

The truth about honeybees

Heard what Einstein said about humans having four years to live if the bees died out? Well he didn't and we won't, say **Marcelo Aizen** and **Lawrence Harder**

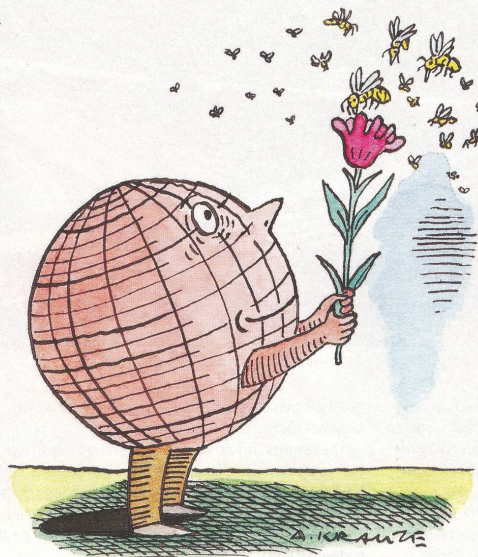
A MOVIE called *Vanishing of the Bees* opened in cinemas across the UK earlier this month. It's a feature-length documentary about the "mysterious collapse" of the honeybee population across the planet – a phenomenon that has recently attracted a great deal of attention and hand-wringing.

The idea that bees are disappearing for reasons unknown has embedded itself in the public consciousness. It is also a great story that taps into the anxieties of our age. But is it true? We think not, at least not yet.

First, the basics. Pollination by bees and other animals – flies, butterflies, birds and bats – is necessary for the production of fruits and seeds in many wild and cultivated plants. More than 80 per cent of the planet's 250,000 species of flowering plants are pollinated by animals.

Agriculture is a large-scale beneficiary of these pollination services, so claims that pollinators are in decline have triggered alarm that our food supply could be in jeopardy, that we may be on the verge of a global "pollination crisis".

Claims of such a crisis rest on three main tenets: that bees are responsible for the production of a large fraction of our food; that pollinators are declining worldwide; and that pollinator decline threatens agricultural yield. Numerous scientific papers, many media stories and even a European Parliament resolution in 2008 present each of these as an uncontested truth. But are they?



Our analysis of data from the Food and Agriculture Organization of the United Nations reveals a different perspective on the pollination crisis – one that is less catastrophic than that depicted in the movies (*Current Biology*, vol 18, p 1572, and vol 19, p 915).

The first tenet – that bees are responsible for the production of a large fraction of our food – is simply untrue. Pollinators are important for many crops, but it is a myth that humanity would starve without bees.

About 70 per cent of the 115 most productive crops, including most fruits and oilseeds, are animal-pollinated. These account for

nearly 2.5 billion tonnes of food a year, about a third of global agricultural production. However, few of these crops depend on animal pollination completely, owing largely to their capacity for self-pollination.

On top of that, production of many staple foods does not depend on pollinators at all: carbohydrate crops such as wheat, rice and corn are wind-pollinated or self-pollinated. If bees disappeared altogether, global agricultural production would

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decrease by only 4 to 6 per cent.

What of pollinator decline? Claims of global bee disappearance are based on collections of (often extreme) regional examples, which are not necessarily representative of global trends. These examples tend to come from parts of Europe and North America where little natural or semi-natural habitat remains.

Stocks of domesticated honeybees, the most important crop pollinator of all, have also decreased considerably in the US and some European countries in recent decades. However, these declines have been more than offset by strong increases in Asia, Latin America and Africa. Indeed, the number of managed honeybee hives worldwide has increased by about 45 per cent in the past five decades.

There have also been scare stories about "colony collapse disorder" and the spread of *Varroa* mites in the US and Europe. Again, these are real phenomena, but they are short-term blips rather than the driving forces of long-term trends. Instead, the long-term declines seem to be consistent with the economic dynamics of the honey industry, which seems to be shifting to developing countries in search of cheaper production.

Finally, does a low abundance of pollinators significantly affect agricultural productivity? It is true that a lack of pollinators, especially bees, can limit the yield of many crops and wild plants. It is also true that the yields of many pollinator-dependent crops have

grown more slowly than that of most non-dependent crops. However, contrary to what we would expect if pollinators were in decline, the average yield of pollinator-dependent crops has increased steadily during recent decades, as have those of non-dependent crops, with no sign of slowing.

Overall, we must conclude that claims of a global crisis in agricultural pollination are untrue.

Pollination problems may be looming, though. Total global agricultural production has kept pace with the doubling of the human population during the past five decades, but the small proportion of this that depends on pollinators has quadrupled during the same period. This includes luxury foods such as raspberries, cherries, mangoes and cashew nuts. The increased production of these crops has been achieved, in part, by a 25 per cent increase in cultivated area in response to increased demand for them.

This expansion may be straining global pollination capacity, for two reasons. Demand for pollination services has grown faster than the stock of domestic honeybees, and the associated land clearance has destroyed much of the natural habitat of wild pollinators.

The accelerating increase of pollinator-dependent crops therefore has the potential to trigger future problems both for these crops and wild plants. These problems may grow as decreasing yields of raspberries, cherries and the rest prompt higher prices, stimulating yet more expansion of cultivation. So although the current pollination crisis is largely mythical, we may soon have a real one on our hands. ■

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