

Africanized Honeybee

Introduction

There are many species of bees in the world, but only four species are honeybees. These are *Apis florea*, *Apis indica*, *Apis dorsata* and *Apis mellifera*. The first three species mentioned above are Asian honeybees, while the fourth species, *Apis mellifera*, which probably originated in Europe or Africa, is to be found today throughout the world, having been transported by man worldwide over the last six centuries.

Within the *Apis mellifera* species, there are many subdivisions or subspecies or races of honeybees. These races are broadly known as European races of which there are three main ones (*Apis mellifera ligustica*, *A. m. caucasica* and *A. m. carnica*) and the African races. There are at least eleven (11) races of African honeybees of which *Apis mellifera scutellata* (Lepeletier) is the one that is the origin of the Africanized honeybees.

Africanized honeybees, like most other races of honeybees, are hybrid bees. They are the descendants of the African honeybee, *Apis mellifera scutellata*, that crossed with the several races of European honeybees that were present in South America in the 1950s. This interbreeding produced hybrid honeybees that have all been labeled under one name “Africanized honeybees” (Fig. 1).

The Africanized bees were first introduced to the Americas by Warwick Kerr in Brazil in 1956. Kerr brought *A. m. scutellata* queens from Tanzania and South Africa with the purpose of crossing them with the Brazilian (really European) honeybees present in that country. He was attempting to produce a more productive honeybee that was better adapted to tropical conditions than the Brazilian honeybees.

It is reported that in 1957 twenty-six colonies of pure *A. m. scutellata* escaped (swarmed) and began crossing with the Brazilian bees in the wild. This process involves *A. m. scutellata* drones mating naturally with virgin European queens and the progeny emerging being “Africanized honeybees”. The process of Africanization also involves virgin African queens being mated by European drones and/or African drones. The progeny will still be Africanized because of dominant African genes.

Colonies of Africanized honeybees were also known to invade or colonize European colonies, having serious battles and in the process, killing the European queens and establishing their own invading Africanized queens. Within a few weeks, the newly emerged honeybees in the colonies would have been mainly Africanized.

It is also possible that pure *A. m. scutellata* honeybees bred with their own pure race and their descendants remain pure up to this day.

Today, when we refer to “Africanized honeybees” we mean the pure *Apis mellifera scutellata* (Lepeletier) and their hybrid offspring.



Fig. 1: Africanized honeybee hive

Identity

Authority	: Lepeletier
Classification	
Kingdom	: Animalia
Phylum	: Arthropoda
Class	: Insecta
Order	: Hymenoptera
Family	: Apidae
Genus	: <i>Apis</i>
Species	: <i>mellifera</i>
Common name	: Africanized honeybee
Role	: Beneficial insect

Signs & Symptoms

Africanized honeybees (AHBs) differ from European honeybees (EHBs) in their biological and behavioral characteristics. When compared to EHB:

- (a) AHBs exhibit highly defensive behaviour. One study revealed that their stinging response to an intrusion is ten (10) times greater, and while their venom is no more poisonous, with the greater number of stings, the victim will receive a larger amount of poison, which increases the risk of death.

In Trinidad over the period 1979-2002 there have been about sixteen (16) human deaths directly related to bee stinging incidents and deaths to hundreds of animals, mainly goat, sheep and dogs. One study predicted that the median lethal dose of bee venom is nineteen (19) stings per 1kg (2.2lbs) of human victim body weight. Another study estimated that the average lethal dose for an adult is 500 - 1,100 bee stings.

AHBs are easily disturbed by vibrations from motors, tractors, lawn mowers, bushwhackers and other vibrating machinery. A larger number of AHBs than EHBs have been known to chase intruders up to one-quarter mile away from their nest.

- (b) AHBs swarm (reproduce) more. Studies have shown that they have a rapid population growth and they can swarm six (6) to fifteen (15) times per year in the wild. However, when managed properly, swarming is much reduced. AHB have a slightly shorter developmental time, emerging as adults approximately ½ to 1 day earlier which means that they can have more generations per year than EHB.
- (c) AHBs nest anywhere – in large and small cavities, in holes in trees, inside rolls, in wall partitions, in holes in the ground, in tires, in pots and pans, in steel, concrete and p.v.c. pipes, in electricity posts, in the open with exposed nests – on trees, bushes, eaves of houses, in steel drums, in abandoned cars, etc. This increases the competition between AHB and resident EHB colonies and (Fig. 2) eventually it quickens up the complete Africanization of the beekeeping industry.



Fig. 2: Exposed nest of Africanised honeybees

- (d) AHB abscond (or abandon their nests) more often. One study indicated that 15% of swarms are absconding swarms. A swarm could travel about 170km (100 miles) before selecting a new site to establish its nest. Absconding and swarming could rapidly increase the rate of population of new colonies in any area and also quickly cause the spread of Africanized bees throughout any geographical area.
Absconding is caused by a lack of nectar and pollen in a hive or by any undue disturbance of the colony.
- (e) AHB robs other colonies when nectar resources are lacking or low. Robbing could occur when the beekeeper exposes a colony during hive manipulations. Strong colonies will immediately rob weak, exposed colonies.
- (f) AHB colonies are unpredictable in their defensive behaviour and have a greater potential for excessive stinging. At one moment they can appear to be relatively calm and in the next minute they can be highly defensive.
- (g) AHB foraging bees fly directly into a hive entrance without alighting on the hive landing board. EHB may also do this but only during a good nectar flow.
- (h) AHB brood pattern is noticeably different from EHB. The whole brood frame is generally filled with brood unlike the less than full pattern of EHB.
- (i) AHB are very active when a colony is being opened by a beekeeper. They run up the inner sides of the hive and to the tops of the frames quickly. They “boil” over the sides of the hive and swirl in their thousands around the hive. If one hive is close to another hive, then the honeybee alarm pheromones given out during stinging will immediately cause the neighboring hive to behave in the same way.
In this situation the AHB queen is also extremely difficult to find, making the re-queening of a colony very difficult.

Morphology

Africanized honeybees (AHB) look almost identical to the European honeybees (EHB) found in the New World. To the untrained eye, no difference can be easily seen. However, AHB are slightly smaller than EHB races.

The identity of AHB can be accurately done using several methods developed in the USA. One of the methods used is called FABIS (Fast Africanized Bee Identification System). This system is used at the Texas Honey Bee Identification Laboratory among other places. The length of the suspected AHB forewings are measured and the results are compared with the forewing measurements of standard EHBs. If the average forewing length of ten (10) honeybees is less than 0.375 inches long, then the bee is considered as of the Africanized race. If the results are not conclusive then a more comprehensive measuring system is done which is called the Universal System for Detecting Africanization (USDA –ID). In this test, twenty-six separate measurements are taken from a sample of honeybees and the results are analyzed using a computer programme. There is another identification program based on the electrophoretic determination of individual honeybee genotypes. Another way is to analyze the DNA and enzymes of the specimen. These systems are extremely complicated but accurate.

In Trinidad, a simple, less accurate system of identification is used. Since AHBs are slightly smaller than EHBs, the size of the individual worker brood cells that they build is smaller than the size of the EHB worker brood cells. So in this system, the size of the brood cell is measured to determine Africanization.

The procedure is to measure the distance between ten (10) sealed worker brood cells in one row from the outer edge of the first cell to the outer edge of the tenth cell. The worker brood cells being measured must come from a piece of natural comb completely built by the colony and not from comb built on wax foundation sheets put in by the beekeeper. Also only sealed cells from the central portion of the brood comb should be measured. At least three sets of measurements should be done and an average taken. If the average measurement of ten (10) cells is 4.9cm or less, then the bees have a probability of 1.0 of being Africanized. If the mean is 5.2cm and more the bees have a probability of 1.0 of being European. Any bees with mean measurements in-between are to be suspected as having some degree of Africanization in them.

Biology & Ecology

Much of the biology and ecology have been discussed above, so only a few additional points will be made here.

The life cycle of the AHB is the same for EHB with four stages i.e. from egg to larva to pupa to adult. The three castes of honeybees – queen, worker and drone have different developmental times. With EHB the time for complete development is:

Queen	-	16 days
Worker	-	21 days
Drone	-	24 days

For AHB the development time is shorter by ½ - 1 day for all castes.

An ecological consideration for AHB is that when introduced to a new country or area, because of their rapid spread and population growth, there will be increased competition for

available nectar and pollen resources with managed and feral EHB colonies. This will surely lead to decline in honey yields in the managed colonies even if they were AHB. With free and constant mating between AHB and EHB, the process of africanization is accelerated.

PEST SIGNIFICANCE

In South and Central America and in Trinidad where the AHBs have become well established and are the bees being profitably managed by beekeepers, the AHB is not considered a pest but a beneficial insect that produces honey, pollen and other bee products and which pollinates a wider variety of crops and plants than EHB.

In the USA, where the Africanized honeybees began migrating in 1990, the beekeepers` policy is to requeen AHB colonies with European honeybee queens. This policy was tried in South and Central America and in Trinidad and it failed completely due to the significant superiority of the AHB.

Dispersal

Absconding swarms, on wind currents, cargo ships plying between infested and non-infested areas.

Management

AHB can be managed for producing honey, other bee products and crop pollination. Management strategies will involve the use of individual hive stands with hives three metres apart, use of partial shade, proper smoking of colonies, control of swarming, absconding and robbing, wearing of safer protective clothing (Fig 3), proper nutrition in the non-honey flow period, adequate space with brood and super boxes, division of strong colonies, annual requeening, appropriate placement of hive boxes and other specialized management practices for AHBs.

If there is a policy to keep managed colonies with EHB, then constant requeening of colonies with marked European queens and the constant removal of feral AHB colonies are the most important procedures to be conducted.



Fig. 3: Managing Africanized Bees with Safe Protective Clothing

Host Notes

Africanized honeybees are beneficial insects; they are not pests or parasites. AHB out-compete European honeybees and completely replace them in the wild.

Distribution

From Sao Paulo, Brazil in 1957, Africanized honeybees multiplied, swarmed, absconded and migrated to all parts of South America except Chile. They have been travelling in the Americas at rates between 160-600 km per year. They reached Suriname in 1974, Guyana in 1975 and Venezuela in 1977.

It was from Venezuela that swarms of Africanized honeybees migrated to Trinidad in June, 1979 and they continue to fly into Trinidad up to the present time. Africanized honeybees (AHB) then spread upwards through Central America, reaching Mexico in 1980, Panama in 1981, Costa Rica in 1983 and Nicaragua in 1984. They continued migrating upwards through Belize and Mexico and then they reached Texas in the United States in 1990. They then spread to Arizona and New Mexico in 1993, California in 1994, Nevada in 1998 and Virginia in 2000.

Africanized honeybees also migrated to the islands of Puerto Rico in 1994 and the Virgin Islands in 1995.

It is unlikely that the AHB will migrate further northward in the United States because of temperature and other climatic conditions.

REMARKS

The Africanized honeybee is not a pest, it is a beneficial insect that is suited to tropical climates. It is as good a producer of honey, pollen, beeswax and other bee products as the European honeybee, as long as specialized management techniques are used.

However, it is more defensive than the EHB. The public and animals are likely to be more involved in bee stinging incidents than previously. Countries faced with the introduction of Africanized honeybees should develop techniques to capture bee swarms and colonies from the public environment and manage them for the production of honey and other bee products.

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Web Resources -

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