

‘Industrial-scale’ beekeeping doesn’t boost disease prevalence in honeybee colonies, study shows

It is generally thought that the intensification of farming will result in higher disease prevalences, although there is little specific modelling testing this idea. Focusing on honeybees, we build multi-colony models to inform how “apicultural intensification” is predicted to impact honeybee pathogen epidemiology at the apiary scale.

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Honeybees are typically managed in apiaries, which are associated colonies placed together for beekeeping convenience at a single site. Pathogen dynamics at the apiary level are determined both by pathogen transmission within and between colonies. Intensification of apiculture changes apiary ecology in a number of ways, all potentially relevant to disease. In particular, increasing the number of colonies and changing the arrangement of those colonies influences epidemiology through changes in both the size and network structure of the population.

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We used both agent-based and analytical models to show that three linked aspects of apicultural intensification (increased population sizes, changes in population network structure and increased between-colony transmission) are unlikely to greatly increase disease prevalence in apiaries.

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Our findings contradict the idea that apicultural intensification by crowding honeybee colonies in large, dense apiaries leads to notably higher disease prevalences for established honeybee pathogens. More broadly, our work demonstrates the need for informative models of all agricultural systems and management practices in order to understand the implications of management changes on diseases.

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Even in their most plausibly extreme cases, changes in the number of colonies, their spatial arrangement and transmission rates between colonies had only a small effect on the severity of disease at the apiary level for pathogens of interest.

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Overall, our findings represent the first stage in developing robust epidemiological models for studying honeybee pathogens at an apiary scale. In the face of increasing challenges to global apiculture, our models predict that the size of apiaries per se is not causing notable increases in disease prevalence for important established bee pathogens, while it may increase the risk of pathogen emergence. Finally, this study demonstrates that conventional thought on how agricultural intensification influences disease may not be robust in the face of system-specific ecological nuance.

Read full, original article: [Industrial bees: The impact of apicultural intensification on local disease prevalence](#)