
37. Read the information written in the “Information Sheets 5 Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
38. Accomplish the “Self-check 3” in page 19
39. 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 3).
40. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” in page 19. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
41. Read the “Operation Sheet 1” and try to understand the procedures discussed.
42. Read the “Operation Sheet 2” and try to understand the procedures discussed.
43. If you earned a satisfactory evaluation proceed to “Operation Sheet 2” in page 20. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
44. Do the “LAP test” in page 20 (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work.



Information Sheet-1	Identify honey harvesting during season Indicators
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1. 1Honey harvesting and method of identification matured honey capped

When the first honey crop can be harvested depends on when the hive was colonized by bees. Once a parent colony is capping honey, so will the offspring colony, probably because nectar is available at the same time.

Observing the behavior of the local flowering plants can be very useful in determining when honey can be harvested with maximum results: it is when most of the flowers drop that the bees have capped most of the honey in their nest. As an example, the best harvesting time in west Africa occurs during the peak of the dry season, just before the arrival of the dry harm attain wind. The beekeeper should not wait to harvest until the windy nights and first rains drive the bees to load their honey and fly off with it.

In any particular area, the best way the beekeeper has of knowing that his honey crop is at the maximum is to observe that his colonies are getting ready to swarm. Brood-rearing ceases, and this is characterized by foraging bees sending little or no pollen into the hive. Few bees are seen at the entrance during the day; the bees seem to become lazy, as foraging activity in general seems to have come to an end, but most of the bees continue buzzing and ventilate the hive at night. The honey cells are capped. The hive smells of honey when it is approached. The guards at the entrance become more aggressive than ever and send out patrols to attack any potential intruder loitering in the vicinity. The population of the hive is now at its peak. The brood nest is overcrowded. There is congestion at the entrance. During the night, the bees form a large cluster there, waiting for the cool wind, because they cannot cope with the heat in the hive. All these signs that the colony is getting ready to swarm are also signs that its honey reserves are maximum.

1.1. How to harvest honey

In the general rules for brood-nest control and honey-harvesting are the same, and they therefore do not need to be repeated here in detail.



Wear protective clothes. Never forget to take along a good knife or hive tool, brush or quill and a good container for honey. The honey container may be made of earthenware, stainless steel, plate or plastic, but it should always be rust-proof. Smoke the hive and open it as described . Then remove the combs one by one (giving a puff of smoke before removing each one) and look at them carefully.

Empty combs, brood combs, and combs containing both brood and honey or uncapped honey should all be returned to the hive. Only full combs of ripe honey should be taken. When such a comb is found, brush any bees on it into the hive and use a knife to cut the comb honey away and Leave about one centimeter of comb on the top-bar to guide the bees to work the next honey crop. Carry on with the harvest until a dark comb is reached. This comb usually contains both honey at the top and brood below.

Some combs may not be easy to remove because the bees may have attached them to each other. This usually happens when the beekeeper has left space between his top-bars. Use a knife to separate them.

If the hive entrance is in the mid-section, there will be honey at both sides. Replace all top-bars and treat the other side in the same manner, but be sure to leave ten combs in the middle. The bees will then work faster to produce the next honey crop than if all honeycombs were taken away.

After removing the surplus honey, rearrange the top-bars carefully in the same manner as before. If bees are rushing out between top-bars, drive them back with smoke, but avoid crushing them unnecessarily. Then close the hive carefully, making sure the lid is firmly placed on the hive. Cork the smoker after work is done. Do not throw left-over fuel into the bush -- it can cause bush fires.

A. Honey harvesting at night

In practice, the aggressiveness of the African honeybee makes it impossible for most beekeepers and wild-honey tappers to approach their hives or harvest their honeycombs in broad daylight. Comb moving and most related jobs, such as brood-nest control, are best performed late in the afternoon or delayed until night or early morning, when bees are less aggressive. However, it is not easy to work well in the dark. Light must therefore be provided, and this definitely requires an extra hand to assist in the operations. Flashlights, which are



ideal for use in the job, are usually beyond the reach of the average honey-tapper, especially since, in many tropical countries, batteries for them cannot be obtained on the market. When lanterns or hive torches are used, many bees, attracted to the fire, are burned to death. If the lanterns are shaded to avoid this, bees will cluster around the shades and shut out most of the light.

Under such circumstances, the job cannot be carried out efficiently, and precious bees and comb may well be crushed in the process.

B. Honey harvesting in daylight

One simple and effective system for harvesting honey or controlling the brood nest with little or no danger, even during the hottest hours of the day, makes use of the fact that foraging bees always return to the site of their hive, even if the hive is no longer there.

1. The beekeeper brings with him to the site an empty hive and a container with a lid for carrying the harvested honey.
2. He smokes the hive heavily from the outside to force the "security guards" and any other bees of the colony who are waiting outside the hive to return to it. It is important to continue smoking until the bees have lost all their aggressiveness.
3. The hive is then carried away from the site, in the direction opposite to the flight runway, and placed on a platform (or on the ground) at least 50 meters from the nearest hive in the apiary. The empty hive is left at the hive site to serve as a temporary home for any returning foragers or for any bees that escape from the moved hive.
4. Working as quickly as possible in order to avoid robber bees, which can otherwise cause trouble, the beekeeper carries out his harvesting or control operations in the normal manner.
5. When the work is completed, the hive is closed and carried back to its original position, and the empty hive is removed. Any bees in it, or members of the colony waiting outside, will then rejoin the hive.

The economy of this system is obvious. Daylight is utilized to ensure proper execution and efficient harvest or brood-nest control without attacking bees chasing nearby inhabitants. Diseases can easily be detected, and hive predators can be found and eliminated. Crushing



of combs and bees between top-bars is avoided or minimized. Top-bars can be restored to their proper position. Work can be done throughout the day in a pleasant atmosphere without rushing.

To take advantage of this process, it is suggested that beehives be sited on platforms to facilitate easy moving instead of hanging them on trees or nailing them to a table.

1.2. Uses of honey

➤ As human food:

- in certain alcoholic beverages sugar substitute in cooking and baking
- in child feeding
- for athletic and strenuous activities diabetics

➤ As an ingredient in drugs:

- for hay fever; in cough syrup; as sweetening agent in drugs, especially for children

➤ For animal feeding:

- dairy cows (to increase milk production)
- donkeys and racehorses poultry mash and feed for fish farms

➤ In veterinary medicine:

in the treatment of acetonemia (a disease of the cow)

➤ In cosmetics:

-as a facial cleanser and an ingredient in hand lotion

- In mice- and rat-repellent compounds etc. Honey harvesting season in Ethiopia has two times per year. First from April –June but the main honey harvesting time is September December based on availability of flower.



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

5. When does hone harvest? (1 points)

A, *Honey harvesting at night*

B, *Honey harvesting in daylight*

C, *Both A and B*

6. Write down the hone harvesting time in Ethiopia?(5 points)_____

7. List use of honey(2points)_____

Note: Satisfactory rating - 3 and 5 points

Unsatisfactory - below 3 and 5 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____



Name: _____

Date: _____

Short Answer Questions

Information Sheet- 2	Harvesting Honeycombs from Fixed Comb hives or movable Comb hive
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2.1 Beeswax:

Beeswax is an easily stored, non-perishable product. It is used in some areas by local craftsmen and artisans, tanners, leather workers and candle workers. Beeswax can also be used in the making of wood polishes. While in most areas there is a ready local market for honey, this is not always true for beeswax. In some areas it may be necessary to create a market for the wax

2.2. *Bees wax* Common uses of bee wax

- As an ingredient in medicines
- As soldering wax for repairing kitchen utensils and the modern electronic industry uses it in computers.
- Used in tanneries for treating hides and skins.
- It is incorporated into cosmetics candle making etc.

2.3. *Harvesting of bee wax and honey from fixed comb hives*

The traditional methods of extracting honey and beeswax are unsuitable and unhygienic but high yield compared to modern frame hive. Extraction of honey by squeezing with the hand seems to be the quickest method for the average honey-tapper, who cannot afford a centrifugal honey extractor or solar wax-meter. However, the hand contaminates the honey, and unripe honey ferments within a few days after extraction. (Fermentation of honey is more



a problem in coastal areas than inland.) Need and coconut honeys are light in consistency and ferment more quickly than honeys produced from other plants.

The combs, including brood, unripe and capped honeycombs, are collected at night. They are all stacked on a wire mesh and a container is put underneath the pile of combs. Live embers are placed on the pile. The fire begins to consume the combs, and honey and wax trickle down into the container until all combs are completely consumed by the fire. The material collected is left untouched until the next morning. The beeswax which has hardened at the top of the honey is removed, and the honey is poured into bottles of about one kilogram.

In addition, the smoky fire employed is full of ashes, charcoal, dust and gravel which contaminate the honey. Such honey tastes bitter and smoky. The brood combs also add water to the honey, and such honey cannot be stored for long nor enter international markets.

The solar vex-smelter

This is a simple device and can be made by local craftsmen. The smelter is made of wood, lined with a galvanized metal plate and has a glass or clear plastic cover. The base is airtight. The milder can be painted black to absorb more heat it is not common in Ethiopia .

On a sunny day, the wax extractor is capable of generating a temperature of 61°C, enough to melt down a bee comb so that both honey and beeswax flow into a container inside the box.

Hot bath method

In the absence of a wax-smelter, the hot-water bath process now in use by some African beekeepers may be adopted. This is the quickest method of obtaining the wax, but it can only be employed after the combs have been crushed and the honey removed. This is more common in our country.

Equipment:

- 1, a cooking pot
- 2, sackcloth or a sack (preferably jute)
- 3, string or twine (2-3 meters)



4, a stick or a discarded top-bar

5, a large spoon or ladle

6, a mould for the wax

Procedure:

step 1. Put water into the cooking pot and heat over a fire.

step 2. Wash crushed bee combs to remove dirt and honey and place in the sack.

step 3. Make a good package by tightening the string around the sack.

step 4. By now the water should be quite warm. Put the package into the pot and use the stick to push it down to the bottom.

step 5. When it reaches a temperature of about 59°C, the wax begins to melt and a waxy scum begins to form on top of the water.

step 6. Use the stick to press the package. More wax will float to the top of the Water.

step 7. Use the ladle to skim off the melted wax and pour it into a mould. Continue this process until wax no longer rises to the surface.

Note: Do not subject beeswax to high temperatures. Prevent the water from boiling by reducing heat.

Extraction beeswax by Ocloo's method

This method, suggested by a beekeeper from Accra, Ghana, is published here for its simplicity, cheapness and efficiency. The method works on the same principle as the solar wax melted, employing the sun's heat to melt down the combs.

Equipment

1, a large container

2, a sheet of nylon mosquito mesh

3; a strong nylon cord and a needle

4, a plastic or polyethylene cover

Procedure:

step 1. Fasten the mosquito mesh over the container with the nylon cord.

step 2. Place honeycombs on the wire mesh so that honey can trickle into the container.



step 3. Cover the honeycombs and container with plastic and secure it fast to the container with another cord.

step 4. Leave the honey and container in the sun. Both honey and wax will seep down into the container. The wax will harden above the honey and can be removed when the honey cools down to be decanted and bottled.

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. wax is harvested from traditional transitional and modern hives. But wax from modern/movable hive is very low than of the two. From breaking combs and scraps of comb cell. Important factors in processing of bees wax,

Self-Check -2	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

6.

Write uses of wax(2point)



7. List wax harvesting methods. (3 points)

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

You can ask you teacher for the copy of the correct answers

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short

Answer

Questions



Information Sheet-3	process Honey from <i>centrifugal extraction</i>
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3.1 A **honey extractor** is a mechanical device used in the extraction of honey from honeycombs. A honey extractor extracts the honey from the honey comb without destroying the comb. Extractors work by centrifugal force. A drum or container holds a frame basket which spins, flinging the honey out. With this method the wax comb stays intact within the frame and can be reused by the bees.

Bees cover the filled in cells with wax cap that must be removed (cut by knife, etc.) before centrifugation.

Extractors can be one of two kinds depending on how the frames are oriented in the basket:

- tangential: one side of the comb facing outward
- radial: the top bar of the frame facing outward^[5]

Both rely on the use of centrifugal force to force the honey out of the cells. During the extraction process the honey is forced out of the uncapped wax cells, runs down the walls of the extractor and pools at the bottom. A tap or honey pump allows for the removal of honey from the extractor. Honey must be removed in time and always stay below the rotating frames as otherwise it prevents extractor from spinning with sufficient speed.

Extractors can vary in sizes from holding just a couple frames to large commercial ones holding up to sixty frames. The smaller ones can be powered manually while others (especially the commercial ones) will be powered by an electric motor. Most hand-cranked extractors will rely on a gearing system to increase the speed of the rotation of the frames.

Most large commercial extractors are radial and rely on the upward slope of the comb cells. When bees build their comb, the cells are sloped upward from the center rib at an angle of 10 to 14 degrees. By leveraging this slope angle, it is easier to extract the honey. In addition, the amount of work during extraction is reduced in the radial type because the frames do not have to be turned over to extract the honey from the other side of the comb (however some extractors are capable of turning combs automatically).

Some portable honey extractors are driven by gasoline or diesel small engines. Larger diesel engines are more expensive than a compact 2 stroke gasoline ones and usually use the diesel fuel to operate at lower rims with higher torque. Diesel-powered extractors are



harder to start, especially in winter due to reduced fuel viscosity under the ice and snow conditions.

7.1. Honey Extraction stapes

- 1) Heated knife - to unseal honey cells heated knife use 30 degrees.
- 2) Uncapping fork - to unseal honey cells missed by the heated knife The heated knife takes off most of the caps. For the leftover ones, use the uncapping fork and gently shave off the caps.
- 3) tub for wax/honey
- 4) Extractor! - Fancy cylindrical piece of equipment, used to extract honey start the extractor. It should start slowly, 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. Place your food-grade bucket under the extractor spigot. Use a double sieve to catch the wax and impurities as the honey starts pouring out of the extractor. Do not leave the spigot unattended - you will be surprised how much honey comes out!



honey excstracter

- 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 Wash your jugs, jars or whatever containers you will put the honey in. Air dry to avoid fermentation . Fill up your containers with honey and labelers

7.2. Honey processing

Many species of bees collect nectar which they convert into honey and store as a food source. However, only bees that live together in large colonies store appreciable quantities of honey. These are bees of the genus *Apis* and some of the *Meliponinae* (stingless bees)

Many species of bees collect nectar which they convert into honey and store as a food source. However, only bees that live together in large colonies store appreciable quantities of honey. These are bees of the genus *Apis* and some of the *Meliponinae* (stingless bees honey consists of a mixture of sugars, mostly glucose and fructose. In addition to water (usually 17-20%) it also contains very small amounts of other substances, including minerals, vitamins, proteins and amino acids. A minor, but important component of most types of honey is pollen. These components contribute to the different flavors that honey can have, and make honey a nutritious food that has a high demand in many regions of the world.

7.3. Cut-comb honey

The simplest processing is to remove the honeycomb from frame hives, top-bar hives or traditional hives and sell or consume it as "cut-comb" honey. When producing this from frame hives it is necessary to use a wax foundation that does not contain strengthening wires and is thinner than that normally used in wired frames. The process involves collecting pieces of sealed and undamaged honeycomb, cutting them into uniform sized pieces and packaging them carefully in bags or cartons to avoid damaging the honeycomb. Because the honeycomb is unopened, it is readily seen to be pure, and it has a finer flavour than honey that is exposed to air or processed further. Cut-comb honey can therefore have a high local demand and fetch a higher price than processed honey. However, the honeycomb is easily damaged by handling and transport, which makes distribution for retail sale more difficult. It requires protection by packaging materials that will absorb shocks or vibration (e.g. cushioning plastics such as "bubble-wrap" and/or corrugated cardboard cartons) and



packs should be carried carefully and not stacked, thrown or dropped to avoid damage to the honeycombs

7.4. Strained honey

This is honey that is processed to a minimal extent and is usually sold locally. It is prepared by removing the wax capping of the honeycomb using a long sharp knife that has been heated by standing it in warm water. (unsealed combs containing unripe honey should not be used). The honeycombs are then broken into pieces and the honey is strained to remove wax and other debris. A fairly coarse strainer is used at first to remove large particles, and the honey is then strained through successively finer strainers such as cotton or muslin cloths. The clear honey is collected in a clean, dry container. When most of the honey has drained (often over many hours depending on the temperature) the combs are squeezed inside a cloth bag to remove as much of the remaining honey as possible. The wax is collected and formed into a block by melting it gently in a warm water bath or solar wax extractor. This beeswax byproduct often has a high value as a wax polish or for candle-making. The strained honey can either be dispensed from the collection pan into customers' own containers or packed into glass jars or plastic bags for

The wax capping are removed from the honeycombs as for strained honey. At larger scales of production, electrically heated honey knives or "planes" may be used:

When extracting honey from top-bar frames, the frame is placed over a dish, and the thin layer of wax capping is cut from the bottom to the top of the frame and allowed to fall into the dish below. The frame is then turned and the capping on the other side is removed. Honey that is stuck to the wax capping is strained using cloth bags as above. The frame is then placed in a honey extractor. Honey extractors can be manually or electrically operated, depending on the scale of production, and can be either "tangential" or "radial" type machines. They extract the honey by spinning the frames at high speed. In a tangential machine, the frames lie against the barrel of a drum and the outer side of the frame empties when the drum is spinning. The frames are then turned so that the other face of the honeycomb faces outwards, and the machine spun until this side is empty. This prevents the inner part from bursting through the empty outer combs and so prevents the combs from breaking. Although each frame has to be handled four times to load, turn and unload them, more complete extraction can be achieved and this design is more compact and cheaper than radial types. In a radial machine, the frames sit between rings, arranged like the spokes of a wheel and honey is extracted from both sides simultaneously. Radial machines are



larger than tangential machines to ensure that the frames are far enough from the centre to extract properly, but they can hold more frames than a tangential machine (e.g. a 20-frame radial extractor compared to an 8-frame tangential machine).

The honey is collected in a pan, preferably made from food grade plastic or stainless steel, and filtered through a nylon or stainless steel filter unit that has progressively finer filters as the honey moves to the outside of the filter unit. Some filters are fitted with heaters to make the honey flow faster, but these are not necessary in tropical climates and any increase in temperature risks a reduction in the quality of the honey (see below). The clear honey is then collected and packaged into glass or plastic containers and labeled. The package should be moisture proof to prevent the honey picking up moisture from the air during storage.

Because customers regard the color of honey as an important quality characteristic, the containers should preferably be transparent so that customers can see the product. Glass jars with screw-on lids or plastic pots with heat-sealed foil or plastic lids may be used. In countries where glass or plastic containers are difficult to obtain, heat-sealed plastic sachets are an alternative. The label on the container is important for attracting customers and a professionally designed label that describes the source of the honey (e.g. sunflower, mixed blossom, tree honey etc.), its purity, and the district it was produced in, can give a marketing advantage. Legally, in most countries the label should have the following information:

- The name of the product (i.e. pure honey)
- The name and address of the producer.
- The weight of honey in the container (the net weight).

Other information may be included to benefit the customer: for example, the label on comb honey may indicate that the whole comb including the wax is edible, or strained honey may have a note to explain granulation (see below).



Self-Check -3	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next space:

4. What is honey extractor?(2point)

5. Write labeling information that are most countries used.(2points)

6. Why honey store in dry container?(3point)_____

Note: Satisfactory rating – 3 and 4 points

Unsatisfactory - below 3 and 4 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Operational sheet-1	<i>Hot bath method wax harvesting</i>
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Operation steps

- step1. Put water into the cooking pot and heat over a fire.
- step 2. Wash crushed bee combs to remove dirt and honey and place in the sack.
- step 3. Make a good package by tightening the string around the sack.
- step 4. By now the water should be quite warm. Put the package into the pot and use the stick to push it down to the bottom.
- step 5. When it reaches a temperature of about 59°C, the wax begins to melt and a waxy scum begins to form on top of the water.
- step 6. Use the stick to press the package. More wax will float to the top of the Water.
- step 7. Use the ladle to skim off the melted wax and pour it into a mould. Continue this process until wax no longer rises to the surface.

Operational sheet-2	<i>Extraction beeswax by Ocloo's method</i>
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Operational Procedure:

- step 1. Fasten the mosquito mesh over the container with the nylon cord.
- step 2. Place honeycombs on the wire mesh so that honey can trickle into the container.
- step 3. Cover the honeycombs and container with plastic and secure it fast to the container with another cord.
- step 4. Leave the honey and container in the sun. Both honey and wax will seep down into the container. The wax will harden above the honey and can be removed when the honey cools down to be decanted and bottled.



LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **8-12** hours.

Task 1: identify season of honey harvesting.(5point)

Task 2: extract wax from frame hive and fixed comb hive.(5point)

Task 3: Extract honey by using honey extractor.(5point)

Task 3: demonstrate wax harvesting by hot bath method

Instructions: write the appropriate answer for the following questions

8. List wax harvesting method .(5point)
9. Write equipments used for honey storage.(5point)

List of Reference Materials

[http. www. processing of honey with un extractor](http://www.processingofhoneywithanextractor)



Learning Guide-04

Unit of Competence: Support

Beekeeping Work

Module Title: Supporting Beekeeping
Work

LG Code: AGR BKGI M12LO4-LG-12

TTLM Code: AGR BKGI M12sTTLM

0919v1

LO 4: Participate in maintaining health
and safety work place

**Instruction Sheet-3****Learning Guide #12**

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Raising OHS issue and designs according to with enterprise procedures
- Contributing participative arrangements in the work place
- Making Suggest to assess the development
- Assessing manual handling risk
- Assessing information on OHS for specific work operations.

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 –

- Raises OHS issue and designs according to with enterprise procedures
- Contributes participative arrangements in the work place
- Makes Suggest to assess the development
- Asses manual handling risk
- Asses information on OHS for specific work operations

Learning Instructions:

45. Read the specific objectives of this Learning Guide.
46. Follow the instructions described in number 3 to 23.
47. 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.
48. Accomplish the “Self-check 1” in page **11**.
49. 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).
50. 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.
51. Submit your accomplished Self-check. This will form part of your training portfolio.



52. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
53. Accomplish the “Self-check 2” in page 15.
54. 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 2).
55. Read the information written in the “Information Sheets 3 . Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
56. Accomplish the “Self-check 3” in page 17.
57. Read the information written in the “Information Sheets 4. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
58. Accomplish the “Self-check 3” in page 17
59. Read the information written in the “Information Sheets 5 Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
60. Accomplish the “Self-check 4” in page 22
61. Read the information written in the “Information Sheets 6 Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding then
62. Accomplish the “Self-check 5” in page 22
63. 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 5).
64. If you earned a satisfactory evaluation proceed to “self 5” in page 25. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
65. Read the “Operation Sheet 1” and try to understand the procedures discussed. in page 29
66. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
67. Do the “LAP test” in page 29 (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be



either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advise you on additional work.

Information Sheet-1	monitor and report on all aspects of workplace safety
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Introduction

This module covers the process of implementing and monitoring the enterprise OHS program. It requires the ability to provide information to the work group about OHS, facilitate the participation of workers, implement and monitor enterprise procedures for identifying hazards and assessing and controlling risks, dealing with emergencies and hazardous events, and maintain occupational health and safety records. Implementing and monitoring the enterprise OHS program requires knowledge of hazards in the workplace, relevant OHS legislation and Codes of Practice, risk control measures, hierarchy of risk control, and relevant enterprise management systems and procedures.

Definition of Terminologies

Terminology: refers to those terms that are commonly used in livestock operation and the discussion of this module. These include: -

Accident: -is the term indicating a condition of something unpleasant, undesirable, or damaging, that happens unexpectedly during work operation in the workplace due to several factors. It can be physical, mechanical, chemical, biological, electrical, emissions, etc.

Hazard is anything (condition, situation, practice or behavior) that has the potential to cause harm including injury, disease, death, environmental or property and equipment

Safety: refers to the condition of workers and animals being freedom from danger, harm, or risk



OHS Procedures refers to guidelines and/ or technical reference documents with general used to avoid risk techniques

Occupational Health and Safety (OHS): Any occurrence which results in personal injury, disease or death, or property damage

Risk: Risk is the significance of the hazard in terms of likelihood and severity of any possible injury.

Hazardous Substances Any substance that has the potential to harm the health of persons in the workplace and includes chemicals scheduled under the Poisons Act, chemicals classified under the Dangerous Goods Act (1975) or Hazardous Wastes.

OHS policies: An OHS policy is a broad statement that says who is responsible for managing and monitoring OHS and lists any particular objectives for OHS

Workplace is any land, premises, location or a thing at, up on in or near which a worker works

Hazard identification a stage in the risk assessment process where potential hazards are identified and recorded

1.1. **Observe safe practices during work operation**

Personal protective clothing and equipments

This is always the last control measure to be considered. There is still a potential risk to the individual because the effectiveness relies on wearing and using PPE properly. Although PPE is effective for the individual using it, PPE provides no protection for other workers or bystanders. If you have controlled or eliminated the risk by some other method you may not need to wear PPE. PPE includes

- face shields
- respirators
- dust masks
- earmuffs or gloves
- Jacket or suit



- Rubber boots
- Hive tool
- Smoker
- Bee brush
- Personal protective equipment is often used in conjunction with other risk control measures.

Personal protective equipment (PPE) means all equipment (including clothing giving protection against the weather) which is worn or held to protect against risks to health or safety. PPE includes the following, when worn for health and safety protection:-

- (a) Protective **clothing** (e.g., aprons, gloves, footwear, helmets, high visibility waistcoats)
- (b) Protective **equipment** (e.g., eye protectors, respirators, safety harnesses).

1. Provision of PPE: Employers must ensure that suitable PPE is provided to employees exposed to a risk to their health or safety except where the risk has been adequately controlled by other equally, or more effective means. 'Suitability' is by reference to:

- Being appropriate to the risks and workplace conditions.
- the ergonomics and state of health of the person
- being capable of fitting the wearer correctly
- Being effective in preventing or adequately controlling the risk without increasing an overall risk.
- Complying with any other provision implementing any PPE EC Directive.

PPE should be seen as a last resort in the hierarchy of control measures; it should be made readily available (in most cases on a personal basis); no charge can be levied; ergonomic factors should be considered i.e., match the PPE to the person; quality must be ensured i.e., to be certified ('CE' marked) as meeting basic safety requirements.

2. Compatibility of PPE: This is required where more than one piece of PPE is worn.

3. Assessment is needed to ensure the suitability of the PPE to be provided. This should include assessment of the risks, the PPE risk protection characteristics and a comparison of PPE available.

4. Maintenance and Replacement: PPE should be maintained (including replaced or cleaned as appropriate) in an efficient state, in efficient working order and in good repair.



Responsibilities, procedures (including frequencies) should be established and appropriate records kept.

5. **Accommodation:** Suitable accommodation must be provided for the safe storage of PPE. Contaminated or defective PPE should also be segregated.

6. **Information, instruction and training** needs to be provided in a systematic way; it should cover users, managers/supervisors and repair/maintenance/test personnel. Records should be kept. Training to be both theoretical and practical, induction and refresher as necessary.

7. **Use of PPE:** There are duties on employers, self-employed persons and employees to ensure the proper use of PPE.

8. **Reporting of loss/defect** - to the employer.

1.2. Assessing and identifying hazards and risks at workplace

A hazard is defined as an agent, element or event that possesses potential harm, an adverse event or adverse outcome. Or, a **hazard** is any situation, condition or thing that may be dangerous to the safety or health of workers.

A hazard is a source of potential harm or a situation with a potential to cause loss to:

- ✓ People - Injury
- ✓ Allergy of bee sting
- ✓ Equipment - Breakage
- ✓ Fire burning

It is the process used to identify all the possible situations in the workplace where people may be exposed to injury, illness or disease. It is a categorization step identifying biological agents and genotypic and phenotypic hazards, as potential hazards or not, which could potentially be introduced with a commodity or activity and for which pathways exist for exposure of the agents to susceptible animals

Why it is important?

The first step in preventing incidents, injuries or illness in the workplace is identification of all the hazards within the workplace that could cause injury or illness. As an employer, you have your business objectives as well as moral and legal obligations to provide and maintain a safe and healthy workplace.



To effectively manage the business (including health and safety in the workplace) and discharge both moral and legal obligations, it is imperative for:

- ✓ any potentially hazardous situations (which may cause injury, illness or disease) in the workplace to be
- ✓ identified on an ongoing basis before they occur;
- ✓ the likelihood of each of the hazardous situations occurring to be assessed;
- ✓ if there is any likelihood of occurrence, appropriate measures to prevent their occurrence to be identified and effectively implemented; and
- ✓ the measures to be continually reviewed to ensure their effectiveness.

1.3. Hazards in beekeeping farm

Beekeeping farms (workplaces) can be dangerous. There are many hazards that have the potential to kill, injure or cause ill health or allergy. Exposure to the hazard is depending on the type of activities carried out in different farms. different activity that lad to hazard in beekeeping farm are

- ❖ Harvesting of honey
- ❖ Colony transferring
- ❖ Colony splitting
- ❖ Internal hive inspecting
- ❖ Other work near to the hive

I. Behavior and handling - bees.

A. Behavior

- **Worker bees are aggressive**
- **Bee not like color full cloth**
- **Bee sting animals poultry and humans**

1.4. Recognizing and reporting hazards in workplace

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;

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.

A procedure for reporting and addressing occupational health and safety hazards and issues needs to be established. This procedure should also include a process for resolving issues or disputes. If an employee identifies a hazard or occupational health and safety issue they



should report it to their direct supervisor or manager and health and safety representative, and established procedures should be followed

Workplace hazards can be divided into six groups:

Physical hazards such as noise, electricity, heat and cold;

Chemical hazards such as toxic gases, noxious fumes and corrosive liquids;

Ergonomic hazards such as the height of a workbench, the shape of a vehicle seat and the length of a control lever;

Radiation hazards, for example, from x-ray machines, high powered lasers, radioactive materials;

Psychological hazards such as stress from using equipment without proper training or instructions, overwork, or being coerced into using faulty equipment which carries a risk of injury; and

Biological hazard such as syringes containing potentially infected blood, specimen containers carrying potentially infected materials and bacteria and viruses from air conditioning systems. Therefore these all hazards have to be reported **as soon as they occur based on the report format**

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:

10. List hazard control PPE. (3 points)



11. Write bee behavior related to hazard (3 points)

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-2	Raise OHS issue and designs according to with enterprise
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1.1 OHS legislation and Codes of Practice



To ensure that the risk management process has been conducted appropriately within all stages, national and state OHS authorities (eg .Work Cover) have produced guidance material to assist workplaces to understand and apply their OHS legal responsibilities. These guidelines are called:

- standards
- codes of practice
- Guidance notes.

State and territory-based codes of practice and guidelines can be located through the state and territory OHS authorities.

These documents are helpful in providing information on industry-specific and general risk management issues within the workplace. It is also important to note that some standards and codes of practice are required to be used by law. If this is the case, reference will be made to the standard or code of practice within the state/territory's OHS legislation. Several standards and/or codes of practice are usually required when managing OHS risks within an event environment

1.2 OHS policies, procedures and programs

Importance of OHS Policies

Occupational Health and Safety (OHS) is important to create safe work place and to ensure that the work place is a safe for everyone, including visitors to the Property. Having an OH&S policy in work place help employers to meet his responsibility. It also helps them to effectively communicate their commitment to health and safety of workers. Developing, implementing and maintaining an OH&S policy also makes good economic sense. Accidents are costly; perhaps it may even more expensive than expected. Accidents related to cost can add-up quickly and may include:

- possible overtime,
- production loss,
- time spent on completing paper work,
- pain and suffering of an injured worker,
- loss of business or goodwill or negative publicity,
- possible legal costs,
- Effect on the community.



By developing and implementing an OH&S policy, these costs could be reduced.

OHS Procedures

OHS procedure can be described as safe work procedures. These need to cover what needs to be done when carrying out tasks that may have risks or when working in a hazardous environment. For example, when cleaning an extracting room floor, an OHS procedure would explain:

- The purpose of the task and associated possible hazards
- who is to carry out the task and any special training or other requirements that they must meet
- The equipment needed to carry out the task and how it should be used
- what chemicals can be used and any safety precautions that need to be followed for those chemicals
- how to safely deal with excess water, for example by using a squeegee or mop or 'sweep' the excess water towards the drainage point in the floor
- requirement to place hazard warning signs to alert others to the hazard of excess water
- Emergency procedures to be followed (e.g. washing out chemicals on skin or eyes).

1.3 Assisting work place hazard identification and risk control

The hazard identification process is designed to identify all the possible situations where people may possibly be exposed to injury, illness and disease arising from all sources including the above.

Prior to the introduction of any plant, substances, processes or work practices in the workplace, it is essential for the hazard identification process to be carried out to identify whether there is any potential for injury, illness or disease associated with such introduction. This will assist you to take the necessary actions for what may otherwise be extremely costly further down the track if no action is taken at this early stage.

Carrying out hazard identification for all existing plant, substances, processes and work practices in your workplace may require some effort. If you have a large workplace, it is a good idea to split it into several discrete areas for the hazard identification process, and to



tackle one area at a time. Priority should be given to areas with hazardous plant, substances, processes or environment.

In order to minimize the time involved, it is better to perform hazard identification on all sources of hazards in a particular area of the workplace instead of doing each hazard source (e.g. plant, hazardous substances etc) at a time.

The relevant health and safety representatives need to be consulted during the hazard identification process. Employees working in the area have day to day experience of any hazards and should be involved in the hazard identification process. Advice should also be sought from people who are associated with the activities and processes in the area because they may provide valuable input.

Hazards in the workplace can change from day to day. In order to effectively manage workplace health and safety you need to introduce proper systems and procedures to ensure hazard identification is carried out on a regular basis. The OHS legislation requires you to repeat the hazard identification process:

- ✓ before any alteration to plant or any change in the way plant is used or a system of work associated with plant, including a change in the location of plant;
- ✓ before any alteration is made to objects used in the workplace or to systems of work which include a task involving manual handling, including a change in the place where a task is carried out;
- ✓ before plant is used for any other purpose than for which it was designed;
- ✓ before an object is used for another purpose than for which it was designed if that other purpose may result in the person carrying out hazardous manual handling;
- ✓ if new or additional information about hazards becomes available to you; and
- ✓ if an occurrence of a musculoskeletal disorder in your workplace is reported by or on behalf

Self-Check -2	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What does OHS explain (3p0intes)_____



2. What is the importance of OHS (3points)_____

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-3	Contribute participative arrangements in the work place
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3.1. Responsibilities and expectation of both employees and employers

After one is hired it is important to understand that employers have certain expectation that must be met if one is to be successful in his career. Desirable and undesirable work habit can have a strong influence on career success. Good citizen ship skills are important in one's life and employees have a right to expect certain things from their employers. The workers need to understand that employer expectation and good work habits are linked. For the success of job, the worker should develop and use good work habits that will help to meet employer expectations.

Specific expectation will vary from job to job. Some employers have employee hand book that spells out acceptable and unacceptable behavior. If such a hand book is available, study it carefully and takes it seriously; failure to do so often leads to job termination. If there is no policy hand book available, ask your supervisor for an explanation of company policies and a summary of what a company expects from its employees.

3.2. General Employee responsibilities include:

- protecting his/her own and other workers' health and safety;
- knowing and following legislation and safe work practices at all times; properly using all safety clothing/equipment/devices provided; and



- reporting unsafe conditions in the workplace, Traits of honesty and dependability; Work with others,
- Safety on the job,
- Good communication skills,
- Appropriate behavior,
- Health and grooming, and
- Good citizenship

3.3. Employer responsibilities:

Organizations will be required to operate according to legislative requirements using best practices and following (organization name) policies and procedures regarding health and safety.

- providing and maintaining safe equipment, systems and tools;
- providing and maintaining the information, instruction; training, supervision and facilities that are Necessary to ensure the health, safety and welfare of workers;
- ensuring workers use necessary protective clothing and devices;
- ensuring work procedures comply with legislation and safe work practices at all times;
- ensuring all workers are aware of workplace hazards and follow safe work practices and procedures;
- ensuring workplace inspections are completed on a regular basis and follow-up actions taken as necessary;
- Reporting serious injuries

3.4 Measure have to be taken for un safe work .

An employee can refuse work if he/she believes that the situation is unsafe to either himself/herself or his/her co-workers. When a worker believes that a work refusal should be initiated, then the employee must report to his/her supervisor that he/she is refusing to work and state why he/she believes the situation is unsafe for the employee, supervisor, and a JHSC member. Then employee representative will investigate the employee returns to work if the problem is resolved with mutual agreement if the problem is not resolved and a government health and safety inspector is called inspector have to investigate and give decision in writing.



Self-Check -3	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. list employer responsibility (3 points) _____

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-4	Make Suggest to assess the development
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4.1 Undertaking safety training

Accordingly the workers need to know their environment and should take trainings on fields of their specialization or in work place hazards in this case for livestock husbandry practices i

1. Manual handling

It refers to any activity that requires a person to use force to push, pull, roll, hold, or carry an object or hive and hive products, and includes repetitive tasks, such as using hand tools, operating machinery and even mil.

2. Machine Guarding

People working in or visiting the bees can be exposed to plant and machinery hazards

The unguarded moving parts of plant and machinery could result in a person being entangled, struck, crushed, punctured, stabbed or suffer friction burns

3. Confined spaces in beekeeping

Areas in the transferring area, such

Confined spaces are usually distant must bees hive full fill or containers that are large enough for people to avoid bee disturbance

4. Slips and trips.

Slips, trips and falls are the most common cause of injuries in all workplaces and make up the greatest number of Work Cover claims. Slips and trips can cause serious injuries, including sprains and strains

5. Chemicals(fertilizer and weed sides)

Chemical use can be dangerous at any time, but particularly when you are exposed to a chemical concentrate. Aside from direct ingestion, chemicals can be absorbed into the body through:

- exposure to skin;
- breathing in fumes when applying, cleaning, decanting or mixing; and
- Ingesting the substance by accident or through poor hygiene.



Flower water are poised.

4.2. Assessing and identifying hazards associated with handling of hazardous substances

For all hazards a hazard management process must be undertaken. Establishing the parameters of the process including the criteria by which hazards will be assessed. Staff and contractors are to follow the hazard management model to ensure all hazards are identified, assessed, controlled and evaluated for effectiveness. The level of risk is to be determined through the risk assessment process and recommended control measures implemented.

Hazards are required to be identified, assessed and controlled:

- when planning work processes
- prior to purchase, hire, lease, commissioning or erection of plant or substances
- whenever changes are made to the workplace, system or method of work, plant or substances
- whenever new information becomes available regarding work processes, plant or substances.

Prior to any new process being undertaken or where a new hazard has been identified a risk assessment **must** be completed to ensure that all risks are adequately controlled.

When all risks are adequately controlled or pose minimal risk no further action is required. Should further control measures be required a full risk assessment must be completed. No process should be undertaken unless adequate control measures are in place.

Hazards in a workplace can arise from a number of sources including:

- poor workplace design;
- hazardous tasks being performed in the workplace;
- poorly designed plant being introduced into the workplace;



- incorrect installation, commissioning, use, inspection, maintenance, service, repair or alteration of plant in the workplace; and
- people being exposed to hazardous substances, processes or environment.

The hazard identification process is designed to identify all the possible situations where people may possibly be exposed to injury, illness and disease arising from all sources including the above.

Prior to the introduction of any plant, substances, processes or work practices in the workplace, it is essential for the hazard identification process to be carried out to identify whether there is any potential for injury, illness or disease associated with such introduction. This will assist you to take the necessary actions for what may otherwise be extremely costly further down the track if no action is taken at this early stage.

Carrying out hazard identification for all existing plant, substances, processes and work practices in your workplace may require some effort. If you have a large workplace, it is a good idea to split it into several discrete areas for the hazard identification process, and to tackle one area at a time. Priority should be given to areas with hazardous plant, substances, processes or environment.

In order to minimize the time involved, it is better to perform hazard identification on all sources of hazards in a particular area of the workplace instead of doing each hazard source (eg plant, hazardous substances etc) at a time.

The relevant health and safety representatives need to be consulted during the hazard identification process.

Employees working in the area have day to day experience of any hazards and should be involved in the hazard identification process. Advice should also be sought from people who are associated with the activities and processes in the area because they may provide valuable input.

People undertaking hazard identification should have the necessary training to look for:

Mechanical hazards including:

- "drawing in" points
- shearing points
- impact and crushing areas

Non-mechanical hazards including:

- ergonomic hazards including manual handling
- electrical shocks and burns
- chemical burns, toxicity, flammability



- cutting areas
- entanglement areas
- stabbing points
- abrasion areas
- flying particles
- any protrusions which could cause injury
- noise
- vibration
- radiation
- mist, dust, fumes
- suffocation
- engulfment
- biological hazards, viral
- slipping, tripping and falling hazards
- falling objects
- high pressure fluid
- high temperature objects
- working in very hot or cold conditions

Checklists should be developed to assist people who are involved in the hazard identification process in the systematic identification of hazards.

Hazards in the workplace can change from day to day. In order to effectively manage workplace health and safety you need to introduce proper systems and procedures to ensure hazard identification is carried out on a regular basis. The OHS legislation requires you to repeat the hazard identification process:

- before any alteration to plant or any change in the way plant is used or a system of work associated with plant, including a change in the location of plant;
- before any alteration is made to objects used in the workplace or to systems of work which include a task involving manual handling, including a change in the place where a task is carried out;
- before plant is used for any other purpose than for which it was designed;
- an object is used for another purpose than for which it was designed if that other purpose may result in the person carrying out hazardous manual handling;
- if new or additional information about hazards becomes available to you; and
- if an occurrence of a musculoskeletal disorder in your workplace is reported by or on behalf of an employee.



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. list at least 5 mechanized and 5 none mechanized hazards (10 points)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

You can ask your teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-5	. Asses manual handling risk
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5.1 Identifying and participating in manual handling hazards and risk

To begin the risk management process we firstly need to have the ability to identify tasks that have the potential to cause manual handling injuries. Under the OHS Regulation, hazard identification must be conducted by employers:

- before using any premises as a place of work
- before and during installation, erection, or alteration of plant
- before changes to work practices and systems of work are introduced
- whilst work is being carried out
- when new or additional health and safety information becomes available.

Management's responsibility is to ensure that hazard identification takes place at all stages of product service or delivery, from design to manufacture, supply and product use. Supervisors should support this process by involving all employees in the hazard identification process to ensure success.

Manual handling can include any of the following:

- application of force
- repetitive or sustained application of force
- repetitive or sustained awkward posture
- repetitive or sustained movement
- exposure to sustained vibration
- handling live people or animals
- Handling loads that are unstable, unbalanced or difficult to hold.

5.2. Fire fighting and first aid equipments

Fire is one of the most serious hazards on a beekeeping farm. It is usually caused by carelessness. Most fires start from electrical equipments, heaters, or careless smoking. Other causes of fires are lighting, arson, and spontaneous combustion. High level of moisture and ammonia in livestock confinement is also another cause of fires.

First aid kits should be present at all work areas with proper medical supplies.

Items in first aid kits include;

* Various Sizes of sterile bandages



* Roller bandages

* Triangular bandages

* Cotton balls

*a list of names and phone numbers of nearest doctor, ambulance, paramedic services, and poison control centers etc.

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 manual handling risks? (3 points)

2, hazard identification must be conducted by employers:

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

You can ask you teacher for the copy of the correct answers.



Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-6	Asses' information on OHS for specific work operations.
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6.1 Ways to get and keep people involved in maintaining health and safety

Information of risk in work place can be collect either of qualitative quantitative or both of them from:

- Document
- Observation
- experience

A safe workplace requires the active involvement of all people who work in the business or organization. The important thing is that all employees must have a way to have their OHS concerns brought to the attention of 'management' and that employees are consulted about how risks will be managed in the workplace.



Better outcomes are achieved when there is a wide range of ideas about health and safety issues on the farm and how to fix them. Hence, there is usually greater commitment to decisions because everyone is involved in reaching them.

Ways to get and keep people involved

- Work directly with the people who do the jobs in each part of the farm to identify hazards, assess risks and come up with solutions.
- Set regular times to discuss health and safety, such as at weekly job planning meetings, and ensure time is allocated specifically to health and safety matters. Some businesses have occupational, health and safety committees that keep minutes and actions from their meetings.
- Provide a good role model and insist that the farm safety protocols you have established are followed.
- A record of consultation is good practice and may help demonstrate compliance.

6.2. Incorporating OHS in to a work place

Simply having a written OH&S policy is not enough to meet obligations regarding workplace health and safety. To ensure the OH&S policy is effective, there should be a plan for putting the words into meaningful actions. Some ways of doing this include:

- ❖ providing health and safety orientation for new staff;
- ❖ providing health and safety orientation for current staff who start new job tasks, move to new locations, or use new tools, equipment or work processes;
- ❖ providing health and safety training on an on-going basis; including health and safety responsibilities and performance objectives when hiring and evaluating staff;
- ❖ recognizing, evaluating and controlling hazards;
- ❖ conducting regularly scheduled workplace inspections;
- ❖ establishing procedures for reporting and investigating accidents/incidents;
- ❖ documenting and recording health and safety related activities; and
- ❖ Monitoring management and staff to ensure they are carrying out their health and safety responsibilities.



Ensuring success

Part of a successful OH&S policy is ensuring that all workers are aware of its contents. This can be accomplished through:

- ✓ OH&S training;
- ✓ distributing a copy to all workers;
- ✓ including it in policy and procedure manuals;
- ✓ postings on notice board(s);
- ✓ safety talks and meetings; and

A positive example set by management (i.e. how they respond to safety issues, how they carry out their roles and responsibilities, how they enforce the OH&S policy). Maintaining an OH&S policy is as important as developing and implementing it and is necessary for its effectiveness.

Health and safety is not something to be entered into and then forgotten. It is an ongoing process that requires continuous attention of employers, workers, and the WH&S representative/OH&S committee members. These individuals must keep up-to-date with changes in legislation and other areas that affect workplace health and safety. An OH&S policy should be reviewed yearly and revised as required to ensure it continues to effectively reflect the specific needs of the workplace.

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, insuring success without risk is accomplished by (4 points)

- A _____
- B _____
- C _____
- D _____



2, risk information is collected by _____

Note: Satisfactory rating - 2 points

Unsatisfactory - below 2 points

You can ask your teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Operational sheet-1	<i>practices during safe work operation procedures</i>
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Step 1, collect Personal protective clothing and equipments

Step 2, check Compatibility of PPE: This is required where more than one piece of PPE is worn in the workshop.

Step 3, assessing defects on PPE

Step 4, Maintenance and Replacement:

Step 5. Accommodation.

Step 6. implement Information, instruction and training



stage7. Ensure the proper use of PPE.

stage8. Finally report loss/defect

LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **8-12** hours.

Task 1: asses risk occurrence beekeeping farm.(5point)

Instructions: write the appropriate answer for the following questions

1. List risks that come from carelessness.(5point)
2. Write equipments used for PPE.(5point)