

## **A new experimental method for studying trophallaxis as an additional determining factor in the effects of chemicals on foraging bees (*Apis mellifera*)**

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### **Abstract**

Foraging bees perform daily 10 trips on average, lasting 30-80 min each. Thus, the nectar can be stored in the honey-bag even for about one hour before the return to the hive. In the presence of contaminated food, this is a quite long time of exposure. In fact, if the honey-bag's wall has chemical affinity for some or all pesticides, then direct active ingredient's absorption will occur in addition to the quantity ingested by the bee for its own requirements. Therefore, the foraging bees should be much more exposed to pesticides than their sisters in the beehive.

To test this hypothesis, a new experimental method was created, in order to simulate the foraging activity in the laboratory. In a hoarding cage, two groups of bees are divided by a membrane that allows only trophallaxis between the two groups. Only one group (donors) can access the feeders, collect the food (sucrose solution) and transfer it to the other group (receivers). In a separate cage, the bees of a third group (autonomous) have to provide only for their own feeding. Donors and autonomous bees must be necessarily foragers, while receivers are younger bees. Finally, the mortalities of donors and autonomous bees are compared to determine the impact of foraging activity on the intoxication of foragers.

This method was first applied in some demonstrations, in which the two pesticides clothianidin and fipronil were tested at sublethal doses. On one hand, the optimal exchange of food between donors and receivers was verified, confirming the technical validity of the method: it can function properly for at least 72 hours. On the other hand, the results show a significant difference between the mortalities of donors (higher) and autonomous bees (lower) fed with the two active ingredients.