Bees under threat from disease-carrying bumblebee imports, research reveals

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Stricter controls over bumblebee imports to the UK are urgently required to prevent diseases spreading to native bumblebees and honeybees, scientists have warned. The call follows the discovery of parasites in over three-quarters of imported bumblebee colonies they tested. The study - the first of its kind in the UK - is published today in the *Journal of Applied Ecology*.

While wild species of bees and other insects pollinate many crops, commercially-reared and imported bumblebees are essential for pollination of greenhouse crops such as tomatoes. They are also used to enhance pollination of other food crops such as strawberries, and are now marketed for use in people's gardens. The trade is large and widespread: 40-50,000 commercially-produced bumblebee colonies – each containing up to 100 worker bees – are imported annually to the UK, and more than one million colonies are sold each year worldwide.

The team of researchers from the universities of Leeds, Stirling and Sussex bought 48 colonies of buff-tailed bumblebees (*Bombus terrestris*) from three European producers. Some colonies were a subspecies native to the UK and others were non-native. All were meant to be disease-free, but when they were tested using DNA technology, 77% of the colonies were found to be carrying parasites. Parasites were also found in the pollen food supplied with the bees.

Screening revealed that the imported bumblebee colonies carried a range of parasites including the three main bumblebee parasites (*Crithidia*

bombi, *Nosema bombi* and *Apicystis bombi*), three honeybee parasites (*Nosema apis*, *Ascosphaera apis* and *Paenibacillus* larvae), and two parasites which infect both bumblebees and honeybees (*Nosema ceranae* and deformed wing virus).

After the screening tests, the team conducted a series of carefully controlled laboratory experiments to find out whether the parasites carried by the commercially-produced bumblebee colonies were viable and able to infect other bees.

Lead author of the study, Peter Graystock of the University of Leeds explains: "We found that commercially-produced bumblebee colonies contained a variety of microbial parasites, which were infectious and harmful not only to other bumblebees, but also to honeybees."

The results suggest current regulations and protocols governing bumblebee imports are not effective. Currently, Natural England licences are only required for the non-native subspecies. Although the licences require colonies to be disease free, colonies arriving in the UK are not screened to ensure compliance and the regulations do not apply to imports of the native subspecies.

The study argues that producers need to improve disease screening and develop a parasite-free diet for their bees, while regulatory authorities need to strengthen measures to prevent importation of parasite-carrying bumblebee colonies, including checking bees on arrival in the UK and extending regulations to cover imported colonies of the native subspecies .

As well as increasing the prevalence of parasites in wild bumblebees and managed honeybees near farms using the commercially-produced bumblebees, continuing to import bumblebee colonies that carry parasites is also likely to introduce new species or strains of parasites

into some areas, the authors warn.

According to co-author of the study Professor William Hughes of the University of Sussex: "If we don't act, then the risk is that potentially tens of thousands of parasite-carrying bumblebee colonies may be imported into the UK each year, and hundreds of thousands worldwide. Many bee species are already showing significant population declines due to multiple factors. The introduction of more or new parasite infections will at a minimum exacerbate this, and could quite possibly directly drive declines."

Although this is the first study of its kind in the UK, research in North America, South America and Japan suggests that parasites introduced by commercial bumblebees may be a major cause of population declines of several bumblebee species, including *Bombus dahlbomii* in Argentina, and *Bombus terricola* and *Bombus pensylvanicus* in North America.

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