

## Chemical treatment for colony collapse disorder temporarily worsens viral infections in honeybees

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(PhysOrg.com) -- Acaricide, a chemical used against Varroa mites that infect honeybees, appears to render bees more susceptible to deformed wing virus infections, according to research published in the January issue of the journal *Applied and Environmental Microbiology*. Like the mites, these viruses have been identified as potential causes of colony collapse disorder.

The Varroa mite is currently the main pathogen linked to <u>colony collapse</u> <u>disorder</u> among European honey bees worldwide. "The mite population grows rapidly, killing colonies within 2-3 years if beekeepers don't remove the mites, which usually involves chemical treatments such as acaricides," says first author Barbara Locke, of the Swedish University of Agricultural Sciences, Uppsala. Nonetheless, she says, the mites kill the colonies not by direct effects, but by transmitting viral infections to the bees.

Deformed wing virus is strongly associated with mite infestations, and the researchers' hypothesized that following acaricide treatment, the virus population would drop along with the mite population. In the study, they treated six bee colonies with Apistan, an acardicide, for six weeks (the standard treatment duration) and left three control colonies untreated, monitoring mite infestation and virus levels weekly.

Contrary to the investigators' hypothesis, the viral infection worsened in



the treatment group immediately following acaricide treatment. "This initial increase was seen in all bee stages, including pupae that never were in contact with mites," says Locke. "Thus, we interpreted it to be a possible direct effect of the acaricide, making the bees more susceptible to virus infection," possibly due to either "debilitating direct effects of tau-fluvalinate on honeybee physiology and/or immune system responses," she says, adding that further studies are needed to confirm this result. The <u>virus infections</u> ultimately dropped, slowly, "due to reduced transmission by the mites," says Locke. "However, even at the end of the mite removal treatment, we still recorded substantial infection levels."

Two other viral infections, black queen cell virus, and sac brood virus, were found not to be associated with the mite infestation, says Locke.

"Acaricide treatments are still the most effective method at removing mites from colonies when infestation is high, at colony mortality thresholds," says Locke. "However, this research suggests that for maintaining low infestation, regular alternative control treatments, such as organic methods, could be used for promoting better bee health overall. Further, since the virus is not reduced in the colony as rapidly as the mites are removed, our research underlines the importance of early mite removal to reduce <u>virus</u> levels in overwintering bees, to avoid colony losses."

**More information:** B. Locke, et al., 2012. Acaricide treatment affects viral dynamics in Varroa destructor-infested honey bee colonies via both host physiology and mite control. *Appl. Environ. Micriobiol.* 78:227-235.

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