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PP-107 [Bee Health]

Pesticide exposure assessment in stingless bees

Richard A. Dias Vieira, Karen T. de Azevedo, Anete P. Lourenco*

Federal University of Jequitinhonha and Mucuri Valleys, Diamantina-MG, Brazil

*anete.lourenco@ufvjm.edu.br

Bees are crucial pollinators of many crops and wild plants, and pesticide exposure is one of the primary environmental stressors affecting their health. Most information regarding the impacts of pesticide exposure has been derived from studies on honey bees; however, recent research has increasingly focused on pesticide exposure and its effects on **non-*Apis* bees**, including other social bees such as **bumble bees and stingless bees.**

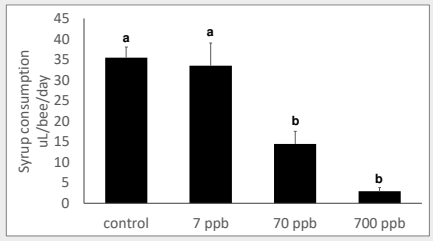
Stingless bees comprise the most diverse group of eusocial bees with more than 500 species distributed in the pantropical region.

The growing declining of insects' population due to human activities, such as **pesticides**, is also affecting the stingless bees. Differences in **life history traits** between **honey bees** and **stingless bees** are likely to influence the routes and levels of **pesticide exposure**.

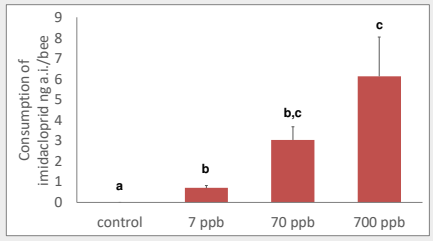
Quantifying food ingestion is a key component in estimating pesticide exposure to bees through their diet. **Foraging bees** consume the largest amounts of nectar, and artificial syrup (50% sugar in water) is a suitable medium for quantifying food intake.

Here, we investigated the consumption of syrup contaminated with the **neonicotinoid imidacloprid, a widely used insecticide in Brazil,** by the stingless bee ***Melipona quadrifasciata***.

Ingestion of syrup



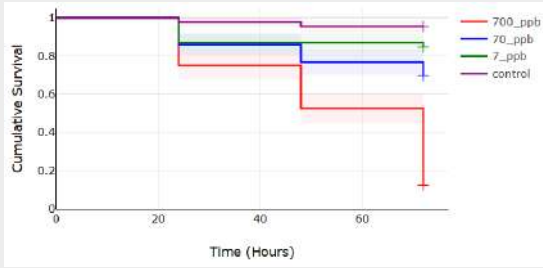
Ingestion of imidacloprid



Control: syrup 50% v/v
Treatments:
Imidacloprid 7 ppb
Imidacloprid 70 ppb
Imidacloprid 700 ppb
} Realistic concentrations found in honey and nectar

Foragers were fed for 72 hours, and consumption was measured at the end of the experiment.
Dead bees were removed daily.

Foragers fed syrup containing 70 and 700 ppb of imidacloprid ingested significantly lower amounts of syrup. Nonetheless, each bee fed 700 ppb consumed more active ingredient than bees fed 70 ppb. An amount of 5-6 ng a.i. of imidacloprid per bee is extremely harmful to *M. quadrifasciata* foragers.



- Our study demonstrates that, unlike honey bees and bumble bees, stingless bees seem **to avoid feeding on syrup contaminated with imidacloprid**.
- This result may have important implications for stingless bee health.

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Richard Abne Vieira, Karen Tainá Azevedo, Anete Pedro Lourenco
Department of Biological Sciences, Federal University of Jequitinhonha and Mucuri Valleys, Diamantina, Minas Gerais, Brazil

Bees are crucial pollinators of many crops and wild plants, and pesticide exposure is one of the primary environmental stressors affecting their health. Most information regarding the impacts of pesticide exposure has been derived from studies on honey bees; however, recent research has increasingly focused on pesticide exposure and its effects on non-Apis bees, including other social bees such as bumble bees and stingless bees. Differences in life history traits between honey bees and stingless bees are likely to influence the routes and levels of pesticide exposure. Quantifying food ingestion is a key component in estimating pesticide exposure to bees through their diet. Foraging bees consume the largest amounts of nectar, and artificial syrup (50% sugar in water) is a suitable medium for quantifying food intake. It is known that foragers of honey bees and bumble bees tend to prefer foods containing neonicotinoid pesticides. In this study, we investigated the consumption of syrup contaminated with the neonicotinoid imidacloprid by the stingless bee Melipona quadrifasciata. We used three different concentrations of imidacloprid (7, 70, and 700 ppb), with the first two concentrations typically found in honey and nectar. Foragers were fed for three days, and consumption was measured at the end of the experiment. The study was conducted with three colonies, with two of the colonies being tested twice. We observed that bees fed syrup containing 70 and 700 ppb of imidacloprid ingested significantly lower amounts of syrup. Nonetheless, each bee fed 700 ppb consumed approximately 5 ng of active ingredient, an amount sufficient to kill almost all the bees within 48 hours. Our study demonstrates that, unlike honey bees and bumble bees, stingless bees seem to avoid feeding on syrup contaminated with imidacloprid.This result may have important implications for stingless bee health.
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