

## Dust drift during sowing of winter oil seed rape - effects on honey bees

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### Abstract

In 2008 a large-scale honey bee poisoning in parts of southern Germany occurred during sowing of maize. This incident was caused by contamination of flowering bee forage plants with drift of dust from the insecticidal seed dressing containing the active substance clothianidin. This ingredient is also used in the seed dressing of other crops such as oil seed rape, sugar beet and various grains (wheat, barley, rye).

Two large-scale drift experiments were conducted in 2009 (Wendhausen) and 2011 (Lucklum). In both drift experiments winter oil seed rape seeds treated with clothianidin was sown; the drill area was surrounded by two experimental areas with flowering mustard. The oil seed rape was sown by a pneumatic sowing machine with compressed air installations with at least 90 % drift reduction due to a deflector.

In 2009, on both sides directly along the edge of the mustard (distances to the contaminated mustard area: 0 and 50 m), 4 hives for the field exposure as well as 4 gauze-covered tents (4 x 4 m) with bee hives for the semi-field experiment were exposed, with the side exposed opposite to the wind direction used as control. Before sowing, the bee hives in the tents were closed and the gauze from the tents at the distance of 0 m to the drilling area was removed. Immediately after sowing, which took about 1 hour, the tents were covered again and the hives reopened. The hive bees in the field trial were free flying and not enclosed during the drilling process, so that they were continuously exposed to the contaminated dust. Besides the free flying hive bees directly bordering the exposed area, other hives were exposed in about 50 and 800 m distance from the exposed mustard.

In 2011 a similar approach was used with 2 x 3 tunnels (6 x 16 m) located in mustard in wind direction and opposite to this and outdoor bee hives in distances of 0, 50 and 500 m to the exposed mustard. Here before sowing the gauze from all tunnels was removed.

The contamination of adjacent flowering mustard and the impact of dust drift on bee colonies in semi-field and field trials were examined by assessing flight activity and mortality in Gary-bee traps as well as population development. Dead bees were documented, collected, frozen and analyzed for residues.

Both experiments show that even in worst case scenarios, sowing of winter oilseed rape with the modified seed technology had no adverse effects on bee colonies.

**Keywords:** honeybee, *Apis mellifera*, bee poisoning, clothianidin, dust abrasion, dust drift

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