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Living 'Bee Fences' Protect Farmers from Elephants, and Vice Versa

A string of hives between posts can fend off the pachyderms better than other deterrents, research shows

By Cari Shane on September 27, 2021



Beehive fence protects farm from elephants outside Tsavo National Park, Kenya. Credit: Copyright © Lucy King *Save the Elephants*

In the African bush in southern Kenya, Lucy King watched an elephant nicknamed Mohican rest under an acacia tree, seemingly nonplussed by an overhead beehive. It was 2007, and King had just published a behavioral study confirming a belief widely held by Indigenous

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thrown by this,” King says, recalling the day she sat watching the untroubled matriarch. “I was like ‘No!’” Thanks for reading Scientific American. Knowledge awaits.

Bees tend to sting elephants at the mouth and even inside the trunk. For her research, King, a zoologist and head of the Human-Elephant Co-Existence Program at the nonprofit organization [Save the Elephants \(STE\)](#), had documented families of elephants running from bees, kicking up dust and shaking their head as if trying to knock bees out of the air. Even recordings of buzzing bees that King played in the bush led to elephants running and “warning” others as they fled.

Fortunately, observing Mohican on that hot day, King eventually realized what now seems obvious: for the bees to scare elephants, the insects must be swarming. King asked her research assistant to chuck a stone at the hive, “and then suddenly, the bees just erupted,” King says. “And the elephants just fled.”

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That aha! moment led King to sketch a novel design for using live beehives as “fences” to protect farm crops from foraging elephants. The goal was to reduce human-elephant conflicts, which increased significantly in parts of Africa in the 2000s. Kenya has seen [some recovery](#) of its population of the pachyderms in recent decades, thanks to conservation efforts there—although the total population of African elephants has declined dramatically in the same time period, King says. Meanwhile sub-Saharan Africa’s human population rose from about 870 million to 1.1 billion people between 2010 and 2020, [according to the World Bank](#). The upshot has been a rise in hotspots where people and elephants compete for space and food.

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Farmers work on beehive fence construction in Ngare Mara, Kenya. Credit: Copyright © Lucy King *Save the Elephants*

“Elephants are disturbing us a lot,” a Kenyan farmer told researcher Sophia Weinmann during an interview for her 2018 master’s thesis about the impact of the giant animals’ crop raids on farmers in Sagalla, Kenya. “I planted about six kilos of green grams; they were all eaten. One time I just fainted in the field after waking up and seeing that happen.”

An elephant can eat a farm’s entire harvest in one day, seriously threatening a family’s income and food security, Weinmann says. The situation has grown more acute during the pandemic: a World Bank report in January revealed that between April and August 2020, residents of four countries in sub-Saharan Africa relied more heavily on agriculture as a means for survival than they did in prior years.

And although elephants are typically peaceful, they can endanger humans if in the search for food the animals end up raiding sheds or trampling homes. To protect their livelihoods, some farmers have taken to shooting elephants, King says. “Sadly, we’re losing these animals by the day, and in some countries, by the hour—to not only ivory poaching but this rapid rise in human-elephant conflict,” she adds.

Similar conflicts have erupted in Asia as well, making headlines earlier this year when a herd of elephants in China walked 500 kilometers from their game park and into the suburbs of

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In an attempt at a nonlethal solution, nearly 10,000 beehive fences like those in King's initial sketches are now built into sites in 20 African and Asian countries, she estimates. STE team members focus on providing beehive fence kits to farmers in the center of the human-elephant conflicts in Africa, often near beehives and 12 dummy hives. The latter double the number of objects that resemble hives to elephants, eventually stretching out the effect without the added expense and upkeep. Hives are suspended from wires hanging between wooden posts. If an elephant tries to enter a farm, it walks into the wires, shaking the hives and triggering a swarm. STE covers the cost of the kits—around \$1,200 per acre of crops. King expects each kit to last 10 years.

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About two dozen boxes holding speakers that play recordings of buzzing bees are being tested around farms with newly installed beehive fences. Researchers at Wild Survivors hope to determine whether the buzzing sounds will discourage foraging elephants until bees move into the hives. Credit: Copyright © Francesca Mahoney *Wild Survivors*

Some 61 percent of farmers interviewed by Weinmann told her that the beehive fences are “more effective” than other deterrents, such as fashioning barriers out of thorn bushes, banging sheet metal, burning rubber tires to create acrid smoke or shining lit torches into elephants’ eyes.

In a 2017 field study, King documented that beehive fences installed at 10 farms near a national park in Kenya deterred elephants 80 percent of the time.

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Still, she knows these fences are not the final answer to human-elephant conflicts, given the scale of the problem in Africa. Also, foraging honey badgers and baboons occasionally feast on the honey and disturb hives to the point that their occupants fly to a safer location. Elephants may then take advantage of the empty hives, though simple metal cages placed over hives have helped protect some of them, King says. The dry season also provokes bees to abandon hives for new, wetter locations with more floral food for the insects. Droughts can wipe out bee populations at farms as well, she adds.

Next steps could include educating farmers to grow crops that elephants dislike—chilies, turmeric, ginger, onions, *Moringa* and sunflowers—King says. Odor-laced fences are another strategy. For these, farmers simply fill empty plastic bottles with refuse such as a mixture of cow dung, rotting eggs, ginger and garlic, then hang the smelly concoctions on wire fencing around their farms. When elephants knock against a wire, the odor released from puncture holes in the bottles is thought to drive the animals away. King and a charitable group called *Wild Survivors* are also testing her recordings of angry swarming bees to see if “buzz boxes”—speakers playing the sound—can be placed around farms to deter elephants.



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Meanwhile bee fences have provided some farmers with new income. As part of the STE program, they are taught beekeeping and provided with protective gear such as suits, smokers, rubber boots and gloves. Selling honey can add \$50 to \$200 to a family's income per harvest, which usually occurs twice a year, King says. “The honey is a huge benefit,” says Esther Serem, a field officer at STE's research center in the Tsavo region of Kenya.

Farms with bee fences and healthy hives have also inspired another type of enterprise. Mavis Nduchwa started a honey-aggregating business called *Kalahari Honey* in Botswana—a country that has a farm-based economy and is also home to the world's largest elephant population. *Kalahari Honey* offers beekeeping training to women at farms with bee fences and helps them sell the resulting honey through her business. The benefits go beyond extra income, she says. “We have seen the decline in the numbers of the gender-based violence cases as women are more empowered and have jobs,” says Nduchwa, who employs more than 1,500 female farmers. “It might sound crazy, but a jar of honey saves elephants and feeds more families.”

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