

PP-042 [Bee Health]

Acute and chronic viruses mediated by an ectoparasite target different developmental stages of honeybee (*Apis mellifera* and *Apis cerana*) brood

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Background/PURPOSE: Honeybees, particularly *Apis mellifera*, are vital pollinators facing significant health challenges globally, largely due to the ectoparasitic mite *Varroa destructor* and the viruses it vectors. In contrast, *Apis cerana*, the eastern honeybee, exhibits greater resistance to these threats. Understanding the mechanisms behind this resistance is crucial for improving honeybee health and mitigating colony losses.

Problem Description: The health disparity between *A. mellifera* and *A. cerana* is well-documented, yet the underlying mechanisms remain poorly understood. *V. destructor* and its associated viruses, such as deformed wing virus (DWV) and Israeli acute paralysis virus (IAPV), are major contributors to colony collapse. This study investigates how these viruses, mediated by *V. destructor*, affect the developing brood of both honeybee species.

METHODOLOGY: The study experimentally infested freshly capped brood cells of *A. mellifera* and *A. cerana* with *V. destructor* mites. Control groups included brood cells that were either pricked with a sterile needle or left untreated. Brood survival and viral loads were assessed at two developmental stages: 1.5 days post-capping and 1 day before expected emergence.

Results and CONCLUSION: The results revealed that *V. destructor*-mediated viruses caused significant mortality in both honeybee species, but the timing and nature of the mortality differed. IAPV, an acute virus, primarily caused mortality in late larvae, while DWV-A, a chronic virus, led to mortality during and after pupation. *A. cerana* exhibited higher brood mortality and lower viral tolerance compared to *A. mellifera*, suggesting that the susceptible immature individuals of *A. cerana* contribute to the overall survival of the colony by limiting pathogen spread.

Practical Implications for Beekeepers: These findings highlight the importance of managing *V. destructor* infestations to prevent virus transmission. Monitoring and early intervention can help mitigate the impact of these pathogens. Additionally, beekeepers are suggested to focus on breeding programs that enhance resistance to *V. destructor* and its associated viruses. The concept of social apoptosis, where susceptible individuals sacrifice themselves for the greater vitality of the colony, could be integrated into breeding strategies to improve colony resilience.