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**ASCI**

Agriculture Skill Council of India

# Facilitator Guide



Sector  
**Agriculture**

Sub-Sector  
**Agriculture Allied Activities**

Occupation  
**Beekeeping**

Reference ID: AGR/Q5301, Version 3.0  
NSQF Level: 3

## Beekeeper



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6th Floor, GNG Building, Plot No.10

Sector - 44, Gurugram - 122004, Haryana, India

Email: [info@asci-india.com](mailto:info@asci-india.com)

website: [www.asci-india.com](http://www.asci-india.com)

Phone: 0124-4670029, 4814673, 4814659

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**Shri Narendra Modi**  
Prime Minister of India

“ Skilling is building a better India.  
If we have to move India towards  
development then Skill Development  
should be our mission. ”



## Acknowledgements

We are thankful to all organizations and individuals for preparation of this facilitator guide. We also wish to extend our gratitude to all those who have reviewed the content and provided valuable inputs for improving quality, coherence and content presentation in respective modules. This facilitator guide will help the trainers to roll out of the skill development initiatives in a fruitful manner.

It is expected that this publication would meet the complete requirements of QP/NOS based training delivery. We welcome the suggestions from users, Industry experts and other stakeholders for any improvement in future.

## About this Guide

This Trainers guide is intended to empower the trainer to prepare for the “Beekeeper” Qualification Pack (QP). The objective of the guide is to provide an approach map for interacting with the trainees undergoing training on this job role. The aim of the course is to provide both theoretical and practical knowledge to the trainees, and also to guide them for marketing the product and generating finances. The guide is neither a substitute nor complete road map, but an aid to help to pass on the knowledge on all the aspects to the trainees in a systematic manner. It is expected that the trainer is fully conversant with all the contents of the guide. The guide is just to indicate that how to proceed for covering a topic and includes some additional information that may be necessary for the trainer to develop better comprehension on following aspects:

- **Knowledge and Understanding:** Satisfactory operational learning and comprehension to play out the required chore.
- **Performance Criteria:** Pick up the required aptitudes through hands on preparing and play out the required operations inside the predetermined measures.
- **Professional Skills:** Capacity to settle on operational choices relating to the zone of work.

The job will also include judging the comprehension and also help them learn more by hands on training. But it has to be ensured that these are in accordance with the knowledge imparted and time spent on each unit. It is expected that irrespective of the region, knowledge on all aspects of beekeeping will be imparted to trainees.

## Symbols Used



Ask



Activity



Do



Demonstrate



Explain



Elaborate



Example



Exercise



Facilitation Notes



Field Visit



Learning Outcomes



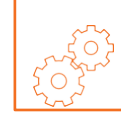
Notes



Objectives



Practical



Resources



Role Play



Summarize



Say



Team Activity

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## Terminal Outcomes

**After the completion of this module, the participant will be able to:**

1. Discuss the job role of a Beekeeper

## Key Learning Outcomes

**After the completion of this module, the participant will be able to:**

1. Describe the size and scope of the agriculture industry and its subsectors.
2. Discuss the role and responsibilities of a Beekeeper.
3. Identify various employment opportunities for a Beekeeper.

## UNIT 1.1: Size and Scope of Agriculture Sector

### Unit Objectives

After the completion of this unit, the participant will be able to:

1. Recognize importance of the programme

### Resources to be Used

- Available objects such as a white board, duster, marker, notepad, pens/pencil, participant handbook, laptop, projector, flip charts/paper.
- Power point slides, pictures / posters that will help the participants to gain insight about beekeeping programme.

### Say

- Welcome the participants and thanks everyone for their participation in this training program.

### Team Activity

**Purpose:** To acquaint the participants with each other and knowing well before sharing space inside classroom.

**Resources:** open ground, participants, big hall for accompanying the larger group of people sitting in small circles.

**Methodology:** Game Activity (Passing the parcel) for 30 min.

#### Expected outcome

- Group activity and team building
- Ability to communicate with unknowns
- Enhancement in observation capacity

Make the participants stand in circle, close enough to the person so that they can transfer the parcel quickly. Say 'stop' when students least expect it. The person who has the parcel at that time should come out and introduce themselves by providing their names and little additional information such as name of his/her village, things people do in their village for living, mention at least one benefit of beekeeping, etc.

### Say

- Thank' you to everyone for their participation.
- Did you enjoy this activity? We will enjoy the upcoming activities as well.
- Discuss responses of participants regarding beekeeping.

## Ask



- What do you mean by beekeeping?
- From your viewpoint how beekeeping can contribute in upliftment of rural people?

## Elaborate



- Elaborate the following topics with the help of participant handbook, audio visual aids etc.
  - ✓ Size and Scope of Agriculture Industry and its Sub- Sectors
  - ✓ Beekeepers

## Notes of Facilitation



- Assist the participants to share their motive for joining the course.
- Help the participants to get rid of their anxiety thus ensuring maximum class participation.
- Indicate briefly the option for career progression and career mobility of bee keeping upon completing this course.
- Motivate the participants to systematically think about bee keeping as their career objective.
- Encourage the participants to share their opinions and discuss their comments regarding the beekeeping programme.

## Exercise



### Key Solutions to PHB Exercises

1. Beekeeping is the maintenance of bee colonies, usually in man-made beehives.
2. This programme will help in learn the skills required to set up a honey bee manufacturing unit approved by the government.
3. After getting training on beekeeping , any person can adopt beekeeping as an enterprise.
4. Beekeeping contributes to income and employment generation and nutritional intake of the rural population.
5. Beekeeper can take services of his/her family members in managing colonies, honey extraction and sale, etc instead of hiring labour to further increase profitability from the occupation.
6. Beekeepers can have small hobbyist operations or be a part of large commercial production farms. Beekeepers may also specialize in a specific area of interest such as honey production, pollination services for fruit and vegetable farmers, or bee breeding.

## UNIT 1.2: Role of a Beekeeper and Employment Opportunities

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Define role of beekeeper engaged in self-employment
2. Explain the role of beekeeper in beekeeping industry
3. Explain importance of beekeeping in generating self-employment
4. Describe importance of beekeeping in generating job opportunities in allied sectors
5. Describe importance of beekeeping in enhancing agricultural productivity
6. Point out the employment opportunities for a beekeeper.

### Resources

- White board, duster, marker, notepad, pens/pencil, participant handbook, laptop, projector, flip charts/paper, power point slides, audio-visual aids, etc.

### Say

- Good day and welcome all the participants to the training session. Recall the key points of previous session discussion.

### Field Visit

**Purpose:** To perceive the role of a beekeeper and job opportunities as a beekeeper

**Methodology:** Field visit and the time varies according to the location, it may be 1-2 hours.

**Expected outcome:**

- Confidence building
- Knowledge enhancement

Organize a visit and ask the participants to list out the persons who are self-employed bee keeper and ask the beekeeper how will perform the activities as bee keeper and explain the importance of beekeeping in agriculture & allied sector.

### Ask

- Have you visited apiary? if yes, share your experiences.
- What are the benefits of setting your own apiary?
- How do you think beekeeping can be prove beneficial for agriculture and allied sectors?

## Elaborate



- Elaborate the following topics with the help of participant handbook, audio visual aids etc.
  - ✓ Role of self-employed beekeeper
  - ✓ Role of beekeeper in bee keeping industry
  - ✓ Bee keeping generates job opportunities in allied sector
  - ✓ Beekeeping as a self-employment venture.
  - ✓ Benefits of bee-keeping to agriculture.

## Notes of Facilitation



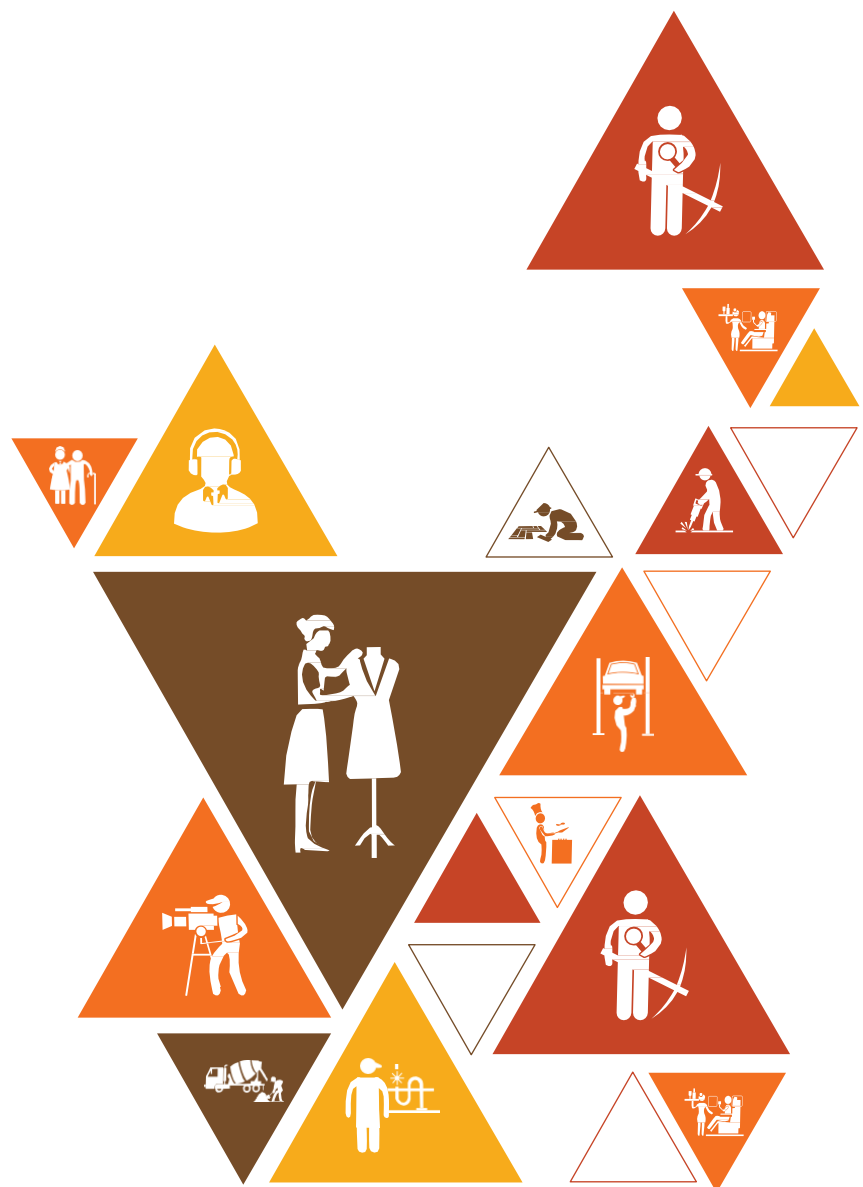
- Make sure all participants well aquatinted with the importance of bee keeping programme.
- Ask the participants if they have any question and clarify all the doubts of the participants.
- Encourage all participants to actively participate in the activity.
- Help to clear out the confusion of the participants regarding the role the beekeeper in bee keeping industry or as a self-employed bee keeper, which is more beneficial?
- Assist the participants to establish their own apiary.
- Keep some handy flip charts, visuals and some case studies.
- Arrange a workshop to have a better understanding about the job role as a beekeeper.

## Exercise



### Key Solutions to PHB Exercises

1. Beekeeper will be managing honey bee colonies in different seasons, honey flow periods, nectar/pollen dearth periods, pest and diseases infesting honey bee colonies, extracting honey and other hive products and marketing these products.
2. Beekeepers can have small hobbyist operations or be a part of large commercial production farms. Beekeepers may also specialize in a specific area of interest such as honey production, pollination services for fruit and vegetable farmers, or bee breeding.
3. Beekeepers have job opportunities in managing honey bee colonies, trading of honey in retail market, hive and other equipment fabrication industry as apiarist in government or private institutes having institutional apiaries.







## 2. Process of Preparing for and Starting Beekeeping Operations

Unit 2.1 - Honey Bee: An Overview

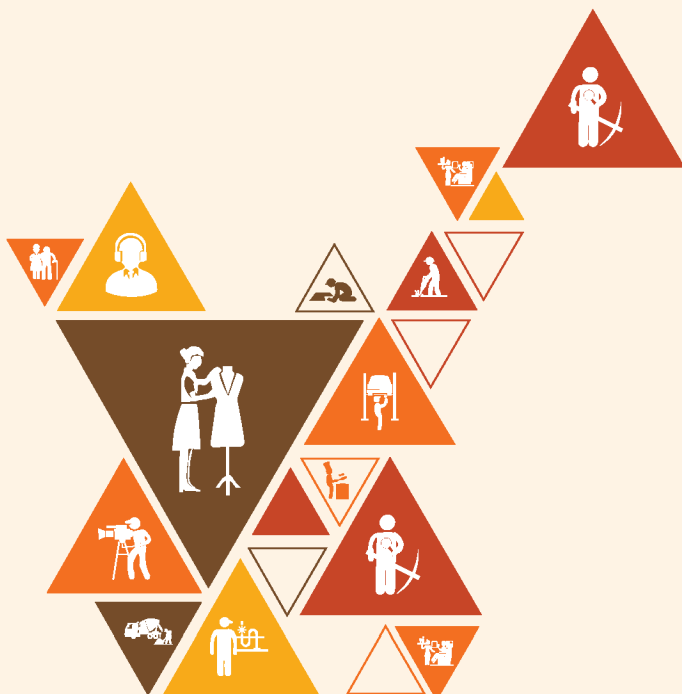
Unit 2.2 - Bee Keeping Systems, Its Economic Aspects and Management

Unit 2.3 - Beehive Management

Unit 2.4 - Specifications, Quality, Utility and Working Principles of Beekeeping

Equipment and Machines

Unit 2.5 - Establishment of Bee Colony



AGR/N5303

## Terminal Outcomes

**After the completion of this module, the participant will be able to:**

1. Describe the process of selecting the site and system for beekeeping.
2. Describe the process of arranging the required resources and planning beekeeping operations.
3. Demonstrate the process of preparing and installing beehives.
4. Describe the process of selecting, procuring and introducing bees in beehives.

## Key Learning Outcomes

After the completion of this module, the participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> <li>1. Explain different species of bees and their life span.</li> <li>2. Explain the role played by honeybees in biodiversity conservation and maintaining ecological balance through pollination and plant reproduction.</li> <li>3. Explain the natural habitats of different species of bees.</li> <li>4. Explain different modern and traditional beekeeping systems, their economic aspects and the ease of management.</li> <li>5. Explain the criteria for selecting a beekeeping system to be used based on cost-benefit analysis.</li> <li>6. State the appropriate climatic conditions required for beekeeping and the healthy growth of bees.</li> <li>7. Explain different stationary and migratory beekeeping systems.</li> <li>8. Explain the honey yield obtained from different beekeeping systems.</li> <li>9. Explain how to conduct a cost-benefit analysis to select an appropriate beekeeping system to be followed.</li> <li>10. Explain the importance of selecting and using cost-effective and easily available tools and equipment for beekeeping.</li> <li>11. Explain the importance of planning beekeeping according to the flowering season.</li> </ol>	<ol style="list-style-type: none"> <li>1. Demonstrate how to assemble the beehives using the recommended type of wood and other relevant materials.</li> <li>2. Demonstrate the process of applying the paint of recommended colour on the beehives.</li> <li>3. Demonstrate the process of setting up the queen excluder as per the requirement.</li> <li>4. Demonstrate the process of installing the beehives with rectangular frames inside them, and stacking them on wooden stands.</li> <li>5. Show how to hang beehives as planned using strong and greased galvanised wires.</li> <li>6. Demonstrate how to clean the beehives thoroughly before introducing bees in them.</li> </ol>

12. Explain the criteria for selecting a site for beekeeping.
13. Explain the importance of selecting a location for beekeeping that consists of diverse vegetation and provides adequate pollen, nectar and water for bee feed.
14. Explain the importance of ensuring the presence of nectar and pollen yielding flowers in the recommended quantity near the site, along with trees for shading and a source of clean water.
15. Explain the importance of ensuring the site selected for beekeeping does not experience intense heat, cold and rains and waterlogging.
16. Explain the use of various tools, equipment, PPE and accessories required for beekeeping, such as top bar hive/ Langstroth hive, smoker, honey extractor, comb foundation sheet, de-capping knife, bee brush, feeder, etc.
17. Explain the importance of selecting a location for the installation of beehives within the recommended distance from the flower field/ forest.
18. Describe the process of assembling beehives using the recommended type of wood and other relevant materials.
19. State the appropriate paint colour to be applied on beehives according to the temperature of the region to maintain the temperature in beehives.
20. Explain the criteria for selecting the appropriate species of bee for apiculture.
21. Describe the process of procuring the package of selected bee species, ensuring the presence of queen bees, worker bees and male bees in the required number.
22. Describe the process of catching bees from the wild.
23. Explain the importance of cleaning the beehives thoroughly before introducing bees in them.
24. Describe the process of introducing bees in beehives following the recommended procedure, maintaining the recommended number of bees in each beehive.

## UNIT 2.1: Honey Bee : An Overview

### Unit Objectives

After the completion of this unit, the participant will be able to:

1. Identify major species of honey bees
2. Explain the role played by honeybees in biodiversity conservation and maintaining ecological balance through pollination and plant reproduction.
3. Explain the natural habitats of different species of bees.

### Resources

- White board, duster, marker, notepad, pens, participant handbook, laptop, projector, flip charts, power point slides, pictures / posters that depict major species of honey bees, preserved samples of some of honeybees species, hand lens, etc.

### Say

- Greet the participants and revise the key learnings of previous session discussion.

### Activity

**Purpose :** To Identification different species of Honeybee. This activity may be planned for 20-30 minutes.

**Methodology:** Role plays through power point presentations.

**Resources:** Projector, system facilitating power point presentations, microphone, camera.

- Display the pictures of major species and races of honey bees on projector.
- Ask the participants to identify the honey bee species.
- Ask any 4-5 participants to stand randomly and speak out the characteristics of these honey bees.
- Motivate them to engage them in activity and clear doubts.

### Ask

- Before starting the session ask the participants following questions-
  - ✓ Can you list some species of honey bee found in India?
  - ✓ Can you name the largest and smallest honey bee of the world?
  - ✓ Have you heard of Italian honey bee? If yes can, you mention its name?

## Elaborate



- Elaborate the following topics with the help of participant handbook, audio visual aids etc.
- ✓ Different species of honey bees
- ✓ Introduction to Italian Bee of India
- ✓ Role played by Honey bee
- ✓ Natural habitat of Honeybee

## Say



- Sum up key learnings of the above discussion.

## Field Visit



- Arrange a field visit to nearby apiary.
- Motivate the participants to observe the major species of honey bees carefully.
- Ask the participants if they any question and clear the doubts of the participants.

## Do



- At the end activity, ask the participants to share their first learning experiences of visiting apiary among their peers.
- Ask the participants to have Q& A session related to the topic.

## Notes of Facilitation



- Ensure that all the participants have through understanding about major species of honey bees.
- Ask the participants if they require any kind of help.
- Organize visit to nearby apiary for better understanding of the concept.
- Arrange relevant pictures and posters showing major species of honey bees.
- Assist the participants to maintain a record of different honey bees species.

## Exercise



### Key Solutions to PHB Exercises

1. Through Body size, body colour, wings, proboscis size, number of worker cells, nature & temperament, comb construction.
2. Apis cerana indica, Apis cerana cerana, Apis cerana himalaya and A. cerana japonica
3. A. mellifera mellifera, A. mellifera ligustica, A. mellifera carnica, A. mellifera caucasica

## Unit 2.2: Bee Keeping Systems, Its Economic Aspects and Management

### Unit Objectives

After the completion of this unit, the participant will be able to:

1. Identify different systems of beekeeping.
2. To identify criteria for selecting a beekeeping system based on cost-benefit analysis.
3. To explain importance of selecting cost-effective equipment for beekeeping.
4. To explain importance of planning beekeeping according to the flowering season

### Resources

- Participant handbook, pens, sticky notes, notepad, laptop, projector, white board, flip charts, marker, duster, audio-visual aids depicting relevant information about lifecycle of honey bees, samples of different types of bees, schematic drawing of honey bee, hand lens, etc.

### Say

- Greet the participants and appreciate participants for their participation. Recall the previous session outcomes and then proceed towards the session.

### Demonstrate

With help of visuals demonstrate, the different types of labelled Hives

- ✓ Traditional Hives
- ✓ Modern Hives

### Activity

**Purpose:** To recall the different types of Hives . The activity may be planned for 20- 30 minutes.

**Material required:** Projector, display screen, desk for sitting participants

**Expected outcome:** Clarify the doubts among different hives .

- ✓ Show various types of hives with models or photos.
- ✓ Ask 4-5 participants randomly to label the various parts of hives.
- ✓ Facilitate the participants to help them to label the various parts.
- ✓ Address any queries of the participants.
- ✓ At the end of activity students able to identify the various parts of hive

**Do**

- Encourage the students to actively participate in the activity.
- Encourage the non-participants to open up and speak up.
- Share your own thoughts and viewpoints related to the topic.

**Ask**

- What do you mean by Beehive?
- Have you seen a Langstroth bee hive?

**Elaborate**

- Bee keeping System
- ✓ Traditional Hive
- ✓ Modern Hive
- Criteria for selecting the Bee keeping System
- Cost-Benefit analysis of Langstroth Beehive(most appropriate beekeeping system)

**Notes of Facilitation**

- Arrange relevant pictures or posters showing different components of bee hive.
- Answer all the questions of the participant.
- Focus on ensuring pictorial as well as live presentation for learning.
- Nearby visit to apiary will help the students to have better understanding about bee hive.

**Exercise****Key Solutions to PHB Exercises**

1. Based on the cost-benefit analysis, the profitability of the beekeeping system is taken into consideration, the size of the colony and expenditure on the maintenance of the hive.
2. The Food and Agricultural Organization of the United Nations defines a floral calendar for beekeeping as a timetable that indicates to the beekeeper the approximate date and duration of the blossoming periods of the important honey and pollen plants in their area.
3. Traditional hive and Modern hive



## UNIT 2.3: Beehive Management

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Select suitable site for siting apiary
2. Know about the requirements for apiary sites
3. Know about importance of selecting an appropriate site
4. Know about suitable climate for beekeeping

### Resources

- White board, duster, marker, notepad, pens/pencil, participant handbook, laptop, projector, flip charts/paper, audio-visual aids, etc.

### Say

- Welcome everyone to this training session and review the key points of previous session discussion.

### Ask

- What is an apiary?
- What can be key factors to be considered for good apiary site?

### Elaborate

- Factors to be considered for Selection of suitable Apiary site
- Requirements for apiary sites
- Importance of selecting an appropriate site

### Demonstrate

- **With the help of audio visual aids or possible practical visits**
  - ✓ The method of shifting and placement of bee colonies.
  - ✓ During the demonstration, ask the participants to observe keenly the shifting and placement process.

## Activity



**Purpose:** To acquaint about the selection of Apiary site. This activity may be planned for 15-20 minutes.

**Methodology :** Pen and per activity

- Ask the participants to list out factors they will consider while setting their own apiary.
- Ask any one of the participants to pin point the factors on white board.
- Ask the other participants to discuss amongst themselves and ask any queries realised to the topic.

## Say



- Emphasize and elaborate the key points of the discussion.
- Share your views regarding the factors to be considered for setting up an apiary.

## Notes of Facilitation



- Participants may be asked to search online for more information about apiary and bee hive.
- Assist the participants to purchase best quality of nucleus colonies.
- Guide the participants to shift and place bee colonies in bee hives.
- Arrange a meeting with KVK or beekeeper to have more practical knowledge about an apiary

## Exercise



### Key Solutions to PHB Exercises

1. An appropriate location should be selected for beekeeping that consists of diverse vegetation and provides adequate pollen, nectar and water for bee feed so that bees can have variety of pollen and other ingredients to produce honey.
2. The area should be dry and free of moisture. High RH will have an impact on bee flying and nectar ripening.

## Unit 2.4: Specifications, Quality, Utility and Working Principles of Beekeeping Equipment and Machines

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Identify various beekeeping tools and equipment.
2. Explain significance of various tools and equipment
3. Explain the structure of beekeeping system/ beehive
4. Describe different parts of a beekeeping system and its significance
5. Identify various beekeeping tools and equipment
6. Explain the significance of various tools and equipment

### Resources

- White board, duster, marker, flip charts, pens / pencils, notepad, computer, projector audio-visual aids, various tools and equipment used in beekeeping such as veil, gloves, overall, hive tool, smoker, comb foundation, bee brush, etc.

### Say

- Greet the participants and recall the previous session learning outcomes.

### Demonstrate

- **With help of visuals demonstrate the following tools that are used in bee keeping.**

• Bee veils, gloves and overall	• Bee escape	• honey extractor
• Hive tool	• Entrance guard	• Honey strainer
• Smoker	• Travelling screen	• Queen cage
• Comb foundation	• Screened bottom board	• Comb foundation mill
• Bee brush	• Varroa board	• Wasp trap
• Queen excluder	• Uncapping knife	
• Feeder	• Capping 's' scratcher & drip tray	

### Ask

- Why is it necessary to wear protective coverings while doing bee keeping?
- What are tools generally used in bee keeping process?

## Elaborate



- Describe the following topics in detail with the help of story making, demonstrate etc.
  - ✓ Top cover
  - ✓ Inner cover
  - ✓ Brood/super chamber
  - ✓ Bottom board
  - ✓ Stand

## Do



- Motivate the students to open up and ask questions.
- Clear the doubts of students related to tools and equipments.
- Assist the participants to prepare bee floral calendar suitable to their own area.

## Notes of Facilitation



- Assist the students to identify the various beekeeping tools and equipment.
- Show photographs of different tools and equipments.
- Give assignments to participants to draw diagram of tools and equipments and label them.

## Exercise



### Key Solutions to PHB Exercises

1. Horizontal queen excluder is a perforated or wired device with wooden frame which is placed above the brood chamber to restrict queen bee in the brood chamber to prevent her to lay eggs in the honey chamber combs.
2. 20" long, 16-1/4" width, 9-1/2" height
3. Tangential and radial honey extractor
4. Bee veil prevent bee stings on the face, hands and other body parts, respectively.
5. Removing capping from the comb of fully ripened honey prior to honey extraction.

## Unit 2.5: Establishment of Bee Colony

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. To identify criteria for selecting appropriate beespecies.
2. To know about the procedure of buying bees.
3. To know about cleanliness of beehives.
4. To know about introducing bees in beehives Explain structure of a flower.

### Resources

- Participant handbook, pens / pencils, laptop, projector, white board, flip charts/paper, marker, duster, audio-visual aids, bee keeping tools such as smoker, comb foundation, hive tools, nucleus colonies, bee frames, etc.

### Ask

- What do you mean by Bee Colony ?
- Have you ever seen Bee Colonies ?

### Elaborate

- Explain the following topics with the help of participant handbook, PPT and other visual aids, etc.
  - ✓ Criteria for Selecting Appropriate Bee Species
  - ✓ Process of catching bees from the wild
  - ✓ The method to analyse the performance of colonies

### Demonstrate

- With the help of audio visual aids or possible practical visits, demonstrate how to established a bee colony.

## Activity



**Purpose:** To learn effective ways to remember the things about the topic. This may be planned for 15 to 20 minutes.

**Materials required:** Pen/Pencil, Notebook, and checklist

- The teacher to make groups with four students in each and ask them to write down the points which they observed in demonstration.
- Prepare notes on your observation.
- Discuss the observation in the class and submit the report to the subject teacher.

## Say



- Wasn't the activity brainstorming? I hope you all like it.
- Thank you everyone for their participation
- Discuss responses of the participants regarding the discussion.

## Notes of Facilitation



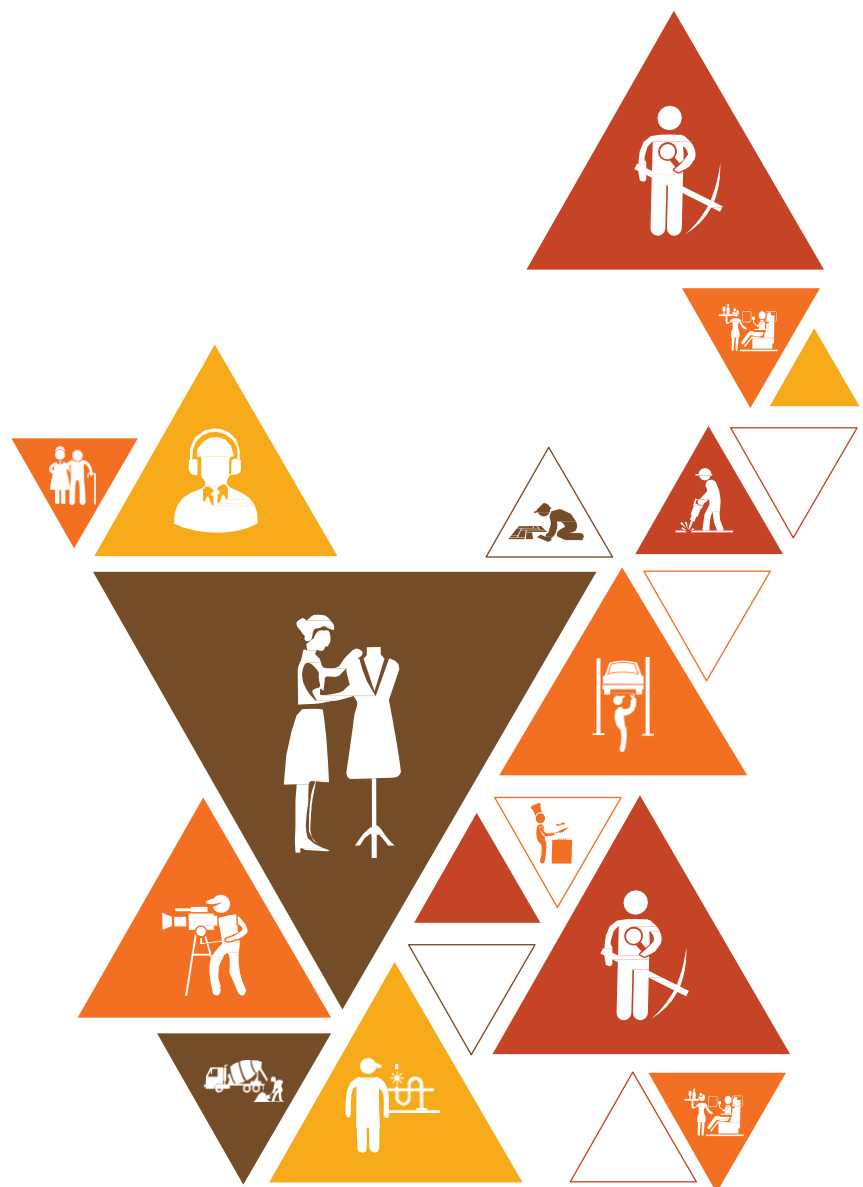
- Assist all groups to understand the topic clearly through visualization.
- Ask any local beekeeper to share how he manages to keep record of performance of honey bee colonies.
- Encourage the participants to maintain their own record of performance of bee colonies.
- Keep some exercises handy for the activity.
- Constantly motivate each student to participate.
- Address the queries of the participants and clear all the doubts participants.

## Exercise



### Key Solutions to PHB Exercises

1. The better performing bee species for a colony are selected based on following criteria including-
  - Bees strength
  - Queen performance
  - Content of frame (honey and pollen)
  - Brooding pattern
2. To order a package of bees, contact a local beekeeper supply or local beekeeping association. Most packages will contain a queen, multiple workers, and a feeder filled with sugar syrup.
3. We must safeguard bees and bee products against outside substances and agents, which is why maintaining good hygiene is crucial.





## 3. Process of Inspecting and Maintaining the Beehives

Unit 3.1 - Inspection of a Bee Colony and Swarming

Unit 3.2 - Selection of Colonies and Mass Queen Bee Rearing

Unit 3.3 - Maintaining Bees and Honey Quality

Unit 3.4 - Pests of Honey Bees and their Management

Unit 3.5 - Diseases of Honey Bees and their Management

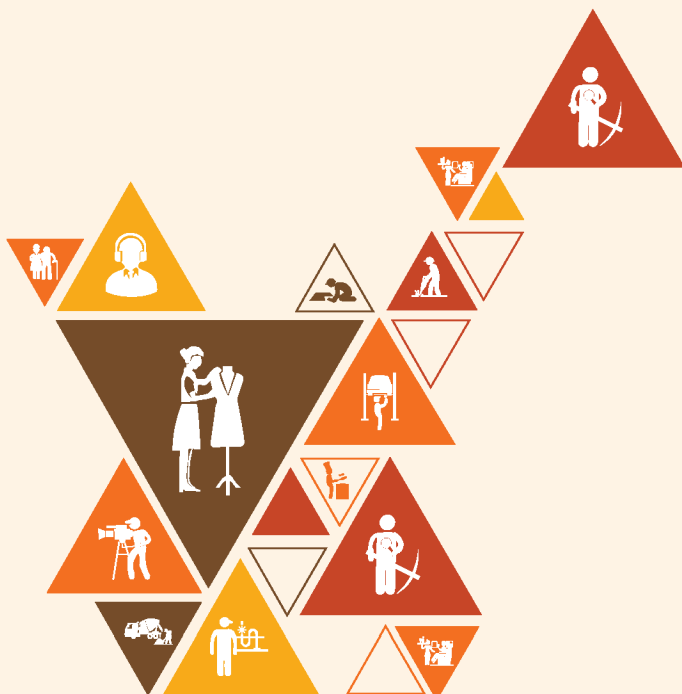
Unit 3.6 - Nuisances to Bee Keeping and their Management

Unit 3.7 - Resource Optimization and Waste Management

Unit 3.8 - Life Cycle, Colony Organization and Communication in Honey Bees

Unit 3.9 - Management of Honey Bee Colonies During Nectar and Pollen Dearth

Period



AGR/N5304



## Terminal Outcomes

**After the completion of this module, the participant will be able to:**

1. Describe the process of inspecting and managing the beehives.
2. Demonstrate the process of performing pest, disease and nuisance management.
3. Demonstrate various practices for effective resource optimisation.
4. Demonstrate various waste management practices.

## Key Learning Outcomes

After the completion of this module, the participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> <li>1. Describe the process of inspecting beehives using the relevant PPE.</li> <li>2. Explain the signs of swarming and absconding in beehives and the appropriate preventive measures to be taken.</li> <li>3. Explain how to identify the need of installing additional frames and honeycomb foundations in beehives.</li> <li>4. Explain the importance of ensuring effective drainage at the apiary site.</li> <li>5. Describe the method for mass rearing of the queen bee.</li> <li>6. Explain the importance of ensuring the availability of bee pasturage or bee forage in an adequate quantity for the survival and healthy growth of bees.</li> <li>7. Describe the process of removing unnecessary and deformed honeycombs, ensuring no damage to other honeycombs.</li> <li>8. Explain the recommended practices to be followed to preserve honeycombs during the dearth period.</li> <li>9. Explain the importance of ensuring appropriate shading from trees or through artificial means to protect bees from the intense heat.</li> <li>10. Explain the need of covering the beehives with gunny bags or rice straw and sprinkling them with the recommended quantity of water to regulate the temperature in beehives during summer.</li> </ol>	<ol style="list-style-type: none"> <li>1. Demonstrate how to clean the beehives following the recommended procedure and using the appropriate tools and equipment.</li> <li>2. Demonstrate how to remove unnecessary and deformed honeycombs, ensuring no damage to other honeycombs.</li> <li>3. Demonstrate the process of carrying out winter packaging with the recommended material such as tar paper during periods of below normal temperatures.</li> <li>4. Demonstrate the process of preparing sugar syrup and pollen to feed bees during the dearth period.</li> <li>5. Show how to feed the bee colonies with sugar syrup, pollen supplement, water and other recommended feed during the dearth period.</li> <li>6. Show how to unite the smaller colonies to enlarge colonies or divide large colonies to populate new beehives, using the relevant tools and equipment.</li> <li>7. Demonstrate how to prepare the bee colonies for the production of royal jelly.</li> <li>8. Demonstrate the use of a queen excluder to keep the queen out of the super chamber to ensure the quality of honey.</li> <li>9. Demonstrate the process of applying the recommended treatment as per</li> </ol>

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> <li>11. Explain the need for winter packaging and the recommended material to be used for that such as tar paper.</li> <li>12. Describe the process of uniting the smaller colonies to enlarge colonies and dividing large colonies to populate new beehives, using the relevant tools and equipment.</li> <li>13. State the recommended practices to be followed to prevent dampness during the rainy season.</li> <li>14. Explain the importance of ensuring no empty space in beehives during the swarming season.</li> <li>15. Explain the use of a queen excluder to keep the queen out of the super chamber to ensure the quality of honey.</li> <li>16. Explain the relevant preventive practices to be followed to prevent pests and disease infestation in beehives.</li> <li>17. State the signs of relevant pests and diseases that infest beehives such as wax moth, varroa mite, ant, termites, European foul brood, American foul brood, sac brood, etc.</li> <li>18. Explain the importance of maintaining the record of inspection of beehives and treatment applied to them.</li> <li>19. Explain the recommended practices to be followed to prevent different types of a nuisance to bees such as domestic animals, honey badgers, birds, vandals, etc.</li> <li>20. Explain the benefits of resource optimisation.</li> <li>21. Explain the importance of recycling and disposing different types of waste as per the applicable regulations.</li> <li>22. Explain different development stages of different types of bees and the time taken at each stage.</li> </ol>	<ol style="list-style-type: none"> <li>10. Demonstrate how to clean the beehives following the recommended procedure and using the appropriate tools and equipment.</li> <li>11. Demonstrate how to remove unnecessary and deformed honeycombs, ensuring no damage to other honeycombs.</li> <li>12. Demonstrate the process of carrying out winter packaging with the recommended material such as tar paper during periods of below normal temperatures.</li> <li>13. Demonstrate the process of preparing sugar syrup and pollen to feed bees during the dearth period.</li> <li>14. Show how to feed the bee colonies with sugar syrup, pollen supplement, water and other recommended feed during the dearth period.</li> <li>15. Show how to unite the smaller colonies to enlarge colonies or divide large colonies to populate new beehives, using the relevant tools and equipment.</li> <li>16. Demonstrate how to prepare the bee colonies for the production of royal jelly.</li> <li>17. Demonstrate the use of a queen excluder to keep the queen out of the super chamber to ensure the quality of honey.</li> <li>18. Demonstrate the process of applying the recommended treatment as per the prescription to beehives to remove the identified pests and diseases.</li> <li>19. Prepare a sample record of inspection of beehives and treatment applied to them.</li> <li>20. Demonstrate various practices to optimise the usage of various resources such as water and electricity.</li> <li>21. Demonstrate the process of recycling and disposing different types of waste appropriately.</li> </ol>

23. Explain different types of raw produce generated by bees during their life cycle.
24. Describe different communication methods used by bees such as producing odour, drumming feet, flapping wings, etc.
25. Explain how bees locate their food source.
26. State the conditions under which bees abandon their existing hives and create new hives.
27. List various bee forage plants and the process and timing of their flowering.
28. State various ways to protect bees and beehives during the dearth period, and intense heat and cold.
29. Explain various recommended practices to be followed for the conservation of bees and beehives.
30. Explain how to fix the radius of apiary location from food sources.
31. Explain the importance of keeping the beehives clean and pest free.
32. Explain the importance of ensuring beehives are stable and easily accessible.
33. Explain how to reduce drifting and disease transmission.
34. Explain the importance of ensuring effective drainage and no dampness at the site of apiculture.
35. Describe the process of feeding the bee colonies during the dearth period.
36. Explain how to rear the queen bee.
37. State the recommended precautions to be taken while dividing and uniting bee colonies.
38. Explain the use of relevant tools and equipment for dividing and uniting bee colonies.
39. Explain how to manage bee colonies during summer, winter and monsoon.
40. Explain the importance of using the relevant PPE while inspecting beehives such as bee suits, gloves and shoes.
41. State the signs of healthy growth of bees and optimum production of honey.
42. State the signs of pests, disease and abnormal behaviour in bees.
43. Explain the symptoms of swarming and absconding in bees and how to deal with it.
44. Explain the need to install additional frames and honeycomb foundation in beehives.
45. Explain the importance and process of removing unnecessary and deformed honeycombs.
46. State the recommended precautions to be taken while applying pesticide or insecticide to beehives.
47. State various practices to be followed to prevent infection contamination at the beekeeping.
48. Explain the importance of positioning beehives appropriately.
49. Explain the use of different beekeeping equipment used in colony management such as a smoker, hive tool, bee brush, etc.
50. Explain the importance of protecting beehives from intense heat, cold, strong winds, and various nuisance.
51. State the recommended pesticides and insecticides to control pests and disease in beehives and the relevant application methods.
52. Explain the bee colony collapse disorder and how to prevent and deal with it.
53. Explain how to prevent and treat poisoning caused by pesticides, insecticides and other chemicals.
54. List various tools and equipment used in insect, diseases and nuisance management.
55. State the applicable preventive practices to be followed to prevent insects, diseases and nuisance in bee colonies.

## UNIT 3.1: Inspection of a Bee Colony and Swarming

### Unit Objectives

**After the completion of this unit, the participants will be able to:**

1. Describe the process of inspecting beehives using the relevant PPE
2. Explain the signs of swarming and absconding in beehives and the appropriate preventive measures to be taken.
3. Explain the importance of ensuring effective drainage at the apiary site

### Resources to be Used

- Participant handbook, Pens / pencils, Notepad, laptop, Projector, White board, flipcharts, audio-visual aids, honeybee colonies, record keeping book, etc.

### Say

- Greet the participants and appreciate participants for their participation. Recall the previous session outcomes and then proceed towards the session.

### Ask

- In your opinion what can be necessary tools and appliances required for setting a apiary?
- What do you mean by Swarming ?
- what is the process of inspecting beehives ?

### Elaborate

- Process of inspecting beehives using the relevant PPE
- Signs of swarming and their preventive measures
- A good apiary site

### Role Play

- Ask one of the participants to be inspector of beehive .
- Ask the rest participants to ask the questions about the process of inspecting beehive using the relevant PPE .

**Do**

- Encourage the students to actively participate in the activity.
- Encourage the non-participants to open up and speak up.
- Share your own thoughts and viewpoints related to the topic.

**Notes of Facilitation**

- Arrange relevant pictures or posters of bee colony.
- Answer all the questions of the participant.
- Focus on ensuring pictorial as well as live presentation for learning.
- Nearby visit to apiary will help the students to have better understanding about bee colony.

**Exercise****Key Solutions to PHB Exercises**

1. A good apiary location is one that is remote, fully exposed to the sun, and close to a variety of flowering plants. It also needs to have good air circulation, water drainage so that the water doesn't get clogged and bees could be prevented from certain pests and diseases and a steady supply of fresh water.
2. water doesn't get clogged and bees could be prevented from certain pests and diseases and a steady supply of fresh water.
3. A very high population of bees in the hive is the sign of swarming and when a colony of honey bees leaves its home in search of another is the sign of absconding .

## UNIT 3.2: Selection of Colonies and Mass Queen Bee Rearing

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Select the colonies for better production.
2. Develop rearing skill and manage the breeder queen.

### Resources

- Participant handbook, pens, notepad, laptop, projector, white board, flip charts, audio-visual aids, queen bee, coloured markers, sheets of foundation, knife, queen excluder, frame with empty comb, swarm boxes with young bees, several strong colonies, finishing colony, several empty frames, mating nuc boxes, etc.

### Say

- Greet and thanks the participants for their participation. Before starting the session, revise the key points from previous session discussion.

### Ask

- What do you mean by queen rearing?
- What can be the important attributes to select breeder queen?

### Elaborate

- Basic criteria for selecting queen bee colonies
- Need for mass queen bee rearing
- Conditions needed for queen cell construction
- Pre-requisites for queen rearing methods
- Different methods of commercial queen rearing such as:
  - ✓ Miller method
  - ✓ Alley method
  - ✓ Smith method
  - ✓ Hopkin method
  - ✓ Grafting method
  - ✓ Karl jenter and Queen cell cup kit method
- The method to transplant queen cells
- Types of queen bee mating nuclei
- Queen bee marking colour chart

## Team Activity



**Purpose:** To point out that the demonstrations will be used to inform each other about queen rearing methods.

**Methodology:** Group activity and it may be 1- 2 hours.

- Divide the participants into 6 groups and allot each group to use a different method to rear queens.
- Ask each group to prepare chart and present demonstrations of their chosen queen-rearing method.
- Outline the purpose of this activity.
- Ask the participants to evaluate each other based on their demonstration.
- Stress the importance of effectively working together to accomplish the tasks.

## Say



- Discuss the methods and encourage the participants.

## Activity



**Purpose :** To perceive the knowledge about Queen Bee. This may be plan for 15- 20 minutes.

**Methodology :** pen and paper activity

- Ask the participants to identify the age of the queen bee based on their colour.
- See if they are able to correctly identify the age of queen bee or not
- Facilitate the participants with queen marking colour chart for reference.

## Notes for Facilitation



- Make sure the participants are well acquainted with different methods of queen rearing.
- Circulate between the groups to provide assistance, encouragement and advice, if needed.
- Involve the participants through group activities, discussions and learning by doing.
- Organise a field visit to apiary to have practical demonstration of discussed topics.
- Pre arrange charts, pictures or videos for more better understanding of the concept.

## Exercise



### Key Solutions to PHB Exercises

1. Selection of breeder colony:
  - Compactness in brood rearing
  - Surplus honey produced
  - Least swarming tendency
  - Gentleness
  - Quietness on the comb
2. Cell builder colony is prepared four days before larval grafting by dequeening a strong colony of 10 or more bee-frames. The dequeened colony will raise a few queen cells from which the royal jelly is extracted 72 hours after dequeening. This royal jelly is used to prime the artificial queen cell cups. Young bees or sealed brood combs are given to the colony to maintain a sufficient number of nurse bees.



3. Miller method, Alley method, Smith method, Hopkin method, Doolittle or Grafting method, Karl jenter and Queen cell cup kit method.
4. The colours used to mark thorax of queen bee is non-toxic and does no harm to the queen bee such as white, yellow, red, green, blue.
5. Doolittle or Grafting method is the most commonly used method of mass rearing of queen bees by the commercial queen breeders. In this method the artificial queen cell cups made of beeswax or plastic are used. These cups are first primed with royal jelly and then selected larvae of the desired age are grafted into them.

## UNIT 3.3: Maintaining Bees and Honey Quality

### Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the recommended practices to be followed to preserve honeycombs during the dearth period.
2. Explain the importance of ensuring appropriate shading from trees or through artificial means to protect bees from the intense heat.
3. Describe the process of uniting the smaller colonies to enlarge colonies and dividing large colonies
4. Explain the use of a queen excluder to keep the queen out of the super chamber
5. Know how to reduce drifting and disease transmission

### Resources

- Participant handbook, pens / pencils, laptop, projector, white board, flip charts/paper, marker, duster, audio-visual aids, bee keeping tools etc.

### Say

- Welcome everyone to this training session and review the key points of previous session discussion.

### Elaborate

- Dividing and Uniting Colonies
- Installation of a Rain Cover
- Install Excluders and Supers
- How to reduce drifting and disease transmission

### Activity

**Purpose :** Knowledge enhancement and the tentative time limit is 20 min.

**Methodology :** Group discussion

- Arrange the participants into 2-3 groups
- Assign each group to one of the following topics
- No team should get same topic
- Ask the teams to conduct group discussion of the following topics:
  - ✓ Division of colonies
  - ✓ Uniting of colonies
  - ✓ Winter packing

## Summarize



- The key learning of above group discussion topics.
- Emphasize and elaborate important aspects of these topics.

## Notes of Facilitation



- Ensure that every student is well acquainted with the process to manage honey bee colonies.
- Display relevant pictures, slides or videos related to the topic.
- Plan an outing to nearby apiary so that students have practical exposure.
- Encourage more participants to involve in group discussion and group activity.
- Facilitate the students if they face any kind of problem.

## Exercise



### Key Solutions to PHB Exercises

1. Division of Honeybee will allow new colonies sufficient time to build up strong populations to gather the crop and Union of Honeybee prevents robbing and makes unification easier.
2. The decision by many beekeepers to paint all of their wood ware white may be influenced by custom, aesthetics, or other factors. Others employ a spectrum of hues to produce a more colourful apiary and possibly aid for returning foragers in orienting themselves. In addition to colour changes, positioning in relation to neighbouring colonies and terrain features can provide navigational aids that prevent drift.
3. Preserve a comb during dearth period by following methods:
  - Remove empty combs and store in air tight container.
  - Unite weak colonies
4. The queen is prevented from laying eggs on the honeycombs by excluders.

## UNIT 3.4: Pests of Honey Bees and their Management

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Identify various ectoparasitic bee mites
2. Identify symptoms of damage by parasitic bee mites
3. Manage ectoparasitic bee mites preferably with non-chemical methods
4. Manage ectoparasitic bee mites with chemical methods in case of severe attack
5. Identify various species of wax moths
6. Identify nature and extent of damage caused by wax moths
7. Identify various developmental stages of wax moths
8. Identify various species of bee predatory wasps
9. Store combs safely to prevent damage by wax moths during dearth period
10. Manage bee enemies with non-chemical and chemical methods
11. Identify various species of bee predatory birds
12. Protect colonies from damage by bee predatory birds
13. Protect colonies from damage by other bee enemies.

### Resources

- Participant handbook, Pens / pencils, Notepad, laptop, Projector, White board, flipcharts, audio-visual aids, honey bee colonies, record keeping book, etc.

### Ask

- What are important pests of honey bee?
- What do you mean by ectoparasitic mites?
- Do you know bees can be infected by wax moths?

### Say

- Discuss the answers of the participants and start the training session

## Elaborate



- The two ectoparasitic mites
- Symptoms and management of mite
- Symptoms and Chemical and non-chemical measures of varroa mite
- Symptoms and management of acaraine mite
- Species of Wax moth infesting honey bee colonies
- Greater and lesser wax moth species.
- Symptoms and management of wax moths
- Protection of honey bees colonies from damage caused by ants
- Damage caused by bee predatory birds

## Team Activity



**Purpose :** To recognise the infested comb. Tentative time limit will be 30 minutes.

**Methodology :** Pen and paper activity

- Arrange samples of infested comb
- Ask the participants to recognize the pest on infested comb.
- Provide sheets to each participant.
- Ask participants to write the name of the insect
- Ask the participants to discuss the symptoms of these insects.

## Do



- At the end of the activity, answer the query of the participants.
- See if they have correctly identified the pest or not
- Encourage the participants make notes about their observation.
- Also provide guidance to trainees on control measures of these pests.

## Notes for Facilitation



- Arrange pictures or slides showing different pests of honey bee.
- Participants may be asked to collect some samples of honey bee pests common to their area.
- Encourage the participants to search online to get more detailed information about the concept.
- Motivate the students to cultivate the habit of note-making.

## Exercise



### Key Solutions to PHB Exercises

1. The moth infests combs with all stages of brood, cells and pollen. Silken galleries spun by wax moth larvae around them near the mid-rid of the brood comb is the cause of Gallariasis, a condition in which adult bees are unable to come out of cells as their legs get entangled in the silken galleries underneath. Wax moth larvae feed on combs and can reduce the combs to a mass of web and debris. This mass of web has black thin and elongated excreta of wax moth. Severe infestation of wax moths leads to suspension of brood rearing, foraging activity and ultimately desertion of colony.
2. Varroa destructor adult female mite is dorso-ventrally flattened, reddish brown in colour while female T. clareae mite is elongate and light brown in colour. Varroa mites' size is large enough to be easily seen with the naked eye. Tropilaelaps clareae mite is smaller than Varroa mite, but can be seen with naked eye. T. clareae mites pierce the bodies of the brood and feed on the haemolymph of brood while Varroa mite can pierce the body wall of adult bees also to feed on their haemolymph.
3. Management Tropilaelaps clareae Mite:
  - Sulphur treatment
  - Formic acid treatment
  - Queen arrestation
4. Non-chemical Methods for Management of Varroa Mite
  - Destruction of drone brood
  - Trapping Varroa on drone brood
  - Queen arrestation
  - Shook-Swarm method
  - Trapping the mite on sticky paper
  - Use of screened bottom board
  - Dusting of powdered sugar
5. K-winged condition is condition of disjoint wings.
6. Management of Wax Moths:
  - Maintain strong colonies.
  - Close all cracks and crevices of the hive and reduce entrance size to prevent entry of wax moth adults.
  - Keep the bottom board clean by burning the debris collected from bottom board periodically.
  - Control diseases and other pests to avoid weakening of colonies.
  - Avoid pesticidal poisoning which otherwise weaken the colonies.
  - Remove excessive combs from the hive, especially during dearth period and store properly.
  - Fumigate extra combs with sulphur @ 250-300 g/m<sup>3</sup> space

## UNIT 3.5: Diseases of Honey Bees and their Management

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Identify various bacterial diseases of bee brood on the basis of their symptoms
2. Identify various viral diseases of bee brood on the basis of their symptoms
3. Identify various fungal diseases of bee brood on the basis of their symptoms
4. Control manage various bee diseases
5. Manage your apiary to minimize loss by bee pests

### Resources

- Participant Handbook, Pens / pencils, sticky notes, notepad, computer, projector, white board, flip charts, audio-visual aids, pictures or slides of honey bee diseases, chemicals like formalin, acetic acid etc.

### Elaborate

- Symptoms and management various bacterial diseases affecting honey bee such as:
  - ✓ European foul brood
  - ✓ American foul brood
- Symptoms and control measures of sac brood disease
- The measures to prevent bee diseases in apiary
- Symptoms and management various fungal diseases affecting honey bee such as:
  - ✓ Chalk brood
  - ✓ Stone brood
- Nosema disease of honey bee

### Activity

**Purpose:** To identify the disease symptoms. The time will be 20 min.

**Methodology:** Pen and paper activity

- Ask the participants to develop a list or chart of diseases from pictures in the book (and/or from slides).
- Ask them to compare the symptoms of the diseases and make a diagnosis of each.
- Ask the participants to distinguish healthy brood from diseased brood.

**Do**

- At the end of activity, discuss and demonstrate methods of honey bee disease control.
- Also discuss the precautions to be taken to prevent the spread of diseases.

**Notes for Facilitation**

- Arrange relevant handouts and leaflets to have a better understanding of honey bee diseases.
- Arrange live samples of infected honey bees.
- Remind participants of the possibility of mailing diseased samples to laboratories to verify field diagnoses.
- Address the queries of the participants.

**Exercise****Key Solutions to PHB Exercises****1. Symptoms of Nosema disease:**

- Bees are not able to fly properly and fall down during their return journey.
- Bees crawl up the grass blades and fall down on the ground.
- Abdomen is distended with faecal matter.
- Bees become shiny black because of loss of body hair.
- Mid intestine is swollen and is dull greyish white coloured compared to amber coloured mid-gut of a healthy bee.

**2. Symptoms of sac brood disease:**

- Death of infected brood is most prominent in late larval or pupal stage
- Infected brood is stretched on its back.
- Cell cappings are sunken and brood is patchy.
- Presence of infected prepupae without cell cappings.
- Skin of dead brood becomes tough.
- Colour of the dead brood changes to pale yellow to brown, with head and thorax regions being darker.
- Dead brood becomes sac like and can be removed with forceps.

**3. Symptoms of European foul brood (EPB) disease:**

- Infected larvae get displaced from the centre of the cell base towards base of lower wall.
- These infected larvae die in the unsealed cells stage when they are only 4-5 days old.
- Dead larvae become soft, watery and dull yellowish.
- The infected larvae get discoloured.
- These dead larvae finally dry up and become brown removable rubbery scales at the bottom of the cell.
- Brood pattern becomes irregular.

**4. Preventative measures for bee diseases:**

- Maintain strong and vigorous colonies.
- Feed sugar, pollen, pollen substitute or pollen supplement during nectar and pollen dearth periods.
- Migrate colonies to areas having good bee forage crops
- Make sure not to transfer combs from diseased to healthy colonies.
- Beekeeping equipment used for diseased colonies should be sterilized by using formalin or carbolic acid.
- Isolate the colonies suspected to have disease and do not exchange its combs and other hive parts with healthy colonies.
- Select colonies showing disease resistance or hygienic behaviour and use these colonies as breeder.



## UNIT 3.6: Nuisances to Bee keeping and their Management

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Identify various nuisances in beekeeping
2. Discuss how pesticide application on crops can affect population and productivity of bee hives
3. Identify the symptoms of insecticidal poisoning
4. Explain the bee colony collapse disorder and how to prevent and deal with it.

### Resources to be Used

- Participant handbook, Pens / pencils, Sticky Notes, Notepad, Computer, Projector, White board, flip Charts, Audio-Visual Aids, live bees in small containers, some examples of pesticides, etc.

### Say

- Greet the participants and appreciate the participants for their participation. Before beginning the session, recapitulate the previous session discussion.

### Ask

- Do you hear of insecticidal poisoning?
- What can be possible reasons for insecticidal poisoning?

### Elaborate

- Insecticidal poisoning in honey bees
- Causes for insecticidal poisoning
- Symptoms of Insecticidal poisoning in honey bees
- Steps to minimize the losses caused by insecticidal toxicity.

### Activity

- This is hands on exercise on insecticidal poisoning
- Apply a variety of insecticides to samples of bees in small glass jars.
- Pass the jars around among the participants.
- As the pesticides begin to affect the bees, have participants describe the symptoms they see.
- Write their responses on whiteboard
- Discuss the symptoms in detail and explain how they may easily be confused with other problems in the colony.

## Notes for Facilitation



- Make sure the participants have thorough understanding about insecticidal poisoning.
- Provide assistance to participants to minimize the losses caused by insecticidal poisoning.
- Ensure sufficient pictorial presentations as well as live presentation for learning.
- Clear the doubts of participants related to insecticidal poisoning.

## Exercise



### Key Solutions to PHB Exercises

1. Symptoms of pesticide poisoning:
  - Sudden and excessive bee mortality in large number.
  - Presence of large number of dead bees.
  - Crawling and trembling movements of legs.
  - The bees poisoned with insecticide, may sometimes fall side-ways or upside down and make trembling movements.
  - Some of the dead bees may have pollen loaded in their pollen baskets
2. Honey bees forage on bee floral crops to collect nectar and pollen or both mainly during the period of crop blooming. Thus, use of insecticides during the crop blooming period helps to contact honey bee with insecticides.
3. Measures to minimize pesticidal toxicity:
  - Avoid placing colonies in an area or crop where insecticidal application is very frequent.
  - Preferably maintain your apiary at a place where use of pesticides is the minimum.
  - The beekeeper should remain updated with information regarding time, frequency and type of pesticide application in the area around apiary.
  - Study prevalent wind direction to place colonies in such a way to prevent damage to honey bee colonies because of drifting of insecticide sprayed on the nearby crop.
  - Beekeepers should be in regular contact of the farmers in the area to have a watch on their insecticide application programmes.
  - Close the entrances of the colonies with wire screen early in the morning before bees start foraging.
  - Request the farmers to avoid spraying insecticides during the crop blooming period.
4. A condition affecting honeybee colonies called colony collapse disorder (CCD) is characterized by unexpected colony death and a lack of healthy adult bees inside the hive.

## UNIT 3.7: Resource Optimization and Waste Management

### Unit Objectives

After the completion of this unit, the participant will be able to:

1. Explain the benefits of resource optimisation.
2. Explain the importance of recycling and disposing different types of waste as per the applicable regulations

### Resources

- Participant handbook, pens / pencils, notepad, laptop, projector, white board, flip charts, audio-visual aids, etc.

### Ask

- What do you understand by waste management ?

### Team Activity

**Purpose :** To understand the topic. This may be plan for 15 – 20 minutes.

**Methodoly :** Group Discussion

- Make team of 2-3 participants and ask each team to have group discussion on the topic how to mange waste product .
- Facilitate team members to answer any query related to topics.

### Elaborate

- Resource Optimisation
- Importance of Recycling and Disposing

### Do

- Make sure the participants have properly understood the topic.
- Ask the participants if they have any questions.

## Notes for Facilitation

- Ensure that each participant understand the concept thoroughly.
- Participation of trainees must be encouraged specially in management of waste and optimisation of resources.
- Trainer must organize visit to apiary to give demonstration and exposure to real exposure of disposing and recycling the waste product.

## Exercise

### Key Solutions to PHB Exercises

1. Optimizing resources and utilizing waste are the scope to achieve sustainability.
2. If a hazardous secondary material is used or reused (for example, as a component in a process), reclaimed, or used in particular ways, such as in a way that counts as disposal and when burned for energy recovery, it has been recycled. Reusing, recycling, and recovering hazardous waste can safeguard the environment, conserve finite natural resources, lessen the country's dependency on energy and raw materials, and generate economic benefits. Depending on the substance and how it is recycled, different levels of regulation may apply to recycled materials.

## UNIT 3.8: Life Cycle, Colony Organization and Communication in Honey bees

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Identify different developmental stages of honey bees.
2. Explain honey and pollen storage behavior of honey bees.
3. Identify various raw material generated by the bees during their life cycle.
4. Describe different communication methods used by bees.
5. Explain how bees locate their food source.

### Resources

- Participant handbook, pens, sticky notes, notepad, laptop, projector, white board, flip charts, marker, duster, audio-visual aids depicting relevant information about lifecycle of honey bees, samples of different types of bees, schematic drawing of honey bee, hand lens, etc.

### Ask

- Before starting the session ask the participants following questions-
  - ✓ Do you know the difference between queen, drone and worker bee?
  - ✓ Do you know honey bee is a social insect? Can you mention other social insects?
  - ✓ Can you enlist the duties performed by queen bee?

### Elaborate

- Life cycle stages of honey bee.
- Characteristics of different types of honey bees in *Apis mellifera* colony .
- The life cycle and life span of the queen, worker, and drone honey bees.
- The specific functional duties performed by each bee with in bee colony.
- The way of honeybees are organised in a bee colony.
- Different raw materials produced by bees during their life cycle?
- Communication process among bees in search of food.
- Three types of dance performed by honeybees
  - ✓ Round dance
  - ✓ Tail wagging dance
  - ✓ Sickle dance

## Demonstrate



- Show a bee colony to demonstrate and review the topics discussed.
- Provide the participants with an opportunity to distinguish between queen, drone and worker bees and between eggs and young larva.
- Point out the royal jelly surrounding all larvae less than 2 days old.

## Team Activity



- Make team of 2-3 participants and ask each team to have group discussion on characteristics, life span and functional duties of queen, drone and worker bee.
- Give sufficient time so that teams may refer participant manual if they any help.
- Facilitate team members to answer any query related to topics.

## Demonstrate



- With the help slides, videos demonstrate the orientation or steps of round dance & tail Wagging dance

## Role Play



- This is learning by doing activity on bee communication.
  - ✓ Ask the participants for role play about 30 minutes.
  - ✓ Ask 2-3 participants to perform round dance and tail wagging dance.
  - ✓ Encourage other participants to observe the dance steps carefully & appreciate the participants.
  - ✓ Ask them if they have any questions.

## Say



- Wasn't the activity brainstorming? I hope it was fruitful to all of you and we will enjoy the upcoming session as well.

## Notes for Facilitation



- Address the queries of the participants regarding the life cycle of honey bees.
- Prearrange live samples of honey bee eggs, larvae, pupae and adult honey bee so that the participants have a clear picture about the various developmental stages of honey bee.
- Invite or organize a session with entomology expert to share his expert opinions about lifecycle of honey bees and division of labour in honey bees.
- Arrange some specific videos describing the roles played by different types of honey bees.
- Make classroom more participatory.

## Exercise



### Key Solutions to PHB Exercises

1. Bees communicate food source to fellow bees through dances and floral odour.
2. Round dance is performed by the returning forager bees to indicate that the food is available near the hive. In a round dance, the foragers run in a circle suddenly reversing direction and then turning again to her original course and so on.
3. Tail wagging dance is performed by the returning forager bees is performed when the food source is generally, away from 80 meters. Through this dance bees, in addition to the distance, are also able to communicate exact direction of the food source relative to the line from the hive to the sun. In tail wagging dance, the worker bee moves a short distance in a straight run, makes a semi-circle back to the beginning of the straight run, then moves to the top of the run, makes another semi-circle in the opposite direction and keeps on repeating the whole figure for several minutes.

## UNIT 3.9: Management of Honey Bee Colonies during Nectar and Pollen Dearth Period

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. State the conditions under which bees abandon their existing hives and create new hives.
2. List various bee forage plants and the process and timing of their flowering
3. Location of an apiary.
4. Explain how to manage bee colonies during summer, winter and monsoon.

### Resources

- Participant handbook, pens / pencils, notepad, laptop, projector, white board, flip charts, audio-visual aids, eggs, brewer's yeast, sugar solution, dehusked parched gram, skimmed milk powder, etc.

### Say

- Greet the participants and recall the previous session learning outcomes.

### Ask

- What do you understand by bee flora or bee forage plants?
- Can you name some bee forage crops?

### Elaborate

- Describe the following topics in detail with the help of story making, demonstrate etc.
  - ✓ Bee flora
  - ✓ Bee floral calendar
  - ✓ Major bee forage crops.

### Activity

**Production :** Knowledge enhancement . Time may be plan for 20 minutes.

**Methodology :** Pen and Paper activity

- Ask each participant to list out 10 bee forage crops grown in their area.
- Ask 4-5 participants to stand randomly and share the findings among their peers.



**Do**

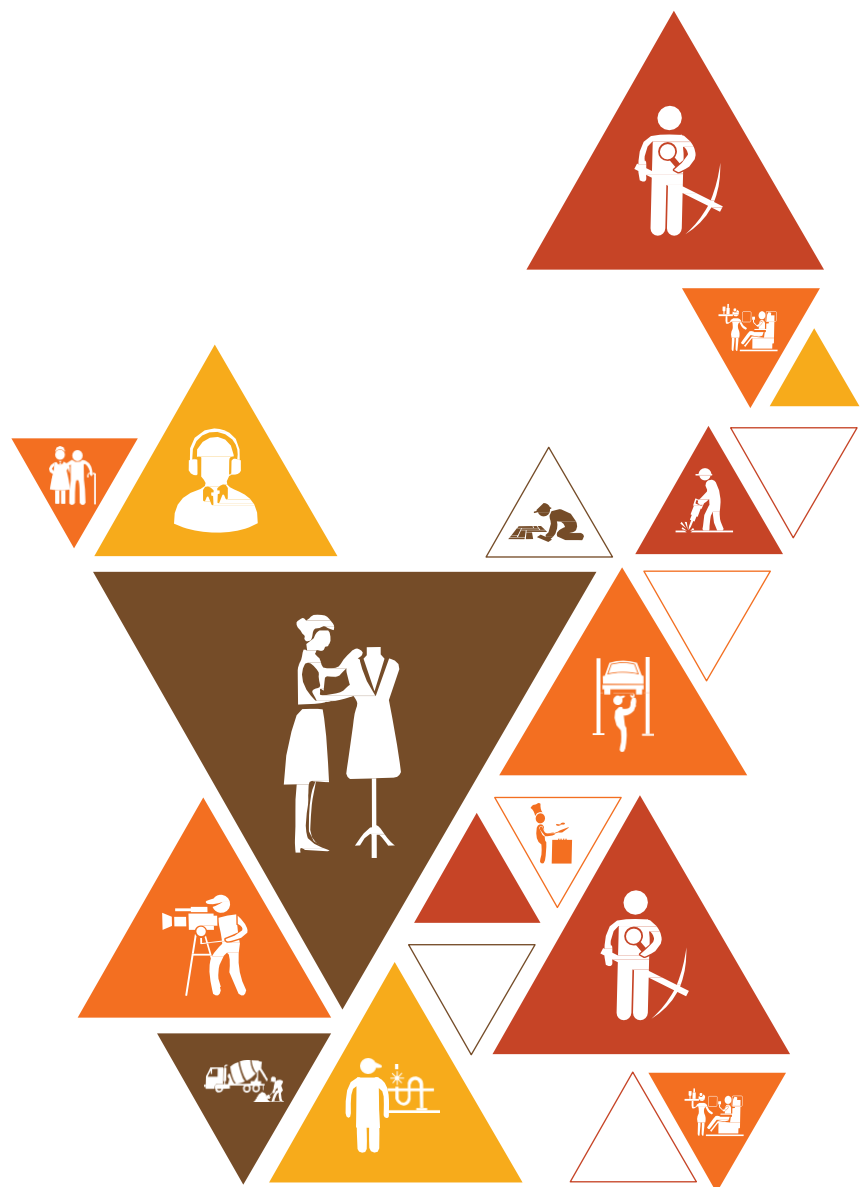
- Clear the doubts of students related to bee flora.
- Motivate the students to open up and ask questions.
- Assist the participants to prepare bee floral calendar suitable to their own area.

**Notes for Facilitation**

- Assist the students to identify the bee forage plants.
- Visual demonstration on how to prepare floral calendar.
- Show photographs of different bee forage plants.
- Give assignments to participants to prepare the floral calendar of their own area.

**Exercise****Key Solutions to PHB Exercises**

1. The plants which provide nectar or pollen to the bees are collectively termed as bee flora or bee forage plants.
2. A bee floral calendar is as time table that indicates to the bee keeper the approximate date and duration of the blossoming periods of the important honey and pollen plants in his area.
3. Refer to section 3.9.2 of participant handbook.





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## Terminal Outcomes

**After the completion of this module, the participant will be able to:**

1. Demonstrate the process of harvesting honey and other bee produce
2. Demonstrate the process of grading and storing the produce
3. Describe the process of marketing the produce

## Key Learning Outcomes

After the completion of this module, the participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> <li>1. Explain the importance and process of identifying the honeycombs containing ripe honey which are sealed, with a fine layer of beeswax.</li> <li>2. State the appropriate time for harvesting honey and other raw produce.</li> <li>3. Explain the importance of ensuring no harm to bees during the extraction process.</li> <li>4. Explain the recommended practices to be followed to protect honey and other produce from contamination during extraction.</li> <li>5. Explain the applicable grading and sorting parameters such as ripeness, colour, taste, purity for grading honey and other produce.</li> <li>6. State the appropriate storage requirements for packed honey and other produce.</li> <li>7. State the potential buyers and markets for honey and other bee produce, such as e-Mandi, local traders, exporters, etc.</li> <li>8. Explain the importance and process of negotiating with the buyers to secure a profitable price for the produce.</li> <li>9. State the appropriate mode of transport to be used for safe and hygienic delivery of honey and other produce to the buyer.</li> </ol>	<ol style="list-style-type: none"> <li>1. Demonstrate the use of the relevant tools and equipment for extracting honey and related produce such as hive tool, smoker, honey extractor, etc.</li> <li>2. Demonstrate the process of the process of extracting honey, propolis, pollen, royal jelly and bee venom from honeycombs safely, using the recommended PPE.</li> <li>3. Demonstrate the process of unfreezing honeycombs and filtering the melted honeycombs to obtain yellow beeswax.</li> <li>4. Describe the process of bleaching the yellow beeswax with the recommended oxidizing agent such as hydrogen peroxide, sulphuric acid, or sunlight to obtain white beeswax.</li> <li>5. Show how to collect the extracted produce in separate and clean containers, protecting it from contamination.</li> <li>6. Show how to grade honey and other produce based on applicable grading parameters such as ripeness, colour, taste, purity, etc.</li> <li>7. Demonstrate how to sort out the produce based on their shelf-life.</li> <li>8. Demonstrate the process of packing honey and other produce in suitable packaging and labelling it with the relevant information.</li> <li>9. Demonstrate how to process the payment using the buyer-preferred e-</li> <li>10. payment method.</li> <li>11. Prepare a sample manual and/ or electronic record of sales and payments using the physical registers and/ or the relevant computer application.</li> </ol>

## UNIT 4.1: Harvesting and Processing of Honey and Other Hive Products

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Select and collect honey combs for extraction
2. Uncap sealed honey combs
3. Extract honey
4. Filter and store honey properly
5. Bottle filtered honey
6. Prepare an attractive and colourful label for honey bottles
7. Extract wax from broken combs or sealings
8. Install pollen trap on honey bee colonies to collect propolis
9. Prepare queen cell cups for grafting
10. Extract royal jelly from queen cell cups
11. Collect bee venom from honey bee colonies.

### Resources

- White board, duster, marker, flip charts, pens / pencils, notepad, computer, projector, audio-visual aids, bee suite and gloves, smoker, honey extractor, bee brush, wire screen, uncapping knife, comb foundation mill, royal jelly extractor, venom extractor, pollen trap, propolis trap, propolis collector, pollen collector, etc.

### Ask

- How can you extract honey?
- What are other hive products other than honey?
- What do you mean by propolis?

### Elaborate

- Procedure to extract honey.
- Source and methods to extract bees wax.
- The method to prepare comb foundation.
- Prerequisites for production and collection of royal jelly.
- Process for royal jelly production, filtration & storage.
- The procedure to collect pollen
- Source and utility of propolis.
- Different methods to collect propolis.
- Processing of propolis.

## Demonstrate



- The process to extract honey.
- The different methods to extract bee wax
- Preparation of comb foundations
- The process for royal jelly production and storage.
- Various methods to collect propolis

## Field Visit



- Take a field trip to have practical exposure on harvesting and processing of honey and other hive products.
- While en route, discuss with participants the objectives for this field trip and how to best meet these objectives.
- Once at the destination, assist the participants in interviewing the proprietor of the operation related to:
  - ✓ Procedure to extract honey
  - ✓ Source of the beeswax used
  - ✓ Procedures used to extract bee wax
  - ✓ Prerequisite and method to collect royal jelly, pollen and propolis.

## Do



- At the end of activity ask the participants to review important technical insight.
- Encourage questions, analysis, and comments during this procedure.
- Emphasize and elaborate the utility of different hive products.

## Notes for Facilitation



- Assist all the participants to understand the concept clearly through visualization.
- Ask the participants if they have any questions related to the topic.
- Give assignments to participants enlist different hive products other than honey.
- Facilitate the participants to demonstrate the harvesting and processing procedure to their peers.

## Exercise



### Key Solutions to PHB Exercises

#### 1. Honey extraction procedure:

- Select and collect only sealed honey combs.
- Do not select honey combs having sealed/unsealed brood.
- Check for presence of queen bee before dislodging bees off the combs.
- Dislodge bees from honey combs with gentle jerks. Honey bees still adhering to the honey combs may be dislodged by using bee brush.
- Put these honey combs inside an empty hive and cover it to prevent entry of bees into the honey extraction site.
- Arrange the subsequent extraction procedure in bee tight enclosures like screened room or honey extraction net or large sized mosquito net.
- Uncap the sealed honey comb by removing wax seals of honey comb with uncapping knife by placing the combs in the drip tray.
- Put uncapped honey combs into the honey extractor.
- Gradually increase the speed of rotation of the honey extractor.
- After extracting honey from one side, change the side of the combs if tangential honey extractor is in use, and extract honey from the other side.
- When using radial honey extractor, reversing the direction of rotation will extract honey from the other side.
- Filter the honey through stainless steel strainer or double-fold muslin immediately after extraction.
- After honey extraction, give the emptied combs back to the honey bee colonies at the earliest.

#### 2. The pollen trap is fitted on the hive on alternate weeks during the period when pollen availability is in plenty. While pollen collecting bees try to enter into the hive through pollen detaching strip, pollen balls from their hind legs get detached and fall into a tray below. Collect pollen from the trap daily or on alternate days to prevent spoilage. This fresh pollen should be filled in air-tight containers stored in deep freezer or it may be shade dried.

#### 3. Extract royal jelly from the queen cell cups 72 h after grafting. The cells are cut to the level of royal jelly with the help of sharp blade and the larva in the cell is discarded. Then the jelly is extracted either with the help of aspirator or using some water-vacuum pump or motorized suction pump. The PAU has designed and developed a very light-weight, cheap, portable and very effective royal jelly extractor which does not have any motor and hence does not require any electricity for vacuum suction. It requires only running water tap to work with and to have sufficient vacuum.

#### 4. Crude bees wax and old damaged combs are put into hot water. The beeswax will melt in hot water. The whole material is then sieved through wire screen or muslin or thick cloth in some metallic container having narrow bottom and wide top. Beeswax is lighter in weight than water. So gradually the wax will rise above the water surface. Keep the filtrate overnight, the wax will solidify into a wax cake on top of the container. To remove this wax cake, either keep the container in Sun or heat it slightly so that wax leaves the surface of the container. The impurities adhering to the top and bottom of the wax cake are removed by scrapping.

#### 5. Preparation of comb foundations:

- Melt beeswax by providing indirect heat. So, beeswax is placed in a container which is further placed in a hot water container/drum over a source of heat.
- A wooden or glass plank of almost the size of a comb foundation is dipped in soap water or honey water solution before dipping it twice in molten beeswax. Two sheets, one from each side of the plank, are removed from the wooden or glass plank with the help of a sharp knife.
- Pass these plain beeswax sheets, one by one, through the rollers of comb foundation mill.
- Pour soap water solution on the rollers to prevent sticking of beeswax sheets to these rollers. Wash these comb foundations in water to remove any residue of soap.



## UNIT 4.2: Marketing of Hive Products

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Prepare a ractive and colourful label for honeybottles
2. Select a r active and useful bo les for packinghoney
3. Explain mportance of preparinghoney packages of different weight
4. Explore different avenues for marketing your honey and other hive products properly.

### Resources

- White board, duster, marker, flip charts, pens / pencils, notepad, computer, projector, PPT Slides or videos on marketing of honey and other hive products, relevant case studies, bottles of different capacities, colourful labels, etc.

### Ask

- How can you market honey and honey-based products in retail market?
- What quality standards need to be taken for marketing of honey products?

### Elaborate

- Packing and labelling of honey
- Quality standards need to be maintained for marketing of honey
- Marketing of honey and other products.

### Field Visit

**Purpose :** To enhance the knowledge of marketing of honey.

**Methodology :** Field visit and the time varies according to the location, it may be 2 hours.

- Arrange a visit to nearby market
- Ask the participants to interact with shopkeeper regarding marketing procedure of honey
- Discuss the problems faced during the sale of honey-based products.
- Emphasize methods for local marketing for small-scale beekeepers.
- Point out that marketing is as important as producing in a beekeeping project.

## Notes for Facilitation



- Assist the participants to prepare attractive and colourful label of honey products.
- The participants may be asked to explore different avenues for marketing honey and other hive products.
- Give your expert advice on how to market honey and other hive products effectively.
- Encourage the students to prepare their own marketing strategy.

## Exercise



### Key Solutions to PHB Exercises

1. Label on the honey bottles should be colourful and highly attractive. And the label should have information regarding source of honey, name and address of packer, date of packing, lot number, etc.
2. Steps to be taken for selling of honey in retail market:
  - Maintain good quality of honey.
  - Use an attractive brand name for your honey.
  - Use wide mouthed, clean bottles of good quality and shape.
  - Fill honey in bottles of different capacities.
  - Obtain FSSAI Number for selling honey in retail packing
  - Obtain AgMark to ensure confidence of consumer in purchasing your brand of bottles honey.
  - Label on the honey bottles should be colourful and highly attractive.
  - Apart from brand name, the label should have information regarding source of honey, name and address of packer, date of packing, lot number, etc
  - To give boost to retail sale of honey, prepare attractive gift packs for festive seasons and functions.
3. FSSAI and AgMark quality measures should be taken.





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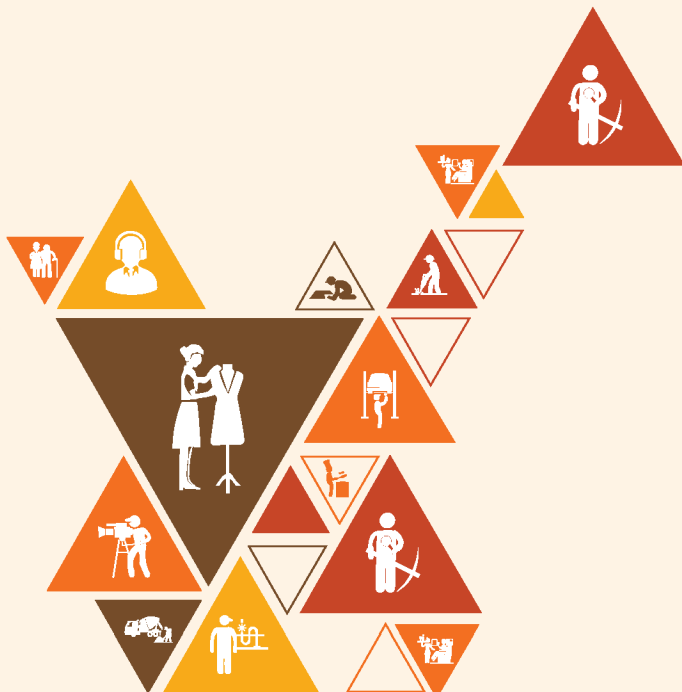
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# 5. Hygiene and Cleanliness

Unit 5.1 - Hygiene and Cleanliness



**AGR/N9903**

## Terminal Outcomes

**After the completion of this module, the participant will be able to:**

1. Discuss how to adhere to personal hygiene practices.
2. Demonstrate ways to ensure cleanliness around the workplace.

## Key Learning Outcomes

After the completion of this module, the participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> <li>1. Explain the requirements of personal health, hygiene and fitness at work.</li> <li>2. Describe common health-related guidelines laid down by the organizations/ Government at the workplace.</li> <li>3. Explain the importance of good housekeeping at the workplace.</li> <li>4. Explain the importance of informing the designated authority on personal health issues related to injuries and infectious diseases.</li> </ol>	<ol style="list-style-type: none"> <li>1. Demonstrate personal hygiene practices to be followed at the workplace.</li> <li>2. Demonstrate the correct way of washing hands using soap and water, and alcohol-based hand rubs.</li> <li>3. Demonstrate the steps to follow to put on and take off a mask safely.</li> <li>4. Show how to sanitize and disinfect one's work area regularly.</li> <li>5. Demonstrate adherence to the workplace sanitization norms.</li> <li>6. Show how to ensure the cleanliness of the work area.</li> </ol>

## UNIT 5.1 : Personal Hygiene Practices

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Describe the process of maintaining good hygienic practices in the workplace.
2. Follow the rules of sanitisation in the workplace, including keeping distance from sick people.

### Resources

- Participant handbook, Presentation slides, Whiteboard, Markers, Pictures, Posters, Newspaper clippings, Laptop, Internet connection (if possible).

### Say

- Greet the participants and before beginning the session, recapitulate the previous session discussions.

### Ask

- Do you understand by the term “Hygiene”.?

### Explain

**Explain with the help of PHB :**

- Workplace Hygiene
- Personal Hygiene
- Washroom Hygiene
- Security measures for the safety of employees and other

### Activity

**Purpose:** To understand the need for personal hygiene

**Methodology:** Discussion for 15 minutes.

**Expected Outcome:** Participants have to list the external parts of the body that need to be kept clean and healthy, while explaining why it is needed.

- Put up the power point slide and start a discussion around the subject – what is personal hygiene and why it is needed.

**Do**

- During the activity, encourage the participants to ask questions and have active participation.
- At the end of the activity, clarify the doubts the participants.
- Provide your own expert advice and opinion regarding the topic.

**Notes of Facilitation**

- Conclude the unit by calling for volunteers to sum up one by one the learning on importance of sanitizing the workplace, the procedure to sanitize and disinfect work area.
- Encourage active participation and engagement from students, such as through group discussions and hands-on exercises.
- Provide a balance of both theoretical and practical information on the use PPEs, Cleaning disinfectants and other objects needed in this process.
- Get participants to open up their participant handbooks and solve the exercises given at the end of the unit. Discuss the answers.

**Exercise****Key Solutions to PHB Exercises****A. Short Answer type Questions**

1. Many diseases and conditions can be prevented or controlled through appropriate personal hygiene.
2. Wear face mask, at a minimum, at all times when around coworkers or the general public. Frequently wash your hands with soap and water for at least 20 seconds and avoid touching your eyes, nose, or mouth with unwashed hands.

**B. Multiple Choice Questions**

1. Personal Protective Equipment
2. 2019

**C. Fill in the Blanks:-**

- 1.
- 2.
- 3.

**D. True/False**

- 1.
- 2.
- 3.







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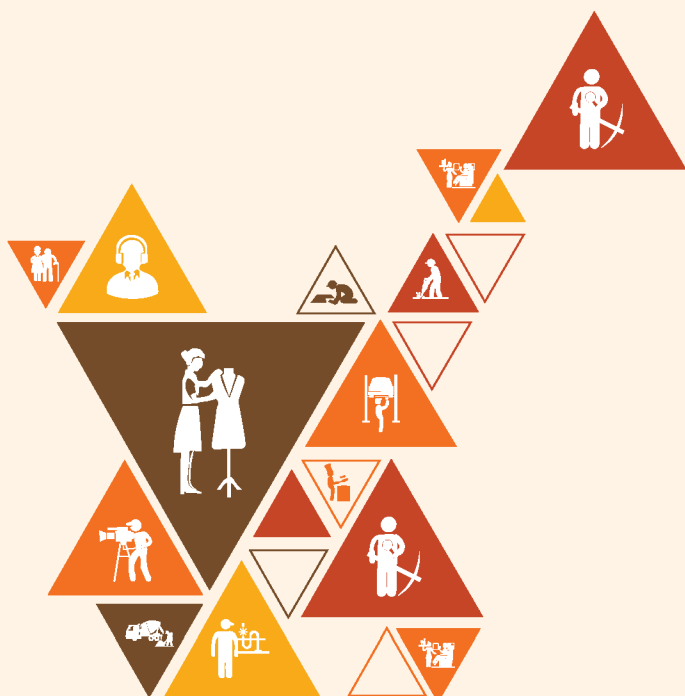
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## 6. Safety and Emergency Procedures

Unit 6.1 - Safety and Emergency Procedures



**AGR/N9903**

## Terminal Outcomes

**After the completion of this module, the participant will be able to:**

1. Describe how to adhere to safety guidelines.
2. Show how to administer appropriate emergency procedures.

## Key Learning Outcomes

After the completion of this module, the participant will be able to:

Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ol style="list-style-type: none"> <li>1. List the Personal Protective Equipment (PPE) required at the workplace.</li> <li>2. Describe the commonly reported hazards at the workplace.</li> <li>3. Describe the hazards caused due to chemicals/pesticides/fumigants.</li> <li>4. Describe the basic safety checks to be done before the operation of any equipment/machinery.</li> <li>5. Describe the common first aid procedures to be followed in case of emergencies.</li> <li>6. State measures that can be taken to prevent accidents and damages at the workplace.</li> <li>7. Explain the importance of reporting details of first aid administered, to the reporting officer/doctor, in accordance with workplace procedures.</li> <li>8. State common health and safety guidelines to be followed at the workplace.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check various areas of the workplace for leakages, water-logging, pests, fire, etc.</li> <li>2. Demonstrate how to safely use the PPE and implements it as applicable to the workplace.</li> <li>3. Display the correct way of donning, doffing and discarding PPE such as face masks, hand gloves, face shields, PPE suits, etc.</li> <li>4. Sanitize the tools, equipment and machinery properly.</li> <li>5. Demonstrate the safe disposal of waste.</li> <li>6. Demonstrate procedures for dealing with accidents, fires and emergencies.</li> <li>7. Demonstrate emergency procedures to the given workplace requirements.</li> <li>8. Demonstrate the use of emergency equipment in accordance with manufacturers' specifications and workplace requirements.</li> <li>9. Demonstrate the administration of first aid.</li> <li>10. Prepare a list of relevant hotline/emergency numbers.</li> </ol>

## UNIT 6.1: Cleaning Around the Workplace

### Unit Objectives

**After the completion of this unit, the participant will be able to:**

1. Explain the importance of workplace safety
2. Explain about PPE kit
3. Explain cleaning, disinfection and pest control measures
4. Explain the importance of drainage and waste disposal around the workplace
5. Describe the importance of labelling and risk assessment practices in the workplace

### Resources

- Participant handbook, Presentation slides, Whiteboard, Markers, Pictures, Posters, Newspaper clippings, Laptop, Internet connection (if possible).

### Say

- Greet the participants and before beginning the session, recapitulate the previous session discussions.

### Ask

- Have you ever heard about PPE ?

### Elaborate

- Inspection of Personal Protective Equipment (PPE).
- Cleaning and disinfection
- Pest Control system
- Drainage and Waste disposal

## Activity



**Purpose :** To perceive the topic and time will be 20 minutes.

**Methodology :** Pen and paper

- Divide the participants into groups
- Ask the participants to label the chart paper “TIPS FOR CLEANLINESS”.
- Now discuss the points of every group.

## Notes for Facilitation



- Encourage active participation and engagement from students, such as through group discussions and hands-on exercises.
- Provide a balance of both theoretical and practical information on the use PPEs, Cleaning disinfectants and other objects needed in this process.
- Get participants to open up their participant handbooks and solve the exercises given at the end of the unit.

## Exercise



### Key Solutions to PHB Exercises

1. (a) All the equipments and tools used on the day is pre-inspected.  
(b) All workplaces are inspected and any hazards are taken care of.  
(c) If unable to remove or protect against the hazard, a warning sign should be provided in such case.
2. Chemical safety checklist
  - (a) Seperate storage area for pesticides
  - (b) Adequate supply of water
  - (c) Warning sign- NO SMOKING
  - (d) Availability od suitable PPE
3. Emergency procedures
  - (a) Apply first aid upon exposure or injury by equipment or during pesticide overexposure
  - (b) Giving proper rest to the person under heat stress
  - (c) Call the local doctor or drive in personal to the nearest emergency treatment center.





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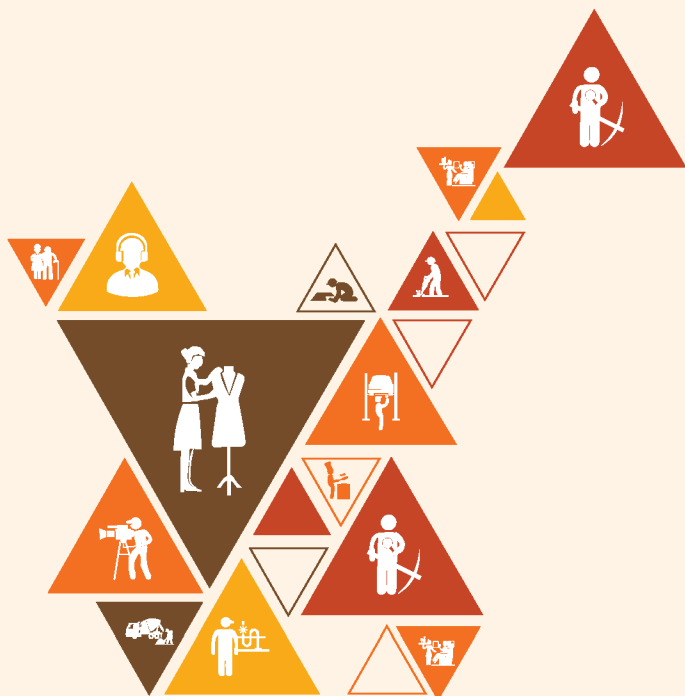
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## 7. Annexures

Annexure I - Training Delivery Plan

Annexure II - Assessment Criteria

Annexure III - QR Codes –Video Links





## Annexure - I

### Training Delivery Plan

Training Delivery Plan			
Program Name:	Beekeeper		
Qualification Pack Name & Ref. ID	AGR/Q5301		
Version No.	3.0	Version Update Date	
Pre-requisites to Training (if any)	5th Class with 4 Years of relevant experience OR 8th Class with 1 Year of relevant experience OR Ability to read and write with 5 Years of relevant experience OR Certificate-NSQF Level-3 (in Agriculture/Horticulture Sector Job Roles) with 1 Years of relevant experience		
Training Outcomes	<p><b>After completing this programme, participants will be able to:</b></p> <ul style="list-style-type: none"> <li>• <b>Understand bee biology and behaviour:</b> Types of Bees, Life cycle</li> <li>• <b>Handle beekeeping systems and beekeeping equipments:</b> Bee Keeping Systems/Hives, Installation of Hives, Tools</li> <li>• <b>Beehive Management:</b> Colony Management etc</li> <li>• Manage insects, diseases and nuisances in beehive:</li> <li>• <b>Harvest, process and market the produce:</b> Honey and other byproducts, Method of Harvesting, time of harvesting, tools and equipments required, Processing of products, marketing etc.</li> </ul>		

S. No.	Module Name	Session Name	Session Objectives	NOS References	Methodology	Training Tools/Aids	Durations
1	Introduction T: 04:00 P : 00:00 (HH:MM)	Size and Scope of Agriculture sector	<ul style="list-style-type: none"> <li>Recognize importance of the programme</li> </ul>	NA	Classroom lecture, Activity	PHB, Presentation, White board, Marker, Projector, Laptop, Video Films	T: 2:00
		Role of Beekeeper and Employment Opportunities	<ul style="list-style-type: none"> <li>Define role of beekeeper</li> <li>Explain importance of beekeeping in generating self-employment</li> <li>Describe importance of beekeeping</li> </ul>		Classroom lecture, Field visit, Expert session	PHB, Presentation, White board, Marker, Projector, Laptop, Video Films	T: 2:00
2	Process of preparing and starting beekeeping operations T: 24:00 P: 64:00 (HH:MM)	Honey Bee : An overview	<ul style="list-style-type: none"> <li>Identify species of honey bees</li> <li>Explain the role played by honeybees</li> </ul>	AGR/N5303 KU1, KU2, GS1-GS7	Classroom lecture, Activity, Field visit	PHB, pens, notepad, laptop, marker, projector, white board, Hive Uncapping Knife, Hive Tool, Bee Brush, etc.	T: 2:00 P: 5:00
		Honey Bee : Natural habitat	<ul style="list-style-type: none"> <li>Explain the natural habitat of bees.</li> </ul>	AGR/N5303 KU3, GS1-GS7	Classroom lecture, Activity, Field visit	PHB, pens, notepad, laptop, marker, projector, white board, Hive Uncapping Knife, Hive Tool, Bee Brush, etc.	T: 2:00 P: 5:00
		Bee keeping systems	<ul style="list-style-type: none"> <li>Identify systems of beekeeping</li> <li>Identify criteria for selecting a beekeeping system</li> </ul>	AGR/N5303 KU4, KU5, GS1-GS7	Classroom lectures, Activity, Demonstrate	PHB, pens, notepad, laptop, marker, projector, white board, etc.	T: 2:00 P: 5:00
		Economic aspects and management	<ul style="list-style-type: none"> <li>Explain importance of selecting cost-effective equipment</li> <li>Explain importance of planning beekeeping</li> </ul>	AGR/N5303 PC5, KU4, KU10, GS1-GS7	Classroom lectures, Activity, Demonstrate	PHB, pens, notepad, laptop, projector, white board, marker, audio-visual aid, samples of different types of bees, schematic drawing of honey bee, etc.	T: 2:00 P: 5:30
		Beehive Management (Part-1)	<ul style="list-style-type: none"> <li>Select suitable site for siting apiary</li> <li>Know about the requirements for apiary site</li> </ul>	AGR/N5303 PC8, KU10, KU12, GS1-GS8	Classroom lectures, Activity, Demonstrate	White board, PHB, laptop, projector, flip charts/paper, audio-visual aids, Honey Extractor, Propolis Collector, Pollen Collector, etc.	T: 2:00 P: 5:30
		Beehive Management (Part-2)	<ul style="list-style-type: none"> <li>Know about importance of selecting an appropriate site</li> <li>Know about suitable climate</li> </ul>	AGR/N5303 KU6, KU13, GS1-GS8	Classroom lectures, Activity, Demonstrate	White board, PHB, laptop, projector, flip charts/paper, audio-visual aids, Honey Extractor, Propolis Collector, Pollen Collector, etc.	T: 2:00 P: 5:00

S. No.	Module Name	Session Name	Session Objectives	NOS References	Methodology	Training Tools/Aids	Durations
		Principles Of Beekeeping Equipment and Machines (Part-1)	<ul style="list-style-type: none"> <li>Identify beekeeping tools and equipment.</li> </ul>	AGR/N5303 PC5, KU10,GS1-GS7	Classroom lecture, Demonstrate	White board, duster, marker, pens, notepad, computer, etc.	T: 2:00 P: 5:30
		Principles Of Beekeeping Equipment and Machines (Part-2)	<ul style="list-style-type: none"> <li>Explain significance of various tools and equipment</li> </ul>	AGR/N5303 PC5,KU16, GS1-GS7	Classroom lecture, demonstration, group discussion	White board, PHB, laptop, projector, flip charts/paper, audio-visual aids, Honey Extractor, Propolis Collector, Pollen Collector, etc.	T: 2:00 P: 5:30
		Specifications, Quality, Utility and Working (Part-1)	<ul style="list-style-type: none"> <li>Explain the structure of beekeeping system</li> <li>Describe parts of a beekeeping system</li> </ul>	AGR/N5303 KU11,KU15, GS1-GS7	Classroom lecture, Demonstrate	White board, duster, marker, flip charts, pens / pencils, notepad, Projector audio-visual aids,PHB,etc	T: 2:00 P: 5:30
		Specifications, Quality, Utility and Working (Part-2)	<ul style="list-style-type: none"> <li>Identify various beekeeping tools and equipment</li> <li>Explain the significance of tools and equipment</li> </ul>	AGR/N5303 PC5, KU16, GS1-GS7	Classroom lecture, Demonstrate	Various tools and equipment used in beekeeping such as veil, gloves, overall, hive tool, smoker, comb foundation, bee brush, etc.	T: 2:00 P: 5:30
		Establishment of Bee Colony (Part-1)	<ul style="list-style-type: none"> <li>Identify criteria for selecting beespecies</li> <li>Know about the procedure of buying bees</li> </ul>	AGR/N5303 PC14, KU23, GS1-GS8	Classroom lectures, Activity, Demonstrate	PHB, pens, laptop, projector, white board, marker, duster, etc	T: 2:00 P: 5:30
		Establishment of Bee Colony (Part-2)	<ul style="list-style-type: none"> <li>Know about cleanliness of beehives</li> <li>Know about bees in beehives</li> </ul>	AGR/N5303 PC16, KU26, KU27, GS1-GS7	Classroom lecture, Activity, Demonstrate, Trainer	PHB,audio-visual aids, bee keeping tools such as smoker, comb foundation, hive tools, nucleus colonies, bee frames, etc	T: 2:00 P: 5:30
3	Process of inspecting and maintaining the beehives T: 24:00 P: 64:00 (HH:MM)	Inspection of a bee colony and swarming (Part-1)	<ul style="list-style-type: none"> <li>Describe the process of inspecting beehives</li> <li>Explain swarming and absconding in beehive</li> </ul>	AGA/N5304 PC1,PC2, KU1,KU2, GS1-GS8	Classroom lecture, Role play	PHB, White board, Marker, Projector, Laptop ,All Personal Protective Equipment Required, Smoker, Bee Suite and Gloves, Royal Jelly Extractor, Venom Extractor, etc.	T: 2:00 P: 4:00
		Inspection of a bee colony and swarming (Part-2)	<ul style="list-style-type: none"> <li>Explain the importance of ensuring effective drainage</li> </ul>	AGA/N5304 KU4, GS1-GS8	Classroom lecture, activity, group discussion	PHB,Pens, Notepad, laptop, Projector, White board, audio-visual aids,	T: 1:00 P: 4:00

S. No.	Module Name	Session Name	Session Objectives	NOS References	Methodology	Training Tools/Aids	Durations
						honey bee colonies, record keeping book, etc.	
		Selection of Colonies and Mass Queen Bee Rearing	<ul style="list-style-type: none"> <li>Select the colonies</li> <li>Develop rearing skill and manage the breeder queen</li> </ul>	AGA/N5304 KU5, GS1-GS7	Classroom lecture, demonstration, practical	PHB, pens, notepad, laptop, projector, white board, audio-visual aids, queen bee, coloured markers, knife, queen excluder, frame with empty comb, swarm boxes, etc	T: 2:00 P: 4:00
		Maintaining Bees and Honey Quality (Part-1)	<ul style="list-style-type: none"> <li>Explain the practices of preserve honeycombs</li> <li>Explain the importance of shading</li> </ul>	AGA/N5304 PC6, PC8, PC9, KU8, KU9, KU10, GS1-GS8	Classroom lecture, activity, group discussion, practical	PHB, pens, laptop, projector, white board, marker, duster, audio-visual aids, bee keeping tools etc.	T: 1:00 P: 4:00
		Maintaining Bees and Honey Quality (Part-2)	<ul style="list-style-type: none"> <li>Describe the process of uniting and dividing</li> <li>Explain the use of a queen excluder</li> <li>Know how to reduce drifting and disease transmission</li> </ul>	AGA/N5304 PC14, PC18, KU15, KU18, KU39, GS1-GS8	Classroom lecture, activity, group discussion, practical	PHB, pens, laptop, projector, white board, marker, duster, audio-visual aids, bee keeping tools etc.	T: 2:00 P: 4:00
		Pests of Honey Bees (Part-1)	<ul style="list-style-type: none"> <li>Identify ectoparasitic bee mites</li> <li>Identify symptoms of damage</li> <li>Management with non-chemical methods</li> <li>Management with chemical methods</li> <li>Identify species of wax moths</li> </ul>	AGA/N5304 PC22-PC24, KU20-KU22, GS1-GS7	Classroom lecture, Demonstration, activity, group discussion, practical	PHB, pens, laptop, projector, white board, marker, duster, audio-visual aids, bee keeping tools etc.	T: 2:00 P: 5:00
		Pests Of Honey Bees (Part-2)	<ul style="list-style-type: none"> <li>Identify nature and extent of damage caused by wax moths</li> <li>Identify developmental stages of wax moths</li> <li>Identify bee predatory wasps</li> </ul>	AGA/N5304 PC22-PC24, KU20-KU22, GS1-GS7	Classroom lecture, Demonstration, activity, group discussion, practical	PHB, White board, Marker, Projector, Laptop, All Personal Protective Equipment Required etc.	T: 1:00 P: 4:00
		Management Of pest	<ul style="list-style-type: none"> <li>Store combs safely to prevent damage by wax moths</li> <li>Manage bee enemies with non-chemical and chemical methods</li> <li>Identify predatory birds</li> </ul>	AGA/N5304 PC22, PC23, KU20, KU21, GS1-GS8	Classroom lecture, Demonstration, activity, group discussion, field visit	PHB, White board, Marker, Projector, Laptop, All Personal Protective Equipment Required, , Bee Suite and Gloves, etc.	T: 2:00 P: 4:00
		Management of bee enemies	<ul style="list-style-type: none"> <li>Protect colonies from predatory birds</li> </ul>	AGA/N5304 KU23, GS1-GS7	Classroom lecture, Demonstration, activity, group discussion, field visit	PHB, White board, Marker, Projector, Laptop, All Personal Protective	T: 1:00 P: 4:00

S. No.	Module Name	Session Name	Session Objectives	NOS References	Methodology	Training Tools/Aids	Durations
			<ul style="list-style-type: none"> <li>Protect colonies from other bee enemies.</li> </ul>			Equipment Required, , Bee Suite and Gloves, etc.	
		Diseases of Honey Bees	<ul style="list-style-type: none"> <li>Identify bacterial diseases</li> <li>Identify viral diseases</li> <li>Identify fungal diseases</li> </ul>	AGA/N5304 PC21, KU19, KU60, KU61, GS1-GS8	Classroom lecture, Demonstration, activity, group discussion	PHB, White board, Marker, Projector, Laptop ,All Personal Protective Equipment Required, , Bee Suite and Gloves, etc.	T: 2:00 P: 4:00
		Management of diseases	<ul style="list-style-type: none"> <li>Manage bee diseases</li> <li>Mange your apiary</li> </ul>	AGA/N5304 PC21, KU60, KU61, GS1-GS8	Classroom lecture, Demonstration, activity	PHB, White board, Marker, Projector, Laptop, Pens , notepad, projector, pictures or slides of honey bee diseases, chemicals like formalin, acetic acid etc.	T: 2:00 P: 4:00
		Nuisances to Bee keeping and their Management (Part-1)	<ul style="list-style-type: none"> <li>Identify nuisances in beekeeping</li> <li>Discuss pesticide application</li> </ul>	AGA/N5304 PC25, KU23, KU52, KU59, GS1-GS7	Classroom lecture, Demonstration, activity, group discussion	PHB, Pens, Notepad, Computer, Projector, White board, live bees in small containers, some examples of pesticides, etc.	T: 1:00 P: 4:00
		Nuisances to Bee keeping and their Management (Part-2)	<ul style="list-style-type: none"> <li>Identify the symptoms of insecticidal poisoning</li> <li>Explain the bee colony collapse</li> </ul>	AGA/N5304 PC19, KU58, GS1-GS7	Classroom lecture, Demonstration, activity, group discussion	PHB, White board, Marker, Projector, Laptop , some examples of pesticides, etc.	T: 1:00 P: 4:00
		Resource Optimization and Waste Management	<ul style="list-style-type: none"> <li>Explain the benefits of resource optimisation.</li> <li>Explain the importance of recycling and disposing</li> </ul>	AGA/N5304 PC26, KU24, GS1-GS7	Classroom lecture, activity	PHB, pens, notepad, laptop, projector, white board, audio-visual aids, etc.	T: 1:00 P: 1:00
		Life Cycle, Colony Organization	<ul style="list-style-type: none"> <li>Identify stages of honey bees.</li> <li>Understand honey and pollen storage behavior</li> <li>Identify various raw material generated</li> </ul>	AGA/N5304 KU27, KU28, GS1-GS7	Classroom lecture, activity, group discussion	PHB, pens, notepad, laptop, projector, white board, marker, schematic drawing of honey bee, hand lens, etc.	T: 1:00 P: 4:00
		Communication in Honey bees	<ul style="list-style-type: none"> <li>Describe different communication methods</li> <li>Explain how bees locate their food source</li> </ul>	AGA/N5304 PC16, KU29, KU30, GS1-GS8	Classroom lecture, Demonstration, activity, group discussion	PHB, pens, notepad, audio-visual aids depicting relevant information about lifecycle of honey bees, etc.	T: 1:00 P: 2:00
		Management of Honey Bee Colonies during	<ul style="list-style-type: none"> <li>List bee forage plants</li> <li>Location of an apiary</li> </ul>	AGA/N5304 PC5, PC7, KU7, KU36, GS1-GS7	Classroom lecture, Demonstration, activity, group	PHB, pens, notepad, laptop, projector, white board, eggs,	T: 1:00 P: 4:00

S. No.	Module Name	Session Name	Session Objectives	NOS References	Methodology	Training Tools/Aids	Durations
		Nectar and Pollen Dearth Period	<ul style="list-style-type: none"> <li>Explain how to manage bee colonies</li> </ul>		discussion, field visit	brewer's yeast, sugar solution, dehusked parched gram, skimmed milk powder, etc.	
4	Process of Harvesting, Processing and Marketing of the Produce T: 24:00 P: 60:00 (HH:MM)	Harvesting of honey (Part-1)	<ul style="list-style-type: none"> <li>Select and collect honey combs for extraction</li> <li>Uncap sealed honey combs</li> <li>Extract honey</li> </ul>	AGR/N5305 PC1-PC5, KU1-KU5, GS1-GS8	Classroom lecture, activity, group discussion, field visit	PHB, White board, duster, marker, pen, notepad, computer, projector, audio-visual aids, bee suite and gloves, smoker, etc.	T: 2:00 P: 5:00
		Harvesting of honey (Part-2)	<ul style="list-style-type: none"> <li>Filter and store honey</li> <li>Prepare a ractive and colourful label</li> </ul>	AGR/N5305 PC6,PC11, PC12, KU6,KU10,KU11, GS1-GS7	Classroom lecture, Demonstration, activity, group discussion, field visit	Honey extractor, bee brush, wire screen, uncapping knife, comb foundation mill, extractor, trap,collectoretc .	T: 2:00 P: 5:00
		Processing of honey	<ul style="list-style-type: none"> <li>Extract wax from broken combs</li> <li>Install pollen trap</li> <li>(Done by one group of class)</li> </ul>	AGR/N5305 PC7,PC8, KU4,KU7, GS1-GS8	Classroom lecture, activity, group discussion, practical	PHB, projector, audio-visual aids, smoker, bee brush, wire screen, uncapping knife, comb foundation mill, etc.	T: 2:00 P: 6:00
			<ul style="list-style-type: none"> <li>Extract wax from broken combs</li> <li>Install pollen trap</li> <li>(Done by another group of class)</li> </ul>	AGR/N5305 PC7,PC8, KU4,KU7, GS1-GS8	Classroom lecture, activity, group discussion, practical	PHB, projector, audio-visual aids, smoker, bee brush, wire screen, uncapping knife, comb foundation mill, etc.	T: 2:00 P: 6:00
		Harvesting and processing other hive products (Part-1)	<ul style="list-style-type: none"> <li>Prepare queen cell cups-1</li> </ul>	AGR/N5305 PC1, GS1-GS7	Classroom lecture, Demonstration, activity, group discussion	PHB, White board, duster, marker, pen, notepad, computer, projector, audio-visual aids, bee suite and gloves, smoker, etc	T: 2:00 P: 4:00
			<ul style="list-style-type: none"> <li>Prepare queen cell cups-2</li> </ul>	AGR/N5305 PC1, GS1-GS7	Demonstration, activity, practical	Bee suite and gloves, smoker, etc	P: 4:00
		Harvesting and processing other hive products (Part-2)	<ul style="list-style-type: none"> <li>Extract royal jelly</li> <li>Collect bee venom</li> </ul>	AGR/N5305 PC4, KU4, GS1-GS7	Classroom lecture, Demonstration, activity	PHB, bee brush, wire screen, uncapping knife, comb foundation mill, extractor, trap,collectoretc .	T: 2:00 P: 6:00
		Marketing of hive products (Part-1)	<ul style="list-style-type: none"> <li>Prepare a colourful label</li> <li>Select a ractive and useful bottles-1</li> </ul>	AGR/N5305 PC11,PC12, KU10,KU11, GS1-GS7	Classroom lecture, Demonstration, activity, field visit	PHB, White board, marker, pens, notepad, computer, projector, PPT	T: 2:00 P: 5:00

S. No.	Module Name	Session Name	Session Objectives	NOS References	Methodology	Training Tools/Aids	Durations
						Slides or videos on marketing of honey and other hive products,etc.	
			<ul style="list-style-type: none"> <li>Prepare a colourful label</li> <li>Select a ractive and useful bottles-2</li> </ul>	AGR/N5305 PC11,PC12, KU10,KU11, GS1-GS7	Classroom lecture, Demonstration, activity, field visit	PHB, White board, marker, pens, notepad, computer, projector, PPT Slides or videos on marketing of honey and other hive products,etc.	T: 2:00 P: 5:00
		Marketing of hive products (Part-2)	<ul style="list-style-type: none"> <li>Explain importance of preparing honey packages</li> <li>Explore avenues for marketing</li> </ul>	AGR/N5305 PC13-PC16, KU11-KU15, GS1-GS7	Classroom lecture, Demonstration, activity, field visit	White board, marker,pens, notepad, computer, projector, PPT Slides or videos on marketing of honey etc.	T: 2:00 P: 5:00
		Chapter Recall (Part-1)	<ul style="list-style-type: none"> <li>Revision of Harvesting and processing of Honey</li> </ul>	AGR/N5305 PC1-PC16, KU1-KU15, GS1-GS7	Classroom lecture, Reading, Group discussion	PHB, Laptop, white board, marker, etc	T: 3:00 P: 5:00
		Chapter Recall (Part-2)	<ul style="list-style-type: none"> <li>Discuss exercise questions</li> </ul>	AGR/N5305 PC1-PC16, KU1-KU15, GS1-GS7	Classroom lecture, Reading, Group discussion	PHB, Laptop, white board, marker, notepad, pens, etc	T: 4:00 P: 4:00
5	Hygiene and cleanliness T: 2:00 P: 2:00 (HH:MM)	Hygiene and cleanliness	<ul style="list-style-type: none"> <li>Describe the process of maintaining good hygienic practices</li> <li>Follow the rules of sanitisation</li> </ul>	AGR/N9903 PC1-PC5, KU5-KU8, GS1-GS7	Classroom lecture, activity	PHB, Presentation slides, White board, Markers, Pictures, Posters, Newspaper clippings, Laptop,etc.	T: 2:00 P: 2:00
6	Safety and emergency procedures T: 2:00 P: 10:00 (HH:MM)	Safety and emergency procedures (Part-1)	<ul style="list-style-type: none"> <li>Explain the importance of workplace safety</li> <li>Explain about PPE kit</li> <li>Explain cleaning, disinfection and pest control measures</li> </ul>	AGR/N9903 PC5, PC6, PC9, KU1-KU3, GS1-GS7	Classroom lecture, activity, group discussion	PHB, Presentation slides, White board, Markers, Pictures, Posters, Newspaper clippings, Laptop,etc.	T: 1:00 P: 5:00
		Safety and emergency procedures (Part-2)	<ul style="list-style-type: none"> <li>Explain the importance of drainage and waste disposal</li> <li>Describe the importance of labelling and risk assessment practices</li> </ul>	AGR/N9903 PC13, KU11, GS1-GS7	Classroom lecture, activity, group discussion	PHB, Presentation slides, White board, Markers, Pictures, Posters, Newspaper clippings, Laptop,etc.	T: 1:00 P: 5:00

S. No.	Module Name	Session Name	Session Objectives	NOS References	Methodology	Training Tools/Aids	Durations
7.	Employability Skills	Introduction to Employability Skills	<ul style="list-style-type: none"> <li>Describe the importance of Employability Skills</li> <li>Prepare a note on different industries, trends, required skills</li> </ul>	DGT/VSQ/ N0101	Team Activity: Interactive discussion	White-board and Markers Chart paper and sketch pens LCD Projector, Laptop for Presentation, audio visual aids, note pad, paper, pen, computers etc.	1 hrs
		Constitutional Values: Citizenship	<ul style="list-style-type: none"> <li>Detail the principles of the constitution of India</li> <li>Identify the various environmentally sustainable practices</li> </ul>		Class room lecture, discussion, Demonstration, practical		1 hrs
		Becoming a Professional in the 21st Century	<ul style="list-style-type: none"> <li>Discuss relevant 21st century skills required for employment</li> <li>Practice critical thinking and decision making skills</li> </ul>		Class room lecture, discussion, Demonstration, practical		1 hrs
		Basic English Skills	<ul style="list-style-type: none"> <li>Read English text with appropriate articulation</li> <li>Practice basic English words, sentences and punctuation</li> </ul>		Team Activity: Role play, video session		2hrs



S. No.	Module Name	Session Name	Session Objectives	NOS References	Methodology	Training Tools/Aids	Durations
		Communication Skills	<ul style="list-style-type: none"> <li>Explain the importance of communication at workplace</li> <li>Demonstrate effective communication strategies</li> <li>Demonstrate how to communicate effectively using verbal and nonverbal communication</li> </ul>	DGT/VSQ/N0101	Class room		4 hrs
		Diversity and Inclusion	<ul style="list-style-type: none"> <li>Demonstrate effective communication strategies</li> <li>Demonstrate how to communicate effectively using verbal and nonverbal communication</li> <li>Explain the need of diversity at workplace Identify the various PwD policies applicable at workplace</li> <li>Discuss the significance of the POSH Act</li> </ul>	DGT/VSQ/N0101	Class room session, Team Activity: Round of Inter-active discussion,		1 hr

S. No.	Module Name	Session Name	Session Objectives	NOS References	Methodology	Training Tools/Aids	Durations
		Financial and Legal Literacy	<ul style="list-style-type: none"> <li>Discuss various financial institutions, products, and services</li> <li>Explain the common components of salary such as Basic, PF, Allowances (HRA, TA, DA, etc.), tax</li> </ul>	DGT/VSQ/N0101	Class room lecture, Group discussion, demonstration, activity		4 hrs
		Essential Digital Skills	<ul style="list-style-type: none"> <li>Detail the use and features of various MS Office tools, like MS Word, MS Excel, MS PowerPoint, etc.</li> <li>Demonstrate how to operate digital devices</li> <li>Create an e-mail id and follow e-mail etiquette to exchange e-mails</li> </ul> <p>Describe the role of digital technology in day-to-day life and the workplace</p>	DGT/VSQ/N0101			3 hrs

S. No.	Module Name	Session Name	Session Objectives	NOS References	Methodology	Training Tools/Aids	Durations
		Entrepreneurship	<ul style="list-style-type: none"> <li>Describe the types of entrepreneurship and enterprises</li> <li>Describe the 4Ps of Marketing- Product, Price, Place and Promotion and apply them as per requirement</li> </ul>		Class room lecture, discussion, Demonstration, practical		7 hrs
		Customer Service	<ul style="list-style-type: none"> <li>Identify types of customers and how to deal with them</li> <li>Identify methods to get customer feedback and how to implement them</li> <li>Explain various tools used to collect customer feedback</li> <li>Discuss the significance of maintaining hygiene and dressing appropriately</li> </ul>	DGT/VSQ/N0101	Class room lecture, discussion, Demonstration, practical, Team Activity: Role play, video session		4 hrs
		Apprenticeships and Jobs	<ul style="list-style-type: none"> <li>Practice personal grooming strategies</li> <li>Illustrate the use of online platforms for job hunting</li> <li>Detail the concept of Apprenticeship</li> <li>Demonstrate how to enroll for Apprenticeship programs.</li> <li>Draft a professional Curriculum Vitae (CV)</li> <li>Role play a mock interview</li> </ul>	DGT/VSQ/N0101			2 hrs

## Annexure - II

### Assessment Criteria

For Updated Assessment Criteria, Refer QP from link:

<https://asci-india.com/standards-qp-nos.php>

#### CRITERIA FOR ASSESSMENT OF TRAINEES








Assessment Criteria for ASCI- Beekeeper	
Job Role	Beekeeper
Qualification Pack	AGR/Q5301
Sector Skill Council	Agriculture







Sr. No	Guidelines for Assessment
1.	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2.	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3.	Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4.	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5.	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
6.	To pass the Qualification Pack, every trainee should score a minimum of 50% of aggregate marks to successfully clear the assessment.
7.	In case of <i>unsuccessful completion</i> , the trainee may seek reassessment on the Qualification Pack.

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
AGR/N5303. Prepare for and start beekeeping operations	30	40	0	30	100	30
AGR/N5304. Inspect and maintain the beehives	30	40	0	30	100	30
AGR/N5305. Harvest, process and market honey and related produce	30	40	0	30	100	30
AGR/N9903. Maintain health and safety at the workplace	40	25	0	35	100	5
DGT/VSQ/N0101. Employability Skills (30 Hours)	20	30	0	0	50	5
<b>Total</b>	<b>150</b>	<b>175</b>	<b>0</b>	<b>90</b>	<b>450</b>	<b>100</b>

## Annexure-III

## QR Codes –Video Links

Chapter No.	Unit No.	Topic	QR Code Links	QR code (s)
<b>Chapter -1</b> Introduction to the Role of a Beekeeper	Unit 1.1 - Size and Scope of Agriculture Sector	Size and Scope of Agriculture Sector	<a href="https://www.youtube.com/watch?v=bdiFKc1zYcM">https://www.youtube.com/watch?v=bdiFKc1zYcM</a>	 Size and Scope of Agriculture Sector
	Unit 2.1 - Honey Bee: An Overview	Honey Bee: An Overview	<a href="https://www.youtube.com/watch?v=82jhpETt0Qg&amp;list=PLu5EbRHxkq_dOAK2NbFoy_7irCrRGDcwc&amp;index=2">https://www.youtube.com/watch?v=82jhpETt0Qg&amp;list=PLu5EbRHxkq_dOAK2NbFoy_7irCrRGDcwc&amp;index=2</a>	 Honey Bee: An Overview
<b>Chapter -2</b> Process of Preparing for and Starting Beekeeping Operations	Unit 2.3 - Beehive Management	Beehive Management	<a href="https://www.youtube.com/watch?v=g2Gq5octKkU&amp;t=12s">https://www.youtube.com/watch?v=g2Gq5octKkU&amp;t=12s</a>	 Beehive Management
	Unit 2.4 - Specifications, Quality, Utility and Working Principles of Beekeeping Equipment and Machines	Specifications, Quality, Utility and Working Principles of Beekeeping Equipment and Machines	<a href="https://www.youtube.com/watch?v=QvDIDw1MCtg">https://www.youtube.com/watch?v=QvDIDw1MCtg</a>	 Specifications, Quality, Utility and Working Principles of Beekeeping Equipment and Machines
<b>Chapter -3</b> Process of Inspecting and Maintaining the Beehives	Unit 3.1 - Inspection of a Bee Colony and Swarming	Inspection of a Bee Colony and Swarming	<a href="https://www.youtube.com/watch?v=CohtHUTHEvC">https://www.youtube.com/watch?v=CohtHUTHEvC</a>	 Inspection of a Bee Colony and Swarming
			<a href="https://www.youtube.com/watch?v=wF-rUKSnihc">https://www.youtube.com/watch?v=wF-rUKSnihc</a>	 Inspection of a Bee Colony and Swarming
	Unit 3.2 - Selection of Colonies and Mass Queen Bee Rearing	Selection of Colonies and Mass Queen Bee Rearing	<a href="https://www.youtube.com/watch?v=tOD7-jKDYiE">https://www.youtube.com/watch?v=tOD7-jKDYiE</a>	 Selection of Colonies and Mass Queen Bee Rearing

Chapter No.	Unit No.	Topic	QR Code Links	QR code (s)
	Unit 3.4 - Pests of Honey Bees and their Management	Pests of Honey Bees and their Management	<a href="https://www.youtube.com/watch?v=PadLDv6lXD8&amp;list=PLu5EbRHXkq_dOAK2NbFoy_7irCrRGDcwc&amp;index=6">https://www.youtube.com/watch?v=PadLDv6lXD8&amp;list=PLu5EbRHXkq_dOAK2NbFoy_7irCrRGDcwc&amp;index=6</a>	 Pests of Honey Bees and their Management
			<a href="https://www.youtube.com/watch?v=gdYILcNBR_c">https://www.youtube.com/watch?v=gdYILcNBR_c</a>	 Pests of Honey Bees and their Management
	Unit 3.5 - Diseases of Honey Bees and their Management	Diseases of Honey Bees and their Management	<a href="https://www.youtube.com/watch?v=PadLDv6lXD8&amp;list=PLu5EbRHXkq_dOAK2NbFoy_7irCrRGDcwc&amp;index=6">https://www.youtube.com/watch?v=PadLDv6lXD8&amp;list=PLu5EbRHXkq_dOAK2NbFoy_7irCrRGDcwc&amp;index=6</a>	 Diseases of Honey Bees and their Management
			<a href="https://www.youtube.com/watch?v=N3o8S-QEe5M">https://www.youtube.com/watch?v=N3o8S-QEe5M</a>	 Diseases of Honey Bees and their Management
	Unit 3.9 - Management of Honey Bee Colonies During Nectar and Pollen Dearth Period	Management of Honey Bee Colonies During Nectar and Pollen Dearth Period	<a href="https://www.youtube.com/watch?v=Q4uPH2BmZGo">https://www.youtube.com/watch?v=Q4uPH2BmZGo</a>	 Management of Honey Bee Colonies During Nectar and Pollen Dearth Period
<b>Chapter -4</b> Process of Harvesting, Processing and Marketing Honey and	Unit 4.1 - Harvesting and Processing of Honey and Other Hive Products	Harvesting and Processing of Honey and Other Hive Products	<a href="https://www.youtube.com/watch?v=YZNMGsftd3g&amp;list=PLu5EbRHXkq_dOAK2NbFoy_7irCrRGDcwc&amp;index=8">https://www.youtube.com/watch?v=YZNMGsftd3g&amp;list=PLu5EbRHXkq_dOAK2NbFoy_7irCrRGDcwc&amp;index=8</a>	 Harvesting and Processing of Honey and Other Hive Products





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**ASCI**  
Agriculture Skill Council of India

**Address:** 6th Floor, GNG Tower, Plot No. 10  
Sector - 44, Gurgaon - 122004, Haryana, India  
**Email:** [info@asci-india.com](mailto:info@asci-india.com)  
**Web:** [www.asci-india.com](http://www.asci-india.com)  
**Phone:** 0124-4288322, 4047488, 4046678  
**CIN No.:** U93000HR2013NPL048073