



BEEKEEPING Level - II

Learning Guide

Unit of Competence: Assist in
Managing of Bee Colonies

Module Title: Assisting in Managing of
Bee Colony



Learning Guide-10

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LO1.Prepare to manage bee colonies

Beekeeping level-II	Version:01	Page No.2
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Instruction Sheet-1	Learning Guide #10
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- **Identifying required tools and equipment's according to instruction.**
- **Directing procedure of managing colony.**
- **Conducting Occupational Healthy Safety (OHS) according to work**

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 required tools and equipment's according to instruction.**
- **Direct procedure of managing colony.**
- **Conduct Occupational Healthy Safety (OHS) according to work**

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 2-3 to **3..**
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 **6.**
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 **1,2**” in page **6-21**
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 22
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).

Beekeeping level-II	Version:01	Page No.3
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14. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” in page 12. 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 1” in page 26. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
17. Read the “Operation Sheet X” and try to understand the procedures discussed.
18. If you earned a satisfactory evaluation proceed to “Operation Sheet 1 in page 26 however, if you’re 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. Do the “LAP test” in page 27 (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	Identifying required tools and equipment's according to instruction
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1.1. Identify required

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 the 4 follow hierarchies to undertake –

2. **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. Traditional (local) hive are hives made from locally available materials. Transitional hives These are hives with movable combs (bars) Improved (modern) hives - These are the movable frame hives such as Langstroth, Zander, Dadant, Modified Zander, Foam hive etc.

Components of the Improved (modern) hive stand Bottom Board Brood chamber Queen Excluder Extracting or bulk comb supers (may be added as needed) Inner Cover Telescoping cover (outer cover) Hive stand (function): - is keeping the hive off the damp ground & keeping the cluster and combs drier in winter. Bottom Board: serves as the floor of the beehive and is supplied with various means of reducing or enlarging the entrance to the hive. Hive Body (Brood chamber)=Full depth super The first hive body resting on the bottom board will be the brood chamber where the queen lays the eggs & the baby bees are raised. Queen Excluder: -if used is placed b/n the brood chamber & the supers.

3. **Supers:** -are constructed in various depths for different reasons. Inner Cover: -a rectangular covers & fits B/n the top hive body & the telescoping over or roof of the beehive. Outer cover -is the roof of the beehive & is supplied in beginner kits. -It is usually metal covering a wooden frame for added protection against the weather and its sides telescope well down over the inner cover & the top super or body for a rainproof fit and extra stabilization in high winds.

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

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

6. **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.



7. **Embedded knives**- is used as an alternative or hot iron bar to do the same purpose (as of transformer)
8. **Honey extractor (Centrifugal)**- it can be hand drive or electrically operated
9. **Honey presser**- it is used to extract honey by methods of hand pressing of the honey combs which are not framed E.g. **honeycomb harvested** from traditional and Transitional hives.
10. **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.
11. **Uncapping knife** - is also used for the same purpose, but it is electrically operated.
12. **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.
 - ❖ Hard metal.
 - ❖ Metal sheet Queen excluder
 - ❖ Plastic
- 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 calamity of 50 kg
 - ❖ The one, which has, calamity of 30 kg.
13. **Honey jars (glass or plastic)** - Each contains 500 gm.
14. **Chisel (bee keeper's tool)** - it is made up of iron metal and has sharp surface on one end. –
 - It's a hand tool of a beekeeper.
 - One has to use or have in his/her hand before appetizing bee hives.
 - It is used to open the hive, clean porpoise and other up necessary materials seen in the hive.
 - It can be made locally.
15. **Bee brush**- a soft bristled used to remove bee from a frame combs (to draw bees into the hive)
16. **Smoker**- it is manually exported - 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 evening up the hive.
17. Other personal protective equipment to undertake while assigning in managing of the bee colonies



Hand glove
 .Bee Veil
 Bee keeper's protective clothes
 Over all (bee suits)
 Boots sheets.

18. **.Water Sprayer Used to spray water on bees** (especially at low land areas like Gamble) to reduce- Aggressiveness Immediate evacuation from their **nest**.

19. **.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

20. **Honey strainer.** It is a double course screen it is usedp:-



honey freshly extracted from the comb to remove 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 cupping.

Check materials, tools and equipment for **Assisting in Managing of Bee Colonies** work Containers and processing equipment need to be made of material compatible with this very acidic food as the following :-



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 odors 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

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. ----- It is a metal caused with zinc. It is manually operated and used to make artificial comb foundation sheet - (3 points)

Beekeeping level-II	Version:01	Page No.7
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- A. Casting mould
B. Frame wire-
C. Supers
D. Beehive
2. ----- . a soft bristled used to remove bee from a frame combs (to draw bees into the hive) - (4 points)
- A. Smoker
B. Bee keeper's tool
C. Bee brush-
D. honey jar

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

Information Sheet-2

Directing procedure of managing colony.

2.1. Directing procedure of managing colony.

Directing procedure of managing colony is the seasonal pattern of a given area honeybee colonies have seasonal cycles, which is synchronized with the seasonal changes of their environment. So beekeepers have to carry out necessary management activities following the two seasonal cycles of colonies

- ☒ Dearth period management &
- ☒ Active period management

1. Dearth period managements are

- ✿ Reducing supers
- ✿ feeding,
- ✿ Reducing supers

Beekeeping level-II	Version:01	Page No.8
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- ✿ After a honey harvest, when the flowering season is over the queen starts to reduce its egg laying.
- ✿ As a result a population could become too small to control the hive space.
- ✿ So the unoccupied space can attract pests like wax moth.
- ✿ To timely reducing super is very important
- ✿ To maintain the strength of a colony
- ✿ To protect from pest attack.

There are indicators that show reducing the colony management for reducing the suppers these are during inspection of colony

- ☐ decreasing of population,
- ☐ having of unoccupied combs
- ☐ complete or partial moving of bees either to the bottom or to super boxes.

2. How to reduce super

During reducing supers instead of removing all frames from the top select and reduce only empty combs (without nectar, pollen), old combs, broken frames from both base and super boxes

After reducing if the combs are not too old and or damaged hang them in aerated areas to be reused.

If the combs are old and damaged, strain the combs to be used for foundation sheet making for re super.

Then clean the frames and the box to be re super in the next active period.

3. Feeding

Bees do not need feeding as other livestock does it In conditions where there is flowering of bee plants, one after the other bees may utilize this for subsistence.

However supplementary or emergency feeding is required

- ❖ in long dry periods
- ❖ in heavy raining periods
- ❖ when colonies caged for intensive pollination
- ❖ colonies under other manipulation
- ❖ Like royal jelly production artificial queen rearing.

What to feed

- ☐ Leave adequate honey during harvesting
- ☐ Sugar syrup
- ☐ Pollen substitute (pea, bean, chick pea, Soya bean flour)

Methods of preparations

Procedure Mix 1: 1 ratio of water and sugar about 2 kg of sugar to average colony size.

Sugar feeding should be only during dearth period to the amount of subsistence and should not be during flowering periods to the extent of being stored by honeybees as honey.

If supering is too late towards to honey flow periods, bees may spent much of their time in building the comb instead of collecting and storing honey.

If supering is too early it may become difficult to the bees build the new combs and to manage the unnecessary space created to them.



Active season managements spurring

As soon as flowering is commence the queen start lay eggs up to 1500-2000 a days during flowering period.

As a result the population become high and the population may become congest.

If supering is too late the colony become swarm due to overcrowding which brings in reduction of population and decreases in honey yield.

What are indications for supering

From external observation it is possible to see clustered bees at the entrances of their hives.

When the hive is open the whole combs could be covered with bees.

6-8 combs filled brood could be observed.

Methods of spurring

- Simple adding of suppers from the top

Putting new frames alternatively with old frames in both base and super boxes

Queen excluder inserting

Queen excluder is important to create honey & brood chamber, and it also limit the egg laying potential of the queen so that worker bees diverge to words honey storing instead of rearing to much brood.

4. Time of queen excluder (Q.E.) inserting :-

Q. E has to be inserted 21-30 days before the expected honey-harvesting period.

Swarm and its control

What is a swarm? A Swarm is colony that left its nest for different reasons

There are three types of swarm or reasons why bees leave their nest.

- ✿ Reproductive swarm
- ✿ Migratory swarm
- ✿ Absconding



5. Reproductive swarm

Swarm occur as the result of reproduction of a colony if is a way of maintaining the survival of the species.

Reproductive swarming can be triggered due to over crowding

However, since it is a natural phenomenon it can occur even in non congested colony.

Tropical African bees have high Reproductive swarming tendencies

In modern beekeeping reproductive swarming is not accepted because

- ✚ It reduce the population size
- ✚ it reduce the working force
- ✚ and lead total or partial lose of yield in that season

How to control reproductive swarm

- ✚ Add super early /on right time
- ✚ **Inspect colony and damage queen cells**
- ✚ Insert Q.E to partially limit the egg laying of a queen
- ✚ Remove brood & give to weak colony

6. Types of Queen Cells

When we remove queen cell we have to identify the nature of queen cell

1. Reproductive queen cells

- ✚ Mostly at periphery of the comb 10-20
- ✚ Occur at peak flowering period
- ✚ In overcrowded colony

2. Supersedure queen cells

- ✚ It is built when the queen become old to be replaced
- ✚ Queen cells are few in number
- ✚ Mostly at the face of the comb
- ✚ The brood pattern is not normal as that young queen brood pattern
- ✚ When we remove the queen cell we have to leave at least 2 proper queen cells



3. Emergency queen cells

Emergency queen is built when there is sudden loss of queen /death during hive operation
there is no egg & young larvae

So during removing such queen cells we have to leave at least two queen cells

7. Migratory swarm

Migratory swarm is a swarm in which the whole colony moves from one ecology to the other following dearth period mostly due to shortage of food, high temperature.

8. Absconding

Total movement of a colony due to disturbance & unworkably reasons

2.1. Harvesting honey

When the honey is ready it has to be removed immediately

Honey can be considered as ripe when 75% the comb is sealed

What are indications for honey harvesting?

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

Early cropping is important

To force the bees to collect 2nd round honey either for their Owen or for 2nd harvest

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

It may avoid the consumption of the store by the bees particularly if there is rain

If harvesting is at late flowering leave some provision to the bees.

Or if you remove all the honey immediately feed them with sugar

After harvest- extract & strain the honey while it is liquid

2.1.1. Extracting of honey

Uncapping the honeycombs and extracting honey

After the honey combs with frames are brought to the honey house, the seals honey combs should be uncapped in order to be extracted easily, to let the easy flow of honey from the comb cells. There are many types of uncapping equipment available for commercial operator, from steam and electrically heated to mechanically operated units. All are suitable, and the type to be used must be decided by the individual conditions. Originally uncapping was and in some cases is still done by dipping sharp knives in hot water or scooping the combs with wide fork. The next step was the introduction of the steam-heated knife. This was soon followed by an electric knife. In our country, the uncapping fork is now commonly used. The uncapped honey will be 30



Extracted by the manually or electrically operated centrifugal honey extractor. There are many types of honey extract developed with various capacity of frame holding.

2.1.2. Straining honey

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

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

2.1.3. Honey from traditional hive

- ☐ Harvest only ripe honey
- ☐ Separate pure & ripe honey from brood & pollen combs
- ☐ Thoroughly crush the combs immediately after harvesting
- ☐ Allow to drain using different sieve sizes
- ☐ Warming for further purification
- ☐ Both traditional & box hive honeys
- ☐ it is not advisable to heat honey b/se affects its quality

So heating should be

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

1. Fermentation

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

To prevent honey fermentation

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

2. Harvesting Beeswax

Beeswax is one of the important high value bee product

Beeswax is used for more than 300 purposes

For - cosmetics - Parma cuticles 31



Polish - others

Annual production of beeswax is estimated to be 5000 tons

From this only <10% is used for export purpose

The remain large portion is wasted different level.

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

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

In traditional beekeeping, beekeepers cut damp large amount of beeswax.

Processed beeswax can stay 10-20 years with out deterioration of its quality it can not be attacked by wax moth

2.1.4. Processing of crude beeswax /safe/

1st pick large particles (leaves & sticks of Gesho

(Rhamino perinoids)

2. then sock with water for 12-24 hrs to dissolve water soluble impurities and for easy release of the wax from the cocoon

3. transfer the beeswax to a bowl after squeezing the water from the beeswax

4. Melt the beeswax by adding water up to the level of beeswax

During melting

-it should not be piously heated

- it has to be stirred continuously

5. After complete melting strain the beeswax using sack or kaki fabric

6. Applying mechanical force to efficiently recover the beeswax

7. Allow settling solidifier for 12 hour

8. Remove the beeswax block

Scrap the impurities from the bole

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

❖ Other bee products

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

These are

☐ propels

☐ royal jelly

☐ pollen & others

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



2.2.5 Honey bee breeding and queen rearing

Breeding may be defined as the systematic mating of selected males and females to produce offspring, which possess desirable traits

The aim of breeding is to develop good traits and eliminate unnecessary traits, i.e. to develop

- ✿ Productive honeybees
- ✿ Disease resistance honeybees
- ✿ Over winter ability

Honeybees" breeding is very complex and very difficult. This is because mating occurs only in free flight and control of the mating of such queens by humans is extremely difficult, when queens mate naturally.

The problem in honeybee breeding can be solved in two ways: -

- 1). Establishment of isolated mating yard
- 2). Controlled breeding of queen bee through Artificial Insemination (AI)

Virgin queens from a group of selected mothers are instrumentally inseminated with thorough mixture of semen of many drones taken from the entire group of selected mother colonies.

Before any breeding programme to be under taken, selection should be done. The aim of selection is to identify and direct the heritable performance capabilities of the honeybee colonies. Thus selection is the major tool for a breeder to make genetic progress or genetic improvement in a given stock to be the parents of the next generation while depriving chance of others.

2.2.6..Type of selection

There are two type of selection

- ✚ Natural selection
- ✚ Artificial selection

In natural selection nature takes activity while in artificial selection there is the interference of man.

Generally, selection is based on different factors

1. Commercial interest For honey production

- ✿ Colony population
- ✿ Efficient pollinators
- ✿ Resistance to bee disease
- ✿ Behavior the bees

2. Geographical desirability

For example, in temperate regions

- ☐ Over wintering ability
- ☐ Properly times building up

In tropics regions

- ☐ Maintaining through rainy seasons
- ☐ Long drought tolerant
- ☐ Rapid build up
- ☐ High temperature tolerant

Beekeeping level-II	Version:01	Page No.15
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2.2.7. Types of breeding

There are two types of breeding

1. **Inbreeding:** - is mating between closely related individuals that is mating between parents and off spring we can have inbreeding up seven generation
2. **Hybrid or cross breeding:** - mating b/n unrelated individual. Generally a concerted effort is needed to select and breed from indigenous honey bee stock such a program could be very productive and resolve many of the problems related to management of African bees.

European races of bees should not be introduced to sub Saharan Africa. There for are many genetic biological and environmental reasons against using import stock but introducing honey bee disease in particular the mite *varroa jacobsonii*.

2.2.8. Queen Rearing

The Queen in a honeybee colony is the fully competent sexual female present and under normal conditions is the mother of all other individuals in the colony.

The relationship that exists between a queen and her colony is so close that the success or failure during honey production depends upon the quality of the queen. If all other colony management practices are of the highest quality, the honey crop produced is entirely a matter of queen quality since the worker bees that produce this crop are complete daughters of the queen. The force of the a colony of honeybees is dependent upon the quality of the queen.

To satisfy the demand and to increase the declining number of honeybee population it is very important to rear queen honeybees by different techniques of queen rearing.

Queen rearing: - is a process of producing virgin queen in a colony of honeybee.

A queen that is not mated is called virgin queen.

1. Importance of queen rearing

- For requeening the existing queen. Actual life span of queen is 5 years.
- ❖ Commercial life span of queen is 2 yrs
- ❖ To improve the genetic qualities of the bees
- ❖ To have extra queens so that colony number will be increased
- ❖ To replace for sudden loss as emergency

Types of queen rearing

There are two types of queen rearing

1. Natural
2. Artificial

1. Natural queen rearing

In this case honeybees themselves rear queens under natural condition in one of the following three conditions.

When a colony lost its queen as emergency

When it is preparing for swarm, reproductive swarming

When an old queen is failing to lay egg, supersede 34



◆ Natural conditions

Swarming Supersedure Emergency

- ☐ Occurrence active periods mostly active time any time
 - ☐ No of Q.C.C many few a few
 - ☐ Position of Q.C at bottom on the surface on the surface
- to be constructed edges of combs of the combs of the combs

Key: - **No Q.C.C = Number of queen cell constructed**

Q.C = Queen cell

2. Artificial method of queen rearing: -

As a process of stimulating a circumstance/condition under which queen is reared.

The artificial way of queen rearing is categorized into two basic methods.

1. Simple methods of queen rearing

This enables us to rear a few number of queens.

2. Commercial method of queen rearing: - is used for commercial purpose (high level) of rearing and rear as many queens as required.

Factors to be considered in artificial queen rearing

One has to follow series procedures of breeding programmes

A. The breeder colonies should have the following good traits

B. Queen rearing season should be active so that there will be enough supply of pollen and nectar

C. There should be adult drones that are ready for mating; but if there is an AI service, the presence of an adult drone is not vital

D. An appropriate working site

E. It has to be away from public areas Skill of different methods of queen rearing

A. F. Queen rearing room and equipment should be available

Here the type of equipment required depends on the methods or techniques of rearing which is going to be used

- ✿ Good brood pattern (solid and compact; concentric circle of brood comb)
- ✿ Disease and pest resistant
- ✿ High honey production
- ✿ Good temperament
- ✿ Pollen gathering ability
- ✿ Propolis collection shouldn't be too low or too high
- ✿ Early/pre-flow build up of the colony
- ✿ Less tendency of swarming
- ✿ No absconding tendency
- ✿ No robbing tendency
- ✿ Wintering ability
- ✿ Adaptation to all weather conditions
- ✿ Hours of flight i.e., foraging time should be longer
- ✿ Clustering and fanning ability
- ✿ Hive defense



The commercial method of queen rearing requires more of sophisticated equipment than that of simple methods of queen rearing

Materials /equipment required for queen rearing

- ☐ Box hive
- ☐ Queen catcher
- ☐ Queen cages
- ☐ Knife
- ☐ Frame of nursery cage
- ☐ Feeder frame
- ☐ Nuclei box
- ☐ Cell bar
- ☐ Beeswax
- ☐ Cell cups (wooden or plastic)
- ☐ Dipping sticks
- ☐ Grafting needle
- ☐ Straight grafting needle
- ☐ Automatic grafting needle
- ☐ Grafting shade
- ☐ Magnifying glass
- ☐ Cold light
- ☐ All working tools of beekeeper

Simple methods of queen rearing

1. Splitting method

This involves the division or splitting of strong colony into two or more divisions.

The queen right part should be moved 1km distance or there should barrier between the splits. As long as eggs and larvae are present in queenless colonies, honeybees can rear their own queen

Advantages &Disadvantages of splitting method

Advantages Disadvantages

*This technique is simple so that any * sometimes it may fail
beekeeper can rear queens * only a few queens can
queens using this method be reared by this method

*There is no risk of losing
mother colony

* It is good technique of
controlling swarming

2. Over crowding method

This method involves forcing of a colony to become over populated so that the colony will be stimulated to construct queen cells to undergo reproduction swarming.

This overcrowding situation is implemented or done by two methods. 36

Beekeeping level-II	Version:01	Page No.19
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Merely by not adding supers

By reducing the supers

Advantages & Disadvantages overcrowding method

Advantages Disadvantages

* Superior quality of * If there is no regular follow up

Queens can be reared of the colony, it will swarm

3. The Miller method

This method was developed by medical physician doctor C.C miller

This method involves the providing of trimmed comb (a comb which bottom portion is cut in a zigzag fashion to a queen less colony.

Here the comb which is going to be trimmed should have young worker larvae in worker cells that can be developed into queens

Commercial method of queen rearing

Grafting method

This method involves the transferring of young larvae from a brood comb into artificial queen rearing cups.

Unlike simple methods of queen rearing, grafting method requires the use of sophisticated equipments like: -

1. Grafting needle: - Used to transfer larvae from brood comb into queen rearing cups
2. Queen rearing cups: - Used to hold grafted larvae. It could be plastic or a wooden base with beeswax cup
3. Dipping sticks: - Used to make cell cups.
Dip the sticks into molten beeswax, then put in the cold water.
4. Cell bar and frames: - Used to hold cell cups.
5. Nuclei box: - This is a five frames box used to keep newly reared queen with a few number of worker honeybees until it will be transferred to the normal hive.
6. Magnifying glass: - Used to see the larvae to be transferred clearly.
7. Cold light: - This is used as light source during grafting of larvae.
8. Grafting room: - Grafting room should be suitable and conducive; it should have a temperature of 75oF and humidity of 50%.

Artificial insemination

Today artificial insemination is well developed to inseminate the honeybee queen with an appropriate dosage of sperm.

Advantages of artificial insemination are: -

- ☐ For appropriate dosage
- ☐ For control breeding
- ☐ To reduce the risk of losing queens due to:
 - ☐ Predators
 - ☐ Missing their nest
 - ☐ To avoid failing of mating due to bad weather



2.2.8. Honeybee Enemies [Pests and Predators of Honeybees]

1. Ants

Control of Ants

- ◆ Keeping apiaries clean, i. e, free of debris
- ◆ Controlling overgrowths of grasses
- ◆ Keeping the ground dry under hive stands.
- ◆ Destroying ant nests.

2. Wax moth

- ◆ Eat & destroy the bees' wax
- ◆ Habituate in the hive of honeybees.
- ◆ It produces a great damage on combs.
- ◆ The larvae of this wax moth form a silken feeding funnel & create a mass of webbing on comb cells

3. Control measures

Strengthening the colony.

Proper seasonal management

Biological control

1. Chemical

2. Non-chemical treatment

- a) Heat treatment- exposing combs to high temperature 720c
- b) Cold treatment (freezing)- exposing combs to very low temperature (170c).

For rural beekeepers, withdrawing & melting the infested comb & making new foundation sheet is the best solution

Death's Head Hawks Moth

Control

- ☐ By understanding its time of attack
- ☐ Putting a piece of queen excluder can keep the pest outside the bees' hive.

Beetles

Large hive Beetle *Oplostomus fuliginous*

- ☐ Large & black beetle
- ☐ Do much damage to combs & comb contents
- ☐ Feeds honey

Control

Reducing the hive entrance to 9mm,

Or placing a metal screen over the hive entrance

Wax/Small hive beetle (*Aethina tumida*)

- ☐ Is only 7mm long
- ☐ Larvae pupate in the soil

Beekeeping level-II	Version:01	Page No.21
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- ☐ Females lay eggs in any combs
- ☐ Pollen combs are reduced to dust



2.8.9. Predators

1. BIRDS

- ☀ Prey upon many insects [honeybees]
- ☀ Serious when they attack apiary in flocks
- ☀ Honey badger ['Hama, or hamagota, or Hamakosi, or Shelemmetmat]

2. Control methods

- ☀ Different types of controlling means are practiced.
- ☀ Making strong fence (made of stone, barbed wire ... etc)
- ☀ attending to kill the animal and the like

3. Wasps

Control

As the pest itself & organisms on which it prey is not well studied. An effective control measure of this pest is unknown.

4. Lizards

- These are Amphibians (Reptiles), which predate & eat on honeybees
- They live in cracks of buildings & houses
- Catch the bees, weaken the colony.

5. Toads

Control

Place the colony on hive stands about nee height

Regular supervision & killing the toads

6. Prey-mantis

Control

Because of its feeds outside the hive, no control methods were developed

7. Spiders (Arachnidae)

Control

Continuous supervision of apiaries & regularly cleaning the places where the spiders' web are constructed

Killing & destroying the whole rests of the spiders.

8. Bee Lice (*Braula Coeca*) ['Yenib mesuger]

Control

Identifying bee colonies suffering from bee lice, blowing tobacco smoke briefly through the hive entrance.

By the gentle smoke of tobacco, the lice will fall down from the bees



Self-Check -2

Written Test

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

1. Which one of the following are supplementary or emergency feeding is required (3 points)
 - A. colonies caged for intensive pollination
 - B. colonies under other manipulation
 - C. Like royal jelly production artificial queen rearing
 - D. All
2. _____ As soon as flowering is commence the queen start lay eggs up to 1500-2000 a days during flowering period. ? (4 points)
 - A. True
 - B. False

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____
2. _____



Information Sheet-3

Conducting Occupational Healthy Safety (OHS) according to work

1. Definition of Terms

OHS: - as a multidisciplinary activity aiming at Protection and promotion of the health of workers by eliminating occupational factors and conditions hazardous to health and safety at work

Toxicology: is the science that studies poison and toxic substances and their mechanisms and effects on living

Toxicologists: are persons who study poisoning and responsible defining quantitatively the level of exposure at which harm occurs organisms.

3.1. Conducting Occupational Healthy Safety (OHS) according to work

THE Occupational health and safety is one of the most important aspects of human concern. It aims an adaptation of working environment to workers for the promotion and maintenance of the highest degree of physical, mental and social well being of workers in all occupations.

The question of occupational health and safety, as a global issue, is now taking a new turn. The main contributory factors towards this idiosyncrasy seem to be due to the rapid industrial and **agricultural development** that are taking place in the developing countries, and the emergence of new products and product processes from these places.

Many of these countries are moving from manual labour to service mechanization in the main productive sectors, such as manufacturing, mining and agriculture, hence the potential occupational health ramifications should be anticipated. Also the insatiable desire of these countries for technical advancement has brought about the importation of sophisticated machinery and pieces of equipment not only into the industrial production sector, but also to services and commerce.

Making working conditions healthy and safe is in the interest of **workers, employers** and **governments**, as well as the public at large.

Although it seems simple and obvious, this idea has not yet gained meaningful universal recognition. Hundreds of millions of people throughout the world are employed today in conditions that breed ill health and/or are unsafe. **According to WHO (1995)**, occupational safety and health can be defined as a multidisciplinary activity aiming at:

- Protection and promotion of the health of workers by eliminating occupational factors and conditions hazardous to health and safety at work



- Enhancement of physical, mental and social well-being of workers and support for the development and maintenance of their working capacity, as well as professional and social development at work
- Development and promotion of sustainable work environments and work organizations The ILO/WHO definition of occupational health is “The promotion and maintenance of the highest degree of physical, mental social well- being of workers in all occupation” and the WHO considers occupational health service to be responsible for the total of worker and, if possible, his or her family.

Occupational Health is a diverse science applied by occupational health professionals engineers, environmental health practitioners, **chemists, toxicologists, doctors, nurses**, safety professionals and others who have an interest in the protection of the health of workers in the workplace. According to a statement by occupational health institutes collaborating with the WHO (1995)

3.1.1. the most important challenges for occupational health for the future will be: •

Occupational health problems linked to new information technologies and automation

- ✿ New chemical substances and physical energies;
- ✿ Health hazards associated with new biotechnologies;
- ✿ Transfer of hazardous technologies;
- ✿ Aging working populations;
- ✿ Occupational Health and Safety
- ✿ special problems of vulnerable and underserved groups (e.g. **chronically ill and handicapped, bites of insect**),
- ✿ including **migrants** and the **unemployed**; and,
- ✿ problems related to growing mobility of worker populations and occurrence of new
- ✿ Occupational diseases of various origins.

Definition of Terms According to WHO (1995), occupational safety and health can be defined as a multidisciplinary activity aiming at:

- Protection and promotion of the health of workers by eliminating occupational factors and conditions hazardous to health and safety at work
- Enhancement of physical, mental and social well-being of workers and support for the development and maintenance of their working capacity, as well as professional and social development at work
- Development and promotion of sustainable work environments and work organizations The ILO/WHO definition of occupational health is “The promotion and maintenance of the highest degree of physical, mental social well- being of workers in all occupation” considers occupational health service to be responsible for the total of worker and, if possible, his or her family.



Occupational Health is a diverse science applied by occupational health professional's engineers, environmental health practitioners, chemists, toxicologists, doctors, nurses, safety professionals and others who have an interest in the protection of the health of workers in the workplace.

3.1.2. The discipline covers the following key components:

1. the availability of occupational health and safety regulations at workplace
2. the availability of active and functional occupational health and safety committee at workplace
3. monitoring and control of factory hazards to health
4. supervision and monitoring of hygiene and sanitary facilities for health and welfare of the workers
5. inspection of health safety of protective devices
6. pre-employment, periodical and special health examination.
7. performance of adaptation of work to man
8. provision of First Aid
9. health education and safety training to the worker
10. Advice to employers on the above mentioned items
11. Reporting of occupational deaths, diseases, injuries, disabilities ,hazards and their related preventive measures at working According to a statement by occupational health institutes collaborating with the WHO (1995)

3.1.3. Most important challenges for occupational health for the future will be: •

- Occupational health problems linked to new information technologies and automation;
- new chemical substances and physical energies;
- health hazards associated with new biotechnologies;
- transfer of hazardous technologies;
- aging working populations; Occupational Health and Safety
- special problems of vulnerable and underserved groups (e.g. chronically ill and handicapped), including migrants and the unemployed; and problems related to growing mobility of worker populations and occurrence of new occupational diseases of various origins.

Interdisciplinary Relationships Environmental Managers:

are those trying to eliminate hazards from the workplace cause many environmental problems. **Toxicology:** is the science that studies poison and toxic substances and their mechanisms and effects on living organisms.

In other words toxicology is the study of adverse effects of chemical on biologic systems, or when a substance has a capacity to produce undesirable physiological effect when the chemical reached a sufficient concentration at a specific site in the body.

Toxicologists: are persons who study poisoning and responsible defining quantitatively the level of exposure at which harm occurs and they also prescribe precautionary measures and exposure limitations so that normal recommended use of chemical substance does not result in excessive exposure and subsequent harm Ergonomics: is a multidisciplinary activity dealing with the interaction between man and his total working environment plus

3.2.4. Occupational Health and Safety 7 Chemical engineers.

Beekeeping level-II	Version:01	Page
	Copyright Info/Author: Ethiopia Federal TVET Agency	No.27



- ◆ **Mechanical engineers** are those who responsible for choosing materials handling systems or for specifying noise levels on machinery.
- ◆ **Environmental health professionals:** are those who apply their knowledge and experience, understand the environmental health hazards, analyze the technical and social approaches and reduce and eliminate human exposures and health impacts.
- ◆ **Industrial hygienists** are scientists, engineers, and public health professionals committed to protecting the health people in the workplace and the community

Occupational health and development The health status of the workforce in every country has an immediate and direct impact on national and world economies. Total economic losses due to occupational illnesses and injuries are enormous (WHO 1999). The International Labor Organization (ILO) has estimated that in 1997, the overall economic losses resulting from work-related diseases and injuries were approximately 4-5 % of the world's Gross National Product. Workforce is a backbone of a country development. A healthy, welltrained and motivated workforce, increases productivity and generates wealth that is necessary for the good health of the community at large.

Self-Check -3	Written Test
----------------------	---------------------

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

1. **Toxicologists:** are persons who study poisoning and responsible defining quantitatively the level of exposure at which harm occurs organisms **(3 points)**
 - A. True
 - B. False
2. _____ Are multidisciplinary activity aiming at Protection and promotion of the health of workers by eliminating occupational factor ? (2 points)
 - C. Toxicologists
 - D. Toxicology:
 - E. Occupational health and safety
 - F. Environmental health professionals

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____
Rating: _____

Beekeeping level-II	Version:01	Page No.28
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Name: _____

Date: _____

Short Answer Questions

1. _____
2. _____

Operation Sheet - 1	Techniques of inserting Queen excluder
------------------------	--

Techniques for method of inserting queen excluder of bee directing management procedure

Step 1- force the bees including the queen to the base box,

Step 2- Take out each frame one by one while brushing or shaking away the bees to the box.

Step 3- checks the supper is free from combs and bees, remove the super and check frames with honey & nectar or sealed brood from the base and replace with combs with young brood or pollen from the top box.

Step 4- Put the Q.E. on top of the base hive & place the super and put combs with honey, nectar

Step 5- M sealed brood above Q.E



LAP Test	Practical Demonstration
----------	-------------------------

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 how include the queen to the base box

Task 2: discuss ways of the frame take out during brushing or shaking.

Task 3: identify the process of checking the super with honey and nectar

Task 4. identify how the queen excluder put on the base of the hive

Task 5. Discuss the m sealed brood above the queen excluder



List of Reference Materials

1. <http://www.dave-cushman.net/bee/uniteshake.html> 2019 09

David A. Cushman

2. European Union's Horizon 2020 research and innovation programmed

3. under Grant Agreement N° 780755

-
- Journals/publications/magazines
- Reference Book
- Job specifications
- Advanced beekeeping Manual and Guide
- Learning Guide #1

Tolera Kumsa, Dereje Woltedji and Kibebew Wakjira (2012). Determining the efficiency of different beehives In Gemechis Legesse, Kibebew Wakjira, Amssalu Bezabeh, Desalegn Begna and Admassu Addi (eds). Apiculture research achievements in Ethiopia, Oromia Agricultural Research Institute, Holeta Bee Research Center, 2012, Holeta, Ethiopia.

Workineh Abebe (2007). Determinants of adoption of improved box hive in Atsbi Wemberta district of eastern zone, Tigray region, Haramaya Univesity.



Learning Guide-10

Unit of Competence: Assist in Managing of Bee Colonies

Module Title: Assisting in Managing of Bee Colon

LG Code: AGR BKG2 10 0919LO2-LG-10 TTLM

Code: AGR BKG2 10 TTLM 0219v

Beekeeping level-II	Version:01	Page No.32
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LO2.Manage colony

Instruction Sheet-2	Learning Guide #02
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Inspecting External and Internal part of hive
- Uniting different bee colony
- Applying seasonal colony management

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:

- Inspect the external and Internal part of hive
- Unit different bee colony
- Apply seasonal colony management

Learning Instructions:

21. Read the specific objectives of this Learning **Guide-10**
22. Follow the instructions described in number 2” in page **30**
23. 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.
24. Accomplish the “Self-check 1” in page **40**.
25. 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). ” in page **47**.
26. 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.
27. Submit your accomplished Self-check. This will form part of your training portfolio.
28. 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.
29. Accomplish the “Self-check **3**,” in page **51**



30. 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).
31. 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.
32. Accomplish the “Self-check -3in page 51
33. 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).
34. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” in page 12. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
35. Read the “Operation Sheet 1” and try to understand the procedures discussed.
36. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” in page 26. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
37. Read the “Operation Sheet X” and try to understand the procedures discussed.
38. If you earned a satisfactory evaluation proceed to “Operation Sheet 1 in page 26 however, if you’re rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
39. Read the “Operation Sheet 1” in page 53. And try to understand the procedures discussed.
40. Do the “LAP test” in page 53 (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	Inspecting External and internal parts of hive
----------------------------	---

Definition terms

- 1. Internal part of hive** Inside cover is a four-sided box of rectangular cross-section without a top and bottom with water proof plywood separator
- 2. Internal part of hive** The dimension of the inner cover consists of plywood dimension to perfectly fit with wooden Rims dimensions

2.1. Inspect External and internal parts of hive

- 1.** Inspect your beehive on a regular basis—but not too often. For beginners, every seven to 10 days during spring and summer is a good range. Inspecting more than weekly will make your bees unhappy. Every inspection disrupts their hive activity and sets them back a day.

To get ready for an inspection, don your bee suit or jacket and veil. Gather your smoker and hive tool. If you will be refilling feeders during the inspection, have them ready to refill. Light the smoker and wait for it to pump out nice, cool smoke for the bees.

- 2.** Smoke in front of the hive, by the entrance, to confuse the guard bees. Lift the outer cover slightly and direct a few puffs of smoke underneath it. Let the cover back down gently and wait for one to two minutes for the smoke to take effect.

People often say smoke "calms" the bees, but what it really does is give them the signal that there is a fire nearby, which makes them gorge on honey. When they're gorging on honey, they're not worrying about the big, white-suited animal that is messing with them. When you see their little heads line up at the top bars, looking at you, it's time for more smoke.

- 3.** Remove the outer cover and carefully set it on the ground upside down. Direct some smoke into the hole in the inner cover, if you have one. Wait a minute or two for the bees to get the message.

Beekeeping level-II	Version:01	Page No.35
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4. Remove the inner cover Use your hive tool to gently pry up the inner cover and remove it. If there is wax or propolis on the inner cover, use your hive tool to scrape it off. Set the inner cover on top of the outer cover on the ground, being careful not to smash any bees.
5. Remove the Pry up the honey super (if your hive has one) using your hive tool. Lift off the super and set it on top of the inner cover.

6. Smoke the Deep Hive Box



2.1.1 Internal part of hive

Inner/inside cover :- Inside cover is a four-sided box of rectangular cross-section without a top and bottom with water proof plywood separator screen at the middle with a passage hole for the bees to visit Upper part of the inner cover.

The inner cover will serve as a feeder to supply bees with sugar Syrup or pollen patty during dearth period and also for various beekeeping activities. The size of the passage hole can be with a dimension of 50 mm x 80, but can be of different size.

2.1.2. External part of bee hive colony

Inner cover/lid

The dimension of the inner cover consists of plywood dimension to perfectly fit with wooden Rims dimensions, similar to the outer hive chambers (Figure 5). For Lang troth hive, the wooden

rim consists of two pieces of dimensions 505 mm long, 40 mm high and 20 mm wide and two

Pieces of dimensions 365 mm long, 40 mm high and 20 mm wide. Then by using table saw make

a 10 mm deep by 5 mm wide groove at 10 mm distance from the edge of 40 mm high wood Pieces.

The grooves are just to slide the 5 mm thick plywood into that groove.

This gives wooden rims on one side (inside) is 10 mm thick which equals the bee space. The 25 mm high wooden rim on the outside shall be to provide sufficient room for pollen patty or sugar syrup feeding to bees

on the top surface. At the center of the inner covers a rectangular space of about 50 mm x 80 mm is cut and a tight ledge of 15 mm high and 30 mm wide erected to facilitate provision of

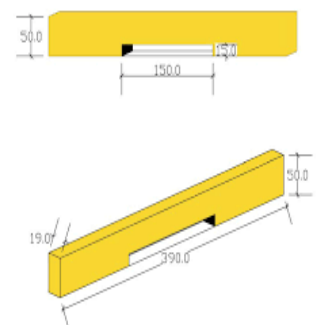
Beekeeping level-II	Version:01	Page No.36
	Copyright Info/Author: Ethiopia Federal TVET Agency	



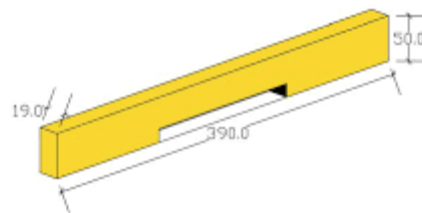
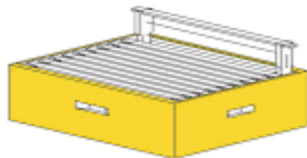
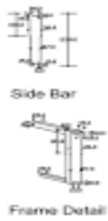
feeds. This open space allows bees' access to the space between the inner cover and the hive lid during feeding.

2.1.3. Tools and Materials required for hive construction

- ✱ Thicknesses machine for adjusting thinness and surface smoothing.
- ✱ Circular saw for cutting wood.
- ✱ Jointer machine for smoothing edges and creating side bar shoulders.
- ✱ Measuring tape.
- ✱ Digital caliper.
- ✱ Framing square or drywall.,
- ✱ T-square.
- ✱ Table saw.
- ✱ Saber saw (sword with a slightly curved blade that is sharp on one edge),
- ✱ Putty knife or chisel,
- ✱ Hammer, Clamps,
- ✱ bits
- ✱ Jigsaw
- ✱ Chop saw
- ✱ Sanding block
- ✱ Carpenter's square (or a frame jig)
- ✱ Carbide-tip blade
- ✱ Materials
- ✱ Waterproof wood glue.
- ✱ 19 mm thick Waterproof plywood.
- ✱ 5 mm thick Waterproof plywood.
- ✱ 5 and 8 cm galvanized nails
- ✱ cm hardened trim nails (small nails)
- ✱ Cigar box nails (16 mm shoe nail)
- ✱ Timber for frames
- ✱ Timber for entrance block/reducer



- ✱ Lumber of thickness 20 mm after finished Power Drill-drill with



2.1.4. Assembling a /put together beehive

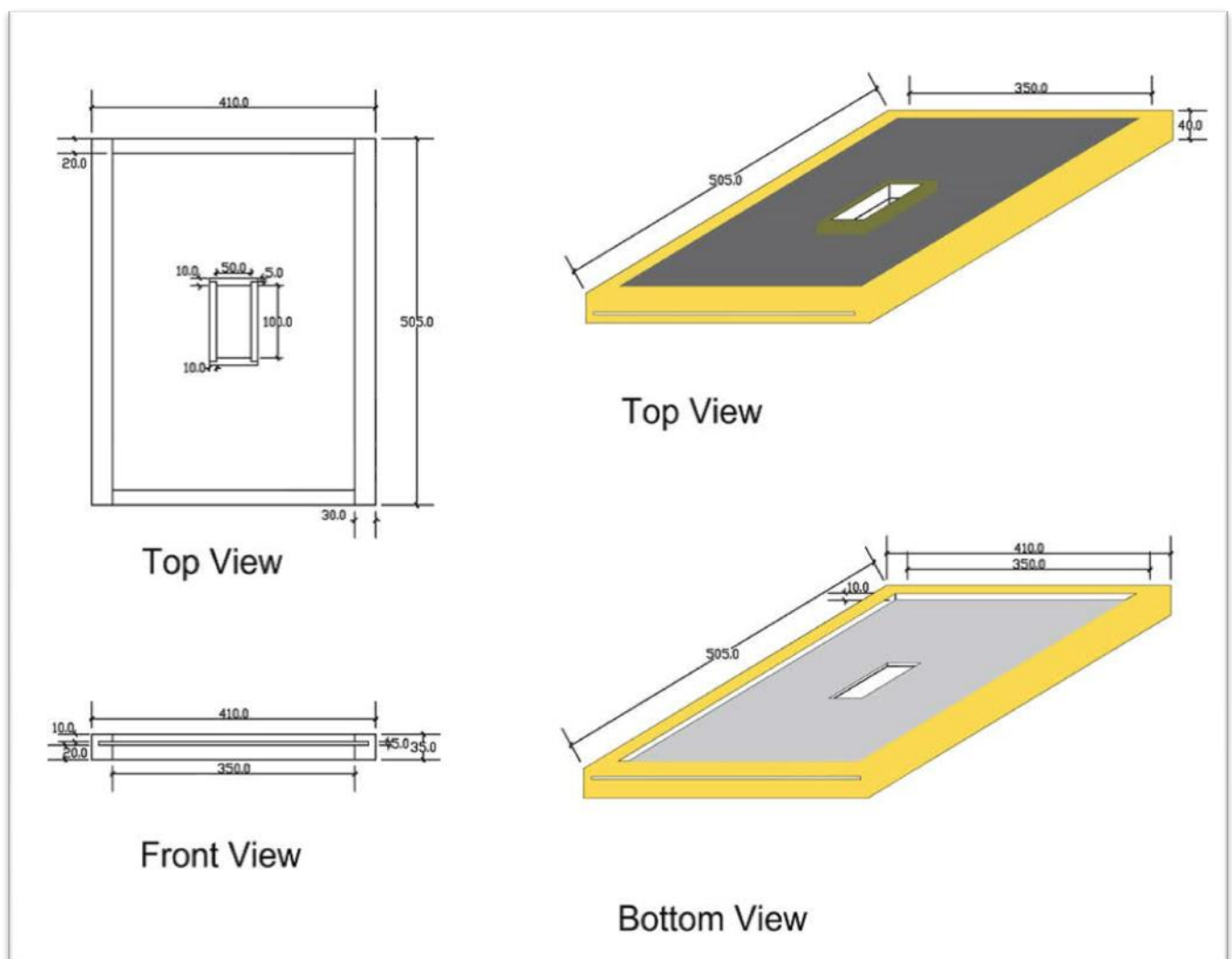
The most important parts of Lang troth and Dad ant beehive are:

- 1) A loose bottom board



- 2) A bottomless brood chamber, in front of which is entrance block with the entrance passage
- For the bees;
- 3) the brood chamber holds 10 frames, which are kept separated at the right
- 4) Distance by means of side bars
- 5) Above the brood chamber is a queen excluder (not absolutely necessary), placed horizontally
- 6) on top of the brood chamber
- 7) Based on the population of the colony are one or more honey supers with 10 frames are
- 8) placed on top of the brood chamber or on the queen excluder
- 9) On top of the honey chambers is placed an inner cover of 5 mm thick
- 10) The total hive system is then covered by an outer cover made of wood, covered with zinc or
- 11) Aluminum sheet. This outer cover should fit easily over the honey super or brood chamber.

Figure 6. A complete assembled beehive looks like the following sketch



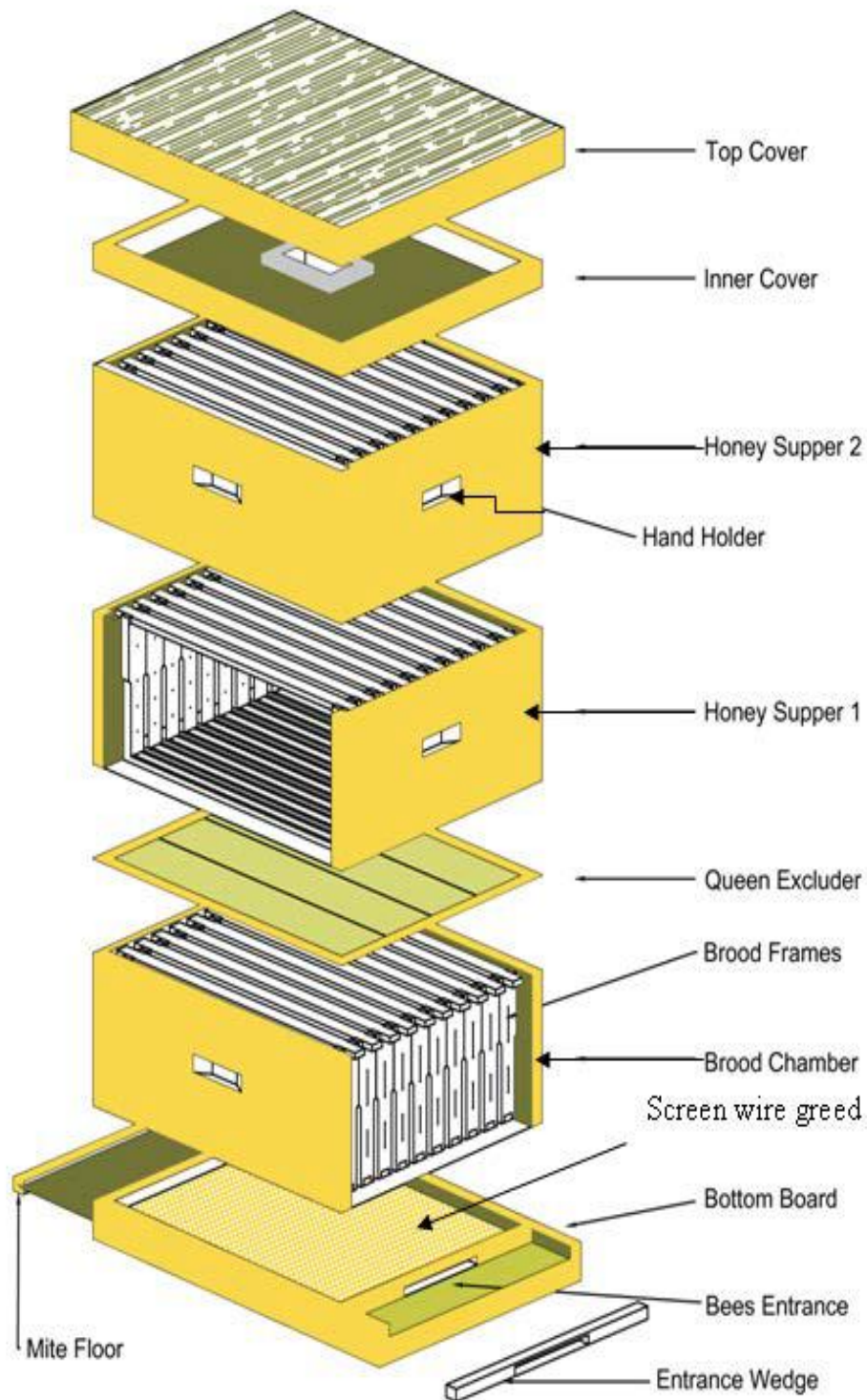


Figure 6 A complete assembled beehive sketches

If the required materials are fulfilled, its fabrication is simple. Construction of the beehive begins

With the supers, the stackable boxes that held frames. During building them, it is very important

To check the dimensions against the size of the frames intended to use



2.1.5. SMOOTHING AND CUTTING LUMBER

All the wood for hive shall be well smoothened and all thickness must be prepared precisely.

A

Small deviation from the required measurement may affect the balance between the Requirements of the colony of honeybees and the ease and convenience for the work of Beekeepers.

Sand both flat sides to make fine smooth. After all the required smoothening and Thickness achieved, cut the lumbers into the required pieces as indicated in table 3 to make outer

cover, inner cover, chamber bodies and bottom board by using table saw. From each of

The remaining wood timber, discard scrap or save for later uses.

Assembling and wiring frames

Frames and frame parts require precision to ensure proper services. Required frame dimensions

are indicated in table 4. Top and bottom bars and side bars thickness and dimensions shall be as

described for standard use. It is important to dado (make groove) 5 mm deep centered on bottom side of top bar frames to facilitate fixing of wax foundation, which otherwise warp if not

inserted into this groove.



Self-Check -4

Written Test

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

3. _____ which one of the following are tools and materials required for hive construction

(3 points)

E. Measuring tape.

F. Circular saw for cutting wood.

G. 19 mm thick Waterproof plywood

H. All

2. _____ cover is a four-sided box of rectangular cross-section without a top and bottom with water proof plywood

C. Bee hive

D. Internal part of hive

E. External part of hive

F. Honey extractor

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____



Information Sheet-2 Unite Different bee colonies

3.1. Unite Different bee colonies

The correct term that has been used for a long time that everyone knows and understands is "Uniting", not "combining", "merging", "amalgamating", "joining" or any of the other terms that have crept into beekeeping in recent years. I think these have come from inexperienced people who have tried to teach or write books before they have the knowledge to do so, or are aware of the correct terminology.

This page provides a focus for methods and equipment that can be used to unite colonies, nuclei or a single frame of bees.

The method of uniting different colony is the following seven harrichies listed below:-

1. Uniting a super of homey and bees
2. Uniting using flour
3. Effect of exposure flour to light
4. Peppermint sprays uniting
5. News paper bag method
6. Uniting a nuc to a hive
7. Uniting by shaking

There are many different circumstances when it is advisable to unite groups of bees, such as:-

- To reduce colony numbers, where manipulations have resulted in extra colonies or the beekeeper is downsizing.
- Make a colony from two or more that is strong enough to have a chance of wintering that wouldn't survive on their own.
- Because of a shortage of queens at the end of the season, such as queen rearing nukes, where there may have been failed mating.
- A colony has been queen less, had a drone layer or laying workers.
- A colony has been artificially swarmed (or similar operation) and the two resulting colonies are brought back together.
- To re-queen a colony.

There are many other reasons, but whatever it is, here are some simple rules that you may find helpful:-

Beekeeping level-II	Version:01	Page No.44
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- If put together immediately on combs, bees from two colonies will probably fight, three or more usually won't.
- If there is no physical barrier, e.g. newspaper, bees from one colony may kill a queen from another, unless she is caged.
- Disorientation, confusion and a common smell will often make direct introduction possible.
- Make sure none of the colonies are diseased, especially **foul brood**.
- The resulting colony, if united in the autumn, should be strong enough to overwinter. If not, then add frames of sealed brood at intervals from other colonies until it is strong enough.
- Two or more swarms can be united by dumping them on a board in front of a hive together.
- A swarm can be used to bolster another colony, but it is preferable to remove the queen in the colony a couple of hours before, or to cage her if you want to retain her and kill the queen in the swarm

1. Uniting a super of homey and bees

There are some occasions, when a colony is underdeveloped, that insufficient stores are available to cope with the "**June Gap**". When these conditions prevail we may think of uniting extra bees to improve the honey gathering potential.

However we may not have a '**spare**' **Nucleus** or swarm to hand. It is at times like these that the method described below may be used.

It utilizes a super from another colony and provides a reasonable quantity of bees plus whatever honey has so far been stored in this super.

The equipment used is simple and easily constructed or adapted from an existing **cover board (inner cover)**. Most cover boards are furnished with two apertures that are intended for the fitting of **porter bee escapes**, (**The page "[Porter Escape Holes](#)"** gives details of these). We need to blank off one of these holes (**the one that is not on the centre line**). The other hole is covered by a plate with a **single 8 mm hole in its centre**), ".

The method is simplicity itself and can be performed two different ways depending upon the distance between the two hives concerned.

If the hives are side by side or otherwise close together then proceed as follows:-

- ✿ Remove the roofs from both colonies and stack them out of the way.
- ✿ Smoke the colony that is to become the recipient of the bees and honey.
- ✿ Remove the cover board from it and shake or brush all bees onto the top bars.
- ✿ Immediately put the prepared single hole board in its place, using as little smoke as possible.
- ✿ Take the super and cover board, as one unit, from the other hive and place on top of the single hole board.
- ✿ Quickly put the 'spare' cover board on the open donor colony. Replace both roofs.
- ✿ If the hives are situated some distance apart within the apiary:-
- ✿ Place an additional cover board near the colony that the super will be taken from.
- ✿ Remove the roofs from both colonies.

Beekeeping level-II	Version:01	Page No.45
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- Place the roofs upside down on the ground next to the colonies, in a convenient position to act as temporary resting places for the super being transferred.
- Place the single hole board diagonally on top of the upturned roof of the donor colony.
- Lift the super, with its own cover board, from the hive onto the single hole board (the bees are effectively, but not totally captive).
- Put the spare cover board on the open colony.
- Pick up the super and single hole board as one unit and carry to the other hive.
- Place diagonally on the upturned roof.
- Smoke the recipient colony through the hole in the cover board.
- Remove this cover board, shake the bees into the hive and quickly place the super and single hole board in its place.
- Replace both roofs and clear away the cover board that is now spare.

Finally, whichever method was used, wait a few days then remove the single Hole board.

How and Why it works:-?

An 8 mm hole is too small for two bees to go through at the same time. (Or if they can it is a scramble).

The bees in the super soon realize that they are enclosed and try to escape, this causes a buildup of bees on the top side of the hole plate.

Meanwhile the bees in the main box smell the honey, (and bees), in the new super and go to investigate.

This causes another build up of bees, this time on the underside of the hole plate. (A small cluster forms; this is why we chose the central position for the hole, as bees cluster more readily in the centre of a rising stream of warmth).

The two lots of bees can only migrate in either direction one at a time and in struggling to pass each other at the 8 mm hole their scents are rapidly combined or blended or masked (whatever the actual mechanism is). The cluster provides further resistance to travel and further scent combination.

No bees rush out of the hive entrance when this method is used. (They are too busy at the congested hole site). No dead bees have been seen thrown out of the entrance during or after such a manipulation.

Even though the bees are from a hive within the same apiary none fly back to the parent colony... Though I suspect that a few of the older workers will return to their original home after their first foraging flight

2. Uniting Bees Using a Uniting Board

Acknowledgement is made to **Alistair Reid**, who originated the idea, but the development and design of the particular board described on the [Uniting Board](#) page was performed by myself whilst I was the proprietor of APEX Enterprises.

It is an easy way of utilizing the "newspaper method" of uniting and it is particularly well suited to use in back gardens as the minimum possible disturbance occurs and the bees are exposed for only very brief periods.

Equipment required:-

Uniting Board, Newspaper, Selotape (or similar adhesive tape),
Masking Tape (or Parcel Tape), Pin or other pricking device
(plastic headed corkboard pins are ideal)
Hand held trigger spray bottle full of plain water

Beekeeping level-II	Version:01	Page No.46
	Copyright Info/Author: Ethiopia Federal TVET Agency	



First prepare the board by fixing the newspaper. A little care is needed, as the newspaper tends to stretch, first cut a square piece of newsprint about 300 mm or 1 foot square, then using 4 small pieces of Sellotape (one at each corner) fix the newspaper as tightly as possible to match the red line on the drawing, leave for a few minutes for the paper to stretch. Once the paper has stretched then re-position the Sellotape so as to take up any slack. The masking tape, or parcel tape, can then be applied in 4 x 300 mm lengths keeping as much tension as possible in the paper sheet. Once the paper is fixed fit the drop panel and swivel the retaining toggles so that they are at right angles to the board rim. Turn the assembly over and pierce the newspaper several times at random over the exposed surface.

The method of use is simple and straightforward:-

Prior to the day of uniting, the colonies must be brought close together by moving them 1 meter or less per day.

✿ Advantages...

- A quick and simple well organized method.
- Very "neighbor friendly".
- Can be performed even in the dark.

✿ Disadvantages...

- Requires an extra bit of kit to be made and stored when not in use.

NOTES...

By trapping the queen less bees at the crucial time of uniting, the guard bees of the queen right stock are not alerted

3. Uniting A Nucleus Of Bees To Another Hive

A manipulation in honey bee management that can be used to combine two honey bee colonies of unequal strength, sometimes performed as a method of introducing a new queen to an established stock.

The first method is due to Albert Knight of [BIBBA](#), whose words I have used here.

4. Uniting the nucleus to a full colony

Go to the hive that is to be re-queered during the afternoon while the bees are flying. Find the queen and remove the frame she is on and two other frames. In fact, you take away a three frame nucleus. Have your new queen on the centre comb of her own three frame nucleus and place the nucleus into the hive in space created by the removal of the three frames.

In this way the new queen starts her new life surrounded by her own progeny and does not come into immediate contact with strange bees, she just carries on as though nothing had happened.

Note that this is uniting is done when the bees are flying, so that most of the bees in the brood chamber and in the nucleus are young bees, and such bees can be united without any fuss as they seldom fight.

Alternatively, the new nucleus can be united by the newspaper [uniting method](#).

Always check a colony for queen cells in the weeks following the introduction of a new queen. Often a colony will raise supersedure cells in order to replace their new queen. Remove these queen cells and then continue to check until they stop building such cells.



Often the nuc is in a box that is much smaller than a normal hive, while special boards can be constructed to accommodate the size difference so that the newspaper method can be used, it is often a problem to support the hive roof. Another way is to use an empty brood box, placed directly over the newspaper that has been spread on the opened bottom colony, place the frames from the nuc in the centre of this extra box and fill the

There are many ways of uniting bees, the most common is probably the "newspaper method", that is in all the books. This method of shaking is quick, simple and I have never had a failure.

Shaking bees disorientates and confuses them and is probably why it is so successful. It can be carried out at any time of the day, but I wouldn't try it in a nectar dearth, especially for an inexperienced beekeeper, as I think many similar manipulations, such as queen introduction, may be less likely to succeed at such times.

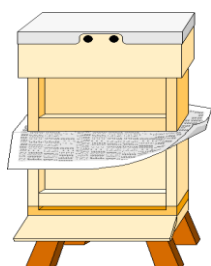
Having taken the usual precaution of checking for disease and inspecting the colonies to be united, so you know what you have, do the following:-

- Bring the colonies close together as in the newspaper method. If you have more than two colonies then put them in a line all facing the same direction with a small gap between. If the colonies originally faced different directions, then gradually rotate them at each step towards their destination. If they are some distance apart so it will take several days to put them together, move them both, so they are adjacent in half the time, then move the resulting colony after uniting.
- Put a sloping board in front of the brood box you want to keep. The longer the board, the better.
- Move the other hive(s) back slightly.
- Smoke all colonies and remove crown boards.
- Remove the queen(s) you don't want, or have another use for.
- Shake a frame of bees onto the bottom of the board. This could be the frame with the queen on.
- Drop the queen on top of the shaken bees if not done in previous step.
- Shake bees from all colonies on top of the queen in turn.
- Place the combs that have been shaken in the brood box, arranged as if it is one colony, i.e. brood in the middle, food on the outside.
- Put crown board on colony and close down.
- Remove all other hive parts to avoid confusing the bees.

The good thing about this method is it can be performed quickly and on the same day.

Roger Patterson

5. Uniting Honey Bees The "newspaper method"





The "newspaper method" is the most common method of uniting two or more boxes of unrelated bees.

One or two sheets of newspaper are placed between the boxes of bees to act as a barrier which will slow down the integration of the two groups of bees. The newspaper is pricked a few times in the area that will be over the centre of the box. This will give the bees a purchase to start the chewing, which will gradually open a passage which bees can pass through.

This chewing takes time and during it, bees from either side of the membrane have an opportunity to lick each other allowing scents to mingle. Very little fighting normally occurs, although on odd occasions fighting results in the deaths of many bees. Luckily such occasions are so rare that I have only seen it once in a thirty year period and I am one that has taken a few chances.

Leave the united bees alone for a week, they will have removed most of the newspaper and it will be seen as scattered fragments in front of the hive entrance.

A queenless or weak colony may be united with another. Put the weaker colony on top of the stronger one. Many texts will tell you to kill the least desirable queen in one of the two groups to be united, but I find it is often prudent to leave both queens, so that the bees can make the choice, in most cases the younger and fitter queen remains, but there may be subtle things in a queen's make up that the bees are better able to make choices about rather than the beekeeper.

There is a variation to this method... If the lower colony already has a honey super on, this can be left in place and the newspaper positioned on top of the super, rather than the brood box.

Yet another variation is to use one or two queen excluders, so that the bees unite, but the queens cannot meet. If the upper box does not contain frames, a swarm may be dumped into it. In either case the queen from the upper box will be found on the upper surface of the topmost queen excluder after most of the bees have gone through the newspaper.

6. Uniting Bees Using A Peppermint Flavored Spray

Uniting honey bees by spraying them with a slightly sticky liquid in order to give them much grooming and cleaning work and at the same time blend or mask any colony odours. *Uniting honey bees with a slightly sticky liquid.*

This is a very similar process to the flour dusting technique, but is the liquid version. *Fox's Glacier Mint*

Among the kit boxes in my van there are several pump action spray bottles (sold for misting plants). One of these bottles contains water which has had a peppermint sweet dissolved in it (Fox's Glacier Mint).

This method can be used to unite a swarm to an existing colony or to unite colonies of unequal size.

If one or more swarms are involved they are sprayed with the slightly sticky liquid at the time of collection.

If uniting a swarm to an established colony I first remove and dispose of the swarm queen using generous misting to keep the bees basically in the swarm box. I open the main colony and remove each frame in turn squirting peppermint water over all bees and comb



faces. When all bees are sticky I throw the now queenless swarm into the brood box with the other lot of bees and rebuild the hive.

If my objective is to unite two lots of bees that are already on frames then I take out one frame from each box alternately and give each side of each frame a generous burst of spray mist and then place in the new brood box.

I have actually achieved several things in this process:-

- I have exposed the bees to light.
- I have made both lots of bees smell the same.
- I have disoriented the bees by interleaving the frames or throwing extra bees into the box.
- I have caused the bees much immediate work to clean each other of the sticky liquid.
- I have given the bees much long term work in re-organizing the usage of their frames and utilizing their extra labor force.

Another uniting technique is quite similar, but uses an aerosol air freshener as the spray...

The product known as 'Glade' is often specified. The two groups of bees being given a burst of spray for a few seconds each, before being physically combined. I am not sure of what possible contamination could occur by the use of the product named.

A manipulation in honey bee management that can be used to combine two honey bee colonies of unequal strength, sometimes performed as a method of introducing a new queen to an established stock.

The first method is due to Albert Knight of [BIBBA](#), whose words I have used here.

7. Uniting the nucleus to a full colony

Go to the hive that is to be re-queened during the afternoon while the bees are flying. Find the queen and remove the frame she is on and two other frames. In fact, you take away a three frame nucleus. Have your new queen on the centre comb of her own three frame nucleus and place the nucleus into the hive in space created by the removal of the three frames.

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Note that this uniting is done when the bees are flying, so that most of the bees in the brood chamber and in the nucleus are young bees, and such bees can be united without any fuss as they seldom fight.

Alternatively, the new nucleus can be united by the newspaper [uniting method](#).

Always check a colony for queen cells in the weeks following the introduction of a new queen. Often a colony will raise super seduce cells in order to replace their new queen.

Remove these queen cells and then continue to check until they stop building such cells.

Often the nuc is in a box that is much smaller than a normal hive, while special boards can be constructed to accommodate the size difference so that the newspaper method can be used, it is often a problem to support the hive roof. Another way is to use an empty brood box, placed directly over the newspaper that has been spread on the opened bottom colony, place the frames from the nuc in the centre of this extra box and fill the spaces with [dummy frames](#), [division boards](#) or special [queen rearing](#) dummies



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:

3. _____ which one of the following are different circumstances when it is advisable to unite groups of bees, (4 points)

- C. to reduce colony numbers,
- D. make a colony from two or more
- E. a colony has been artificially swarmed
- F. environmental health professionals

4. _____ is the most common method of uniting two or more boxes of unrelated bees. (3points)

- G. newspaper method"
- H. uniting the nucleus to a full colony
- I. a peppermint flavoured spray
- J. uniting the nucleus to a full colony

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Beekeeping level-II	Version:01	Page No.51
	Copyright Info/Author: Ethiopia Federal TVET Agency	



1. _____
2. _____

Information Sheet-3

Applying seasonal colony management

The Seasonal applying colony Spring Management

Spring management varies from locality to locality and year to year depending on weather conditions and the available nectar sources in the area. The following sequence of spring management practices might have to be modified slightly for some areas.

1. Early spring (late March to early April)

1. Tilt each hive back and clear the bottom board of dead bees and debris. When finished, replace the entrance reducer.
2. Check for a good egg and brood pattern. This shows the queen is laying well. She should have begun in late February or early March. If the queen is missing or not laying in a good pattern, plan to requeen in April when some nectar is coming into the hive.
3. Check for sufficient stores. The supply should never get below 10 pounds. The bees can exhaust this amount in a week if no nectar is coming in.

2. Mid-Spring (the period of fruit bloom)

1. Requeen the hives according to your plans.
2. Continue to watch for poor queens in other hives, i.e., spotty or sparse egg laying. Requeen immediately if needed.
3. Provide free access to the hive entrance by removing the entrance reducer and rank plant growth in front of the entrance.
4. As the fruit bloom period progresses, brood rearing might move up into the overwintering super. If so, reverse the hive body and super so the super is on the bottom.
5. If full frames of honey and pollen are next to the brood nest blocking its expansion, rearrange the frames in the brood chamber so an empty frame separates the brood from the food stores. As these frames fill with brood, provide more space in a like manner.

3. Late spring (end of fruit bloom to beginning of main nectar flow)

1. Watch for signs of swarming. Prepare empty equipment to hive swarms and increase your numbers of colonies or to provide expansion room.

Beekeeping level-II	Version:01	Page No.52
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2. Just before the main nectar flow, rearrange the hive body and super so that the super is again on top.
3. Begin supering for honey production. See the [section on supering](#) for instructions.

Fall Management

Fall management prepares the hive for winter. The three main requirements are: 1) a large supply of healthy young bees, 2) an abundant supply of food stores, and 3) sufficient protection from cold and disturbances.

A large cluster of bees is needed to produce and conserve enough heat to survive. If the cluster shrinks in size during winter because many bees die of old age or disease, the rest of the colony might also die because of freezing. Honey is the fuel bees use to generate heat, so an abundant supply is needed for winter. Protect the hives from winds or the bees will use up their honey too fast and might not be able to maintain a living temperature.

Fall management practices to help bees meet satisfactory wintering conditions are:

1. Check that the cluster contains five to 12 pounds of bees, or enough to cover five to 12 frames.
2. Unite small colonies with stronger ones. Leave the extra hive body above the hole in the inner cover to keep wax moths from destroying the comb.
3. Feed the colony fumagillin-treated syrup if Nosema disease is in your area. This disease can reduce the cluster size such that it will die of freezing.
4. If the colony does not have a full hive body and shallow super of honey, or about 50 pounds, feed sugar syrup to make up the short- age. Do this in late September and October.
5. Build a windbreak or move the hives to the protection of a hedge, wall, building, or some natural windbreak.
6. Wrapping the hive with insulation is not recommended in Kentucky. Bees winter as well without it.
7. Before the first frost, insert the entrance reducer. An entrance reducer at this time helps to prevent field mice from entering the hive.
8. Treat for varroa and tracheal mites. Use vegetable shortening or menthol treatments for tracheal mites and Apistan strips for varroa mites

Record Keeping

The first style shows the succession of bloom more clearly, while the second style shows the range of dates for which you can expect nectar flow from a particular plant.

Whether you keep bees for profit or as a hobby, keep records to manage your hives efficiently. They allow you to see if your effort is paying off.

One type of record is a diary in a weatherproof container attached to each hive. In the diary, record: date the colony was established, dates of inspection, date it was requeened, honey yield, occurrence of disease if any, and other facts which help you manage a particular hive.

Honey plant blooming records help you schedule management practices.



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:

- _____ Which one of the following are early Spring (late March to early April) (3 points)
 - Tilt each hive back and clear the bottom board of dead bees and debris
 - Colonies under other manipulation.
 - Check for a good egg and brood pattern
 - Check for sufficient stores
- Record is a diary in a weatherproof container attached to each hive, in the diary, date the colony was established, dates of inspection, date? (4 points)
 - True
 - False

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Name: _____

Short Answer Questions

- _____
- _____

Score = _____
Date: _____
Rating: _____

Beekeeping level-II	Version:01	Page No.54
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Operation Sheet -2	Inspecting External and internal parts of hive manage colony
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Techniques for listing information internal and external part of hive management colony

- Step 1-** Inspect your beehive on a regular basis for beginners, every seven to 10 days during spring and summer
- Step 2-** Smoke in front of the hive, by the entrance, Lift the outer cover slightly and direct a few puffs of smoke underneath it
- Step 3-** Remove the outer cover and carefully set it on the ground upside down.
- Step 4-** Remove the inner cover Use your hive tool to gently pry up the inner cover and remove it.
- Step 5-** Remove the Pry up the honey super (if your hive has one) using your hive tool.
- Step 6-** Smoke the Deep Hive Box



LAP Test -2	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 key information about local resources including in government and non-Governmental organizations

Task 2: identify ways of smoking in the front hive and the entrance of the outer.

Task 3: identify the process of removing the outer and inner cover during harvesting

Task 4: .identify ways of removing the inner cover and ways of pry up the inner cover

Task 5: Discuss the how remove the pry up when you are using the hive tools.

Task 6: Define the smoking bee hive box process



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David A. Cushman

4. European Union's Horizon 2020 research and innovation programmed
5. under Grant Agreement N° 780755

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- Journals/publications/magazines
- Reference Book
- Job specifications
- Advanced beekeeping Manual and Guide
- Learning Guide #1

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Beekeeping level-II	Version:01	Page No.57
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