

B-AGENT™: modelling pressures on migratory beekeeping

The CRC for Honey Bee Products has developed the spatial modelling framework B-AGENT™ to help migratory beekeepers understand the effects of pressures, including climate change and bushfires, on honey bee forage resources.

Migratory beekeeping refers to beekeepers who travel across the country with their beehives following the availability of nectar and pollen flora. Migratory beekeeping depends on access to quality forage sites to maintain bee colony health and produce profitable honey. While Australia is rich in floral diversity, land management practices and irregular flowering events affect the availability of bee forage.

Beekeeping involves interconnected human and environmental systems affected by many pressures, such as climate change and bushfires. Beekeepers, beehives, forage landscapes and land managers are components of the interconnected beekeeping system. Managing the impact of pressures on any one component requires an understanding of how these pressures affect the other components.

Researchers at the CRC for Honey Bee Products identified and modelled beekeeping interconnections to help migratory beekeepers decide their itineraries.

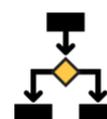
Understanding the components and connections within the beekeeping system helps beekeepers manage the pressures on their industry.



CRC HBP
FOR HONEY BEE PRODUCTS



food
resources



decision
support



hive site



CRC researcher Vidushi Patel (right) explains how B-AGENT™ is used to understand pressures on migratory beekeeping



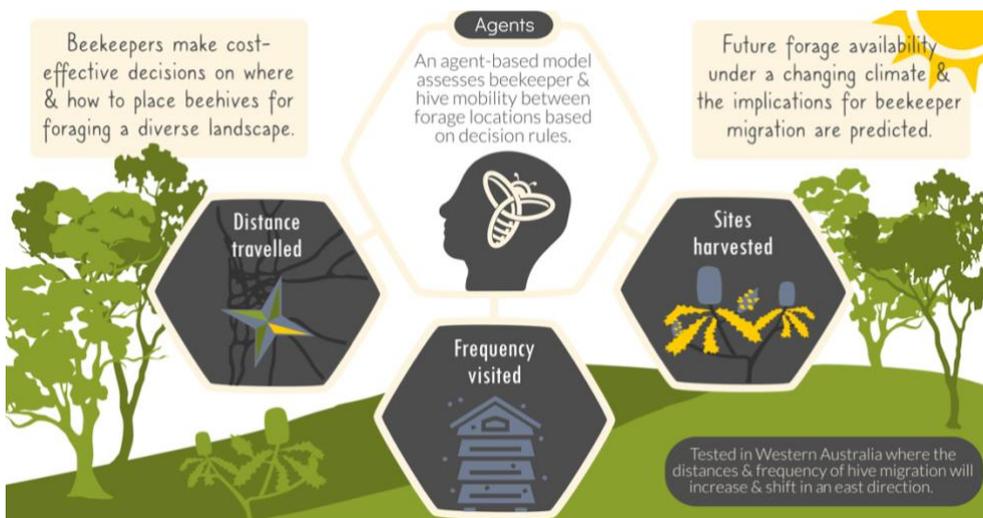


CRC researchers developed an integrated model called B-AGENT™ to bring together human and environmental processes that influence how a beekeeper accesses forage resources. Researchers identified the key components central to the Western Australian beekeeping system, including:

- environmental change: pressures that affect bee resources
- bee resources: quality habitat required for food
- managed beehives: location of hives at sites with quality forage
- beekeeping interactions: the movement of hives to optimise honey production
- bee governance: state government regulation of site permits, plans and policies
- industry outcomes: bee products and services generate income
- beekeeping practices: to create apiary site demand and stimulate investment
- environmental management: sustainable practices are essential

B-AGENT™ combines a machine-learning species distribution model and an agent-based model to simulate the landscape of bee forage availability and associated beehive migration patterns to assess the effects of pressures on migratory beekeeping.

Using B-AGENT™, CRC researchers conducted a south-west Western Australia case study to model beekeeper decision-making in response to climate change impacts. It showed that climate change is altering the distribution of 30 bee forage species. Because of these changes, hive migration will need to increase and move eastward if commercial beekeepers are to maintain current production levels. The extra travel distance will increase business costs and the working hours of beekeepers.



The modelling components used in B-AGENT™ to simulate climate change impacts on key forage species and the likely consequences for beekeepers

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