

Africanized Bee Research

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Our initial progress in setting up here at the University of California at Davis has been encouraging. Already, we have four major Africanized bee research programs underway, and further research programs are planned. Current Africanized bee research programs include: (1) development of genetic markers to help detect Africanized bees, (2) genetic characterization of California honey bees, (3) selecting high quality bee stock for breeding, (4) assessing the impact of Africanized bees on a queen rearing business in Mexico.

1. Development of Genetic Markers to Help Detect Africanized Bees.

Genetic markers will be needed along with other characteristics to determine the range and extent of Africanization of feral and commercial honey bee populations in California. So far, we have established a "library" of honey bee DNA that might provide some useful markers. It currently contains over 500 separate sections of honey bee DNA that have been inserted into bacterial plasmids for cloning. We are currently testing these markers to see if they show suitable polymorphisms for use in identification.

2. Genetically Characterizing California Honey Bees.

With the California survey, we aim to characterize wild bee colonies from throughout California. When Africanized bees arrive, the gene frequencies of specific markers and the size of workers will change in these populations. Honey bee queens from queen bee breeders mate with wild honey bee drones (as well as with commercially reared drones). Monitoring Africanized gene frequencies through California will enable us to advise queen breeders of areas that are free from Africanized genes where they can mate their European queens. Helping California queen breeders maintain European stock is essential to our program to combat Africanization of commercial hives.

Progress has included sending out over 1,000 letters throughout California requesting locations of wild bee colonies. So far this year, we have collected samples from over 100 wild honey bee colonies that await genetic and morphological characterization.

3. Selecting High Quality Bee Stock for Breeding.

When Africanized bees are in California, we will still be able to pollinate California's orchards with commercial colonies of European bees. This will be possible because

commercial hives can be requeened with certified European queens on a regular basis. Therefore, the heart of our program is to help ensure that queen breeders have superior European bee stocks. A closed population breeding program has been initiated to produce superior pollinating lines of bees for use in pollination services. This year, we measured the pollination potential (indicated by pollen reserves) of 125 commercial bee colonies. From these colonies, high pollinating bees have been selected and bred (using instrumental insemination) for two generations. After the first generation, we observed a significant increase in the amount of pollen stored and in the proportions of the foragers in the hive that collected pollen. In 1991, we will take these presumably high pollinating bees and breed them for two additional generations and begin releasing the stocks for field testing.

4. Research Program in Mexico.

The aim of our research program in Mexico is to learn more about Africanized bees before they arrive in California. One specific aim is to learn what proportion of Africanized genes can be present in European bees and still be manageable. This is important because it will give us an idea about how much isolation and control we will need in areas where we mate queens. We have established a research site in Ixtapan, Mexico (near Mexico City). This is an area that is presently in the early stages of becoming Africanized. Mr. Garcia, the major commercial beekeeper in that area, will be cooperating with our research program. Already, we have visited the area and hired an experienced graduate student from Davis to go down to Mexico to do the research.