



BEEKEEPING Level - II

Learning Guide

Unit of Competence: Identify Honey Bee Flora
Module Title: Identifying Honey Bee Flora



Learning Guide #1

LG Code: **AGR BKG2M 05 LOLG1**

TTLM Code: **AGR BKG2 TTLM 0919v1**

LO 1: Preparing for honey bee flora recognition



Instruction Sheet	Learning Guide #-1
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Identifying and recognizing of *arrange of honey bee flora*
- Identifying and recognizing *resources and equipment for activity*
- Selecting honey bee flora and use

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

- Identify and recognition of *arrange of honey bee flora*
- Identify and recognition *resources and equipment for activity*
- Selecting honey bee flora and use

Learning Instructions:

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

Information Sheet-1	Identifying and recognizing of <i>arrange of honey bee flora</i>
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Identifying and recognizing of *arrange of honey bee flora*



BEE FLORA Honey bees collect nectar and pollen from a variety of plants which are known as bee flora or bee forage or bee pasture or nectar and pollen plants. Nectar is source of honey, meeting the carbohydrate requirements of honey bees, where as pollen is source of protein. Bee pasture can be designated as build up, honey flow and dearth period flora depending on period of availability with respect to development of bee colonies. The flora of an area is characteristic of its agro climatic conditions and as such varies from place to place. This flora is also a food base for large number of pollinators. Out of 3,52,000 species of flowering plants in the world nearly 3,08,000 species (87.5 per cent) are pollinated by animals (including insects, birds, bats, etc.). Bees pollinate a large majority of these plants. Pollination is an ecosystem service provided by the bees that is almost always taken for granted. In simple terms bees make more fruits and seeds for us by collecting nectar and pollen than the quantity of honey they make. Hence, it is essential to understand various types of bee flora and their blooming phenology in a given area to conserve bee colonies. Honey bees usually forage on only one kind of flower on any single trip. • A single bee can carry about 35% of its body weight of pollen.

Fruit trees:

Most fruit trees will provide forage to bees Apple, Plum and Cherry trees are some of the most bee-attracting trees. •Fruit trees provide both nectar and pollen to foraging bees in the spring and early summer. Plants which are visited by bees only for nectar: Tamarind(*Tamarindusindicus*) , Neem(*Azadirachtaindica*) ,Soapnut tree(*Sapindus spp.*) ,Eucalyptus spp, Pungam(*Pongamiapinnata*) , Moringatinctoria ,Prosopisspicigera

Plants which supply pollen to the bees: Sorghum, Maize, Roses, Finger millet, Bajra, Castor, Tobacco

Bee attraction plants are plants which are visited by bees these plants have different characteristics.

Flower position should be suitable for the bees to land on it and manipulate easily

Flower color especially the corolla colour should be white, yellow violent, blue or orange.

Flower morphology- Shape, arrangement, texture of corolla should be convenient for the bees to manipulate the flower.

High sugar rate (in nectar)- their taste should reach the bees demand .

Size and nature of pollen grain -Smaller and sticky in nature because honey bees do not collect and store in the comb cells



time of the day and activities of honey bees opening & releasing of pollen & nectar secretion of the flowers should coincide with the activities of honey bees.

Self-Check -1

Written Test

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

1. Define bee flora? 3pts
2. Write Bee attraction plants which plants have different characteristics?8pts
3. Write at least eight fruit trees that visited by bee? **5pts**

Note: Satisfactory rating - 16 points Unsatisfactory - below 16points
You can ask you teacher for the copy of the correct answers.



Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____



Information Sheet-2

Identify and recognition *resources* and *equipment* for *activity*

Resources may include

- Enterprise or public library
- Business and research organization websites
- Suppliers and contractors
- Enterprise supervisor and team colleague experience,

Equipment may include

- Computer assisted or manual word processors
- Telecommunication appliances
- Plant fixing materials
- Secateurs,
- Older and exercise books
- Pens and pencils..

Personal equipment

A) **Protective clothing-** to keep the bees reaching our flesh (for both traditional and modern bee keeping)

- **Bee suits (overall)** - used to cover all parts of body except head, hands and feet
- **Bee veil-** straw hats (any type of hat with brim) and used to protect the head, face and neck.

Hand gloves-protect the hand and fingers

- **Pair of long boots-** protects feet from sting

B) Smoker

- ✓ next in importance to the bee hives itself
- ✓ bees not allow for the bee keeper to harvest their honey (fight)
- ✓ has two main parts

i) Container (contain dry materials like animal dung)



ii) Bellows section (used to puff air into container) the smoke makes the bee docile

C) **Alive tool**- pry open and remove the frames from the hive, knife may be used for this Purpose.

D) **brush/quill**-

E) **feeder**- can be jam jar or a special container turned upside down and so arranged that the

1. Water trickles slowly from it for the bees to drink
2. Frame wire – to support the honey comb
3. Cast mould- used to make artificial comb
4. transformer- to fix comb foundation sheet to frames
5. Embedded knife – use as transformers
6. Honey extractor – to separate pure honey from modern hive
7. Honey presser- to extract honey from not framed combs
8. Uncapping fork – to decap cells of ripened honey
9. Queen excluder- excluding queen and placed between base chamber and honey chamber
10. Honey storage- to store honey
11. Honey jars- can be plastic/ glass container containing 500gm capacity
12. Chisel – to open hive, clean propolis and unnecessary materials
13. Water sprayer- to reduce aggressiveness and immediate evacuation from nest
14. Honey weighing scale- in order to weigh honey, wax pollen etc
15. Honey strainer



Self-Check -2

Written Test

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

1. Write at least four resource for bee work activity? 4pts
2. Write at least 4 equipment used for bee activity 4pts
3. Write at least 8 PPE used for bee work? 8pts

Note: Satisfactory rating - 16 points Unsatisfactory - below 16 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____



Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

Information Sheet-3	Selecting honey bee flora and use
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Selecting honey bee flora and use

3.1. Types of honey bee flora selected for bee

- ✓ The diversity of Agriculture and Horticulture Crop bee flora



- ✓ Fruits
- ✓ Ornamental plants
- ✓ Cereal Pulses
- ✓ Other crops (fiber, oilseed)
- ✓ The diversity of Forest tree/wild plantation bee flora

3.2. Major bee plants: are those plants, which are visited by honey bees throughout their flowering season. E.g. Bidens species (meskel flower), Trifolium species. (Clover), Eucalyptus species, Acacia species, and Vernonia species.

3.3. Minor bee plants: are those plants that are visited less often by bees or only when flowers of major bee plants are not in flower. E.g. Echinopes species (Koshoshila), Solanum species (Imboay), Dovyalisabyssinica (koshim) and Sida species (chiferge).

Self-Check -3	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write type of honey bee flora 5pts
2. Write major and minor types of honey bee flora 5pts
3. Write honey bee flora calendar 5pts
4. Write benefits of bee forage 5pts

Note: Satisfactory rating - 20 points

Unsatisfactory - below 20 points

You can ask you teacher for the copy of the correct answers.



Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____



4.

REFERENCE

1. Advanced beekeeping manual
Ethiopian beekeepers association
2. a practical manual of beekeeping
how to keep bees and develop your full potential as an apiarist



Unit of Competence: Identify Honey Bee Flora
Module Title: Identifying Honey Bee Flora
LG Code: AGR BKG2M 05 LOLG3

TTLM Code: AGR BKG2 TTLM 0919v1

LO 3: Complete recognition of honey bee flora

Instruction Sheet Learning Guide #-3

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Documenting Information about honey bee flora
- Recognizing as new honey bee flora and updated reference of collection
- Disposing any plant debris according to enterprise guidelines.

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

- Document Information about honey bee flora
- Recognize as new honey bee flora and updated reference of collection
- Dispose any plant debris according to enterprise guidelines

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.



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

Information Sheet-1 Documenting Information about honey bee flora

Documentation May include,

- A written description of the plant species including common and botanical names
- Visible characteristics
- Details of occurrence or origin
- Optimum growth requirements and/or a herbarium of plant samples preserved according to the requirements of the enterprise or industry sector

May include, but not limited to:

Types and sources of information

- Variable written and graphical instructions,
- Work bulletins,
- Data sheet,
- Diagrams or sketches
- Occupational health and safety manual
- Industry/workplace codes of practice
- Organization operating procedures
- Safety work procedures/manual and material safety data sheets
- Workplace guidelines/ workshop manuals



- Manufacturer's diagrams, charts
- Manufacturer's catalogue/specification manual.
- Manufacturer's service and operation manuals
- Design specification manual
- Repair request documentation ,job cards,
- Manufacturing and designing specifications and instructions
- Records and reports
- Virtual library(electronic media)

Documentation will:

- Prove that programs are effective and being completed as written;
- Demonstrate due diligence;
- Meet requirements for third party customer assessments/audits;
- Meet regulatory requirements; and
- Establish a paper trail to improve the current food safety program.

A facility may already have programs or activities in place. Processors should document and keep records of these programs. These can be used to prove that safety actions are taking place. To develop a documentation system, it's important to break it into stages or levels. Each level expands to create a complete program and compares to one step in the development process.

Level 4: Records = Where is it recorded?

Level 3: Procedures = How is it done? How often what situations? When?

Level 2: Designate Responsibility = Who is responsible for the task?

Level 1: Policy Development = Provides a definition for approach and scope.

DOCUMENTS AND RECORDS

It is important to understand the difference between a document and a record.

Documents Records

- Permanent
- Describe facility policies and work instructions (Level 1, 2, and 3)
- Define systems, processes and procedures
- Filled in as activity occurs (Level 4)
- Provide proof that policies were followed or activities performed
- Demonstrate processes and procedures are being conducted as required



Document and record all processes and activities. These documents and records should be stored in official files and remain accessible to staff who need them. Base the documents on the prerequisite programs and on the product protection or HACCP plan. If documents are already being kept, review them to make sure they are complete and that they follow the necessary standards.

Follow these three general principles to develop records and documents:

1. Keep it short and simple. Use bullet points and flow diagrams instead of long sentences and lengthy paragraphs.
2. Clarity is important. Step-by-step instructions are easily understood.
3. Use a standardized, consistent format. Although different programs may need different documents and records, using a similar approach will help staff learn quickly.

DOCUMENTATION SYSTEM FORMATS

There is more than one correct format for a documentation system, but it must include all necessary information and be easy to read and understand.

Description of Activities and Qualifiers

Who: Identifies the person or position responsible for carrying out the activities.

What/How: Describes what is done and provides instruction (monitoring procedures) on how it's done. Includes:

- Duties and how they are completed;
- Acceptable and unacceptable standards/limits (if applicable);
- Records to be completed and how they are completed; and
- References to other bullet points and/or manuals.

When: Describes how often (frequency) the monitoring procedure is done.

Records: Describes what records are kept and where they are located.

Deviation and Corrective Action Procedures: In the event that a deviation from normal occurs (e.g. outside of the acceptable limits), the corrective action procedure describes the actions to be taken to correct the deviation. It includes who, what, how and a record description.

Verification Procedures: Verification procedures ensure that the monitoring procedures have been performed correctly. This involves a different person/position than the who in the monitoring procedure. Verification procedures also include who, what, how and a record description.



Self-Check 1
Written Test

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

1. write types and sources of information 5pts
2. Write the difference between record and documentation 5pts
3. write three general principles to develop records and documents 5pts

Answer Sheet

Name: _____

Date: _____

Short Answer Questions

1. _____



2. _____

_____ -

3. _____

Information Sheet-2 Recognizing as new honey bee flora and updated reference of collection

Identify Season of honey bee flora

Floral calendar is an important tool for beekeeper, it indicates various information of an area. This information is an important tool to plan beekeeping activity. It indicates the beekeeper the date, time and period of flowering in an area. Through experience beekeeper knows the major flowering periods of his area. Charts are published from many parts of the world. The floral calendar is an useful tool to the apiculture extension worker. Beekeeping depends much on floral calendar of an area. It is also useful if one has to take up migratory beekeeping.

The following steps are undertaken to design a floral calendar:

1. Survey to be taken up in the area and to make a list of plants and also to observe the flowering density.
2. Estimate food shortage increase/decrease in weight by weighing the hive periodically.
3. List the plant species visited by bees within its foraging range (mellifera-1 Km).
4. Identify the plants as pollen /nectar yielder.
5. Study the frequency of bee visit to plants. If there is no increase or decrease in weight , it is useful only in maintaining the colony. If there is increase in colony weight, the plant species is major source, useful in production.
6. Carefully record all the changes in flowering of plants visited, by bees.

After these steps it should be carefully studied in terms of colony performance and chart can be prepared for the area, where the study was conducted.

Assessment of areas for beekeeping

Productive beekeeping depends on good colony management and good beekeeping areas, and in order to promote it as a profitable agricultural occupation, areas with a good potential for beekeeping must be located and evaluated. Asia is rich in places inhabited by feral swarms of native honeybees, and this fact often inspires premature judgements to the effect that beekeeping can be promoted almost anywhere in the continent where native bees are found. The truth, however, is those most feral colonies of Asian honeybees adopt a migratory strategy, moving with the seasons and the availability of forage. Thus, the temporary presence of a few feral swarms of honeybees here and there, for short periods, does not necessarily indicate that there is enough forage in the area to support year-round commercial beekeeping.

As in the assembling of floral calendars, weighing the hive is one of the most accurate ways of assessing the suitability and supporting capacity of an area. One major problem in this respect is how



to select sites for assessment. The following guidelines for the exploration and evaluation of potential beekeeping areas may be found useful:

1. Referring to lists of known major honey plants in other countries or regions with similar vegetation patterns, agro-ecosystems, climate and edaphic conditions, determine whether similar plants are to be found in the area under study.
2. The seasonal occurrence, in unusually high numbers, of feral nests of native honeybees can often indicate that there is ample forage in the area, at least during the period in question.
3. The mere presence of flowering trees and shrubs in limited numbers, or of a few hectares of land covered with good honey plants preferred by bees, does not necessarily indicate that the area has potential for commercial beekeeping.
4. Practical, large-scale beekeeping operations call for large areas, usually hundreds or thousands of hectares of nearby land bearing good forage with high population densities. Good honey plants are characterized by relatively long blossoming periods, generally in terms of several weeks or months; high density of nectar-secreting flowers per plant or unit area; good nectar quality with high sugar concentrations; and good accessibility of the nectaries to the bees. The foraging land should be well proportioned, in terms of length and width, so as to promote foraging efficiency.
5. The supporting capacity of an area for honey production is best determined by monitoring weight changes in the bee colonies. Among other factors that affect the economic value of an area for beekeeping are average hive yields, prevailing honey prices in the area, as well as costs of colony-management inputs.
6. The fact that a flower is brightly coloured or that it has a strong scent does not always indicate that it is good for bees, unless the fact is confirmed by the criteria set out above.
7. The large-scale planting of honeybee forages has never been proved to be a profitable approach in terms of net economic return, except in integration with other agricultural activities, such as reforestation, roadside plantings, animal pasture, etc

Self-Check 2

Written Test

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

1. Write steps are undertaken to design a floral calendar 5pts
2. Write guidelines for the exploration and evaluation of potential beekeeping areas 5pts



Answer Sheet

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

Information Sheet-3 Disposing any plant debris according to enterprise guidelines.

Handling and Disposal of Production Inputs

Target Outcomes

Beekeepers prevent the degradation and contamination of production inputs by safe and secure storage and disposal.

Description

Production inputs include consumable products such as

- feed (carbohydrate and protein supplements and substitutes);
- water;
- treatment products (pest control products, including pharmaceuticals, acid treatments, and essential oils);



- Cleaning and disinfection supplies. (Refer to Appendix F for information on using and handling disinfectants.)

The Risks

Biosecurity risks associated with improper handling and disposal of production inputs include the following:

Spread of pests within the operation or to other beekeepers' operations through exposure of healthy bees to contaminated feed and/or water or beeswax foundation derived from contaminated hives:

Contaminated pollen and honey stores contained within the hive can be of particular risk for spreading disease from area to area when moving colonies for pollination.

Reduced efficacy of treatments: Treatment products may be degraded or become toxic to bees if they are not stored according to label instructions (e.g. light-, temperature-, or humidity-controlled storage), are reused, or are used after the expiry date.

Potential for treatment-resistance development may occur if, for example, acaricide strips are not removed promptly at the conclusion of the treatment period or are reused.

Producer Benefits

The benefits of implementing biosecurity-recommended practices when handling and disposing of production inputs are

- Reduced chance of introducing pathogens to healthy bees and therefore reduced need for increased monitoring, management, and treatments of exposed bees.
- Optimal treatment efficacy.
- Reduced chance of developing resistance to treatment products.
- Less need for destruction of supplies by minimizing exposure to contaminants.
- Improved reputation as a reliable supplier of bee production inputs – a benefit if selling beekeeping supplies.
- Less need for buying new feed to replace spoiled feed.
- Less need for buying new treatments to replace spoiled treatments.

Recommended Practices

Personal sanitation practices are followed after handling confirmed or suspected production inputs that have been contaminated with bee pests.

1. Handling and Disposing of Feed and Water

- a. Use unexposed (e.g. hive-top) feeders and clean up honey spills and syrup as soon as possible.
- b. Provide an alternate water source if necessary, limit bees from seeking water where they may co-mix with others, or be a nuisance to the neighbours.
- c. Feeders and water containers should be sealable and of a smooth material (e.g. food-grade containers) that can be thoroughly cleaned to remove wax, propolis and honey residue and disinfected before reuse. Rinse with clean, potable water before refilling. Use floats on the water so the bees won't drown and change water weekly.
- d. Store liquid feed in sealed containers. Pollen patties should be stored in a cool, dry area or frozen. Store all feed in areas segregated from bees, honey processing and other storage facilities.
- e. If a food or water source is found to have been accessed by infected or infested bees, or if the health status of bees accessing the food or water source is unknown, the feed and water should be removed (if feasible), sealed and disposed of safely.
- f. If moving hives ensure that the feed and pollen stores are not carrying diseases that are new or uncommon in the area being moved to.
- g. Avoid disposing of excess, uncontaminated sugar syrup by dumping on the ground as it can attract robber bees and pests.
- h. Excess pollen patties should be removed before placing honey supers on the colony and used patties should be buried or burned and not exposed to bees.
- i. Avoid the buildup of dead bees and other insects in or around feeders.
- j. Clean dead bees or other insects from feeders.

2. Handling and Disposing of Treatment Products



- a. If applicable, store pharmaceuticals and chemical treatments according to label instructions (temperature, humidity, and light controlled).
- b. Keep products in their original unopened package until ready for use.
- c. Use a first in/first out inventory management system for supplies; that is, older inventory is used before newly acquired inventory.
- d. Promptly dispose of used, expired, or excess products that will not be used, according to the label instructions or further recommendations. Contact your provincial apiarist or apiculture specialist for current disposal recommendations.
- e. Mark hives with the number of acaricide strips applied to control mites and the date they should be removed. Count and record the number of strips to ensure that all strips are removed at the conclusion of the treatment period.
- f. Avoid re-using acaricide strips.
- g. Follow label instructions when applying treatments, especially if exposed to direct sunlight or high heat to prevent degradation of the treatment.

Record Keeping

Records should be kept on

1. feeding dates, feed type, lot number, quantity, and supplier.
2. treatments applied, product lot numbers, and dates for application and removal (if applicable).
3. apiary and or hive placement identifier (i.e. where the product was used)

Self-Check 3

Written Test

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

1. Write benefits of implementing biosecurity 5pts
2. How can Handling and Disposing of Feed and Water 20pts



Answer Sheet

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

Reference

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3. GOAL/QPC (2000) The Memory Jogger 9000/2000 – A Pocket Guide to Implementing the ISO 9001 Quality Systems Standard.
4. Alberta Food Processors Association (2002) Effective Records for HACCP – Participant Manual.
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7. Peterson, D. E. (2001) Documenting Corrective Actions [online], Available from: www.foodboss.com/foodsafety102001.htm.
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Learning Guide #2

Unit of Competence: Identify Honey Bee Flora

Module Title: Identifying Honey Bee Flora

LG Code: AGR BKG2M 05 L02LG2

TTLM Code: AGR BKG2 TTLM 0919v1

LO 2: Recognizing specified honey bee flora



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

- Specify honey bee flora according to their *identifiable characteristics*.
- Brief descriptions of plant habits, characteristics and significant features are record
- taking advice of supervisors if necessary and where appropriate in the recognition activity

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

- Specify honey bee flora according to their *identifiable characteristics*.
- Brief descriptions of plant habits, characteristics and significant features are record
- takes advice of supervisors if necessary and where appropriate in the recognition activity

Learning Instructions:

8. Read the specific objectives of this Learning Guide.
9. Follow the instructions described in number 3 to 20.
10. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
11. Accomplish the “Self-check 1”
12. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
13. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
14. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Specifying honey bee flora according to their <i>identifiable characteristics</i>
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Specifying

honey bee flora according to their *identifiable characteristics*



Identifiable characteristics

Plant characteristics may include:

- The shape
- Size colour
- Texture
- Presence of hairs and spikes on leaves
- Stem
- Fruit
- Flower
- pollen and nectar

Common names will be used in recognition of honey bee flora. However, in some situations botanical names may be required. In Indigenous communities, language names can be used in lieu of common

Important Honeybee Plants of Ethiopia

✓ Table

Botanical name	Common name	Propagation	Apicultural use
<i>Opuntia ficus indica</i>	Beles	Cutting	Major honeybee flora
<i>Becium grandiflorum</i>	Mewatis, Tebeb (Tig)	Cutting, seed	Major
<i>Acacia nilotica</i>	Girar	Seed	Pollen source
<i>Euclea shimperi</i>	Dedeho	Seed	Nectar source
<i>Parkinsonia aculeata</i>		Seed, seedling	Good honeybee flora for arid areas
<i>Eucalyptus camadulensis</i>	Key bahirzaf	Seedling	Major
<i>Hypoestes</i>	Girbiya (Tig.)	Seedling	Major
<i>Vicia dasycarpa</i>	Gaya	Seed	Nectar source
<i>Vernonia amydalina</i>	Grawa	Seed	Major
<i>Guizotia scabra</i>	Mechi	Seed	Nectar and pollen source
<i>Maytenus ovatus</i>	Atat	Seed	Nectar, pollen, Propolis
<i>Sesbania sesban</i>	Sesbania	Seed, seedling	Nectar, pollen
<i>Cordia africana</i>	Wanza	Seed	Nectar, pollen
<i>Rhus vulgaris</i>	Yeregnakollo	Seed	Nectar, pollen
<i>Euphorbia candelabrum</i>	Qulqual	Cutting	Nectar, Pollen
<i>Agave sisalana</i>	Qacha	Seedling	Nectar, Pollen
<i>Euphorbia tiruciae</i>	Kinchib	Cutting	Nectar, Pollen
<i>Lepidium sativum</i>	Feto	Seed	Nectar, Pollen
<i>Schinus molle</i>	Kundeberbere	Seed, seedling	Nectar



Self-Check 1

Written Test

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

1. Write characteristics Plant
2. Categories plant based on nectar and pollen

Note: Satisfactory rating - 2points Unsatisfactory - below 2points

You can ask you teacher for the copy of the correct answers.



Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

1. _____

2. _____



Information Sheet-2	Brief descriptions of plant habits, characteristics and significant features are record
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Brief descriptions of plant habits, and characteristics

Toxic plants

Toxic plants are plants whose pollen, nectar, honey dew is toxic to honey bees and those honey from their nectar is toxic to human being As there are a number of important plant species for honey, bees there are some or relatively low poisonous and killer plants on this plants. There are Diagnostic keys to disease type called nectar poisoning, pollen poisoning and honey dew poisoning although these were separate effects each with a single cause.

Plants can kill bees by mechanical action too. There are some plant species that trap bees with glue webs watery pits or closing flowers some of these plants are very common in our country.

Eg Arabis glabra /tower mustard/, macadamia integrifolia, cuscuta species /dodder/ one of its species datura stramonium /datur jimson weeds /, justice schimperana / wild / etc.

Identification of plants, which benefit Honeybees

Ethiopia is potentially rich with diversity of plant habitat some of the honey plants are dominant in highland & others in lowland areas there are also cultivated crops forage plants horticultural plants in different areas which provide ample nectar and pollen for foraging honey bees.

Forage evaluation

The bee flora is classified as major and minor source based on the production of the resources & collection of these

A. POLLEN YIELDERS



Some plants provide pollen to the bees said to be pollen yielder these can be classified as major & minor source based on the forage attendance over a period of time e.g. *stereopermum kunthianum* *prunus persica* *Hagenia abyssinica*) minor source (*Eucalyptus citriodora*)

I. NECTAR YIELDER

Some plants provide nectar to honey bees said to be nectar yielder they can be classified as major & minor based on the amount of nectar the concentration of sugar in the nectar.

Major nectar source are plants much visited by the bees throughout their flowering period eg *Banalitysaegyptiaca*, *Adansoniadigitata*, *Guizota* species *trifolium* species, *Bidens* species, *varnonia* species, some *Acacia* species *Eucalyptus* species etc

Minor nectar source –are plants visited by the bees less often or only when flowers of major nectar source plants are not available or flowers which do not meet the demand of bees visited under extra ordinary condition eg *Acacia pollen acanthi solanivm* species

II. POLLEN AND NECTAR YIELDER

Are plants provide both nectar and pollen to bees the plants may provide abundant nectar and some pollen OR they may provide abundant less pollen and nectar producing plants of high land & low land areas the area can be assessed as useful zones for promoting Beekeeping activity as a profitable agricultural occupation

Highland – eg *Hygenia abyssinica* (*kosoltrifolium* species *Guizzota* species *schefflera*

Species (Getema) *Bidens* species *rage seed coffee arabica* *Aypoestes* species are

Dominant nectar sources

Lowland – eg *prosodies* *Acacia* species *Euphorbia* species *parakisonia*



No	Plant species	Common (local)	Flowering period	source	
1	Mangifera indica	Mango (Eng.Amh&ora	Dec-mar	A+	A+
2	Rhusglutinosa	Tatesa (or)	Oct-janu	A+	A.
3	Schinusmolle	Tikur-berberie (Amh)	Jan-Dec	A+	A
4	Polysciasfulva	Yegenjerowenber(Amh) talao(or)	Non -Apr	A+	A+
5	Schifleabyssica	Geteme (Amh) marfatu(oro)	Mar-may	A+	A+
6	Veronicas amygdaline	Grawa(Amh) Ebicha (oro)	Jan-Feb	A	A.
7	Jacarand a mimosifolia	Yetemenjazaf(Amh)--	Non-may	N	A
8	Stereospermumkunthianum	Zana (Amh) Botoro(oro)	Sep-may	A+	A+
9	Adansoniadigitata	Bambo (Amh)-----	May-july	N	A+
10	Cordiaafricana	Nanga /waddesa(oro)	Oct-may	A+	A
11	Buddlejapolystachya	Atikuar(Amh)cheilor	Non-may	A	A
12	Boswelliapapyrifera	Yeitan-zaf(Amh)kafal(oro)	Oct-mar	A+	A
13	Opantiaficus-indica	Kwkual -----	Janu-Dec	A+	A+
14	Combretummolle	Didessa (oro)	Janui-Aprit	A+	A+
15	Euphorbia abyssinica	Kulkual (tulu)	Sep-Nou	A	A
29	Syzygiumguineese	dokina	Janu-March	A+	A+
16	Corotonmacrostachys	avocado	APR-lul	A	A
17	Dovalisabyssinica	Koshm(Ankakutch) oro	Oct -Feb	A	A
18	Perseaamericana	avocado	Oct-Dec	A	A
19	Acacia species	Girar	Varies from species to species	A	A
20	Albizespecies	Sisa /mukarbe	"	A	A
21	Erythriusabyssinica	Kore(Amh) walensu(oro)	Sep-April	A	A
22	Azadirachtaindica	Neem tree	Oct-march	A	A
23	Ekebergiacapensis	Lol(Amh) walensu(oro)	Nov-may	A	A
24	Ficusvasta----	Warka (Amh) –kiuta (oro)	Oct-Dec	A	A
25	Ficussur	Shoal(Amh)arbu (Or0)	Oct-Dec	A	A
26	Eculyptasspecies	Bar-zar	March-Apri	A	A



27	Masaxparadisiaca	Muz(Amh)&oro) bakana	Januy-Dec	A	A
28	Psidiumguajava	dokima	Janu-Dec	A	A
30	Dleaspecies	Weyira /Ejersa	April tojane(varies)	A	A
31	Coriandrumsativum	DimbcAl(Amh)	Jan-Dec	A	A
32	trachyspernumamini	NechAz mud(Amh)	Oc-Dec	A	A
33	Carissa edulis	Agam(Amh)Agamsa(oro)	Jan-Dec	A	A
34	Bidensspecies	AdeyAbeba(Amh)keloAbare(oro)	Sep-oct	A	A
35	Carthamustincarius	Sunflower suf	Nov-Feb	A	A
36	Guizotiaspecies	NvgHada,tufo	Aug-Feb	A	A
37	Brassica napus	oilseed	Sep-Nov	A	A
38	Brassica nigra	Senafch-----	Sep-Aprl	A	A
39	Lapidiumsativum	Feto(Amhxoro)	Oct-Nov	A	A
40	Chat edulis	Chat (Amh) jima(oro)	Sep-Dec	A	A
41	Cobretuspaniculatus	Begi(e) (oro)	Sep-Dec	A	A
42	Cucurbitapepo	Duba (Amh)-----	Apr-Dec	A	A
43	Ocimumlamiifolium	Damakasio (Amh)	Apr-Dec	A	A
44	Ocimumurticifolium	Besobla[amh.]	Jan- Dec	A	A
45	Salvianilotica	Besobila[Amh.]	Sept-Dec.	A	A
46	Saturejparadosca	Naddo(Amh) tenadam(oro)	Sep-Dec	A	A
47	Thymus schimperi	shimbra	Jan-Dec	A	A
48	Ciceraritinum(Chikpea)	Shimbra	Oct --Feb	A	A
49	Trifoliumspecies	Megat,Wazma(Amh.) ,Sidisa(Orom.)	variable	A	A
50	Vaciafaba	Bakela	Sep-oct.	A	A
51	Vaciadassyycarpa	Vech	Apr-Dec.	A	A
52	Forage Legumes	Different	Sep.-Dec	-	-
53	Linumusltatissimum	Telba(Amh.)	Oct-Nov	A	A
54	SolaniumTuberosum	Dnich(Amh.)	-	A	-

Key A: available N: not available.



Self-Check 2

Written Test

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

1. What is toxic Plants? 5pts
2. identify plants which benefit to bees 8pts
3. write for each plants flowering periods 7pts

Note: Satisfactory rating - 20points

Unsatisfactory - below 20points

You can ask you teacher for the copy of the correct answers.



Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

Information Sheet-3	taking advice of supervisors if necessary and where appropriate in the recognition activity
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General procedures

The following procedures shall be followed for all beekeeping activities:



Placement of beehives

- OVPCPF must approve the placement of beehives on all IU property in advance. Groups that wish to place a hive should submit a [Request for Service](#) to OVPCPF.
- OVPCPF will consider each request on a case-by-case basis and will utilize general guidelines of at least 100 feet from common travel areas and at least 1,000 feet from daycare facilities, playgrounds, and areas that experience dense human traffic (stadiums, auditoriums, etc.). OVPCPF may choose to ignore or alter these guidelines at its discretion based on individual situations.
- Rooftop hives will not be permitted without the express consent of OVPCPF and IUEHS for the respective campus.

Signage and barriers

- Signage shall be posted to indicate that a designated area is used for beekeeping activities: “CAUTION: ACTIVE BEE HIVE: DO NOT DISTURB”.
- Perimeter protection may or may not be needed and will be decided by OVPCPF and INLOCC.
- All persons participating in beekeeping activities shall complete the INLOCC liability waiver.

General guidance

- Any person with suspected or known allergies to bee venom must seek medical advice from their primary care physician prior to participating in beekeeping activities.
- Any person with suspected or known allergies to bee venom must notify the head beekeeper.
- Proper lifting techniques shall be used when lifting boxes. Medium boxes can weigh around 30-50 pounds when filled with honey.
- A telephone must be on site any time participants are present.
- Be aware that bees are sensitive to dark colors and odors such as perfume, dogs, and diesel. These things may affect their behavior.
- Note that commercial sale or use of honey or other edible hive products may be subject to state and federal regulation. Contact IUEHS for your respective campus for further information if you intend to package or provide honey products to the public.
- While transport of bees into Indiana is not regulated, transport to other states may be. State requirements are available by contacting the State Apiarist for the state into which you are transporting.

Equipment

- Maintain a fire extinguisher within 50 feet of the area where the smoker will be used. Information about fire extinguisher training may be found at the [INLOCC](#)
- Only dry fuel (e.g. newspaper, pine needles, bark) shall be used while lighting the smoker. Add a small amount of dry fuel, draw a gentle fire, and pack in more dry fuel.
- When the smoker is not in use, place the smoker in a space free of combustible material (e.g. a metal bucket).
- Keep the area around the hive free of combustible materials.
- To avoid burns and irritation of eyes, the hot barrel of the smoker should point away from the operator.
- The smoker should be extinguished after each use.



Personal Protective Equipment (PPE)

Personnel participating in beekeeping activities should, at a minimum, wear a beekeeping hat and veil, elbow length gloves that are leather or nitrile, and closed-toe/closed-heel shoes.

Before entering the beekeeping area, personnel shall wear clean protective clothing/personal protective equipment. The protective clothing should be without holes to prevent bees from entry.

Beekeeping hat and veil

- The ventilated hat should keep its shape and be firm enough to support the veils that fit over them and provide space that keeps the veil away from the face.
- Veils are required when working closely with the bees. A folding wire veil should be fitted to the hat to ensure good separation between the beekeeper's face and the bees outside the veil.
- Dark felt hats and floppy hats should be avoided.

Beekeeping gloves

- Gloves need to be strong, but pliable;
- Elbow length cloth sleeves attached to the gloves should be worn when gaining access to the inside of the hive; or
- A band of elastic should be sewn into the cloth sleeve at the elbow end to make it bee-resistant.

Footwear

- Closed-toe and closed-heel shoes should be worn.

Bee sting first aid

• Reactions to bee stings

- Normal reaction includes: some pain, redness, itching, and swelling at the site
- Mild to moderate reaction includes: persistent or spreading pain, itching or swelling, large or uncomfortable areas of pain, redness, itching or swelling, ongoing symptoms over several days.
- Severe (Anaphylactic) reaction includes: Abdominal pain or vomiting, difficult or noisy breathing, swelling of the tongue, swelling or tightness of the throat, wheezing or persistent cough, difficulty talking or swallowing and/or hoarse voice, persistent dizziness or collapse.

What to do if you are stung

- Remove yourself from the vicinity of the hive.
- Remove the stinger by scraping the sting as soon as possible. Personnel shall not delay the removal of the sting, regardless of the method used to remove it, as it increases the amount of venom injected into the body.
- Oral antihistamines may assist with persistent itching.
- If you have an adrenaline auto-injector, such as an EpiPen, you should locate it in case your symptoms worsen or call 911.
- Be aware that antihistamines will not prevent or treat anaphylaxis, the most severe form of allergy. The only pre-hospital treatment for anaphylaxis is adrenaline.



Reporting injuries and stings

- Employees must notify their supervisor and/or the head beekeeper immediately if an injury or illness occurs.
- If the person stung is an employee, within 24 hours, the supervisor (or designee) must fill out and submit an injury/illness form. More information regarding injury reporting can be found at [Indiana University Human Resources](#).
- If the person stung is a student or other non-employee, they or the head beekeeper should fill out the form provided by [INLOCC](#) within 24 hours.
- A [first aid kit](#) shall be on site and equipped with supplies to remove bee stings. Personnel should know and understand how to use the first aid kit in the event of a sting.
- IU Police Department for the respective campus shall immediately be contacted if an individual starts to experience a mild to severe reaction bee sting.

Training and recordkeeping

Training

- First aid training should be completed by the head beekeepers.
- Fire extinguisher training should be completed by anyone who may be expected to use a fire extinguisher. Training is required annually.

Recordkeeping

- The department or organization sponsoring the beekeeping shall retain completed liability release forms for all participants for at least three years after the last beekeeping activity by each individual.
- The department supplying the training shall maintain training documentation

Self-Check 3

Written Test

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

1. **Write Personal Protective Equipment (PPE)** 10pts

2. write general procedure and guidance in beekeeping 10pts



Note: Satisfactory rating - 20points Unsatisfactory - below 20points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

1. _____



2

Reference

1. advanced beekeeping manual
Ethiopian beekeepers association
2. a practical manual of beekeeping
how to keep bees and develop your full potential as an apiarist



Learning Guide #3

Unit of Competence:

Identify Honey Bee Flora

Module Title:

Identifying Honey Bee Flora

LG Code:

AGR BKG2M 05 LOLG3

TTLM Code:

AGR BKG2 TTLM 0919v1

LO 3: Complete recognition of honey bee flora

Instruction Sheet	Learning Guide #-3
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- *Documenting* Information about honey bee flora
- Recognizing as new honey bee flora and updated reference of collection
- Disposing any plant debris according to enterprise guidelines.

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

- *Document* Information about honey bee flora
- Recognize as new honey bee flora and updated reference of collection
- Dispose any plant debris according to enterprise guidelines



Learning Instructions:

15. Read the specific objectives of this Learning Guide.
16. Follow the instructions described in number 3 to 20.
17. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask your teacher for assistance if you have hard time understanding them.
18. Accomplish the “Self-check 1” **in page -.**
19. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
20. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
21. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	<i>Documenting</i> Information about honey bee flora
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Documentation May include,

- A written description of the plant species including common and botanical names
 - Visible characteristics
 - Details of occurrence or origin
 - Optimum growth requirements and/or a herbarium of plant samples preserved according to the requirements of the enterprise or industry sector
- May include, but not limited to:

Types and sources of information

- Variable written and graphical instructions,
- Work bulletins,
- Data sheet,
- Diagrams or sketches
- Occupational health and safety manual
- Industry/workplace codes of practice
- Organization operating procedures
- Safety work procedures/manual and material safety data sheets
- Workplace guidelines/ workshop manuals



- Manufacturer's diagrams, charts
- Manufacturer's catalogue/specification manual.
- Manufacturer's service and operation manuals
- Design specification manual
- Repair request documentation ,job cards,
- Manufacturing and designing specifications and instructions
- Records and reports
- Virtual library(electronic media)

Documentation will:

- Prove that programs are effective and being completed as written;
- Demonstrate due diligence;
- Meet requirements for third party customer assessments/audits;
- Meet regulatory requirements; and
- Establish a paper trail to improve the current food safety program.

A facility may already have programs or activities in place. Processors should document and keep records of these programs. These can be used to prove that safety actions are taking place. To develop a documentation system, it's important to break it into stages or levels. Each level expands to create a complete program and compares to one step in the development process.

Level 4: Records = Where is it recorded?

Level 3: Procedures = How is it done? How often? In what situations? When?

Level 2: Designate Responsibility = Who is responsible for the task?

Level 1: Policy Development = Provides a definition for approach and scope.

DOCUMENTS AND RECORDS

It is important to understand the difference between a document and a record.

Documents	Records
<ul style="list-style-type: none"> • <i>Permanent</i> • <i>Describe facility policies and work instructions (Level 1, 2, and 3)</i> • <i>Define systems, processes and procedures</i> 	<ul style="list-style-type: none"> • <i>Filled in as activity occurs (Level 4)</i> • <i>Provide proof that policies were followed or activities performed</i> • <i>Demonstrate processes and procedures are being followed as required</i>

Document and record processes and activities. These documents and records should be stored in official files and remain accessible to staff who need them. Base the documents on the prerequisite programs and on the product protection or HACCP plan. If documents are already being kept, review them to make sure they are complete and that they follow the necessary standards.

Follow these three general principles to develop records and documents:

1. Keep it short and simple. Use bullet points and flow diagrams



instead of long sentences and lengthy paragraphs.

2. Clarity is important. Step-by-step instructions are easily understood.
3. Use a standardized, consistent format. Although different programs may need different documents and records, using a similar approach will help staff learn quickly.

DOCUMENTATION SYSTEM FORMATS

There is more than one correct format for a documentation system, but it must include all necessary information and be easy to read and understand.

Description of Activities and Qualifiers

Who: Identifies the person or position responsible for carrying out the activities.

What/How: Describes what is done and provides instruction (monitoring procedures) on how it's done. Includes:

- Duties and how they are completed;
- Acceptable and unacceptable standards/limits (if applicable);
- Records to be completed and how they are completed; and
- References to other bullet points and/or manuals.

When: Describes how often (frequency) the monitoring procedure is done.

Records: Describes what records are kept and where they are located.

Deviation and Corrective Action Procedures: In the event that a deviation from normal occurs (e.g. outside of the acceptable limits), the corrective action procedure describes the actions to be taken to correct the deviation. It includes who, what, how and a record description.

Verification Procedures: Verification procedures ensure that the monitoring procedures have been performed correctly. This involves a different person/position than the who in the monitoring procedure. Verification procedures also include who, what, how and a record description.



Self-Check 1

Written Test

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

1. write types and sources of information 5pts
2. Write the difference between record and documentation 5pts
3. write three general principles to develop records and documents 5pts

Note: Satisfactory rating - 15points

Unsatisfactory - below 15points

You can ask you teacher for the copy of the correct answers.



Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____



3. _____

Information Sheet-2	Recognizing as new honey bee flora and updated reference of collection
----------------------------	--

Identify Season of honey bee flora

Floral calendar is an important tool for beekeeper, it indicates various information of an area. This information is an important tool to plan beekeeping activity. It indicates the beekeeper the date, time and period of flowering in an area. Through experience beekeeper knows the major flowering periods of his area. Charts are published from many parts of the world. The floral calendar is an useful tool to the apiculture extension worker. Beekeeping depends much on floral calendar of an area. It is also useful if one has to take up migratory beekeeping.

The following steps are undertaken to design a floral calendar:

1. Survey to be taken up in the area and to make a list of plants and also to observe the flowering density.
2. Estimate food shortage increase/decrease in weight by weighing the hive periodically.
3. List the plant species visited by bees within its foraging range (mellifera-1 Km).



4. Identify the plants as pollen /nectar yielder.
5. Study the frequency of bee visit to plants. If there is no increase or decrease in weight , it is useful only in maintaining the colony. If there is increase in colony weight, the plant species is major source, useful in production.
6. Carefully record all the changes in flowering of plants visited, by bees.

After these steps it should be carefully studied in terms of colony performance and chart can be prepared for the area, where the study was conducted.

Assessment of areas for beekeeping

Productive beekeeping depends on good colony management and good beekeeping areas, and in order to promote it as a profitable agricultural occupation, areas with a good potential for beekeeping must be located and evaluated. Asia is rich in places inhabited by feral swarms of native honeybees, and this fact often inspires premature judgements to the effect that beekeeping can be promoted almost anywhere in the continent where native bees are found. The truth, however, is those most feral colonies of Asian honeybees adopt a migratory strategy, moving with the seasons and the availability of forage. Thus, the temporary presence of a few feral swarms of honeybees here and there, for short periods, does not necessarily indicate that there is enough forage in the area to support year-round commercial beekeeping.

As in the assembling of floral calendars, weighing the hive is one of the most accurate ways of assessing the suitability and supporting capacity of an area. One major problem in this respect is how to select sites for assessment. The following guidelines for the exploration and evaluation of potential beekeeping areas may be found useful:

1. Referring to lists of known major honey plants in other countries or regions with similar vegetation patterns, agro-ecosystems, climate and edaphic conditions, determine whether similar plants are to be found in the area under study.
2. The seasonal occurrence, in unusually high numbers, of feral nests of native honeybees can often indicate that there is ample forage in the area, at least during the period in question.



3. The mere presence of flowering trees and shrubs in limited numbers, or of a few hectares of land covered with good honey plants preferred by bees, does not necessarily indicate that the area has potential for commercial beekeeping.
4. Practical, large-scale beekeeping operations call for large areas, usually hundreds or thousands of hectares of nearby land bearing good forage with high population densities. Good honey plants are characterized by relatively long blossoming periods, generally in terms of several weeks or months; high density of nectar-secreting flowers per plant or unit area; good nectar quality with high sugar concentrations; and good accessibility of the nectaries to the bees. The foraging land should be well proportioned, in terms of length and width, so as to promote foraging efficiency.
5. The supporting capacity of an area for honey production is best determined by monitoring weight changes in the bee colonies. Among other factors that affect the economic value of an area for beekeeping are average hive yields, prevailing honey prices in the area, as well as costs of colony-management inputs.
6. The fact that a flower is brightly coloured or that it has a strong scent does not always indicate that it is good for bees, unless the fact is confirmed by the criteria set out above.
7. The large-scale planting of honeybee forages has never been proved to be a profitable approach in terms of net economic return, except in integration with other agricultural activities, such as reforestation, roadside plantings, animal pasture, etc

Self-Check 2	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:



1. Write steps are undertaken to design a floral calendar 5pts
2. Write guidelines for the exploration and evaluation of potential beekeeping areas 5pts

Note: Satisfactory rating - 10points Unsatisfactory - below 10points

You can ask you teacher for the copy of the correct answers.



Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

I. _____

2. _____



Information Sheet-3	Disposing any plant debris according to enterprise guidelines.
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Handling and Disposal of Production Inputs

Target Outcomes

Beekeepers prevent the degradation and contamination of production inputs by safe and secure storage and disposal.

Description

Production inputs include **consumable** products such as

- feed (carbohydrate and protein supplements and substitutes);
- water;
- treatment products (pest control products, including pharmaceuticals, acid treatments, and essential oils);
- Cleaning and disinfection supplies. (Refer to Appendix F for information on using and handling disinfectants.)



The Risks

Biosecurity risks associated with improper handling and disposal of production inputs include the following:

Spread of pests within the operation or to other beekeepers' operations through exposure of healthy bees to contaminated feed and/or water or beeswax foundation derived from contaminated hives: Contaminated pollen and honey stores contained within the hive can be of particular risk for spreading disease from area to area when moving colonies for pollination.

Reduced efficacy of treatments: Treatment products may be degraded or become toxic to bees if they are not stored according to label instructions (e.g. light-, temperature-, or humidity-controlled storage), are reused, or are used after the expiry date.

Potential for treatment-resistance development may occur if, for example, acaricide strips are not removed promptly at the conclusion of the treatment period or are reused.

Producer Benefits

The benefits of implementing biosecurity-recommended practices when handling and disposing of production inputs are

- Reduced chance of introducing pathogens to healthy bees and therefore reduced need for increased monitoring, management, and treatments of exposed bees.
- Optimal treatment efficacy.
- Reduced chance of developing resistance to treatment products.
- Less need for destruction of supplies by minimizing exposure to contaminants.
- Improved reputation as a reliable supplier of bee production inputs – a benefit if selling beekeeping supplies.
- Less need for buying new feed to replace spoiled feed.
- Less need for buying new treatments to replace spoiled treatments.

Recommended Practices

Personal sanitation practices are followed after handling confirmed or suspected production inputs that have been contaminated with bee pests.



1. Handling and Disposing of Feed and Water

- a. Use unexposed (e.g. hive-top) feeders and clean up honey spills and syrup as soon as possible.
- b. Provide an alternate water source if necessary, limit bees from seeking water where they may co-mix with others, or be a nuisance to the neighbours.
- c. Feeders and water containers should be sealable and of a smooth material (e.g. food-grade containers) that can be thoroughly cleaned to remove wax, propolis and honey residue and disinfected before reuse. Rinse with clean, potable water before refilling. Use floats on the water so the bees won't drown and change water weekly.
- d. Store liquid feed in sealed containers. Pollen patties should be stored in a cool, dry area or frozen. Store all feed in areas segregated from bees, honey processing and other storage facilities.
- e. If a food or water source is found to have been accessed by infected or infested bees, or if the health status of bees accessing the food or water source is unknown, the feed and water should be removed (if feasible), sealed and disposed of safely.
- f. If moving hives ensure that the feed and pollen stores are not carrying diseases that are new or uncommon in the area being moved to.
- g. Avoid disposing of excess, uncontaminated sugar syrup by dumping on the ground as it can attract robber bees and pests.
- h. Excess pollen patties should be removed before placing honey supers on the colony and used patties should be buried or burned and not exposed to bees.
- i. Avoid the buildup of dead bees and other insects in or around feeders.
- j. Clean dead bees or other insects from feeders.

2. Handling and Disposing of Treatment Products

- a. If applicable, store pharmaceuticals and chemical treatments according to label instructions (temperature, humidity, and light controlled).
- b. Keep products in their original unopened package until ready for use.



- c. Use a **first in/first out** inventory management system for supplies; that is, older inventory is used before newly acquired inventory.
- d. Promptly dispose of used, expired, or excess products that will not be used, according to the label instructions or further recommendations. Contact your provincial apiarist or apiculture specialist for current disposal recommendations.
- e. Mark hives with the number of acaricide strips applied to control mites and the date they should be removed. Count and record the number of strips to ensure that all strips are removed at the conclusion of the treatment period.
- f. Avoid re-using acaricide strips.
- g. Follow label instructions when applying treatments, especially if exposed to direct sunlight or high heat to prevent degradation of the treatment.

Record Keeping

Records should be kept on

1. feeding dates, feed type, lot number, quantity, and supplier.
2. treatments applied, product lot numbers, and dates for application and removal (if applicable).
3. apiary and or hive placement identifier (i.e. where the product was used)

Self-Check 3	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:



1. **Write** benefits of implementing biosecurity 5pts
2. How can Handling and Disposing of Feed and Water 20pts

Note: Satisfactory rating - 25points

Unsatisfactory - below 25points

You can ask you teacher for the copy of the correct answers.



Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____



Reference

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