

BUSIER BEES: INCREASING NEST TRAFFIC IN COMMERCIAL BUMBLEBEE COLONIES

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Commercially reared bumblebee colonies are used to provide pollination services to a variety of crops. For example, in the UK approximately 15,000 bumblebee (*Bombus terrestris audax*) colonies are imported for use on soft fruit farms (e.g. strawberry, raspberry, blueberry). Before being placed into crops, these colonies are reared in large scale industrial facilities. When the colonies reach an appropriate size, they are distributed to farms around the world.

Each commercial colony is provided with a reservoir full of artificial nectar, meaning that bees do not need to leave the colony to acquire nectar. Nectar is one of two essential dietary resources that bumblebees require to survive and rear offspring, with the other being pollen. It is possible that this readily available food resource directly in the nest may influence the number of bumblebees that leave the nest to forage outside on the target crop. This could impact how well a crop is pollinated.

We tested whether the presence and the sugar concentration of the nectar reservoir effected colony 'nest traffic' (the number of bees entering and leaving commercial colonies). To do this we placed commercial colonies around the Royal Holloway, University of London parkland campus. These colonies were split into three treatment groups: those with (1) access to an unaltered nectar reservoir; (2) access to a diluted reservoir; and (3) no reservoir access.



Commercial bumblebee (Bombus terrestris audax) foraging on a strawberry flower © Callum Martin

We found that colonies with diluted nectar reservoirs had higher levels of nest traffic than colonies with undiluted reservoirs and colonies with no reservoirs. In addition, all the colonies with access to a nectar reservoir, both diluted and undiluted, had higher proportions of bees returning carrying pollen loads and higher levels of colony development than colonies without access to a reservoir.

These results demonstrate that manipulating the availability and concentration of internal nectar reservoirs of commercial bumblebee colonies has a large effect on the nest traffic. It is possible that the increased nest traffic caused by dilution of the nectar reservoir could be a strategy for increasing the pollination services commercial colonies provide to crops. This may improve the yield and quality of the crops themselves and enhance overall agricultural efficiency.