

## Manual application of insecticidal dust in semi-field experiments with honeybees

*Manuelle Applikation von Insektizidstäuben in Halbfreilandversuchen mit Honigbienen*

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In order to assess the risk for honey bees following exposure to different size fractions of dust containing insecticides, semi-field trials were carried out from 2010 to 2012. Aim of these experiments with manual application of insecticidal dust was to establish a “no observed effect rate” (= NOER) and a “lowest-observed-effect rate” (= LOER) for honey bees by examining adult bee mortality and development of brood (brood termination rate). In addition, using the same experimental conditions (size fraction, application rate) but different crops effects on bee mortality were investigated and compared.

Dusts of different size fractions were gained by sieving abraded dust of insecticide treated maize to different size classes, analysed for residue content and manually applied on flowering Phacelia and winter oilseed rape. To facilitate homogeneous distribution of the small amounts of active ingredient, the contaminated dust was diluted with standard soil (LUFA 2.2) of the same particle size range as the investigated dust. The effects of different rates of active substance (0.10, 0.25, 0.50 and 1.0 g a.i./ha Clothianidin; n=3) and of different particle sizes of dust ( $x \leq 160 \mu\text{m}$ ,  $250 < x \leq 450 \mu\text{m}$ ,  $x > 500 \mu\text{m}$  with an application rate of 2.0 g a.i./ha; n=3) on honey bees were examined.

In the experiments, 2-3 gauze-covered tents (10 x 4 m) covering the flowering crop, with one bee colony in “Hohenheimer Einfachbeuten” (Zander, 10 frames) with at least three brood combs in all developmental stages (eggs, larvae and sealed brood) were set up in each replicate. In the experiments, different mixtures of dusts and soil (seed treatment dusts and standard soil LUFA 2.2) were manually applied on the flowering crop inside the tents during full bee flight activity. Foraging intensity and mortality in dead bee traps (Type “Gary”) were assessed for at least 7 days after application and samples of dead bees were taken for residue analysis.

In contrast to other dust fractions applied at the same rate of a.i. per ha, significantly increased mortality and effects on brood development were detected for fine dust particles « $x \leq 160 \mu\text{m}$ », which is the particle size range of pollen (2–250  $\mu\text{m}$ ). At the same application rate and size fraction similar mortalities occurred in winter oilseed rape and Phacelia. In the trials with a target application rate of 0.1 g Clothianidin/ha, no adverse effects were observed, at 0.25 g Clothianidin/ha a slight increase of adult mortality was detected.

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