

Bee Benefits to Agriculture

One mouthful in three of the foods you eat directly or indirectly depends on pollination by honey bees. The value of honey bee pollination to U.S. agriculture is more than \$14 billion annually, according to a Cornell University study. Crops from nuts to vegetables and as diverse as alfalfa, apple, cantaloupe, cranberry, pumpkin, and sunflower all require pollinating by honey bees.

For fruit and nut crops, pollination can be a grower's only real chance to increase yield. The extent of pollination dictates the maximum number of fruits. Post-pollination inputs, whether growth regulators, pesticides, water, or fertilizer, are actually designed to prevent losses and preserve quality rather than increase yield.

When pollination is this important, farmers can't depend on feral honey bees that happen to nest near crop fields. That's why farmers contract with migratory beekeepers, who move millions of bee hives to fields each year just as crops flower. Pollinating California's 420,000 acres of almond trees alone takes between 900,000 and 1 million honey bee colonies.

But the bees' importance goes far beyond agriculture. They also pollinate more than 16 percent of the flowering plant species, ensuring that we'll have blooms in our gardens.

Of course, there is also the honey. More than \$130 million worth of raw honey was produced in 2002 in the United States.

Not bad for an insect that is not even native to the New World. But then again, most of our crops and many of our garden plants aren't natives either. These evolved in areas where honey bees are native, and both crops and insects were brought here to become essential parts of our agricultural system.

Because all our common honey bees are introduced rather than native, colonies not managed by beekeepers are considered feral rather than wild. We have lost much of our managed and feral honey bee populations in recent years. New invasive pests like *Varroa* and tracheal mites and the small hive beetle have appeared in the last 15 to 20 years. Diseases like American foul brood and chalk brood are also taking a heavy toll. Beekeepers are battling these problems and not always winning.

With these kinds of pressures on such an important agricultural and environmental resource, it should not be surprising that ARS maintains a strong honey bee research program to improve disease and pest treatments, breed stronger honey bees, and enhance management methods.

While all these problems are well known to beekeepers, the honey bee problem the public is most familiar with is the invasion of the Africanized honey bee (AHB), for which Hollywood has created a fearsome reputation as a "killer bee." Since the bees first arrived here in 1990, ARS has been the primary USDA agency for tracking their spread in the United

States and for figuring out how we will live with them. There is currently no way to eradicate AHBs, because anything that will kill them will also kill our essential honey bees.

AHBs are problems for beekeepers mainly because of two characteristics. They have a strong tendency to abscond—leave the home hive for new venues—which makes it hard for beekeepers to keep them. The other trait is defensiveness. All honey bees defend their nest by stinging, and their behavior ranges from mild to intense. But AHBs sting in greater numbers on less provocation. That makes them hard for beekeepers to work with, because they don't want to get stung nor do they want to have to wear complete bee suits just to work their bees.

It is this defensive behavior that Hollywood has raised to mythic proportions. But in the past 14 years, fewer than 15 deaths have been attributed to AHBs in the United States. The average person can survive 1,000 to 1,500 stings (about 10 to 15 stings per pound of body weight), especially if they get medical attention. Fortunately, such massive stinging is rare. To put this in some perspective, in 2000 alone, 50 people in the United States died from being struck by lightning.

If a person is allergic to bee venom, however, a single sting from either a European or Africanized honey bee could be equally dangerous, as their venom is virtually identical.

Vibrations from heavy machinery like lawnmowers can upset all bees. If you live in an area with AHBs or if you are allergic to bees, it is a good idea to inspect your property for signs of a bee nest before operating machinery. Sealing cracks and openings in buildings that could attract a swarm looking for a nest cavity is also a good idea whether you live in an area that has AHBs or not.

But public fear and concern about AHBs has cost beekeepers many of the locations they once rented to maintain beehives, often in areas thousands of miles from the nearest AHB.

ARS continues to be a center for research on how AHBs affect our honey bees, managed and feral. Beekeepers in the five U.S. states and two territories that already have AHBs—Arizona, California, Nevada, New Mexico, Texas, Puerto Rico, and the U.S. Virgin Islands—must be able to deal with them. And the public needs the best advice on how to live with AHBs.

In the 14 years we have had AHBs in this country, ARS has developed some important answers about living with them. Like most good research, many answers have given rise to additional questions, but we believe we are well on our way to containing this and other bee problems.

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