APICULTURE AND AQUACULTURE
WEEK 2 – TAXONOMY AND RACES OF BEES

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TAXONOMY OF HONEY BEES

- The term is derived from the Greek words taxis ("arrangement") and nomos ("law")

- Taxonomy therefore refers to the science of naming, describing and classifying organisms and includes all plants, animals and microorganisms of the world.

Races of bees

- The categories of different bees are described as **races**. Honeybees are categorized into races, since most bees fall into the same species*, Apis mellifera*.

Distinguishing, Traits and characteristics among the honey bee races

- Brood raising periods,
- Disease resistance,
- General productivity,
- Production preferences,
- Temperament,
- Temperature preferences,
- Twarming tendency.

Original Races of honey bees

These original races of bees originated from Europe, Asia, and Africa and they include: Africanized bees, Carniola bees (Apis mellifera carnica), Caucasian bees (Apis mellifera caucasica, German Black bees (Apis mellifera mellifera),Italian bees (Apis and mellifera ligustica) (Johnson, 2020).

Races of the bees …..

The Africanized bees (*Apis mellifera scutellata*). Africanized bees originated from east Africa. They are similar in appearance to the European bee, but their abdomen is striped with black bands and they are slightly smaller in size.

Original Races of honey bees continues….

- **Carniola bees (*Apis mellifera carnica*)**

✓Native to the Austrian Alps, Danube Valley in Austria, and northern Yugoslavia.

✓Black and brown in color with brown spots or bands around their abdomen.

✓Smallest in size amongst the other races of bees.

✓Harmless species of bees that swarm frequently.

Original Races of honey bees

Caucasian bees (Apis mellifera caucasica):

- They originate from the post-Soviet states Georgia, Azerbaijan, Armenia, and the Russian Federation.

- The bees are typically grey in color.

Original Races of honey bees continues ….

➢ **German Black bees (*Apis mellifera mellifera*)**

- German Black bees originated from the northern parts of Europe.
- These honeybees are brown and black in color.
- The German Black bees are an aggressive species that can survive harsh winters, but build slowly in the spring and produce relatively less honey.

Original Races of honey bees continues ….

➢**Italian bees (Apis and mellifera ligustica).**

- The Italian bees originate from the Apennine Peninsula in Italy.
- Yellow in color.
- Most popular honeybees because they can survive and adapt to harsh winter seasons and produce honey quickly in the spring.
- Like the Africanized Honey and German Black bees, the Italian bees are also naturally aggressive and rob other colonies stores of honey.

Hybrid bees

- ✓These bee races are obtained through crossbreeding by man. They include:
- ✓Russian,
- ✓Cordovan,
- ✓Buckfast,
- ✓Starline,
- ✓Midnite bees

BEE ANATOMY

Five characteristics that are common to most insects.

- Hard outer shell called an exoskeleton.
- Three main body parts: head, thorax, abdomen.
- Possess of antennae that are attached to their head.
- Three pairs of legs used for locomotion/walking.
- They have two pairs of wings.

ANATOMY OF THE HONEY BEE

- **Bees are typical insects with parts: — head, thorax and abdomen.**

(a) The head:

- A pair of antennae with an el-bow like shape.
- The head also has compound eyes.
- The lower portion of the honey bee makes up the mouthparts.
- Bees have spatula-shaped mandibles and proboscis.

(b) The thorax of the honey bee

- The thorax is the center for locomotion and has three segments, each with a pair of spiracles for letting in air.

- Bees have 2 pairs of wings and three pairs of legs attached to the abdomen.

- The legs are very versatile, with claws on the last tarsomere, allowing bees to have good grip on rough.

The legs of the honey bee

- On the front leg, there is a special structure used for cleaning antenna (when too many pollen grains stuck there), properly called the “antenna cleaner” (Smith, 20219).

- Pollen basket on hind leg.

The legs of the honey bee …

- One is called the pollen basket (corbicula), located on the tibia of the hind leg, which is used for carrying pollen or propolis for foragers.

- Corbicula is a concave surface with hairs on the edges and a central long bristle that goes through the pollen pellet or propolis so the load would stay while bees are flying.

Wings:

- The front wings are larger than the hind wings and the two are synchronized in flight with a row of wing hooks (humuli, singular: humulus) on the hind wing that would hitch into a fold on the rear edge of the front wing.

SOCIAL BEHAVIOURS IN HONEY BEES

1. SWARMING.

Swarming is a natural process in bee colonies where a large group of bees, including the queen and many worker bees, leave their original hive to establish a new colony.

According to Seeley (2019), swarming is a critical part of bee reproduction and colony survival, as it allows bees to spread and establish new colonies, contributing to genetic diversity and population growth.

CAUSES OF SWARMING IN HONEY BEES

- **This behavior is typically triggered by factors such as:**

✓Overcrowding,

✓The need for new nesting space,

✓ The health of the queen.

✓ When a colony grows too big leading to overcrowding in the hive.

✓Shortage of food and water within a two-mile radius of the hive.

Causes of swarming in bees continues ....

- ✓ Dampness and bad smell in and around the hive.
- ✓ Disturbance from enemies.
- ✓ Overheating from sunshine and inadequate ventilation.
- ✓ Damage to brood combs during harvesting of honey or by pests.

Causes of swarming in bees continues ....

- Diseased, infertile or inefficient queen.
- Too much direct sunlight to the hive.
- Annual urge to multiply in a new and better environment.

Control and preventive measures of swarming in honey bees

- Making Divisions – this reduces the population of the bee colony thus creating more space in the hive.
- Destroying swarm cells so as to stop the emerging of new queens.
- Switching positions of weak colonies with stronger ones so that the weaker colonies can receive the field bees from the stronger colonies.

Control and preventive measures of swarming in honey bees ……

- De-queening and re-queening. This involves the introduction of a queen with a less swarming tendency.

- Clipping the wings of the queen as a temporary measure.

2. Defensive behavior in honey bees

- Stinging behaviour is one of the greatest deterrents to keeping bees. Beekeeping can be pleasurable through understanding of stinging behavior.

Scouting behavior in bees

- This refers to a situation where scout bees leave the hive in search of new food sources or nesting sites.
- Worker bees scout for food outside the hive in all directions. The ones that find good forage go back to the hive and relay this information to the rest of the colony through a series of dances which recruit foragers to gather food for the colony until the source is exhausted.

Supersedure

Definition of supersedure

- This is a natural behaviour of replacing a queen with a new one in a bee colony.

- This kind of behaviour (i.e., natural replacement of a queen) is acceptable and the beekeeper is advised not to destroy the supersedure cells since making a queen in such conditions is acceptable.

Signs of supersedure

- ✓Irregular egg laying pattern of the queen.
- ✓Weak colony.
- ✓Reduced hive activities.
- ✓Supersedure cells on the surface of comb

Causes of supersedure in honey bees

- Failing queen due to old age, injury, sickness.
- Death of the old queen.
- Accidental loss of queen. Signs of Supersedure.
- Presence of queen cells on the surface of a comb.
- Egg laying pattern of queen is irregular and Weak colony.
- The activities of the bee colony are reduced.
- Workers start to lay eggs.

Absconding behavior in bees

Definition:

This is a sudden departure of the whole colony of bees from a hive. It is caused by:

- ✓Due to pests, predators, diseases.
- ✓Shortage of food and water.
- ✓Unfavourable weather conditions – floods, high temperature.
- ✓Poor management aspects e.g., over-harvesting, mishandling.
- ✓Effect of fire and chemicals.

Migration

Migration is a seasonal movement of the whole colony from one region to another.

Causes of migration in honey bees.

- ✓Scarcity of bee forage (nectar and pollen) and water (Anderson, 2018).
- ✓Genetic factors.
- ✓Seasonal weather variations.

Control measures of migration in bees

- Feeding bees during adverse conditions.
- Improvement of environmental conditions e.g., planting trees, provision of water
- Practicing migratory beekeeping.
- Selection of bees with less migratory tendency.

References:

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- Anderson, K. (2018). Understanding migration patterns and environmental triggers in honey bee colonies. *Journal of Apicultural Science*, *62*(3), 215-230. https://doi.org/10.2478/jas-2018-0019

- **END OF LECTURE**
- **Thank you for your attention.**
- **We meet next week for Lecture 3**