

1.11 Challenges to develop risk assessment schemes for Brazilian bees: multiple exposure routes

Roberta C. F. Nocelli, Karina de Oliveira Cham, Osmar Malaspina

Center for Agrary Science – Federal University of São Carlos – Araras – SP - Brazil

roberta@cca.ufscar.br

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Abstract

Currently, in Brazil, the risk assessment schemes for bees are developed using the *Apis mellifera* model species. However, there are doubts about how comprehensive this model is for Brazilian species. Brazil has a bee biodiversity estimated at more than 2,000 species with the most different levels of organization and behavior. These different behaviors also represent different exposure routes that are not present when the analyzes are performed with the model species. The materials used for the construction and nesting are quite varied. They build their nests in several substrates, such as subterranean cavities, tree trunks, branches of living trees, rock crevices, brick walls, or occasionally in active colonies of other social insects like active or abandoned termite nests, arboreal ant nests, subterranean chambers abandoned by ants, active bird nests, or empty nests attached to branches. For social bees, the architecture of the nest entrance is species-specific and it is also very diversified in terms of shapes and materials as wax, resin, mud, seeds, sticks, petals, small stones. The materials used to build it are usually cerumen (a mixture of wax and resins collected in plants), resins (propolis) and mud. Stingless bees also use batumen, a mixture of mud and resins, to delimit the internal area and coating the nest surfaces. The storage of honey and pollen is done in cerumen cells constructed for this purpose. Honey and pollen are usually stored in different pots, but some species mix both in the same pot. The main source of proteins for adults and larvae is pollen but, opposite to *Apis mellifera* larvae, which receive food processed by workers, larvae of meliponines feed directly on a relatively high amount of pollen. Another important exposure route for Brazilian bees is water, which they collect in large quantities in the hottest and driest seasons. Beside this, many Brazilian species of stingless bees seem to be exposed longer to contact with materials inside the nest than honey bee larvae because of their longer life cycles. Due to the vast agricultural expanses in Brazil, some of these nest materials are collected in or near these areas and should be considered in risk assessments. How can we cover these different exposure routes? Can we develop a test that could be used for different species? The challenges are just starting.

Reference

A review about data available about stingless bees, result of the Workshop Exposure Assessment Paradigm For non-*Apis* Bees, held in EPA from 10-12 january 2017 in EPA - Arlington, VA (USA) was submitted to Environmental Entomology as:

K. O. Cham, R. C. F. Nocelli, L. O. Borges; F. E. C. Viana-Silva; C. A. M. Tonelli; O. Malaspina; C. Menezes; ^{A. S. Rosa}; B. Blochtein; B. M. Freitas; C. S. S. Pires; F. F. Oliveira; F. A. L. Contrera; K. R. S. Terezani; M. F. Ribeiro; M. A. L. Siqueira; M. C. L. S. A. Rocha: Pesticide exposure assessment paradigm for stingless bees.

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- 2nd Symposium, Hohenheim, Germany, 1982
- 3rd Symposium, Harpenden, UK, 1985
- 4th Symposium, Řež, Czech Republic, 1990
- 5th Symposium, Wageningen, the Netherlands, 1993
- 6th Symposium, Braunschweig, Germany, 1996
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- 8th Symposium, Bologna, Italy, 2002
- 9th Symposium, York, UK, 2005
- 10th Symposium, Bucharest, Romania, 2008
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- Job & Margreet van Praagh with award,
- Anne Alix (secretary of the board)

Foto

Pieter A. Oomen (Bumble bee *Bombus lapidarius* on thistle)

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