Exposure by nesting material? – Method development of a suitable design for higher tier studies with solitary bees

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The registration processes and risk assessment of plant protection products on bees resulted in an increasing need for experiments with non-apis pollinators to assess potential side effects of plant protection products on this relatively new group of test organisms. Recently, numerous studies have been performed but there is still a wide range of ongoing challenges. One of the challenges is the risk from insecticide exposure to solitary bees, especially at their larval stages, by contaminated nesting material (e.g. mud partitions – mason bees).

In 2017, an experiment was performed under modified field conditions with the horn-faced mason bee *Osmia cornuta* (Hymenoptera, Megachilidae) with 6 replicates per treatment group at two comparable locations in Southeast Lower Saxony, Northern Germany. The aim of the experiment was to develop a suitable test method for higher tier risk assessments with solitary wild bees exposed to treated nesting material. The potential effect of the insect growth regulator (IGR) Diflubenzuron to bees and their brood was examined. The IGR was applied at two concentrations (T1: 1ppm, T2: 5ppm) directly into the pollen mass and on the mud wall. The results in both treatments were compared to a water treated control (C).

The reproduction capacity and brood termination rate were observed in the study as endpoints. Furthermore, hatching success and flight activity were recorded as additional information at several occasions. Other observations and surrounding flowering plants in the nearby environment were also documented and considered.

The present results provide no evidence that the exposure by Diflubenzuron has an effect on the development during the larval stages of *Osmia cornuta*, neither in pollen mass nor in the nesting material. It remains to be seen whether the results can be confirmed at the end of our experiment in next spring, when further parameter like completion of development, phenotypical changes, hatching and fitness will be evaluated.

The developed method initially seems to be suitable but it is still prone to various sources of errors which have to be excluded by some modifications. For excluding those errors and uniting laboratory regulations and natural conditions of the field experiments, probably semi-field experiments might be more appropriate. Semi-field test designs would investigate the exposure of adult bees as well as their brood to field-realistic pesticide quantities and ensure a collecting only of contaminated pollen/nectar and nesting material.