nutrition, at field-realistic exposures. We also demonstrated that combined chemical stresses can synergistically impair bee behaviour (e.g. locomotion, coordination). Because each specific stressor alone, at the same level, did not cause any significant effect, our results suggest that studying these stressors individually could lead to an underestimation of risks for bees. The consequences for bee health and RA are discussed, as well as possible future directions towards an holistic approach integrating multiple stressors.

103 Imidacloprid diffusion route: from apple orchard to the honey bee colony matrices

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Honeybees play a pivotal role in natural and rural ecosystems by enhancing human and animal food production through pollination services. However, in the context of cultivated areas, bees can be exposed to chemicals used for crop protection. In particular, neonicotinoid insecticides can adversely affect honeybee colonies due to negative effects on immunity, behavior and ultimately survival at sublethal and lethal concentrations. However, despite these insecticides are considered as possible contributors to widespread colony losses, not enough is yet known about the way of entry and diffusion of these pesticides into the hive. Here we wanted to fill this gap by studying the diffusion route of the pesticide Imidacloprid and its metabolites in the hive by analyzing different materials collected in bee colonies used for apple orchard pollination in the framework of Integrate Pest Management strategy. The results show that the first way of entrance of Imidacloprid is the pollen loads transported by foragers; then the pesticide and its metabolites accumulates in bee bread, honey and wax for at least 3 months. This finding should be considered in light of the repeated feeding of bees on bee bread keeping into account that, in this case, damage thresholds may be exceeded contributing to colony losses.

104 Chronic toxicity of select pesticides to honey bee (*Apis mellifera L.*) larvae reared in vitro

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The effects of chronic exposure to two neonicotinoids (clothianidin and imidacloprid), two organophosphates (chlorpyrifos and dimethoate), one fungicide (chlorothalonil) and one insect growth regulator (diflubenzuron) on the survival to adulthood, developmental rate and larval weight of honey bee larvae reared in vitro were determined. Diets containing the chemicals were fed to larvae with the range of concentrations for each compound based on published acute toxicity experiments and residues found in pollen and nectar. Four concentrations of each compound were tested. The controls included a positive control: dimethoate (45 mg/L); solvent control: acetone or methanol; and a negative control: no addition of compounds or solvents to larval diet. Negative control and solvent control survival to adulthood was >80% while positive control survival was <30%, thus validating the experimental design. A significant decrease in survival to adulthood occurred in the 0.8, 1.2 and 8 mg/L chlorpyrifos, 0.4, 2 and 10 mg/L clothianidin, 30 or 100 mg/L chlorothalonil, 0.8, 1.3 or 2 mg/L diflubenzuron, and 45 mg/L dimethoate diets, but not the imidacloprid diets. We were able to use the no observable adverse effect level to calculate risk quotients for the test compounds using the