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Bee declines driven by combined stress from parasites, pesticides, and lack of flowers.

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Abstract

Bees are subject to numerous pressures in the modern world. The abundance and diversity of flowers has declined; bees are chronically exposed to cocktails of agrochemicals, and they are simultaneously exposed to novel parasites accidentally spread by humans. Climate change is likely to exacerbate these problems in the future. Stressors do not act in isolation; for example, pesticide exposure can impair both detoxification mechanisms and immune responses, rendering bees more susceptible to parasites. It seems certain that chronic exposure to multiple interacting stressors is driving honey bee colony losses and declines of wild pollinators, but such interactions are not addressed by current regulatory procedures, and studying these interactions experimentally poses a major challenge. In the meantime, taking steps to reduce stress on bees would seem prudent; incorporating flower-rich habitat into farmland, reducing pesticide use through adopting more sustainable farming methods, and enforcing effective quarantine measures on bee movements are all practical measures that should be adopted. Effective monitoring of wild pollinator populations is urgently needed to inform management strategies into the future.

Comment in

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