

**Resistance and vulnerability of honeybee (*Apis mellifera*) gut bacteria to commonly used pesticides**

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Agricultural and apicultural practices expose honeybees to a range of pesticides that have the potential to negatively affect their physiology, neurobiology, and behavior. Accumulating evidence suggests that these effects extend to the honeybee gut microbiome, which serves important functions for honeybee health. Here we test the potential effects of the pesticides thiacloprid, acetamiprid, and oxalic acid on the gut microbiota of honeybees, first in direct in vitro inhibition assays and secondly in an in vivo caged bee experiment to test if exposure leads to gut microbiota community changes. We found that thiacloprid did not inhibit the honeybee core gut bacteria in vitro, nor did it affect overall community composition or richness in vivo. Acetamiprid did also not inhibit bacterial growth in vitro, but it did affect community structure within bees. The eight bacterial genera tested showed variable levels of susceptibility to oxalic acid in vitro. In vivo, treatment with this pesticide reduced amplicon sequence variant (ASV) richness and affected gut microbiome composition, with most marked impact on the common crop bacteria *Lactobacillus kunkeei* and the genus *Bombella*. We conducted network analyses which captured known associations between bacterial members and illustrated the sensitivity of the microbiome to environmental stressors. Our findings point to risks of honeybee exposure to oxalic acid, which has been deemed safe for use in treatment against Varroa mites in honeybee colonies, and we advocate for more extensive assessment of the long-term effects that it may have on honeybee health.