

Results

Pesticides in pollen loads

Prothioconazol and clothianidin were not detected in the pollen loads of returning bees over the whole period.

Boscalid was detected in all 22 series. At the day of application the detected average boscalid value in the pollen loads was 13.9 mg/kg and at the following day 26.2 mg/kg. At the second day the contamination decreased to 4.7 mg/kg and stayed on this level the following days. At 7 days after the application, boscalid was still measured at levels around 3 mg/kg.

Residues in nectar

All three pesticides were detected in the nectar in the honey sac loads over the 7 day period. Boscalid and prothioconazol residues were in high ppb-levels after the application (1.43 mg/kg respectively 0.69 mg/kg). The values decreased to 0.13 respectively 0.06 mg/kg the following day and for both substances to 0.017 mg/kg the second day. After 7 days the boscalid value reached 0.025 mg/kg and the prothioconazol 0.009 mg/kg. The clothianidin values moved between 0.001-0.003 mg/kg and were always near the limit of quantitation. Clothianidin acted like an internal standard and showed that the forager bees intensely used the treated oilseed rape field.

Conclusions

Spraying of boscalid in oil seed rape according to normal agricultural practice in Germany causes residues in pollen (above the German MRL), nectar and honey. Prothioconazol was detected in nectar and honey. Due to matrix effects and irreversible adsorption effects, this pesticide is not detectable in pollen. Its residual behavior is still unclear. Clothianidin migrates from the plant into nectar in low traces near the LoQ. Even with low quantitation limits (0.001 mg/kg), this insecticide was not detected in pollen or honey. The fungicide spray application leads to appreciably higher residues in the bee products than the seed treatment, particularly in the time after the application. Systemic properties of the three substances induce the contamination of pollen and nectar over a prolonged time. The hydrophilic character of the fungicides may lead to relatively low residues in rape oil, but to relative high residues in honey. Pollen traps should be closed at least for the first few days after spray applications.

Colony losses – interactions of plant protection products and other factors

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Abstract

In recent years repeated colony losses occurred in Germany. Besides Varroosis many other possible causes like bee diseases, nutrition supply as well as effects of pesticides have been discussed.

A chronic feeding study was conducted to find indications to what extent negative effects of pesticides in sub-lethal doses can be discerned from effects of other stressors (pathogens, drugs, mix of plant protection products, malnutrition of proteins) or any interactions or coactions.

In a screening programme effects of chronic dietary exposure to sub-lethal doses of the insecticide imidacloprid were studied in honeybees under stress of another potential stressor (*Varroa destructor*, *Nosema apis*, drugs, lack of pollen supply). The results confirm a chronic oral toxicity of imidacloprid at concentrations which in several previous studies have been reported to be toxic to bees (100 ppb). However, no indications were found for significant differences in sensitivity to imidacloprid between bees under other stressors and control bees.

Results confirm previous findings that optimal of protein supply can soften negative effects of stressors. In addition it became apparent that bees from different colonies of the same apiary which were fed in parallel varied in sensitivity.

A semi-field experiment was conducted to assess the risks of mixing plant protection products by simulating commercial applications during blooming on bee colonies foraging in commercial seed dressed rape with potential residues in nectar and pollen.

No adverse effects on mortality or on development of exposed bee colonies had been found when bees foraged on rape of dressed seeds and plants were sprayed with one single plant protection product (pyrethroid resp. azol-fungicide) or in combination (tank mix pyrethroid plus azol-fungicide).

From the findings of chronic feeding tests and semi-field test it can be concluded that imidacloprid used as standard seed dressing formulation will pose no risks to honeybees.