

MODULE 5: THE FLORAL CALENDAR AND BEE KEEPING

Introduction

Beekeeping follows seasonal cycles. The seasonal weather impacts upon the bee population and hive products. Reduced food means that the queen lays less eggs and the population of the hive falls. Increased food means increased laying and the population increases. This knowledge is very important in modern beekeeping.

Learning Objectives

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

1. Construct a flowering calendar for their localities
2. Identify and explain the 4 key seasons of a colony cycle in a year.
3. Manage colonies during the different seasons in a year
4. Tell signs of harvesting period

Target Participant: Beekeepers, extension service providers, individuals and organizations/Institutions

Suggested Number of Participants: Maximum 30

Duration: 2 hours.

Materials

- Flip chart, masking tape, marker pens, notebooks and pens, chalk, chalkboard, notes, dummy board, queen excluder and/or their pictures.

Method

- Lecture
- Brainstorming
- Group discussion

STEPS

Step 1

Write the title “Floral Calendar and Beekeeping” on the chalkboard or flip chart and introduce it.

Step 2

Engage the participants to brainstorm on the seasons in a year in their areas.

Step 3

Divide the participants in 3 groups and assign each group the following tasks:

- i. Identify the plants bees visit during flowering and their months of flowering in a particular area.

- ii. Construct a flowering calendar and show honey flow months of the area
- iii. Describe indicators of honey harvesting seasons

Step 4

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

HAND OUT: FLORAL CALENDAR AND BEE KEEPING

Seasonal weather impacts upon nectar and pollen resources, which in turn impact on the colony population (performance). Reduced food means that the queen lays less eggs and the population of the hive falls. Increased food means increased laying and the population increases. Since more bees means more food can be collected the colonies with small populations will emphasize brood rearing. It is important to understand how the bee colony changes throughout the year because the bee colony can be manipulated to produce more honey.

Conditions for bees can vary widely throughout the country and the management of the bees depends on where they are found. Nevertheless, when managing bees for honey production, the aim is to have the maximum colony population during the nectar flow. Provided the nectar flow is good and the weather conditions are right a good honey crop can be realized.

Answering the following questions will give you a good overview of the honey year and help you prepare for the honey flow:-

- What are the plants and trees that bees use?
- When do they flower and for how long?
- When is the swarming seasons?
- Which trees or plants give the best honey?
- When the right is times of the year to expect honey and which are the signs of honey harvesting seasons?
- What factors affect plant flowering?

If the above information is recorded carefully as in table below, it is easy to look ahead and predict which plants will flower when.

Table 1: Floral Calendar

Plants/trees	Month												Pollen/nectar
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	

The bees’ behaviour is very sensitive to their environment. When there is plenty of food, bees make honey to eat later on when there is little food. The beekeeper shares in this stock of food.

Manipulating the colony to be at the peak strength at the right time is fundamental to good beekeeping. Good flying conditions (dry weather) for the bees are also important during the nectar flow to get maximum yields. Therefore all management practices are related to the bee colony cycle and understanding which stage the colony is in.

There are four seasons during a cycle and these may occur more than once in a year:

1. **Dearth** – not much nectar is being collected due to bad weather and poor forage.
2. **Build-up** – there are many bee forage plants and the weather is favourable the colony expands.
3. **Honey flow** – many plants provide nectar and flower at the same time
4. **Harvesting seasons**- most plants have stopped flowering and honey is ready for harvesting.

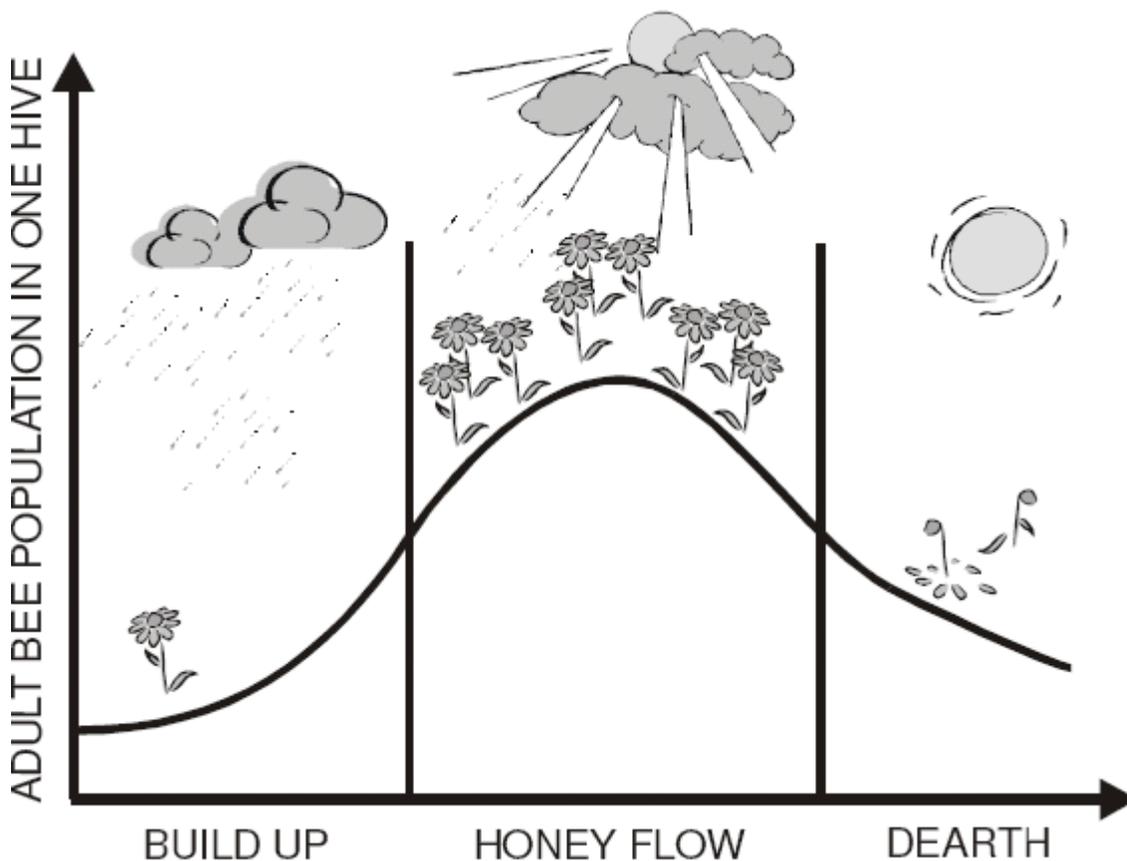


Fig 1: Floral Calendar

Honey flow and harvesting season follow one another.

Managing the bees during dearth

- Weak colonies can be united.
- If combs are dry or movement from the hive entrance is very slow then bees should be fed with sugar syrup.
- Alternatively, do not harvest all the honey from the combs. Leave enough for the bees in the dearth period.
- Decrease the number of combs when the colony gets smaller. A 'dummy board' can be placed near the combs to make the hive space smaller and more comfortable for a small colony. This is a movable partition made of hardboard or similar material. The flight entrance of this empty part of the hive should be closed.
- If the weather is cold then the hive can be insulated with a sack or dry grass at night.
- Check for any attacks by ants, wax moth or other pests as they can cause a lot of trouble to weak colonies. Close the flight entrance with coarse mesh and nails so that mice and lizards cannot get in but bees can get out. Remove all unoccupied combs as the bees will not defend these against wax moths.

Managing the bees during build-up

- Aim to get colonies to be strong and about the same size. A strong colony should have a minimum of 6-8 combs that are fully covered with bees. Combs of sealed brood (without bees) can be taken from very strong colonies and placed in the hives of weaker colonies.
- Feed the colony if it is weak and cannot be strengthened by giving it brood.
- Build-up costs energy, so feed the bees if the honey flow is poor.
- Check that there is enough drinking water in the surroundings.
- Unite very weak colonies. Alternatively weak colonies can be allowed to build up and honey can then be harvested at **a much later date**.
- Provide more space as necessary. It is important to keep adjusting the size of the hive to the size of the colony. The bees should be able to occupy all the frames. Only then can the total comb surface be protected from intruders and kept at the right temperature.
- To prevent brood from developing in the honeycombs, place a queen excluder between the brood and the honey parts of the nest. However this is not imperative to honey production.
- Check for bee diseases.

Managing the bees during honey flow

- Give the bee space and ventilation when colonies become strong. Provide extra room by moving the 'dummy board' and adding more top bars.
- Check for queen cells (after drones are seen flying) by trying to stop any swarming by destroying queen cells or dividing the colony.

However, it is better to divide colonies during the build-up and not the honey flow as any loss of population can decrease the honey production.

The main principles of floral calendar and beekeeping

- Knowing the area, the plants that bees like and when they flower and for how long.
- Understanding the colony cycle and aiming for strong colonies at the same time as the nectar flow for maximum honey yield.
- Leaving food for the bees when harvesting to keep them during time of food scarcity (dearth).

- Providing space for the bees and expanding and contracting the brood nest as needed.

Management during harvesting season

- Inspect hives which are due for harvesting
- Prepare enough containers for honey
- Have protectives, smokers and helpers ready.

MODULE 6 : DIVIDING/ MULTIPLICATION AND UNITING COLONIES

Introduction

You can make a division of an existing healthy colony in order to populate a new hive but always choose the most productive and docile colony. By dividing it you are spreading its good genetic characteristics. Sometimes we may also need to unite colonies. Beekeepers unite colonies in order to enlarge a colony and improve their yield of honey or to survive the dearth.

Learning Objectives

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

1. Explain the purpose for dividing and uniting colonies
2. Describe the steps involved in dividing and uniting colonies

Target participant: - Existing beekeepers and extension service providers.

Suggested number of participants: A maximum of 30

Duration: 3 hours.

Materials

Flip chart or chalkboard, masking tape, marker pens or chalk, notebooks and pens, hand outs; an existing occupied hive, an empty prepared hive, bee suit, smoker and smoker fuel, and/or their pictures

METHOD:

- Lectures
- Brainstorming
- Group work and presentation
- Game (of dividing a colony)
- Field exercise

STEPS

(a) Dividing colonies

Step 1

Write the title “*Dividing an overcrowded colony*” on the chalkboard or flip chart and introduce it.

Step 2

Engage the participants to brainstorm on their experiences and successes with dividing colonies.

Step 3

Allocate the participants in 2 groups and assign each group the following tasks:-

Group 1: List down all the materials required to do successful colony division

Group 2: Describe steps of dividing colonies

Step 4

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

(b) Uniting colonies

Step 1

Write the title “Uniting a colony with another colony” on the chalkboard or flip chart and introduce it.

Step 2

Engage the participants to brainstorm on their experiences and successes with uniting a colony with another colony.

Step 3

Allocate the participants in 2 groups and assign each group the following tasks:-

Group 1: List down all the materials required to do successful uniting of a colony with another colony.

Group 2: Describe steps involved in uniting a colony with another colony

Step 4

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

Step 5

Field exercise- walk with the trainees to the site of an apiary within the local area to participate in the exercise of dividing and uniting colonies.

HAND OUT: DIVIDING AND UNITING COLONIES

A- Dividing a Colony

You can make a division of an existing healthy colony in order to populate a new hive.

You should avoid making divisions during the honey season because it will reduce the amount of honey produced and to be harvested. Make divisions after the honey flow to increase colony numbers. The best time to divide a colony is when the bees are ready to swarm and the bees are trying naturally to reproduce.

How to know if the bees are getting ready to swarm

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 and wanting to divide itself we must 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. There will be clusters of bees outside the hive and lots of drones flying. Also the bees will be producing queen cells (the long thumb shaped cells protruding from the edge of the combs).

Dividing stops them from swarming and saves the beekeeper from losing the bees or the trouble of catching a swarm.

Ways of preventing bees from swarming

- Making sure that the queen has enough room to lay eggs. Make extra space around the brood nest by removing honeycombs and putting in empty combs near the brood nest.
- Weakening the strong colony can prevent its urge to swarm. Destroy all the queen cells in the colony then switch the hive location with a weaker colony. The foraging bees from the strong colony will return to the original site of the hive and strengthen the weak colony. You may also give brood comb (without bees) from the strong colony to a weaker colony and thus weaken the strong one. □Artificially swarming the bees for swarm control by making a division
- Making divisions is also a great way to increase your colonies but always choose the most productive and docile colony. By dividing it you are spreading its good genetic characteristics.

The steps of dividing a colony:-

- (i) Prepare your new hive first – clean it and by rub it with some beeswax or propolis so it smells familiar for the bees.
- (ii) Put on protective gear and have the smoker lit.
- (iii) Always choose a big healthy colony to divide and check it has brood, eggs, pollen and honey.

- (iv) Put the new hive next to the overcrowded hive.
- (v) From the big healthy colony, 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.
- (vi) Now transfer the comb with the 2 queen cells into the new hive.
- (vii) Also transfer one or two other combs with a lot of sealed brood and a little unsealed brood. The number will depend on how many you have in the original hive. The sealed brood is very important because more brood means adult bees will emerge very quickly in the new hive. Also sealed brood are stronger and can survive better than unsealed brood.
- (viii) Also transfer one or two combs of food comb with lots of sealed honey and pollen.
- (ix) You can make a division without queen cells as long as the new colony has female worker eggs 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.
- (x) Include bees on all the combs you transfer and brush or shake in bees from 2 or 3 other combs as well. Include the bees sitting on the brood combs as these are nurse bees that will soon produce royal jelly for the new queen. These are very important to feed and warm the brood also.
- (xi) 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.
- (xii) 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.
- (xiii) These bees will become a new colony. Most of the adult bees will remain in the old hive and continue to make honey.
- (xiv) 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 cells.
- (xv) Wait until dark then move the new hive to a site at least 2kms from the old site if possible.
- (xvi) If you don't have a place to put the new divided colony 2 kms 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.
- (xvii) 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.
- (xviii) If you see the queen or brood after 3-4 weeks then this has now become an established colony.
- (xix) Alternatively, place one hive on top of the other but with different direction of entrances.

Game:

In order to check your understanding of dividing a colony, you will play a simple game. Use the following paper combs provided: 5 combs with honey, pollen and brood; 3 combs with sealed brood, unsealed brood and honey; 4 combs of honey alone; 2 combs with honey, pollen brood and queen cells; 1 comb with honey, pollen, brood and queen. These combs will be stuck onto a sheet of paper with blutack and taped onto the wall of the training room to represent the overcrowded colony that needs dividing. Another blank piece of flip chart will be taped up onto the wall to represent a new hive that is waiting to be colonized.

2 people are required to play this game. The task is to divide the colony and place the right combs into the right hives in the right order.

Ensure that the new colony has combs with queen cells plus more sealed brood combs framed by plenty of food combs. The queen should have remained in the old hive with enough brood and food. The combs should be roughly divided equally between the hives or with more combs left in the old hive. You must also shake off lots of young bees into the new hive - they will give royal jelly to the new queen.

B- Uniting Colonies

We have seen how to divide a colony but sometimes we may also need to unite colonies.

Beekeepers unite colonies in order to enlarge a colony and improve their yield of honey or surviving the dearth. 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 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 either with another colony or with a swarm.

Uniting a colony with another colony

The steps of uniting a colony with another colony:-

- (i) In the late afternoon, check which colony has the youngest and healthiest queen. Remove and kill the queen from the worst, most aggressive or least productive colony.
- (ii) Leave this colony for 24 hrs, they will now be missing the queen and ready to accept a new one. They will also be less likely to fight as there will be no smell on them of the dead queen after 24 hours.
- (iii) In the evening catch and cage the queen from the other colony in a queen cage and place the hive near to the queenless colony. You will have to move it slowly and gradually over a number of days (1m per day) so as not to lose any foraging bees. Alternatively always choose the location of the stronger colony.
- (iv) Smoke both hives thoroughly so that their familiar smells are covered.
- (v) The cage will protect the queen should any fighting start. BUT to prevent bees fighting also dust them with flour or spray with sugar water – they will be busy cleaning themselves and will not fight!
- (vi) Place the queen in her cage in the queenless hive next to the brood nest.
- (vii) Transfer all the top bars with combs and bees into the hive. Smoke each comb as you do so. Alternate combs from the different colonies as you do so until all the brood combs are united and then add the honeycombs at the sides.
- (viii) Completely remove the empty hive.
- (ix) Release the queen when you see that there is no fighting between the 2 united colonies.

- (x) Close the occupied hive and leave the united colony undisturbed for the next few days. Any further disturbances may cause the bees to abscond.
- (xi) If you did not find either queen or do not know which one is the best then you can still unite the colonies. Leave both queens in the hive and the stronger one will kill the weaker one. But remember fights are likely to happen and bees may fly away, so smoke heavily and flick the bees with water to separate them. Watch them and keep smoking them for an hour or so until they settle down.

Beekeepers may also unite a colony with another because one queen has died or has got lost.

If a colony becomes lazy when others are busy then the young queen may be lost during her mating flight. There will be no brood to raise a new queen and workers will start to lay unfertilized eggs. You will notice that many brood cells are crammed with eggs - this is called "Worker Laying".

It is often too late to give the bees some brood from another colony so they can make a new queen. Workers will often be too old to produce milk to raise her. So unite the colony by removing all the combs, brushing off the bees and adding the combs to a healthy colony. Smoke the bees out of the old hive and carry it away. Most of the homeless bees will be welcomed by the colony as they have honey to offer.

Uniting a colony with a swarm

The steps of uniting a colony with a swarm:-

- (i) In the evening time catch a swarm and if you can find the queen then cage her.
- (ii) Open the hive, remove the old queen in a cage and kill her later.
- (iii) Smoke the bees and place the new caged queen from the swarm near the brood nest.
- (iv) Shake the swarm into an empty part of the hive.
- (v) You may leave both queens in the hive to fight and the stronger one will survive.

You can also increase a honey producing colony by partially uniting it. Top bars with capped brood (without bees) can be added from other colonies but the receiving colony must be able to occupy the combs and keep the brood warm or they will die.



Fig.1: Opening an old weak colony for uniting with a swarm

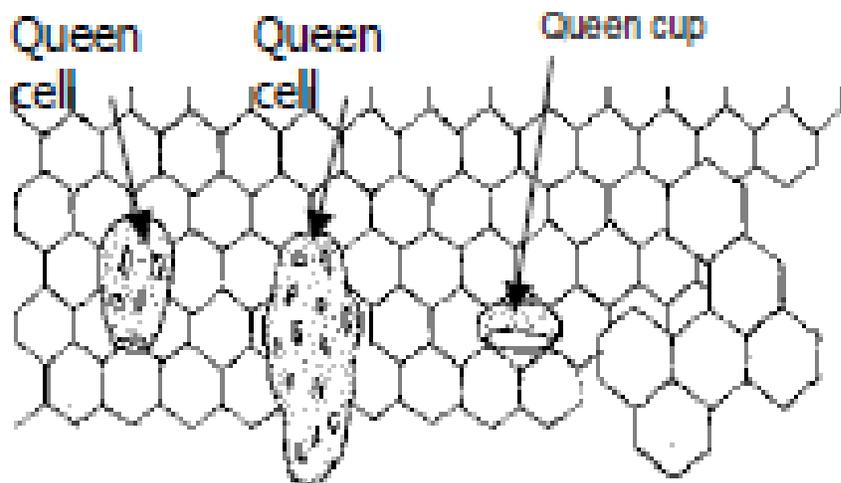


Fig. 2: The appearance of Queen Cells and Queen cups