USDA Fights to Repel African Bees' Invasion

Efforts to slow the bees' northward spread by setting up control zones in Mexico are encountering numerous problems

UNDER ATTACK by a highly mobile and disciplined invasion force, scientists with the U.S. Department of Agriculture appear to be losing their first, and perhaps most crucial, battle against the Africanized honey bee. As General Sherman warned: War is hell.

Cursed by desertion and hampered by severed supply lines, the government scientists have engaged the enemy in Mexico, where the authorities hope to repel, or at least retard, the northward range expansion of the Africanized honey bee, now scheduled to arrive in Brownsville, Texas, by March or April 1990.

But even as the government researchers head for the trenches, opponents of the USDA program predict that they will be routed. The war, the critics charge, is a $4-million folly doomed to fail. "It's humbug," declares Roger Morse of Cornell University.

Undaunted, USDA scientists and their Mexican counterparts have deployed their forces along two lines of defense: one front on the Pacific coast near Puerto Escondido and another on the Gulf of Mexico at the City of Veracruz. These spots were chosen because here the land forms a natural funnel between the sea and the mountains, and through these funnels the bees must pass.

The so-called "killer bees" now in Mexico are the descendants of 26 swarms of African bees that escaped from an apiary in Rio Claro, Brazil, in 1957. The bees were brought to the New World in an attempt to create a heartier breed of honey bees for the tropics, where the European honey bee, the bee of choice in North America, has never fared well.

Moving north at about 350 kilometers a year for the last three decades, Africanized honey bees reached the control zones in May. USDA researchers and their Mexican allies are responding to their arrival by killing every African bee they can get their hands on. Accordingly, some 30,000 traps baited with pheromone have been strung from trees to attract the wild swarms, which are then snuffed out by search-and-destroy brigades that roam the countryside in four-wheel-drive Chevy pickup trucks provided by the USDA.

In addition to simply slaughtering the bees, a more insidious and controversial scheme is being pursued, a counterattack that purports to strike at the very core of what it means to be an African bee. USDA scientists are attempting to dilute the gene pool of the advancing Africanized bees by saturating the battlefield with European honey bees, the more docile race kept by North American beekeepers.

It is hoped that the male drones produced by these European hives will mate with the African queens as they enter the control zones. Perhaps, the government researchers reason, these crosses will produce a hybrid that is more gentle than the Africanized bee.

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It is also hoped that with so many European drones in the air, the Europeans will have a greater chance of mating with their own queens, rather than allowing them to be compromised by the African males buzzing about. "Nothing like this has ever been tried before," says Al Dietz of the University of Georgia, who supports the USDA plan.

Alas, the news from the front is grim. At a meeting last week of the American Bee Research Conference in Weslaco, Texas, government scientists revealed that the Mexican beekeepers are not supporting the war effort. They are leaving the battlefield and taking their bees with them.

The USDA plan calls for having some 80,000 managed colonies of European honey bees in the two control zones. But as of last week, there were fewer than 23,000 hives in place.

"We have been losing about 400 colonies a week," reports Elba Quintero, head of the joint U.S.–Mexican control program. "We don't have the number of hives we need for genetic dilution."

Beekeepers in southern Mexico are migratory, and they are moving their hives out of the control zones to exploit the rich nectar flow in other regions. Since the beekeepers rely on quality honey for their livelihood, and since the only incentive to stay in the battlefield is a free supply of sugar water to feed their hives, the Mexican beekeepers are not very enthusiastic soldiers.

In addition, Mexican beekeepers whose hives have been invaded by Africanized queens are being told to destroy their colonies. This they are loathe to do, since no one is compensating their losses. Some are refusing to kill their bees.

Finally, mated European queens from the United States were to be used to restock the managed colonies in Mexico that are being usurped by African queens. Unfortunately, the fresh supplies of European queens are not forthcoming. Because some honey bees in the United States are infested with mite, Mexican officials are not allowing the importation of U.S. queens south of the border. "This is a major problem for us," says Quintero.

Government researchers from the United States and Mexico are meeting later this month to decide what to do: hold the fort in Mexico or retreat to the Texas border for a last-ditch stand against the Africanized honey bees. There are signs that the Mexican government, already strapped for cash, may even withdraw from the fight. As one scientist put it: "It's finger-pointing time."

In all fairness, it is too early to know for certain if the bee barrier is a success or a failure. The first swarms of Africanized bees are just now being spotted at the northern ends of the control zones.

But a number of bee researchers insist that the war is not winnable and that the northward range expansion of the Africanized honey bee is inevitable. There is a great deal of skepticism about the ability of the USDA to dilute the Africanized bee's gene pool. They contend the Africanized honey bee is just too mobile, too prolific, and too well adapted to the tropical and subtropical world to be defeated.

"The efforts in Mexico are at best a delay tactic," says Glenn Hall of the University of Florida. Adds Morse, "To talk of genetic dilution is ridiculous. It hasn't happened in the 31 years since the bees arrived in Brazil. And there's no reason to think it will happen in Mexico.".

For some time, researchers have been arguing about the exact mechanism used by the Africanized bees to expand their range. Are the bees taking over new areas by mating with European bees in managed colonies? Or are the African bees expanding their range in a way that largely bypasses the

managed hives, that is by feral swarms spreading through the habitat?

"How are these bees maintaining their genetic integrity? That's what we need to ask," says Orley Taylor of the University of Kansas. Taylor remarks that the Africanized bees do not seem to become "Europeanized" as they expand their range northward, despite encounters with large numbers of European honey bees.

Indeed, research by Hall and Debbie Smith of the University of Michigan using mitochondrial DNA may show that bees directly from Africa and Africanized bees from Venezuela and southern Mexico all possess the same genetic markers, which European honey bees from the United States do not share.

"These bees are African. They are not diluted. They are maintaining their genetic integrity. We cannot Europeanize these bees. It's a dead issue. These Africanized bees are going to reach us essentially unchanged," says Taylor, who adds that a natural process of selection is allowing the Africanized bees to become dominant.

Why this is occurring is open to speculation. The bees that were brought to Brazil in 1956 and escaped the following year are from central and subequatorial East and South Africa. There, the bees evolved in an environment far removed from their European counterparts. The African bees live faster and die younger. They are small. There is apparently a strong selective pressure to be highly mobile, to invest more energy in reproduction and less in amassing huge stores of honey to feed a large colony over the winter, as bees in temperate climates do.

African bees will abandon their hives more readily, a trait beekeepers dislike. They also form more reproductive swarms, in which a single hive splits to establish several new colonies. In one study, a colony of Africanized bees in French Guiana produced between 6 and 12 swarms a year. An unmanaged European bee colony usually swarms no more than once or twice a year.

How nasty are the Africanized bees? Morse, who has been combing the literature, says there are no reliable figures on fatalities due to bee stings in South and Central America. "Clearly, there have been a number of deaths attributable to mass stinging by Africanized bees. And there will be more. Unfortunately, these are not the bees that people are used to," says Thomas Rinderer of the USDA Honey Bee Laboratory in Baton Rouge.

"Sting for sting," the Africanized bee is no more venomous than the European bee, though the Africanized bees are more defensive of their colonies. This highly defensive posture may be a holdover from their time in Africa, where the bees evolved in a habitat thought to be filled with more predators, not the least of which was a voracious honey hunter called man.

Studies by Anita Collins and colleagues at the USDA show that Africanized bees react more quickly and sting more readily than European bees. When a suede leather ball was dangled before an Africanized hive in Venezuela, the bees reacted in a mere 1.5 seconds, and left 80 stingers in the ball. European honey bees in Louisiana took 10 seconds or longer to react and left only 10 stingers in the dancing ball. As worrisome to beekeepers, the Africanized bees have a tendency to follow their tormenters for greater distances.

"I'm not in love with these creatures, either, but we must learn to live with them. We have got to accept the fact that these bees are coming north," says Morse.

In fact, Morse does not think that the Africanized bee is really so bad. He contends that after several years of diminished honey production and a few sensational deaths due to mass stinging, both the American public and the American beekeeper will settle down and adapt to the new bee.

This is exactly what has occurred in Brazil, says Morse. At first, beekeepers abandoned their apiaries, and honey production plummeted. But in time, as beekeepers became accustomed to working with the more aggressive bees and taking the precautions the bees demanded, both beekeeping and honey production rose. "Brazil has a healthy beekeeping industry today," says Morse.

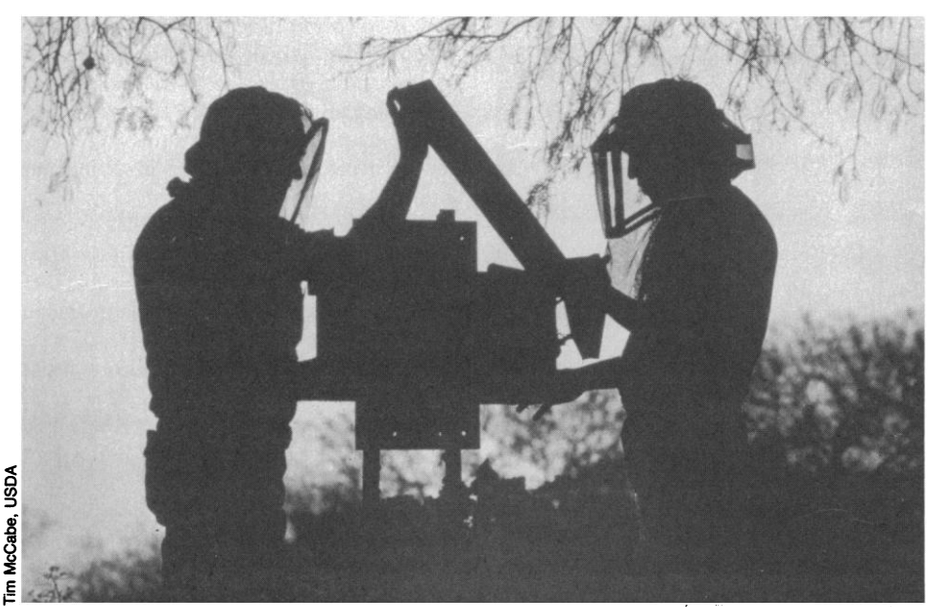
The generals in the research branch of the USDA do not agree with peaceniks such as Morse. The enemy is not to be embraced, at least not yet. "I do not see any redeeming qualities in the African bee," says Hachiro Shimanuki of the Beneficial Insects Laboratory in Beltsville, Maryland, who along with Rinderer at the USDA bee lab is responsible for mounting the counterattack in Mexico.

Shimanuki and Rinderer say they are motivated in their struggle against the Africanized bee not so much by fear for the individual beekeeper, who after all can protect himself with a smoke can, two pairs of canvas overalls, a bee veil, sturdy boots, and rubber gloves, but for the beekeeping industry itself.

Shimanuki and Rinderer say they are concerned that generalized entomophobia and an irrational loathing of "killer bees" will encourage draconian measures to restrict beekeeping. For example, beekeepers now move their hives around the country from season to season, leasing their colonies to growers who need the insects to pollinate their crops. In many settings, the bee boxes are in close proximity to people and homes. Shimanuki worries that local governments may pass laws to keep bees at extreme distances from people. Or that beekeepers will be kept off the land for fear of liability suits. Perhaps beekeepers must prove they are housing only European bees.

"When the bees attack their first victim, the whole debate will change from a beekeeper's problem to a public problem," says Shimanuki, who like many of his peers probably dreads the day that a toddler is attacked by a feral swarm of Africanized bees. Says Shimanuki: "It could spell the end of beekeeping as we know it."

■ WILLIAM BOOTH



Tim McCabe, USDA

Beekeepers beware. *USDA scientists are concerned that an irrational loathing of "killer bees" will encourage draconian measures to restrict beekeeping.*