

# Worker Bees of the World, Unite!

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**H**oneybees are essential to the success of agriculture—in the US alone, they pollinate 90 different agricultural crop species including nuts, berries, fruits and vegetables worth a total of \$15 billion every year [1,2]. One type of bee, the honeybee, pollinates one-third of the crops consumed in the United States [3]. Suddenly, starting in 2004, bee colonies worldwide began to show symptoms of Colony Collapse Disorder (CCD).

CCD initially affects the worker bees, who desert the hive, leaving the queen bee and the young brood with an abundance of honey on which they can survive for a short time. Without the worker population the colony becomes unsustainable and eventually dies out. Interestingly, although



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the worker bee population undergoes a sudden collapse, there very few or no bee corpses left nearby [4].

One survey of American beekeepers showed mean losses of 40% of colonies in the winter of 2008 [6]. This disorder isn't just affecting the US, either—its symptoms have been documented in the rest of North America, Asia, Europe and South America [7].

Our understanding of the cause of this disorder is minimal. A consensus is emerging that 'a number of factors' are causing CCD in combination as a result of intensive agriculture. Suggested causative agents include increased exposure to pesticides, invasive parasites, migratory stress and viruses that invade the bees' immune systems [7]. Bees in the US are kept by beekeepers around the country until the hives are sold. Every year, they travel nationwide, mostly to orchards in California, putting huge stress on the bees. Other literature cites a variety of pathogens, including Israel Acute Paralysis Virus (IAPV) [8].

Our understanding of this phenomenon is so little that even the US Environmental Protection Agency's action plan

consists initially of large-scale data collection and research, though most of the objectives are of "urgent" and "very high" priority [9].

But why, when there are 3000 species of bee native to the United States, are we using just one type—the honeybee—to carry out the pollination of one third of American crops? This over-reliance on so few species (both crops and pollinators) is an additional, long-term problem. History has already taught us that intensive corporate monoculture is unsustainable—it also has detrimental effects on the environment, the workers and the local economy. This ongoing bee crisis puts 90 crops at risk—the effects of a bee population collapse would be devastating and would have worldwide impact.

The USDA is investigating the feasibility of using another species of bee to avoid labour-intensive hand pollination. The 'orchard mason bee,' *Osmia lignaria* could replace the honeybee in the event of a total population collapse and is starting to be introduced in the US.

Past bee die-offs have been described since 1898 and have recurred approximately every 30 years in the United States. The last incidence was noted in 1979 (it was termed the 'Disappearing Disease') [10]. Maybe there is hope—the bee population has recovered every time since the phenomenon was first recorded [9]. But never before have bees disappeared globally and at such a rate. Furthermore, agriculture is different now: one Californian beekeeper suggested that our farming practices are bad for bees' health [11]. Placing beehives into plentiful monocultures, he says, is "comparable to us going to McDonald's every day for a month". When farming was less intense and we farmed a diversity of species, the bees were healthier.

Perhaps the farmer-bee symbiosis has been broken and honeybees have finally reacted to our intensive agricultural practices. We need to rethink our farming methods and enforce diversity—diversity of crop species, of pollinators and of flowering times on one hand and a diversity of pesticides, fertilisers and GM techniques on the other. Governments should reverse this cash-hungry mentality and remember that food is grown to be eaten: only sustainable methods will secure food output in the long-term. ■

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