Africanized Bees in Venezuela

By:

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There are a great number of things that could be discussed about the Africanized bee in Venezuela. This presentation is going to focus on some of the things that were seen by a group of sixty U.S. beekeepers who visited the Bee Breeding Laboratory's installation in western Venezuela during December of 1984. As a result of this visit the beekeepers produced a resolution which said in part "Whereas, these beekeepers are in unanimous agreement that the undesirable characteristics of the African bee far exceeded their expectations". What were some of these undesirable characteristics?

The two major problems associated with Africanized bees that will be discussed in this paper are stinging and honey production. The USDA-ARS Bee Breeding Laboratory has been conducting research on the level of defensive behavior, including stinging, by Africanized bees for a number of years. Dr. Anita Collins has developed a test procedure for evaluating the level of defensiveness of a colony of honeybees. This test sequence is begun by spraying the entrance of the colony with a solution of an artificial alarm pheromone, isopentyl acetate in paraffin oil. This communicates to the bees an alarm or defense situation. The bees are allowed to respond to this chemical for thirty seconds and then the colony is given a physical jolt by shooting it with a large marble. This type of physical vibration to a colony is one of the stimuli that results in extreme defensive behavior. Thirty seconds after the physical stimulus, a visual stimulus is presented in the form of two small, dark, moving leather targets manipulated by a mechanical

apparatus called the jiggler. This machine has two arms to which the targets are clipped and which wave these targets in front of the entrance. The targets are left in place at the entrance for a period thirty seconds. During this time the bees sting the targets, and the stings remain in the leather. At the end of the thirty seconds, these targets are placed in a box so the stinging will cease and carried bac to the laboratory where the number of stings is counted. After the targets have been removed, the colony is smoked. The Africanized bees do respond well to smoking, except for a small number of extremely defensive bees which will continue to harass the experimentors.

In addition to these stimuli, a series of photographs of a colony is taken; one of the colony entrance before the test begins and after each thirty second stimulus and response interval, and a second sequen across the entrance, from which is estimated the number of bees in the air. The speed of response to both the pheromone and to the moving targets is also determined. Table I. shows the average values for the measures of defensiveness for European and Africanized colonies.

Table I

Relative Defensiveness of European & Africanized Colonies

Measure of Defensiveness	Average response of: European	Africanized
Number of bees responding	40.1	102.2
Speed of response (sec) to:		
pheromone	13.1	5.4
target	9.2	0.3
Total number of stings	10.4	85.7

All of these values are significantly different for the two types of bees. The number of bees responding is much greater from Africanized colonies, particularly the number of bees flying out in defense of the colony. The speed of the response to the pheromone is more than twice as fast by Africanized bees. Response to the target is ten times as fast. The mean value for Africanized bees is less than half a second. Finally the character many people are most interested in, the number of stings, is eight and a half to ten times as much by Africanized colonies.

In a totally European (various commercial stocks from the U.S.) apiary in Venezuela, the bees are managed U.S. style; worked in t-shirts with only a smoker and a veil. On the other hand, when working Africanized bees, it is necessary to wear extensive protective clothing. This includes heavy coveralls, a veil, heavy gloves, and boots. In addition it may be necessary to tape or tie closed any possible entrances into this protective gear. The whole time that one is working in an Africanized apiary one will be surrounded by a cloud of defensive bees.

What are the changes that are going to be happening to U.S. beekeeping when the Africanized bee arrives? First of all, it will be much more difficult to find suitable apiary locations. It will be necessary to locate bees much further from people, homes, and livestock than they are currently placed because of the danger of stinging. It is probable that many local communities and states will pass legislation about where, how, and when beekeeping can be practiced. The price of

insurance for the beekeeper will increase. In South America, when a neighbor is upset about the presence of a beekeeper and his bees, he go after him with a machete. In the United States the most likely response is a court suit. In addition, the time necessary to carry o standard management procedures will increase. It takes extra time to dress in protective gear. Because of the nature of the bees, their defensiveness and runniness, it requires more time to carry out stand procedures. For example, it is much more difficult to locate runny queens in a runny colony. After an activity has taken place in the apiary it requires time to lose irate bees from the beekeeper and his vehicle so that he will not transport them into an area where people livestock may be stung. All of these things mean that there will be increase in the labor cost associated with beekeeping. And it will b more difficult to hire people willing to do this work.

An interesting aspect of Africanization is that there has been a increase in the incidence of theft. These bees are very runny and ve responsive to smoke. It is relatively simple for a thief to enter an apiary, remove a colony cover, throw some smoking material on the top the honey super, and drive the bees down into the colony. It is then relatively easy to take the honey super without many bees and make of with the beekeeper' s profits. The net result of all these differenc in defensive behavior is that there will be substantially increased production costs.

The second major problem associated with Africanization relates to honey production. In Venezuela in 1975, prior to Africanization, there were eighteen commercial beekeepers. Collectively they produced five hundred and eighty metric tons of honey, a production level which exceeded the local demands and allowed them for the first time to export a hundred metric tons of honey to Europe. Ten years later, in 1985, two of these commercial beekeepers are still in business and the production of honey has dropped to less than a hundred metric tons. The commercial beekeepers still in business are able to do so partly because the local price has increased to about ten dollars a kilogram or five dollars a pound. Table II presents reported honey production quantities for the years 1975 thru 1981, graphically illustrating this drop in honey production.

Table II

Honey Production in Venezuela

Year	1975	1976	1977	1978	1979	1980	1981
Metric Tons of Honey	580	469	278	139	115	<100	<100

What are the origins of this reduced honey production? One of them is related to stinging behavior. Beekeepers are unable or unwilling, or their neighbors are unwilling, to deal with bees that are this defensive. A second reason is the level of absconding. Africanized bees tend to abandon colonies during times of stress at a much greater

rate than do European colonies. Also the rate of swarming is much greater than for European colonies. Africanized bees build up to a smaller population size before swarming than do European colonies. Th results in a considerable loss of producing colonies to the beekeeper and reduces his total production of honey.

In addition, these absconding and swarming colonies increase the level of feral, or wild, colonies in the area. Competition for available nectar sources from these feral colonies can significantly affect the production of managed colonies.

In addition to these colony level differences in behavior, Dr. Thomas Rinderer has documented differences in foraging habits by individual bees of the two races. He has compared European and Africanized colonies, observation hives and field hives, under two nectar flow conditions. The first of these is a strong nectar flow, that is good quality nectar (high concentration), available at many locations. The second is a poor nectar flow, with weak or small quantities of nectar available over a scattered area. Tables III, IV, and V present the results of this work. For dancing behavior it can clearly be seen that under good nectar flow conditions the Europeans dance considerably more than do the Africanized bees. For poorer nect conditions, the Europeans dance slightly more often than do the Africanized bees.

Table III

Dancing by Two Subspecies of Honey Bee
(number of dancers)

Subspecies	Nectar Period: 1	2	Combined
European	10.9 ±1.5	6.3 ±1.3	8.6 ±1.0
Africanized	5.8 ±1.2	4.6 ±1.2	5.2 ±0.9
Combined	8.3 ±1.1	5.5 ±0.9	

T = 0.02; P<0.05

If we look at the rate of recruitment, that is the number of bees that follow dancing bees and presumably learn nectar locations from them, the Europeans again are much better during a quality honey flow. During the poor honey flow the differences are not significant.

Table IV

Recruitment Rate of Two Subspecies of Dancing Honey Bees (number of followers)

Subspecies	Nectar Period: 1	2	Combined
European	36.9 ±3.7	15.5 ±3.8	26.2 ±3.7
Africanized	14.2 ±4.0	12.3 ±3.3	13.2 ±2.6
Combined	25.6 ±3.8	13.9 ±2.5	

T = 0.003; P<0.006

flows and individual foraging. For the United States, where most of our nectar flows are strong and occur for a short period of time during the year, this means that Africanized bees will be poor honey producers.

So, the effect of Africanization is to substantially increase stinging, and substantially increase production cost, at the same time decreasing honey production and decreasing gross income for the beekeeper. It is quite clear that this bee poses a serious threat to the United Stated beekeeping industry.

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