PP-030 [Bee Health]
Atrazine exposure can dysregulate the immune system and increase the susceptibility against pathogens in honeybees

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Recently, concerns regarding the impact of agrochemical pesticides on non-target organisms have increased. The effect of atrazine, the second-most widely used herbicide in commercial farming globally, on honeybees remains poorly understood. Here, we evaluated how atrazine impacts the survival of honeybees and pollen and sucrose consumption, investigating the morphology and mRNA expression levels of midgut tissue, along with bacterial composition (relative abundance) and load (absolute abundance) in the whole gut. Atrazine did not affect mortality, but high exposure (37.3 mg/L) reduced pollen and sucrose consumption, resulting in peritrophic membrane dysplasia. Sodium channels and chitin synthesis were considered potential atrazine targets, with the expression of various genes related to lipid metabolism, detoxification, immunity, and chemosensory activity being inhibited after atrazine exposure. Importantly, 37.3 mg/L atrazine exposure substantially altered the composition and size of the gut microbial community, clearly reducing both the absolute and relative abundance of three core gram-positive taxa, Lactobacillus Firm-5, Lactobacillus Firm-4, and Bifidobacterium asteroides. With altered microbiome composition and a weakened immune system following atrazine exposure, honeybees became more susceptible to infection by the opportunistic pathogen Serratia marcescens. Thus, considering its scale of use, atrazine could negatively impact honeybee populations worldwide, which may adversely affect global food security.