

# Africanized Honey Bees and Agromedicine

Thomas E. Rinderer, PhD

**ABSTRACT.** Worldwide, honey bees are integral to agriculture because they are the most plentiful and often the most efficient pollinators of crops. Maintaining commercial populations of pollinating honey bees is vital to US agriculture. However, beekeeping is beset with many problems, including those arising from the accidental importation of parasitic mites and the notorious Africanized honey bees (AHB). AHB build large populations of feral colonies, tend to invade commercial bee hives, and are highly sting-prone. Because of their tendency to sting, Africanized honey bees bring agromedical concerns. Education on avoiding stings and proactive medical planning for sting sensitive persons are appropriate responses to Africanized honey bees. Agricultural research has provided solutions to mitigate Africanization problems for beekeeping. These recommendations include management procedures that encourage the hybridization of feral populations of honey bees to help reduce stinging incidents.

**KEYWORDS.** Africanized honey bees, bee stings, agromedicine, apiculture

## *INTRODUCTION*

Worldwide, honey bees are integral to agriculture because they are the most plentiful and often the most efficient pollinators of

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Thomas E. Rinderer is affiliated with the USDA-Agricultural Research Service, Honey-Bee Breeding, Genetics, and Physiology Laboratory, 1157 Ben Hur Road, Baton Rouge, LA 70820-5502.

crops. Outside of Asia, which has several species of honey bees, honey bee pollination is done by the Western Honey Bee, *Apis mellifera*. In the United States, commercial beekeepers are the principal source of honey bees, renting colonies for crop pollination. With many US crops, thousands of honey bee colonies are brought to flowering fields needing pollination, sometimes from states far away. For example, the almond crop in California requires almost one million colonies for two to three weeks in February.<sup>1</sup> Between 5 and 10 billion dollars of the gross national agricultural product are dependent upon honey bee pollination, with fruit, seed, nut and fiber crops all benefiting.<sup>2</sup>

This system of crop pollination is expected to become even more important. Wild bees, including feral honey bees have now become very unreliable pollinators. Through the years, weather, cultural farming practices—such as monoculture and weed control, and pesticide usage have severely reduced populations of bees which were once a dependable source of “free” pollination. In addition, wild or feral populations of honey bees are being destroyed by two species of parasitic mites that have recently been introduced into the US.

### FEDERAL HONEY BEE RESEARCH

Maintaining populations of pollinating honey bees has been an historic concern of the USDA. In addition to its existing honey bee laboratory in Maryland, in 1928 the department established the “US Southern States Bee Culture Field Laboratory” in Louisiana. This laboratory was dedicated to the development and support of a growing honey bee breeding enterprise. This enterprise came about because of the development of the nation’s railway system. Beekeepers in the South were producing queen bees and cages of worker bees which were marketed to beekeepers in the northern states who used them to produce honey.

This early interest in honey bee breeding by the USDA continues. The “US Southern States Bee Culture Field Laboratory” has evolved and become the “Honey Bee Breeding, Genetics, and Physiology Laboratory” of the Agricultural Research Service of the USDA. This laboratory is one of four maintained by the Service that conduct research on honey bees. Each laboratory has its own

primary focus: pollination, honey bee diseases, honey bee management, or honey bee breeding and genetics.

The Honey Bee Breeding, Genetics, and Physiology Laboratory employs 5 scientists and several support staff. Scientists are affiliate members of Louisiana State University's graduate faculty and supervise the thesis work of masters and doctoral students. The laboratory facilities, located on the LSU agricultural facilities near the main campus in Baton Rouge, are modern, well-equipped, and unique in their ability to house honey bees in close proximity to laboratories.

### **AFRICANIZED HONEY BEES**

The Honey Bee Breeding, Genetics, and Physiology Laboratory was assigned the problem of Africanized honey bees about 18 years ago because the AHB is principally a problem of stock quality. Since 1975, AHB work has taken staff and students to Africa, Europe, Asia and, most often, to Latin America.

In the first phase of our work with AHB we defined the principal problems caused by the movement of AHBs into an area. Most of the problems we described are those of agricultural production. AHBs require management changes that are costly to begin and to continue.<sup>3</sup> Yet, AHBs produce less honey.<sup>4</sup> Also, they respond poorly to pollination service management.<sup>5</sup> In addition, Africanized bees build large populations of feral honey bees which are notorious for their propensity to sting.<sup>6</sup>

Africanized honey bees were imported to Brazil in the 1950s to infuse tropically adapted traits to populations of European honey bees brought to Brazil from Portugal in the early 1500s. To a degree, the plan was successful. The honey bees of Africa were better suited to the climatic patterns of tropical America than were the honey bees of Europe. The imported African honey bees interbred with the less well-adapted European honey bees, a process that has resulted in hybrid populations of AHBs. These AHBs developed large populations in vast regions of South America. After 30 years, Brazilian beekeeping has adjusted and developed a truce with AHBs. As a result, a modest beekeeping industry now provides a livelihood to a few full-time, and many side-line bee-

keepers. Each new country encompassed by the range expansion of AHBs requires a lengthy period of adjustment during which beekeeping is first generally destroyed and then rebuilt.<sup>7</sup> Adjustments, often with the protection of import tariffs on honey, include both beekeeping changes and changes in the ways the general public deals with honey bees, the chance of being stung, and actually being stung.

### AGROMEDICAL CONCERNS

AHBs bring agromedical concerns. First, AHB populations (i.e., numbers of colonies) tend to be larger than are European honey bee populations.<sup>4</sup> This, coupled with the AHB's greatly enhanced propensity to sting, increases both the chances of persons to be stung and the chances that they are severely stung. AHBs produce slightly less venom although the biochemical characteristics of Africanized and European honey bees are similar.<sup>8</sup> Hence, persons allergic to bee stings are at greater risk from being stung by a single bee in areas with AHBs primarily because there are more honey bees in the area. Interestingly, even in areas with European honey bees, venom-sensitive persons, even though they are more knowledgeable of sting avoidance procedures, are stung 10 times more often than persons who are not venom-sensitive.<sup>9</sup> Perhaps their fear of bees leads the less knowledgeable members of the group to behavior which is very likely to cause them to be stung. In any event, massive stinging by honey bees increases several fold after AHBs arrive.<sup>10</sup> For example, in Venezuela in 1978, prior to Africanization, 12 deaths were attributed to honey bee stings. In 1988, after Africanization, 100 bee sting related deaths were reported.<sup>11</sup> Venezuela reported 400 honey bee sting related fatalities in the first four years of having Africanized bees<sup>11</sup> while Mexico reported 71 deaths in a similar period.<sup>10</sup> Due in part to better beekeeping and medical management, only 1 person has died in the US since AHBs first entered south Texas in 1990. However, since multiple-sting incidents are predicted to increase in areas of the US having AHBs,<sup>12</sup> agricultural workers and persons that use the outdoors for recreation will need education to avoid stings. State Entomological Extension Officers, usually attached to state universities, or the

Extension Service's national program leader for apiculture<sup>13</sup> can supply written materials concerning sting avoidance for distribution to persons who may encounter AHBs. Excellent information is also available from the medical community.<sup>10</sup> For persons that are venom-sensitive, it may be prudent to either have proactive desensitization procedures or to carry prescription sting kits.<sup>10</sup> When honey bee identification is desired following a severe stinging incident (any incident that caused a person to seek medical attention), it can be obtained from the USDA's identification service.<sup>14</sup>

### CONCLUSIONS

Research has armed beekeepers with tools to reduce the impact of AHB. Procedures have been recommended to help maintain gentle European stocks in colonies and to certify that these efforts are successful. Commercial colonies are rarely responsible for persons being stung; on the contrary, it is the feral honey bee populations that cause the greatest problems. Beekeeping activities that sustain European honey bees in areas having AHB enhance the general hybridization of feral bees and reduce the stinging tendencies of the resulting populations.<sup>15,16</sup> Additionally, work continues on personal protection from honey bee stings.<sup>17</sup>

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