Section 3 – Laboratory/Semi-field/Field

3.1.P Do pollen foragers represent a more homogenous test unit for the RFID homing test, when using group-feeding?

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Abstract

The RFID homing ring test aims at developing a method, which can assess sublethal effects of xenobiotic substances on the navigation of foraging bees. Thereby, bee biology and corresponding behavioral processes might strongly influence the output of this test method. Accordingly, previous experiments demonstrated that the homing ability of nectar foragers differed between group- and single-bee-feeding, based on uneven crop content of returning bees and/or due to uneven food distribution via trophallaxis. Therefore, we here evaluated if pollen foragers represent a more homogenous test unit, when test item solutions are administered to groups of bees and thus are distributed between each other via trophallaxis. For this, we tested thiamethoxam and thiacloprid (both neonicotinoid insecticides) at field realistic doses by orally exposing tagged pollen foragers, either in groups of ten bees, or in single cages.
Our results demonstrate that the homing ability of thiamethoxam-exposed pollen foragers was significantly different from the non-exposed control in the single-bee feeding approach, but not in the ten-bee feeding approach (using conservative bonferroni correction in nominal pairwise matrices). Similar tests with thiacloprid, revealed not such clear differences between the two feeding approaches. Thus, it seems that the effect of group size on the homing ability of pollen foragers seems to be compound/dose specific. Nevertheless, our results suggest that single-bee-feeding reveal biologically more robust results in context of homing ability compared to group feeding, which should be considered in the development of this new test guideline by ideally performing such tests with single-bee feeding. Moreover, pollen- instead of nectar foragers should be preferentially chosen, since they consumed the feeding solution quicker and more reliable compared to previous trials with nectar foragers.

3.2.P Digital Farming & evaluation of side effects on honey bees – first experiences within the Digital Beehive project

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Abstract

Within the framework of the bee pollinators risk assessment of plant protection products, like honey bees (Apis mellifera), semi-field studies (in net houses) are conducted under worst-case exposure conditions to evaluate potential side-effects on the colony level.

Therefore, several parameters concerning the bees' health status, activity and behavior on the level of individual bees and the entire colony have to be assessed. These *in situ* observations and evaluations are necessary conducted by skilled investigators, who are experienced in both bee management and plant protection practices.

Furthermore, digital sensor technologies around the beehive can provide additional valuable information to better understand the assessed parameters. A clear advantage of such a digital monitoring system is a continuous data acquisition, whereas the required manual assessments represent only short snapshots in time. Especially within the first hours after the application, when observations and assessments are limited for reasons of time and health protection, sensor technology can be utilized for observation of the bees' reaction to a test compound and thereby allows the detection of a potential repellent effect or similar. Additionally, digital sensors can be calibrated to ensure the accuracy of the measurements.