

Commercial bees spreading disease to wild pollinating bees

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Bees provide crucial pollination service to numerous crops and up to a third of the human diet comes from plants pollinated by insects. However, pollinating bees are suffering widespread declines in North America and scientists warn that this could have serious implications for agriculture and food supply. While the cause of these declines has largely been a mystery, new research reveals an alarming spread of disease from commercial bees to wild pollinators.

In a study published in the July 23 issue of the online, open-access journal *PLoS ONE*, Michael Otterstatter and James Thomson of the University of Toronto present compelling evidence that commercially produced bumble bees used in greenhouses are infecting their wild cousins, and that this is likely contributing to reductions in the natural pollinating bee population.

Otterstatter and Thomson investigated the occurrence of disease in wild bumble bees in southern Ontario, Canada, particularly in areas close to industrial greenhouse operations. In addition, the authors used a combination of laboratory experiments and mathematical modelling to simulate the spread, or 'spillover', of disease from commercial bees to wild populations, and to predict the extent and severity of such spread in the wild.

The researchers found that commercial bumble bees often carry a harmful and highly contagious pathogen, *Crithidia bombi*, and that these bees regularly escape from greenhouses and interact with wild bees at

flowers. Near greenhouses, the rates of infection were startling: up to one half of wild bumble bees were infected with *C. bombi*, whereas no bees harboured this pathogen at sites away from greenhouses.

Furthermore, the frequency and severity of infections declined with increasing distance from greenhouses, suggesting that these agricultural operations are foci of disease for wild pollinators.

The mathematical model that Otterstatter and Thomson developed confirmed that pathogen spillover from commercial bees would allow disease to invade wild pollinator populations near greenhouses. The model predicts that, although disease may build up slowly at first, given sufficient time, spillover will result in a large-scale epidemic among wild bees.

The commercial bumble bee industry is expanding worldwide. The abundance of disease in commercial bees, and the international trafficking of infected hives, may pose a substantial threat to wild bee pollinators. The authors emphasize that improved management of domestic bees through, for example, greater attention to their diseases and their overlap with wild species, would greatly reduce, or even eliminate, pathogen spillover.

Citation: Otterstatter MC, Thomson JD (2008) Does Pathogen Spillover from Commercially Reared Bumble Bees Threaten Wild Pollinators? PLoS ONE 3(7): e2771. doi:10.1371/journal.pone.0002771
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