

Honeybees are struggling to get enough good bacteria

Date: April 17, 2018

Source: Lancaster University

Summary: Modern monoculture farming, commercial forestry and even well-intentioned gardeners could be making it harder for honeybees to store food and fight off diseases, a new study suggests.

FULL STORY

Modern monoculture farming, commercial forestry and even well-intentioned gardeners could be making it harder for honeybees to store food and fight off diseases, a new study suggests.

Human changes to the landscape, such as large areas of monoculture grassland for livestock grazing, and coniferous forests for timber production, is affecting the diversity of the 'microbiome' associated with honeybees' long-term food supply.

Scientists at Lancaster University's Lancaster Environment Centre and the Centre for Ecology and Hydrology (CEH) examined the mix of bacteria, known as a microbiome, of bee bread -- which is the long-term food supply stored within a hive for young bees.

They found that the bee bread within hives close to agriculturally improved grasslands, made up of single grass varieties, and those near coniferous woodland contained lower bacterial diversity than hives near habitats with more plant variety such as broadleaf woodland, rough grasslands and coastal landscapes.

Bees use a diverse community of bacteria to turn fresh pollen into a long-term food store. They need a range of bacteria to help them fight off infectious diseases, and also the bacteria can act as a preservative for bee bread within hives. Without a diverse microbiome the bee bread can be more vulnerable to mould, causing a food shortage for the hive.

The researchers also discovered that some of the bacteria present within bee bread, such as bifidobacterium and lactobacilli, are the same 'good bacteria' as found in some brands of bioactive yoghurts.

Bees pick up different strains of bacteria from plants when they are foraging for food and this is transferred to bee bread within the hive.

Lancaster's Dr Philip Donkersley, lead author of the study, which is published in the open access journal *Ecology and Evolution*, said: "We are showing that even in a small geographical area there is a huge variance in bee bread microbiome. This is almost certainly because bee bread has a variable composition made up of pollen from different plants.

"It is traditionally thought that monocultures, such as grazing land and timber forests, were bad for pollinators due to a lack of food continuance through the year. However, our study suggests land use change may also be having an indirect detrimental effect on the microbiota of bee bread.

"Since nutrition derived from bee bread and the microbiome therein directly affects the health of bees we therefore believe this demonstrates an indirect link between landscape composition and bee fitness."

In addition, hives located near urban landscapes also demonstrated lower diversity in the microbiome of bee bread.

Gardeners trying to help bees by growing a range of pollinator-friendly flowers from around the world may need to consider that non-native species may not be as good for bees as native UK plants.

Native bees, their forage plants and the bacteria located within have evolved together and the bacteria bees pick up from non-native plants may be less likely to be beneficial to the hive.

Dr Donkersley said: "Decreased bacterial diversity in bee breads near urban environments suggests that the increased range of non-native plants in gardens could be impacting bees' ability to get diverse microbiota.

"This may be evidence that bees suffer from foraging on non-native plants that they have not co-evolved with."

The researchers used a combination of two technologies -- Illumina MiSeq DNA sequencing and denaturing gradient gel electrophoresis -- to identify the microbial communities of nearly 500 bee bread samples taken from 29 honeybee hives across North West England.

This data was correlated against land use information taken from the UK Land Cover Map, produced by CEH, which provides high-resolution information on land use.

Story Source:

Materials provided by **Lancaster University**. *Note: Content may be edited for style and length.*

Journal Reference:

1. Philip Donkersley, Glenn Rhodes, Roger W. Pickup, Kevin C. Jones, Kenneth Wilson. **Bacterial communities associated with honeybee food stores are correlated with land use.** *Ecology and Evolution*, 2018; DOI: 10.1002/ece3.3999

Cite This Page:

MLA	APA	Chicago
-----	-----	---------

Lancaster University. "Honeybees are struggling to get enough good bacteria." ScienceDaily. ScienceDaily, 17 April 2018. <www.sciencedaily.com/releases/2018/04/180417115706.htm>.

RELATED STORIES

With Proper Care, Contaminated Urban Soils Are Safe for Gardening, Study Finds

June 11, 2015 — Crops grown in contaminated urban soils present little to no risk for people eating those crops when gardeners have followed best practices, a six-year study indicates. The findings are significant ... [read more »](#)



Diversity in UK Gardens Aiding Fight to Save Threatened Bumblebees, Study Suggests

Mar. 19, 2014 — The global diversity of plants being cultivated by Britain's gardeners is playing a key role in the fight to save the nation's threatened bumblebees, new research has revealed. "Urban ... **read more** »



Managed Honeybees Linked to New Diseases in Wild Bees, UK Study Shows

Feb. 19, 2014 — Diseases that are common in managed honeybee colonies are now widespread in the UK's wild bumblebees, according to new research. The study suggests that some diseases are being driven into wild ... **read more** »

Vulnerability to Future Phosphorus Shortage: Key Ingredient to Modern Farming

Feb. 3, 2014 — The world was given a shock when global phosphorus prices were raised by 800% in 2008. At a stroke, it became clear how dependent we are on phosphorus for our food supply. Phosphorus is an ingredient ... **read more** »