



The trouble with **BEES**

A MYSTERIOUS DISEASE HAS TRIGGERED A WAKE-UP CALL ABOUT THE IMPORTANCE OF BEES IN OUR FOOD CHAIN. BUT WHAT'S REAL AND WHAT IS MYTH?

words SUE WHITE photography PHOTOLIBRARY & BIG STOCK PHOTO

Colony Collapse Disorder (CCD) has sent a wake-up call about the importance of bees in the food chain.

As summer continues, it's not surprising that the average Australian gardener spends a lot of time mulling over their backyard's environmental needs. But as gardeners resign themselves to replacing the last of their exotic plants with drought-resistant varieties, they might also spare a moment to appreciate the vibrant buzzing that's still a feature of most Australian backyards, thanks to the continued presence of the humble honey bee.

While bees may have previously been one of the most underappreciated insects on the planet, they've spent the past few years moving into a starring role on the world's agricultural stage. As one of our most important pollinators, bees are responsible for far more than honey production, playing a vital role in the pollination of more than 90 fruit and vegetable crops.

As with most modern environmental lessons, we've learned this one the hard way. It's taken a dramatically titled mysterious disease, Colony Collapse Disorder (CCD), to trigger a wake-up call around the world about the importance of bees in our food chain.

CCD is currently thought to have wiped out around 30 per cent of North American and European bees. It first hit the headlines in 2006, when US beekeepers opened their hives to discover large numbers of their bees had simply vanished and, in particular, bodies of worker bees were nowhere to be seen. When the problem happened again the following year, in more American states as well as Europe, eye-catching headlines popped up across the globe and the world started tuning in to the plight of the formerly ubiquitous honey bee.

"Vanishing bees threaten US crops," announced the BBC. "Honey bees vanish, leaving keepers in peril," cried *The New York Times*. "Missing bees could lead to higher food prices," our own newspaper, *The West Australian*, predicted glumly.

Unfortunately, the headlines may be right. Bees play a vital role in our food chain, pollinating an incredibly wide array of fruit and vegetables.

BEES PLAY A VITAL ROLE IN OUR FOOD CHAIN, POLLINATING AN INCREDIBLY WIDE ARRAY OF FRUIT AND VEGETABLES — APPLES, CUCUMBERS, AVOCADOS, CARROTS, ONIONS AND TURNIPS ALL RELY ON BEES FOR THEIR PRODUCTION.

Apples, cucumbers, avocados, almonds, cherries, carrots, onions, celery, pumpkins and turnips all rely on bees for their production. While some of us could potentially live quite happily without turnips, our plates would undoubtedly feel bare without most of the others.

Alison Benjamin, *Guardian* journalist and co-author of *A World Without Bees* (A&C Black), agrees that if the bees' problems continue, food prices will certainly be affected.

"It would be a world without most of the fruit and vegetables we eat," she says. "Bees even pollinate chocolate [cocoa], coffee and cotton. A lot of the commodities we take for granted would be in such short supply that they would be incredibly expensive at best."

It's the dollars involved that have gained the bees most of their press coverage. No dollar figure has been generated for Australia, as CCD is not currently an issue on our shores (see breakout overleaf). However, the US Department of Agriculture estimates bees add \$15 billion a year to local crop values, while UK reports suggest that bee pollination is worth around £200 million to their industry. Suddenly, the future wellbeing of these buzzing creatures has become everyone's business.

BEES BUZZ A BEAT-UP?

One of the problems with CCD is that the syndrome currently generates many more questions than answers. Where do the bees actually go? Is it going to get worse before it gets better? And the billion-dollar question: What's causing it?

Monash University scientist, Dr Adrian Dyer, sums up current

thinking: "We know that in the United States and parts of Europe, bee colonies are essentially just collapsing. They are saying literally that one day the bees just completely left the colony. I didn't believe it at first but it seems to be the case."

Although Dyer is a bee researcher, he doesn't specialise in CCD. But his answers fairly accurately reflect what most scientists seem to believe. That is, CCD exists but we don't know much more than that. At this stage, those who say differently are merely hypothesising.

The issue is complicated by what is termed "pollinator decline" — the observation that, during the 20th century, pollinators have become far less abundant in many ecosystems worldwide. Pesticides, monocultures and increased commerce have all been blamed for the pollinator decline and some see what's happening to the bees as merely part of a gloomy global picture.

Alison Benjamin's book was prompted by her concern about unsustainable practices in food production. A visit to California's almond plantations, which produce 80 per cent of the world's almonds, was an eye opener.

"Four hundred miles [640km] of the Central Valley of California are planted solely with almond trees," she says. "For three weeks every February, they need 1.2 million bee hives trucked into the area on 18-wheeler lorries just to pollinate this monoculture. After three weeks, it's like a wasteland once the blossoms are gone. It's not the image most people have of beekeeping."

As to whether CCD is really a cause for panic or more of a beat-up, well, it

Are bees at risk in Australia?

If there's an emerging theme that arises from speaking to bee experts about CCD, it's just how lucky we are in Australia. We don't have CCD on our shores, plus we're one of the only countries without varroa, a mite found in bee populations across the world. Varroa's impact is radical, wiping out at least 30 per cent of bees and weakening their immunity.

Iain East, from Canberra's Office of the Chief Veterinary Officer, says his group is working hard to keep varroa out of Australia. In the past 15 years, 120 detections of exotic bees have been recorded at our borders, some carrying varroa and other parasitic mites.

Protection starts with helping our neighbours to contain breakouts that may spread to Australia. "When a survey in PNG found a new strain of varroa," says East, "our officers went there and trained local growers in management techniques to help reduce it there."

At our borders, ships must declare their vessel is bee-free and the 26 busiest ports have local beehives, or bait hives, that aim to entice any immigrant bees. These hives are regularly checked by inspectors. Adds East, "It's an early-warning system that would give us a chance to mount a defence if they tested for varroa or other diseases."



appears to depend on whom you ask.

"It's a real issue," affirms Dyer. "The variation in numbers is just too big to be something natural and it tends to suggest that there is something causing it. But what that is, we don't know yet."

But his colleagues are far from united. The University of Sydney's School of Biological Sciences' professor of Behavioural Genetics Dr Ben Oldroyd says CCD is "probably a bit of a beat-up", while the NSW Department of Primary Industries' bee specialist, Doug Somerville, thinks it's a case of a rose by any other name. He believes the same problem exists more or less everywhere and has for a long time.

WHAT'S KILLING THE BEES?

While no one has yet determined the cause of CCD, theories abound about what might be causing the bees' mysterious decline. For a short while, there was quite a lot of finger pointing towards Australia after an article in *Science* proposed that imports of Aussie bees may be bringing the disease with them. Unsurprisingly, our industry breathed a sigh of relief when a closer look proved this impossible.

Even more hype was created

after a story in the UK's *Independent* proposed that mobile phones may be killing off the bees. Experts across the globe were left explaining that the journalist had jumped the gun on the results of one tiny, unverified study. (After being deluged by media calls from across the globe, the scientist eventually put out a statement explaining the information came from a mistranslation and he had no findings to report on CCD.)

But whether the truth makes a great headline or not, Dyer is one of many scientific voices saying it's unlikely any one single theory will provide the solution to CCD. As he says, "the reality is likely to be more complex and multi-faceted".

While the experts continue to look for answers, the following factors are some of the possible players in the mystery of the disappearing bees:

» OVERWORKED AND UNDERAPPRECIATED

While it's clear that bees' importance in the food chain has been underappreciated to date, suggestions that bees are overworked continue to fly.

Although it's not quite a case of life imitating art, it may be life imitating animation. Overworked bees recently starred in their own



Hollywood film, *Bee Movie*, with Jerry Seinfeld voicing Barry B. Benson, a bee who discovers he's literally being worked to death. However, you don't need to be an animated character to figure out the basics. Work too hard, your immunity declines and the risk of illness increases.

Whether overwork plays a role in CCD is unclear, but it's true that in the USA bees do work hard and, often, all year. American beekeepers make a good percentage of their income renting their bees out for pollination duty, particularly on the Californian almond crop. Between the various crops, bees can be shipped across the country almost year round.

According to Ben Oldroyd, winter is a time for bees to rest, not work. "The best thing to do is to have a really strong colony in autumn, take them to the snow [the University of Sydney's bees go to the Blue Mountains], where they just sit and do nothing, and bring them back to a warm place in spring," he says. "That's our management strategy."

» POOR NUTRITION

Like all species, bees need nourishment, and the discovery that US bees are often fed fructose syrup when nectar isn't available has led to the question of the role nutrition

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could play in the prevention of CCD. According to Doug Somerville, the world's beekeepers could learn much from Australia. "The bee industry in Australia is very different from anywhere else in the world," he says. "Eighty per cent of our honey is derived from eucalypts, which flower erratically, depending on rainfall."

Somerville says the long (up to 10-year) gaps between flowering mean Australian beekeepers are nomadic, not migratory. So, instead of chasing the next pollination opportunity across the country, "they have to tune in to the nutritional requirements of their bee colony, see what flowers are on offer and manage things accordingly".

» PESKY PESTICIDES

Throughout the debate the role of pesticides continues to be questioned, though there's no doubt bees don't respond well to pesticides.

In fact, in many areas, beekeepers and farmers work together to avoid the use of pesticides around vital pollination times.

But is there a link between pesticides and CCD? One US non-profit, the National Resources Defense Council (NRDC), is so convinced the answer is yes that they sued the US EPA (Environmental Protection Agency) for failing to tell the public what it knows.

"Recently approved pesticides have been implicated in massive bee die-offs and are the focus of increasing scientific scrutiny," said NRDC attorney, Aaron Colangelo. "Pesticide restrictions might be at the heart of the solution to this growing crisis, so why hide the information?"

But, while the battle over who said what to whom continues, scientists seem no closer to an answer, despite researchers at University of California in Davis and Pennsylvania State University stepping up their efforts to untangle CCD.

As their work continues, the food industry has become one of the first to acknowledge the role the tiny pollinators play in the success of their products. Häagen-Dazs icecream recently contributed \$US250,000 to the study of CCD. It also put a broad awareness campaign into action, noting that 40 per cent of its products use ingredients that are completely dependent on honey bees for pollination.

Like many others now concerned about the honey bees, the company is responding to a potential hit to its bottom line. For Adrian Dyer in Melbourne, this is a part of the issue he's observed with interest.

"It's the economic link to food that has captured the attention of people about what an important pollinator the honey bee is," he says. "It's real-world stuff. It's unfortunate it takes an event like Colony Collapse Disorder, when the animal is effectively taken out of the system, for people to realise, 'Oh, this is quite an important issue.'" **ea**

Life imitating animation: Just as the Bee Movie character Barry B. Benson discovers he's being worked to death, scientists are considering whether CCD is a result of reduced immunity and illness caused by bees being overworked.