

MODULE 4: APIARY MANAGEMENT

Introduction

An apiary is the location of beehives or bee colonies in hives. Apiary management is the set of routine activities in an apiary depending on weather or seasonal changes and the initial objectives of set up. It is important for a beekeeper to know and use Good Agricultural Practices (GAPs) in his/her apiary for maximum yields and quality products.

Learning Objectives

By the end of the session, participants will be able to:-

1. Identify a good apiary site
2. Demonstrate hive hanging and placing
3. Demonstrate how to attract bees into a new empty hive, catch a wild swarm, transfer bees into a hive, division of an existing colony and unite smaller colonies.
4. Keep clean and hygienic apiary
5. Carry out hive inspection
6. Keep good records

Target Participant

Beekeepers, extension service providers, artisans, individuals and organizations/Institutions

Suggested Number of Participants: Maximum 30

Duration: 3 hours.

Materials

- Flip chart, masking tape, marker pens, notebooks and pens, chalk, chalkboard, notes, protective wear, hive tool set, films, video, generator, projector, apiary and/or their pictures.

Method

- Lectures
- Brainstorming
- Demonstrations
- Group discussions

STEPS

Step 1

Write the title “Apiary management” on the chalkboard or flip chart and introduce it.

Step 2

Engage the participants to brainstorm on the characteristics of good apiary site.

Step 3

Divide the participants into 3 groups and assign them the following tasks:-

- Group 1 Describe hive hanging, hive placing and how to attract bees into a new empty hive
- Group 2 Describe catching a wild swarm, transferring bees into a hive, multiplying an existing colony and uniting smaller colonies
- Group 3 Describe hive inspection and record keeping

Step 4

In plenary, participants present findings, the trainer clarifies, summarizes and gives out the notes.

HAND OUT: APIARY MANAGEMENT

The location of honey bee colonies (beehives) is called an apiary. Beehives are hollow containers that can be closed and are purposely made to house bees, and these include:

- a. Traditional hives with fixed combs e.g. log hives and woven hives.
- b. Top bar hives with movable combs e.g. Kenya Top Bar (KTB) hives.
- c. Modern frame hives with movable combs e.g. Langstroth.

Apiary siting

A good apiary management starts with choosing a good site to hang or place hives. If you choose a poor site people and animals may be stung. If the site is insecure honey and hives can be stolen. The following are recommended practices for a good apiary site:-

- The site must be easy to get to and from in order for you to check the hives regularly.
- An apiary can house up to 20 hives depending on the availability of flowering trees in the area as bees forage up to 3 km from the apiary.
- A high hedge or fence should be put around the apiary to separate the bees from people and animals, as bees can be aggressive. The apiary should be away from human and livestock dwelling areas, roads and public areas.
- It should be safe from strong direct sunshine, be shaded during the hot part of the day but have sun in the morning. Shade must be constructed if none is available at the site.
- It should be safe from strong direct wind and allow good air circulation.
- It must be near a fresh water supply; this can be a river, pond or even a dripping tap.
- It must be near food sources such as trees/nectar bearing crops, and cash crops that need pollination. Putting hives in a bee house/shed, which can be locked to prevent thieves stealing the honey, is one option. But there must be holes in the wall to allow the bees to get enough fresh air in and out of their hives.
- It is better if the apiary is away from areas where children play or any source of continual noise. Noise can disturb the bees and make them defensive.
- The apiary should be on higher ground, away from marsh or land liable to possible flooding. Humid conditions encourage fungal growth and prevent honey maturing and bees from foraging.
- The apiary must not be close to areas where pesticides are used as they may kill the bees and contaminate the honey.
- The bees will also appreciate being away from smoke, fire and unfriendly neighbours.
- There should be good water not contaminated one.
- Should not be near the road.
- Should be near good plantation like coffee plantations.

Remember that once the bees enter the hives it will be more difficult to change things so choosing a good site to begin with is most important!

Hive Hanging

- Hang hives using strong greased galvanized wires to protect the bees from pests.
- Hang hives in or under well-shaded trees.
- Suspend hives from wires so that predators such as the honey badger cannot push them over.

- Remember always when hanging hives that it is important to allow for ease of harvesting. Honey quality is improved by careful harvesting which is easier when the hive is within easy and comfortable reach.
- Use trees or solid poles to hang the hive.
- The hives should be hung at waist height above the ground. This is important in modern beekeeping as the beekeeper wears a bee suit making climbing difficult. Traditional hives are usually hung in trees.

Alternatively a hive can be suspended on a rope with a pulley that can be lowered for harvesting.

Hive Placing

- Place hives on sturdy stands especially hives, which are not strong enough to hang.
- Place hives to allow you to approach the hives from behind.
- Placing hives on stands makes them accessible and easy to harvest and manage.
- Remember the stand should be sturdy and high enough for the hive to be at waist height.
- The legs of the stand must be placed in cans of used engine oil to prevent pests such as ants getting into the hive. Alternatively put bands of grease around the legs and spread ashes around the stand to discourage grass growth.
- The legs of the stand must be fitted with rat guards.

Alternatively hives can be put under a shelter or in a bee house. This can be a simple hut with holes in the walls for bees to get in and out. A bee house is useful because it can be locked to prevent thieves stealing the honey or the hives.

Whichever method is chosen, it is always important to remember

- To avoid long straight rows of hives to reduce drifting and disease transmission.
- To cut the grass short around the hives.
- To remove small stones or debris in the apiary as the beekeeper may stumble over them.
- Positioning the apiary should comply with all conditions of beekeeping.

It often happens that bees do not enter the hive for quite a while. It is disturbing to see that the new hive that you have worked so hard to build stays empty and the empty hive does not produce any honey! There is therefore need to attract bees to the new empty hive.

How to attract bees to the new empty hive

- Keep the hives clean and pest free – no dirt, spiders, cobwebs or insects.
- Place hives along the swarming routes of bees.
- Use bee attractants or baits such as beeswax, propolis and lemon grass (wax the top bars for example).
- Use bait hives and catcher boxes to catch a swarm.
- Transfer bees from a fixed comb hive or from a wild nest.
- Divide an existing colony.
- Buy bees

Catching a wild swarm of bees

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. New queen later hatches out and takes over the old colony and the remaining bees. The beekeeper can capture the swarm and place it into a temporary or permanent hive. The swarm has a better chance of staying into the new hive if it is captured during a nectar flow season.

Transferring bees into the hive

It is possible to transfer bees from a wild nest or from a traditional hive with fixed combs in order to colonise the hive.

How to divide an existing colony

Choose the strong, productive and less defensive colony to make divisions to increase your colonies. You can make a division of an existing healthy colony in order to colonise a new hive. Make division after the honey flow to increase colony numbers. The best time to divide a colony is when the bees are getting ready to swarm.

Avoid making divisions during the honey season because it will reduce the amount of honey to be produced. Between the beginning and the peak of the flowering seasons, strong colonies can suddenly become overcrowded with clusters of bees near the entrance, and large numbers of drones. To check if a colony is getting ready to swarm look for signs that the colony is overcrowded and the queen has run out of cells to lay eggs in. A colony can fill between 9 and 15 brood combs with brood of all stages, including a lot of drone brood and sometimes there is even little surplus honey. Also the bees will be producing queen cells.

Dividing controls swarming and saves the beekeeper from losing the bees or the trouble of catching a swarm. But always choose the most productive and less defensive colony. By dividing it you are spreading its good genetic characteristics. To divide a colony you must: -

- I. Prepare your new hive first – clean and rub it with some beeswax or propolis so that it smells familiar for the bees. Put it next to the overcrowded hive.
- II. Use your smoker and suit and keep your smoker alight nearby in case you need it.
- III. Choose a big healthy colony to divide and check it has brood, eggs, pollen and honey.
- IV. Select a comb with queen cells, remove it from the hive and break all the queen cells except the biggest capped two. You need two just in case one gets damaged.
- V. Now transfer the comb with the 2 queen cells into the new hive.
- VI. Also transfer one or two other combs with a lot of sealed brood and a little unsealed brood. More brood means adult bees will emerge very quickly in the new hive.
- VII. Also transfer one or two combs of food comb with lots of sealed honey and pollen.
- VIII. You can make a division with combs as long as the new colony has female worker eggs of less than three days old and larvae in the combs transferred. From the very young larvae they will be able to make new queen cells within a few days and raise a new queen.
- IX. Include bees on all the combs you transfer and brush or shake in bees from 2 or 3 other combs as well.
- X. Check very thoroughly that you DO NOT have the old queen on the combs you move or brush off. She must remain undisturbed in the old hive or mother colony. If you are in doubt then make

sure you leave eggs and at least leave one big capped queen cell in the old hive in case you have taken her by accident. The bees will destroy the queen cell if the queen is present.

Remember to put the brood combs in the middle and the honeycombs on either side to insulate the brood nest. The framing combs feed and help the bees to keep the brood warm. Where there is no honey supplementary feeding can be done.

- XI. These bees will become a new colony. Most of the adult bees will remain in the old hive and continue to make honey.
- XII. The bees will look after the queen cells in the new colony and a new queen will hatch out. The first queen to hatch out will destroy the other queen cell.
- XIII. Wait until dark then move the new hive to a site at least 2kms from the old site if possible.
- XIV. If you don't have a place to put the new divided colony 2kms away then you must move both hives 1m either side of the old location. This will ensure that some returning bees go into the old hive and some into the new.
- XV. You will need to feed the bees in the new hive, as they will not know where to go and get food in their new place. A small colony can become weak very quickly.
- XVI. If you see the queen or brood after 4 weeks then this has now become an established colony.
- XVII. If you observe bees collecting pollen after two weeks, this is an indication that a new queen has emerged in that hive.

Uniting colonies

Beekeepers unite colonies in order to enlarge a colony, improve their yield of honey or control a worker-laying problem. A colony can produce surplus honey only if it is strong enough and contains 6-8 combs with plenty of brood and sealed honey and covered well by bees. This very much depends on the colony having a productive queen. If a colony fails to produce surplus honey for 2 seasons, or if it is weakened by repeated swarming, then it can be strengthened. Two weak colonies can be combined to make one strong colony. One large colony collects more honey than 2 smaller colonies. A colony can be united with another colony or with a swarm. To unite a colony with another:-

- I. Remove and kill the queen from the weaker, most defensive or least productive colony.
- II. Catch and cage the queen from the other colony in a matchbox and place the hive near to the old colony.
- III. Smoke both hives thoroughly so that their familiar smells are covered.
- IV. To prevent bees fighting also dust them with flour or spray with sugar syrup – they will be busy cleaning themselves and will not fight!
- V. Place the queen in her cage in the old hive next to the brood nest. The bees will chew the matchbox to release the queen.
- VI. Transfer all the top bars with combs and bees into the old hive. Alternate combs from the different colonies as you do so until all the brood combs are united and then add the honeycombs.
- VII. Close the hive and leave the united colony undisturbed for the next few days.

To unite a colony with a swarm you must: -

- I. Catch a swarm and if you can find the queen then cage her.
- II. Open the hive and remove the old queen (undesired queen) in a cage and kill her later.
- III. Smoke the bees and place the new caged queen near the brood nest.
- IV. Shake the swarm into an empty part of the hive.
- V. If you did not find either queen then do not worry. Leave both queens in the hive and the stronger one will kill the weaker one.

Note: In the process of uniting the colony, you may experience swarming or absconding.

As the new colony has eggs and larvae in the combs they need to be protected. While uniting the colony the queen should not be kept away for more than 1 hour.

Buy bees

Buy pest and disease free bees only from licensed dealers in colony multiplication and queen rearing.

Hive Inspection

Once the hive is occupied and the bees are busy, it is said to be colonized and it is important to inspect the colony to monitor its performance. Observe the following simple guidelines while carrying out inspection:

- I. Do not stand in the flight path of the bees.
- II. Work gently without excessive talking or banging noises.
- III. Puff smoke gently around the entrance of the hive and remove the lid carefully.
- IV. 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.
- V. Use a hive tool or knife to separate bars that are glued together by propolis.
- VI. 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.
- VII. Do not visit the hive in the warm part of the day-about six o'clock in the evening is a good time.
- VIII. 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.
- IX. Always wear light coloured clothes. Ideally, protective clothing should be worn, especially a veil to protect the eyes and face.
- X. 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.
- XI. Always keep the grass cut and the area around the hives tidy.
- XII. Always extinguish the smoker if not in use.

Note the following during inspection

1. Check on the strength of the colony by observing the brood: eggs, larvae and pupae.
2. Is the queen present? If she is hiding, the newly laid eggs can prove that she is present.
3. Is the queen prolific-laying enough eggs?
4. Is the colony healthy? Check on any indication of bee diseases.
5. Check on food stores (honey and pollen).
6. Is honey ready for harvesting? Indication is the capping of the honey cells. The comb should be capped/sealed on both sides.
7. Is the room enough for the bees? If not, remove some of the brood combs and unite with a weaker colony and replace with empty bars.
8. Are there indications of swarming? This is when they construct many queen cells or drone cells. Destroy some and provide more room (as long as the queen is present).

It is recommended to keep simple but accurate record of each hive. To monitor the development in the colony, it is very useful to take notes in a notebook. After inspection, you should make note of what you

have found in the colony and any adjustment you have made. For example, note the size or strength of the bee colony, the number of harvested combs etc.

In summary, keep notes on the following:

- Date of inspection
- Colony strength, i.e. number of brood combs, is there nectar, pollen, honey etc.
- Characteristics of the colony, calm, defensive, very defensive (sometimes some colonies can be so defensive that no inspection maybe carried out on that day).

Record keeping

Good records kept by the beekeeper will help him/her to follow the general progress of his/her operations. Two records are particularly important: colony and operational records.

Why should we keep records?

- ❖ It is a good idea to keep records during each hive inspection so that you can follow the progress of each colony and monitor their condition. But bear in mind that each inspection should have some purpose and routine examinations should be planned.
- ❖ Records can be kept so that you know what was done last time and what to do next time and what equipment you might need.
- ❖ Keeping records allows us to identify where we have made mistakes in colony handling.
- ❖ Management records are for the beekeeper's individual benefit. Some people like to keep records of all their financial outgoings. From these they can work out when they might recuperate their costs from the sale of the honey or work out how much profit they will get.
- ❖ Most of us can remember what is going on if we have one colony but what about 5 or 10?
- ❖ All the data collected is useful when the number of colonies has grown considerably and you want to start selecting the best ones.
- ❖ You need records to have any chance of success in selecting good queens to breed or in rearing queens.

Types of records

a) Colony Records

- ❖ Date/time of last inspection, forage and weather conditions.
- ❖ Date of occupation/colonization
- ❖ Age of queen
- ❖ Date of last harvest
- ❖ Honey yield per hive.
- ❖ Colony strength and growth rate (number of combs containing brood)
- ❖ Timely manipulation (swarm prevention, feeding)
- ❖ Amount of honey/stores in hive
- ❖ Characteristics of hive (defensive , calm, productive, poor)
- ❖ Swarming record – how often, when and why.
- ❖ Pests and diseases.
- ❖ Hives name and number
- ❖ Type of hive
- ❖ Remarks

b) **Operational Records**

- ❖ Visits to the apiary site
- ❖ Cash flow – how much money spent or earned.
- ❖ Purchases
- ❖ Labour
- ❖ Transport costs
- ❖ Servicing of equipment
- ❖ Other expenses
- ❖ Income

How to keep records

- ❖ A simple table can be drawn in a hard-covered book and stored at home. Alternatively, you can write the information on card and attach it to the underside of the cover of the hive (not inside the hive or the bees will chew it up).
- ❖ The column headings will vary according to what you think is essential. Most things can be recorded in the comments column.
- ❖ For administrative purposes it is useful to number the hives.
- ❖ The record should be read before opening the colony.
- ❖ They should be filled out with essential information immediately after every hive inspection.
- ❖ Records should be brief.
- ❖ You will develop your own method of recording information. With practice the writing of records will soon become an integrated part of every inspection.
- ❖ A cash flow record and other operational records should be separate record from the hive/colony record.

Good record keeping denotes a serious beekeeper

Remember the wise saying: *“The shortest pencil is better than the longest memory”*

Table 1: An example of a hive/colony record sheet

Hive number	Date of colonization	Date of last inspection	Date of last harvesting	No of kgs (yield)	Date of current inspection	Comments	Action
--------------------	-----------------------------	--------------------------------	--------------------------------	--------------------------	-----------------------------------	-----------------	---------------

0001	24/10/2001	24/4/2002	-	-	02/09/2002	Laying queen present. 4 brood combs. 24 honey combs. Colony very aggressive. Honey ready for harvesting.	20 honey combs to be harvested
0002	05/04/2004	1/10/05	1/10/05	8 Kgs of combed honey	2/6/2006	Many bees, strong colony. Queen present. 2 brood combs. 1 honey comb	-

EXAMPLES OF OPERATIONAL RECORDS:

Table 2: Visitors' Book

Date	Names	Contact address/Telephone	Purpose of visit	Comments	Signature

Table 4: Cash Book

Date	Particulars	Debit	Credit