



# BEEKEEPING LEVEL-II

## Learning Guide -01

**Unit of Competence:** -Support in Transferring of Bee Colonies

**Module Title:** -Supporting in Transferring of Bee Colonies



# **Learning Guide -01**

**LG Code: AGR BKGM2 06 0919 LO01-LG-01**

**TTLM Code: AGR BKG2TTLM09 0919v1**

**LO 01: prepare to transfer bee colony**



<b>Information sheet</b>	<b>Learning Guide #01</b>
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Assessing Source of Bee Colony
- Identifying Require Tools and Equipment
- Identifying Necessary Preparation for Transferring Bee Colonies
- Identifying Personal Protective Equipment's (PPE) Required During Bee Colony Transfer

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

- Assess Source of bee colony
- Identify Require tools and equipment according to supervisor instructions or sops.
- Identify Necessary preparation for transferring bee colonies
- Identify Personal Protective Equipment's (PPE) required during bee colony transfer

**Learning Instructions:**

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



<b>Information sheet-1</b>	<b>Assessing Bee colonies</b>
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## **1. What is bee colonies**

A honey bee colony is defined as an aggregate of a queen bee, drones and several thousand worker bees living together as one social unit in a hive or in any other dwelling. Colonies have variable populations ranging from less than 1,000 bees to more than 50,000 bees.

### **I. Queen Bees**

There is always one queen in a hive. She is half again as large as a worker and longer than a drone. Her wings are much shorter than her body and cannot cover the whole of her abdomen. Her long, tapering abdomen makes her resemble a wasp. She has sparkling gold hairs on her shiny body. The queen has a sting but, unlike the aggressive workers, does not use it to fight hive intruders. Her sting is only used to fight rival queens. She does not go out to collect pollen, nectar, water or propolis, and therefore she has no collecting apparatus like pollen baskets, long proboscis for drawing nectar or wax glands to secrete wax to build comb cells. As a queen, she usually does not feed herself.

Immediately after she emerges, the queen tours the hive to see if there is any rival queen hiding somewhere. If she finds one, the two queens will fight until one is killed. If the colony is not preparing to swarm, then the newly emerged queen seeks out potential queens hiding in comb cells. The queen pipes to make a special noise and the hidden capped queen responds. Immediately, the emerged queen locates the cell, tears it to pieces and kills the unemerged queen. Sometimes the workers watching as spectators will help the queen to evacuate the contents of every queen cell.

Five days after the queen emerges from her cell, she starts to fly out of the hive, making an orientation flight of about five minutes. Next she makes mating flights which last about 30



minutes. She flies to an area 6-10 m above the ground where drones have congregated. In other places, she is not attractive to the drones. During a successful mating flight, she is mated by about eight drones. If the flight is not successful, she makes another the next day. During the mating flight, the drone's semen is injected into her oviducts. From there, the spermatozoa enter into a special reservoir called the spermatheca. A well-inseminated queen carries about 5000000 spermatozoa stored in her spermatheca.

Sometimes nuptial flights can be delayed as the result of a long rainy season or pronounced bad weather. When a young queen bee has been unable to mate for about a month, she will start to lay unfertilized eggs in worker cells. From these eggs, only drones will develop. In this case, the colony will perish within a few weeks unless the beekeeper observes what is happening and reacts immediately by giving the colony a new queen (requeening) or by inserting a new brood comb with very young larvae and eggs, from which the colony will develop a new queen, after having killed the old unfertilized one.

Three days after her last mating flight, the queen starts to lay her eggs, which are produced in her ovaries. A good queen lays 1 500-2 000 eggs per day. She lives three to five years, but after two years she lays fewer eggs. When her spermatozoa become exhausted, she also lays unfertilized eggs in worker cells, where drones now develop. Such a queen is called a dronelayer.

Each queen produces a queen substance, called a pheromone, by which many activities of a colony are controlled. In the absence of a queen or a pheromone, the workers transform some worker cells containing young larvae into queen cells and start to rear new queens.

When there are no larvae younger than three days in the colony, the bees have no way of rearing new queens. In this case, ovaries of some workers develop, and they start to lay eggs. However, as worker bees cannot be inseminated, they lay only unfertilized eggs. Such workers are called laying workers.

## **II. Drone Bee**



The drone is popularly known for exhibiting a high degree of laziness. His presence in the hive seems to be of little importance to the beekeeper. He is stout and larger than the worker. He has no suitable proboscis for gathering nectar and has no sting to defend himself or the colony. Like the queen, he possesses no baskets for collecting pollen grains and no glands to secrete wax for comb construction. He does no work in the hive but is fed, eating large quantities of food, and moves about in sunshine and on warm days making loud, frightening noises everywhere he goes. This is why he is considered useless, but he has a very important function to play, which only a few of his kind ever fulfil. This function is to inseminate the queen, and for this he is well prepared.

The compound eyes of the drone are twice as large as those of the queens and workers, and both eyes meet at the top of his head, which is not true of workers and queens. This enables him to see the queen during the mating flight. The drones also have the largest wings, which help them to reach the queen during the flight.

The spermatozoa are produced in the drone's testes during the pupal stage. After the drone emerges from the comb cell, the spermatozoa pass into seminal vesicles, where they remain until mating. During mating, they pass into the copulatory apparatus.

The colony begins to rear drones in late spring and early summer. They reach sexual maturity nine days after emerging, and fly out of the hive (mostly between 1 and 3 p.m.) searching for the queens over a distance of 8 km or more. Mating occurs in the open air, in the drones' congregation areas. During mating, the drone everts his copulatory apparatus, injecting the semen into the queen's oviducts and leaving part of the apparatus in the tip of the queen's abdomen. That part, visible in the queen returning from the mating flight, is called the mating sign. The drone dies during mating.

Toward the end of the nectar flow, when fresh nectar becomes scarce, the workers prevent the drones from feeding. At first they push the drones from the brood combs to the side combs and eventually drag them half-starved from the hive.



In unfavourable periods, drones are tolerated only in queenless colonies or those containing unmated queens. Thus the presence of drones in a colony during such periods shows that something is wrong with the queen and that action by the beekeeper is needed.

### **III. worker bees**

Workers are the smallest and most numerous of the bees, constituting over 98% of the colony's population. One colony, as has been seen, may have as many as 80 000 workers, but 50 000 is a more common maximum.

Although they never mate, the workers possess organs necessary for carrying out the many duties essential to the wellbeing of the colony. They have a longer tongue than the queen and drones, and thus are well fitted for sucking nectar from flowers. They have large honey stomachs to carry the nectar from the field to the hive; they have pollen baskets on their third pair of legs to transport the pollen to the hive. Glands in their head produce royal jelly as food for the larvae and glands in their thorax secrete enzymes necessary for ripening honey. Four sets of wax glands, situated inside the last four ventral segments of the abdomen, produce wax for comb construction. A well-developed sting permits them to defend the colony very efficiently.

The kind of work performed by the worker depends largely upon her age. The first three weeks of her adult life, during which she is referred to as a house bee, are devoted to activities within the hive, while the remainder are devoted to field work, so that she is called a field bee.

#### **1.1. How to Get Bee colonies?**

Most people begin beekeeping by capturing a swarm or getting bees from an established beekeeper. It is much easier to purchase package bees from a reliable bee breeder than to remove them from nests in buildings or trees. This method requires a lot of time and effort. Also, wild bees can be diseased or infested with mites, have a bad temperament, or be poor producers. You will get a better strain of bees from a professional. They select bees for characteristics such as greater honey production, gentleness, disease resistance, and better wintering qualities.

### **I. Swarm Honey Bees**



## **Swarming**

Swarming happens when the colony gets too big and the bees want to reproduce the colony by making a new queen. The old, experienced queen and most of the adult workers leave the hive with the swarm and fly out of the old hive looking for a new home. She needs to find a secure place to mate and start laying eggs. A swarming colony does not have any combs. A new queen later hatches out and takes over the old colony and the remaining bees. During the swarming season it is easier for hives to be occupied quickly. In some areas, swarming seasons coincide with rainfall when there are a lot of flowers for the bees to feed on. It is a good idea to ask experienced beekeepers in your area when the swarming season is. A swarm is a colony of bees clustered in the open and looking for a new home. A swarming colony is easy to catch. The beekeeper can capture the swarm and place it into a temporary or permanent hive. The swarm has a better chance of staying in its new hive if it is captured during a nectar flow.

## **Catching a swarm**

Very simply the steps include: -

- ✚ Preparing a new hive first.
- ✚ Using a smoker, bee veil and suit.
- ✚ Looking for a swarm of bees clustering on a branch or a place where they can be easily caught.
- ✚ Spraying the bees with sugar water to wet their wings.
- ✚ Catching the swarm in a container that is easy to close, easy to carry and be ventilated - such as a
  - ✚ cardboard box, a wide mouthed basket or even a bag made from cloth.
- ✚ Smoking the bees.
- ✚ Holding the container under the swarm and shaking the swarm directly into the container.
- ✚ Finding and caging the queen.
- ✚ Placing the cage with the queen in the upper part of the container.
- ✚ Leaving the container in a shady place until evening covered with a damp cloth.
- ✚ Shaking the bees into your empty hive when evening comes. Placing the caged queen in the hive.
- ✚ Giving the bees a comb with some uncapped honey and a brood comb with eggs (but without bees!) from another hive.



Figure 1: catching swarm bees

### Catching swarming bees

- ✚ Fixing queen gates or includes in front of the entrance holes.
- ✚ Releasing the queen after a few days when the bees have settled down.
- ✚ Feeding the bees in the first few evenings to help the swarm to settle during the nights.
- ✚ Checking that bees are entering and leaving the hive.

You can also trap swarms in a swarm box or bait hive. You can also use special bait hives or catcher boxes (mini top bar hives) to catch swarms – but boxes, baskets or gourds may also be used as bait hives. The best catcher boxes will have top bars from which the bees can build combs. If so these bars should be the same size as those found in your new permanent hive to make transfer easy. Very simply the steps include: -

- ✚ Preparing the bait hive with empty comb, propolis or aromatic plants.
- ✚ Siting the bait hive along a swarm or in a good apiary location.
- ✚ Inspecting the hive every few days.
- ✚ Transferring the new colony to your empty top bar hive, comb after comb, in the same order.
- ✚ Adding 2 brood combs and a food comb from another hive.
- ✚ Brushing the remaining bees into the hive and letting the bees settle undisturbed.
- ✚ Feeding the bees.

## II. Buying bee colonies

### A. Buying Complete Hives



The easiest way to obtain honeybee colonies is obviously to buy complete hives from an established beekeeper. It must be recognized, however, that in countries or areas in which modern beekeeping with A. mellifera has not yet taken root, such local purchase is rarely possible, and it is necessary to import such complete hives from abroad, not a realistic approach in many circumstances.

Given the right price and the good condition of both the bees and the equipment, buying complete hives has often proved to be the most economical approach for beginners, who may in addition be able to obtain valuable suggestions and guidance from the seller. Other advantages are that an apiary can be established immediately, and that the beekeeper can often divide colonies in the populous hives acquired.



Figurer 2: colony buying and copleted hive

Considerations which the prospective purchaser should hear in mind in buying hives include the

- ✓ condition of the hive equipment,
- ✓ the population of adult workers and brood in each hive,
- ✓ the age and egg-laying performance of the queens and
- ✓ the amount of honey and pollen stored, as well as the price.

### B. **Buying Nucleus Colonies**

A nucleus colony (see Fig. 5/17) is a small hive unit, normally consisting of 2 to 5 frames of brood, a small quantity of food reserves, several thousand workers and a laying queen. Nucleus



colonies are cheaper than complete hives and are lighter in weight, so that they can be transported more easily at less cost.



Figure 3: honey bee colony with nucleus box

The guidelines set out above for the purchase of complete hives apply equally to the purchase of nucleus colonies. They should if possible be bought in the spring, or at another time when natural Forage is abundant. Under these conditions, they will soon outgrow their small hive bodies and must be transferred to standard hives properly equipped with frames and foundation

### III. Package Bees

Package bees are not normally available in Ethiopia, but in future the private sector of beekeeping development projects may wish to purchase packages from abroad. The handling of package trees is discussed here in some detail because of the likelihood that this technique will take on greater importance in the medium term, if not sooner.

Basically, a package of bees consists of several thousands of workers, a mated queen, and a can of sugar syrup provided as food during shipment. The trees are packed in a wooden box, two ends of which are screened to provide ventilation. A package contains from 2 to 5 pounds (900 to 2250 g) of bees, one pound (450 g) consisting of 2500-3000 workers. The price of a package, net of shipping costs, is determined by the weight of trees it contains, but as a general rule package trees are cheaper than complete or nucleus colonies.



When ordering packages, the beekeeper specifies a delivery date, in order to be prepared in time to receive them. As soon as they arrive, the bees are fed on a 1:1 sugar syrup, which is brushed over the wire screen of the package. To ensure adequate feeding, from 300 to 500 cc of syrup should be allowed per package, depending on the number of bees it contains.

When the shipment arrives, examine it carefully. There are always a few dead bees. If most of the swarm or the queen is dead, immediately report it to the company. It is usually better to request replacement rather than a refund. If the weather is hot when the bees arrive, put them in a cool dark room that is not over 70°F. While the bees are adjusting to the temperature change, smear the screened sides with sugar syrup. Feed the bees repeatedly until they are engorged. They will be much quieter to handle.

The season for shipping bees is short and the supply can be limited. Place your order in winter and give the delivery date you want. Plan to have package bees arrive six to 10 weeks before nectar flow begins. If you are not sure when that is, schedule the arrival for early or mid-April. Before the bees arrive, your hive should be assembled, fitted with foundation, and set up in a good location.

The bees are best transferred from the package to the hive in late afternoon, one or two hours before dark. Hives should contain five frames, provided with foundation. The feeder can be removed from the package, and any bees it contains are shaken into the hive. The queen cage is removed from the package and the condition of the queen is observed. Install the bees in the hive late in the afternoon when tendency to drift is lessened.

- ✚ Open the hive and remove four frames from one side to allow space for the bee package.
- ✚ Use the entrance cleat to narrow the hive entrance to three inches.
- ✚ Remove the shipping strip from the top of the cage and shake the bees to the bottom of the cage.
- ✚ Take out the queen cage.
- ✚ Remove the pasteboard over the candy end of the queen cage and use a small nail to punch a hole through the candy.



- ✚ Do not make the hole so large that the queen can get out immediately.
- ✚ Suspend the queen cage, screen side down, between two center frames.
- ✚ Remove the feeder can and shake some of the bees over the queen cage.
- ✚ Place the partially emptied package, top side up, in the empty space left by removing the four frames.

If any "queen candy" 1/ remains in the hive, at least half of it is removed, so that the workers can release the queen from her cage within a day; the queen cage is then placed between two frames in the middle of the hive. The remaining bees are shaken from the package into the hive (see Fig. 4) and provided with about two litres of sugar syrup. Some beekeepers prefer to shake out all the bees over the queen cage and not take out the four frames. Place the inner cover upside down on the hive and place the feeder can, feeding holes down, over the hole in the inner cover. Add an empty super to house the feeder can and then put on the outer cover.

One or two days after installation the hive is inspected to ensure that the queen has been released and that the hive contains enough syrup to stimulate comb construction. The colony should normally begin rearing brood within a week of being installed.

Leave the colony alone for a week except to feed them syrup if necessary. If the queen has not escaped from her cage by then, let her out. Remove the queen cage and shipping cage and replace the missing frames. Continue to feed the bees until nectar begins to flow and the colony is strong enough to begin storing honey in the super. The greatest difficulty involved in obtaining package bees from abroad lies in the transportation problem. Starvation and suffocation from heat at airport warehouses while the packages are in transit are perhaps the two most important limiting factors in the importation of package bees. These risks can however be minimized by reducing the duration of the travel, and

Establishing honeybee colonies from packages thus involves complex arrangements, care during installation, and a certain amount of time and attention, but since only adult trees are shipped in this manner, the risk of importing brood diseases is minimized.



Figuer 4: packages bees

<b>Information sheet-2</b>	<b>Prepare Materials and equipment</b>
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## 2. Materials required during transferring

The following important lists of materials are properly arranged and ready for use during the transfer and to be placed at transferring site.

- The type of hive that was ready to put new colony in.
- Make ready smoker and the materials to smoke
- Bee brush
- Water sprayer (but not critical)
- Bee hive chisel
- Knife
- Collection pan for old combs and another one for smooth honey combs
- A sort of carpet, mat, or any other flat material to be placed on the transferring ground.
- Wagon for transporting unused materials
- Wire or rope
- Queen cage
- Feeder frame with sugar paste
- Needle and rope



- Complete technician protective materials

**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, shouldering 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.

**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.

**Water sprayer:** Used to spray water on bees (especially at low land areas like Gamble) to reduce-

- Aggressiveness
- Immediate evacuation from their nest.

<b>self-Check -2</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List source of bee colonies and write short note for each source?



2. What are bee colonies?
3. List important materials that are used for bee transferring?

**Note: Satisfactory rating - 6 points**

**Unsatisfactory - below 6 points**

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Short Answer Questions**

### **List of Reference Materials**

2008. A Practical Manual of BEEKEEPING

2011. Advanced Beekeeping Manual Ethiopian Beekeepers Association

2012. The National Bee Keeping

2018. Deliverable: Manual on Beehive Construction and Operation



# **BEEKEEPING LEVEL-II**

## **Learning Guide -02**

**Unit of Competence: -Support in Transferring of Bee Colonies**



**Module Title: -Supporting in Transferring of Bee Colonies**

**LG Code: AGR BKGM2 06 0919 LO02-LG-02**

**TTLM Code: AGR BKG2TTLM09 0919v1**

## **LO 02: Transfer Bee Colony**

<b>Information sheet</b>	<b>Learning Guide #0</b>
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Directing Procedures of colony transferring
- Assigning Season/time of transferring
- Implementing Follow up after transferring

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 –**

- Direct Procedures of colony transferring
- Assign Season/time of transferring
- Implement Follow up after transferring

### **Learning Instructions:**

8. Read the specific objectives of this Learning Guide.



9. Follow the instructions described
10. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask your teacher for assistance if you have hard time understanding them.
11. Accomplish the “Self-check 1” **in page -**.
12. 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).
13. 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.
14. Submit your accomplished Self-check. This will form part of your training portfolio.

<b>Information sheet-1</b>	<b>Transfer of bee colony to different types of hive</b>
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### **1. Transfer of bee colony from local hive to frame and transitional hives**

One cannot place either frame hive or transitional hive on tree branch in an attempt to trap swarming colonies of bees. For such tasks local hives can be hanged on tree to trap swarming bees. Few farmers can hang frame hives on tree branches where theft is not a problem. Nevertheless, the most common practice is only after the bee colony has been trapped by local hives and then would be possible to transfer the bee colony either in box or transitional hives. During the transfer of bee colony from local hive to either frame or transitional, the entire bees and brood are removed from old nest and transferred to new nesting hive. Bees that are transferred to new nesting hives would be confused and would have feeling of insecure and discomfort for some time until they are used to the changing environment. Before they are removed from their old nest, the conditions of the new nest must be so attractive to bees so that they can quickly accept and settle well.



**Preparations for preconditions are many. These include:**

- A. The bees in the local hive should be placed on the spot where permanently designed to place the colony after transfer. Keep the bees in the old nest for at least three days.
- B. Fencing the apiary site is very important prior to the establishment in areas where predators are existing.
- C. The beeswax to be used for foundation sheets must be pure and free from any chemical and different adulterants.
- D. Prepare wax foundation sheets. While making the foundation sheets, make the layer very thin and transparent because the bees like such foundations.
- E. Melt beeswax cakes with or without water added to it. Since it is the cause of great fire hazard, it is advisable to pay much attention so that the beeswax will not exceed the above-mentioned melting point and not catch fire. So, before one sees melted wax produce a foamy substance, remove it from the melting bowl immediately.
- F. Prepare lubricants to help smoothing the pressing machine called casting mould while making wax foundation sheet,
  - I. clean casting mould with fresh and clean water
  - II. put two small plastic bowls to place freshwater in one and lubricant mixture water in another.

It is wise to be sure before selection whether a certain lubricant is accepted by bees or not. Some lubricants such as detergents (as they are bee repellants) and perfumed soaps must be avoided. It is recommended to use normal soaps made for cloth wash and some others free from perfume and coloring materials.

**Make hive attractive**

A hive must be sited in an appropriate place. To encourage bees to enter a hive you must make it attractive. Often beekeepers put wax on the top bars and wax, propolis or lemon grass inside the hive. But the wax should be fresh and have a strong smell. Bees are very clean insects and do not like a dirty hive. There should not be any dirt, spiders, cobwebs or insects that might capture a scout bee and prevent it returning to fetch the swarm. If there are any ants, lizards or ra



ts nesting in it, you must clean it out and re-grease the wires.

### **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.

### **1.2. Transferring bee colony from local hive into frame hive**

1. Put the mat or flat material prepared on the transferring ground
2. Prepare the smoker with smoking materials inside and place near the edge of the mat
3. Put bee brush near by
4. Have water sprayer with water, good if you make it available
5. Bring the new nesting frame hive and place it on the mat having the size of 120 to 130 cm
6. Open the cover (lid) of the frame hive. The entrance of the frame hive should be towards the wider areas of the mat.
7. 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.
8. hold local hive in the inclined position or Put the new nesting frame hive near and on operation mat.
9. 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.
10. The operation would start by opening the local hive lid.
11. Smoke around the edge of the hive soon after opening the lid. It helps to clear or move away the bees from
12. Whenever removing combs look 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
13. Use bee brush now just to clear the bees from the combs removed.



14. 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 onwards, there is nothing to worry about the mood of working, but
15. 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.
16. Cover the frame hive now after placing the queen bee in
17. 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.
18. 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
19. 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.
20. Make sure that no bees are left in the old local hive. Then take away the old local hive from the working site.
21. 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.
22. 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.
23. After completion of the transfer, place the new frame hive with the newly transferred bees in place of the old hive.



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

### **1.3. 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.

### **Transferring procedure**

1. Bring transitional hive first and place it on the mat
2. 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.
3. Smoke on bees to avoid them from working sites.
4. Whenever remove the combs, look for the queen bee on both sides of the comb.
5. Brush the worker bees down into the transitional hive from the top bar that is temporarily picked.
6. 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 of the hand glove and catch the queen bee with bare fingers (Fig 1). This is simply to safely handle the queen bee the most important individual of the colony.



7. 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.



Fig 1: Holding queen bee with fingers

8. Brood combs removed from local hive should be placed inside the new transitional hive by tying the combs with rope on top bars.
9. Place all the top bars in place. Direct the swarm bees to the new hive entrance.
10. 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.
11. 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: To save these combs as they are by placing in a safe bag for later use that same day, or shortly afterwards, melt and collect pure beeswax before it is attacked by wax-moth.

<b>self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is colony transferring?
2. Write some preparation for precondition to transferring colonies?
3. What are the materials that used for transferring bee colonies?

**Note: Satisfactory rating - 6 points**

**Unsatisfactory - below 6 points**



## Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Short Answer Questions

<b>Information sheet-2</b>	<b>Follow-up and support for settlement of colony transferred</b>
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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. 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 comb cells. 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 queenless 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 another 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.

## **2.1. Pre Inspection Preparation and Care**

Depending on the type, strength and season of the year, bees are aggressive. Necessary preparations should be made and care should be taken before opening a beehive.

### **i. Prepare a Complete Protective and Safety Gear**

After a beehive is opened for inspection bee stings and other inconveniences should not interrupt work progress. Protective and safety gear that have been used for previous colony inspections



may carry the scent of bee venoms that bees can smell from a distance. This makes bees to react causing disturbances. Always, gear has to be washed after use and should be free from such smell. In addition, the color of protective gear should not be black or red. These colors irritate bees. Instead, white and offwhite colors are preferable.

#### ii. **Wearing Protective gear properly**

It is necessary to wear heavy clothes under protective dress and to make sure that zippers run all the way through. Wearing light clothes will enable the bees to sting through. It is also necessary to make sure that bee veil is not too close to the body face and strings are tied tight. Smoke prepared for the inspection has to last through operation time.

#### iii. **Determining Time and Weather Conditions of Inspection**

It is necessary to choose a convenient weather condition to undertake inspection. Backyard beekeeping, should be done at night. Beehives should be opened when it is not windy, cold or rainy. Wearing perfumes or other cosmetics sprayed clothes on inspection days is not advisable. Body and foot odor can also irritate bees and cleanliness is necessary.

#### iv. **Caring for People Stung by Bees**

When people are stung by bees, the venom causes reddish body swell. After some hours the swelling subsides. Trying to pull out the sting from the body by holding with fingers would aggravate severity of the situation. The attempt enables the venom in the sting to spread more into the body. This causes more swelling. Instead, finger nails should be used to pressure out the sting by pressing the surrounding part of the body. If finger nails are short, needle like objects can be used to pull out stings. If available, holding ice on the body helps to reduce the pain. People with minor allergy to bee stings show symptoms of higher level of itching, body swelling, breathing problems and vomiting. In those who are seriously allergic to the venom spreads throughout the body in a very short time. In addition to the above symptoms, they will have higher heart beatings and body sweating. A single bee sting could also be fatal. Hence, such people must be extremely careful. They should not even attempt to participate in any beekeeping activities. If they are stung by several bees, they should be taken to hospital immediately.

#### v. **Avoiding Loud Voices, Disturbances and Fast Movements**



When someone is around bee colonies and apiary, fast movements and loud voices should be avoided. During opening and closing of beehives, when adding or removing super and frames, the movements should be very gentle; bumps and noises should be avoided. This will not only calm the colony but also minimizes accidental death of the queen and the bees.

#### **vi. Using Standard Beehive Opening Procedures**

To do any internal inspection, the top cover should be removed. The following steps should be followed to do this. Stand on the side of the beehive and blow smoke into the beehive through the bee entrance. Wait for 2-3 minutes. Stand on the side or behind the beehive and use a chisel or a knife to pull up the cover. Lift the cover a little and blow smoke on the sides and into the beehive and wait for 2-3 minutes. One should always stand on the side or behind the entrance to do any inspection. Working in front of the entrance blocks the in and out movement of the bees and forces them to change their flying direction. If they do, this disturbs the colony and makes them aggressive. Remove the cover completely and blow smoke to move the bees to the base. Turn the beehive cover up-side-down and put it away. If the inspection is on the base of a beehive; the cover should not lean on the hive. Then proceed with the inspection.

#### **vii. A voiding the Exposure of larvae or brood from Draft and Sunlight, and Avoiding Honey from Robber Bees**

When doing internal inspection, the larvae or brood should not be exposed to draft and sunlight. If inspection is conducted during daytime, bees from one beehive can rob honey and nectar from another beehive. The cover removed for inspection should be placed back as soon as possible to avoid such problems. During such inspection, a colony should be observed if it is ready to split and swarm and if so queen cells should be identified from each comb and should be carefully avoided. Taking time to inspect the beehive frame by frame is not required.

### **2.2. Order of Conducting Inspection**

Beehive inspection should start from weaker and end with stronger colonies. Stronger colonies have more workers. If weaker colonies are inspected after strong colonies, workers of strong colonies will disturb and rob the honey and nectar of the weaker colonies. It becomes more inconvenient to conduct inspection. If colonies in the apiary have equal strength, it is



preferred to start one from each corner and then go to the middle. Inspection should be conducted only when it is necessary to perform required duties and solve problems. Unnecessary repetitive inspections should be avoided. Repetitive inspection may result in weakening of colony, forcing colony to consume honey they made and finally in colony absconding. Specially, in drought seasons, repetitive inspection is not recommended.

### **2.3. Inspection and proper validation of bee management**

Among methods of improved bee handling, follow up of external and internal conditions of colonies is a major and important activity. External inspection is follow up of the external conditions of a colony. Opening of a beehive to detect the internal conditions of a colony is internal inspection. So, colony inspection can be divided into two parts namely, external inspection and internal inspection.

#### **2.3.1. External Bee Colony Inspection**

External bee colony inspection is an observation of the condition of a colony from outside without opening the beehive. In external inspection, the strength or weakness of a bee colony can be determined by observing at the entrance of a beehive to find out the number of worker bees that move in and out. During a flowering season, by looking at the worker bees that carry pollen grain balls by their legs into the beehive, it is possible to determine whether the colony has a queen bee and eggs. If workers do not carry pollen grains into the beehive, it can be an indication of the death of a queen, dearth period causing lack of forgeable food or due to unfavorable conditions they faced inside and outside the hive.

If many bees cluster at hive entrance, this could be an indicative of one of the following: the internal temperature of the beehive is higher, or the beehive is congested and the bees need more space or it is a hint that it is time to harvest honey. Inspecting the surrounding where the beehives are placed helps to find out if there are ants and other predators. If so the necessary corrective measures should be taken. Therefore, inspecting the external conditions of each bee colony before doing any internal inspection assists to discover and gather information that is helpful to internal inspection.

#### **2.3.2. Internal Beehive Inspection**



Internal beehive inspection is conducted to assess the condition of the beecolony, to verify the accuracy of information gathered during external inspection, to identify and take corrective measures of any problems observed and to determine what to do subsequently. The following are some of the major areas to be focused on during internal inspection.

1. Observe if the beehive is too big or too small for the colony
2. Make sure that there is enough feed
3. Observe whether or not the colony is ready to swarm
4. Check if the colony is attacked by disease, animals or pest
5. Check if it is time to install queen excluders
6. Check if honey is ripened enough to be harvested, if not, determine the time for harvest.

<b>self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What would like to do, when the colony losing queens?
2. What are the major care that should be taken before opening the hive?
3. What are two types of inspection methods?

**Note: Satisfactory rating – 6 points**

**Unsatisfactory - below 6 points**

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Short Answer Questions**



## Operation Sheet-1

## Colony inspection

### Examine your colony performance

#### Procedures

- ✚ wear light coloured clothes. Ideally, protective clothing should be worn, especially a veil to protect the eyes and face.
- ✚ Make sure the top bars are pushed together as they are replaced, so that no gap exists. Finally, gently replace the lid on the hive.
- ✚ keep the grass cut and the area around the hives tidy.
- ✚ extinguish the smoker if not in use.
- ✚ Do not stand in the flight path of the bees.
- ✚ Work gently without excessive talking or banging noises.
- ✚ Puff smoke gently around the entrance of the hive and remove the lid carefully.
- ✚ Remove a few empty bars to create a gap at one end of the hive. This should not disturb the bees. Thereafter, remove one bar at a time. Smoke the gap gently and hold the bar vertically so as not to break off the comb.
- ✚ Use a hive tool or knife to separate bars that are glued together by propolis.
- ✚ Keep the bars in the same order and try not to squash any bees when replacing them in the hive. Squashed bees release a smell (alarm pheromone) that sets other bees on the attack.
- ✚ Do not visit the hive in the warm part of the day-about six o'clock in the evening is a good time.
- ✚ Do not try and work with too many hives at a time, at least not more than 45 minutes in an apiary as bees from the first hive worked on will become agitated and attack, leading to further commotion amongst all the bees.



<b>LAP Test</b>	<b>Practical Demonstration</b>
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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

**Task 1- Examine your colony performance?**



## List of Reference Materials

2008. A Practical Manual of BEEKEEPING

2011. Advanced Beekeeping Manual Ethiopian Beekeepers Association

2012. The National Bee Keeping

2018. Deliverable: Manual on Beehive Construction and Operation