Then in a next step in our risk assessment study on side effects we evaluated the impact of sublethal concentrations of Xentari® (0.01% via the sugar water and the pollen) on the foraging behavior of bumblebees with a new experimental setup in the laboratory. Here no change in the behavior of the workers was seen.

Overall the results showed that the tested Bt insecticides cause an effect on the biology of *B. terrestris*. However, more information about relevant environmental concentrations is necessary before making final conclusions about the compatibility of these compounds with *B. terrestris*.

Can pesticide acute toxicity for bumblebees be derived from honeybee LD50 values?

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Abstract

Pesticide acute toxicity towards animals is commonly assessed using lethal doses (LD_{50}). The LD_{50} can be generated with two routes of exposure: when animals ingest the pesticide (oral LD_{50}) or when it is in contact with it (contact LD_{50}). Toxicity values for honeybees are usually used in ecotoxicological risk assessment infering that honeybees represent the pollinating insects. LD_{50} values are also measured for bumble bees but to a lesser extend.

The first step of this exercise was to collect known LD_{50} (contact and oral) values measured for both honey bees and bumble bees.

Based on the LD_{50} values of 20 pesticides, the relationship between oral LD_{50} values of honey bees and bumble bees was calculated with the regression formula. The same calculation was done with contact LD_{50}. Results showed that there was an approximate relationship; toxic active ingredients for honey bees were also toxic for bumble bees. However, when honey bee LD_{50} values in the toxic range (LD_{50} < 1 µg/bee) and less toxic range (LD_{50} > 1 µg/bee), were compared to bumble bee LD_{50}, the relationship was very much less statistically significant. This both counted for the oral and contact LD_{50} values. It is concluded that the known LD_{50} values of honey bees could indicate broadly a range of LD_{50} values for bumble bees. However, for toxic and less toxic substances, the LD_{50} for bumble bees cannot be derived from known honey bee LD_{50} values. It must be noticed furthermore that the LD_{50} values for honey bees, presented in literature and databases of universities and legislation offices vary significantly.

IV. Test methodology (laboratory, cage, field, sub-lethal, etc.)

Influence of the brood rearing temperature on honey bee development and susceptibility to intoxication by pesticides

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Abstract

The brood rearing temperature is one of the most precisely controlled physiological parameters in a honey bee colony. Adult bees keep the brood area centre at 35 ± 1°C. In order to maintain the temperature within this narrow range, the high or low external temperature is contrasted by thermoregulation behaviours. Thus, normally only slight deviations from the optimal level may occur. Nevertheless, in particular situations the brood may be subject to conditions of suboptimal temperature. For example, a slight bee poisoning, causing

the loss of apparently insignificant quantity of adult bees in early spring, i.e. in the conditions of low external temperatures, could impede to maintain the brood at the constant optimal temperature. It was hypothesised that the honey bees deriving from the brood kept at suboptimal temperature might be characterised by lower fitness and by higher susceptibility to pesticide intoxication. This could lead to consistent adult bee losses delayed in time. In previous studies, adult bees, reared at suboptimal temperature during pupal development, showed decrement in short-term learning and memory capacities. These bees could have difficulties to carry out thermoregulation behaviour causing, again, reduced brood rearing temperature.

The present study was aimed to investigate if the decrease of the brood rearing temperature of only 2°C may have effects on the larval mortality and on the adult emergence and life parameters. Moreover the susceptibility to the intoxication by pesticides was studied both on the larvae and on the adults emerged from the brood reared at the tested temperatures. For this purpose, lab trials were conducted basing on Aupinel's protocol for the *in vitro* rearing of honeybee larvae. The larvae were exposed to two temperatures: 35°C (optimal) and 33°C (suboptimal) from 12h after hatching until 15 days of age. According to the experiment, dimethoate was administered either to larvae or to adults. Larval mortality, adult emergence and longevity were measured. The mortality both of the larvae and of the adults after the dimethoate administration was also recorded.

Our results showed that the lower rearing temperature has no negative influence on the larval susceptibility to the intoxication with dimethoate. The LD50 (48h and 72h) was even higher for the larvae reared at lower temperature than for those reared at the optimal temperature. The adult emergence doesn't seem to be influenced by the rearing temperature, but the longevity is strongly reduced in the bees deriving from the cool-reared brood. The mortality rate of adults emerged from larvae reared at the suboptimal temperature is comparable to that of adults intoxicated with the LD50 of dimethoate emerged from larvae reared at the optimal temperature. Thus the low-temperature-brood-rearing seems to be an important stressing factors with the effects on the adults.

Field testing methodology for investigating the effect of systemic insecticides on honey bees

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Abstract

Elsewhere at this symposium risk assessment schemes are being proposed for systemic insecticides. The purpose of this presentation is to demonstrate methodologies already used for systemic seed treatment insecticides. Investigations involved two main designs:

- semi field (tunnel) trials, assessing residues in plants, pollen, and various hive products;
- open field studies investigation the long term developments of honey bee colonies. Colnies were followed for a long time period, including overwintering. Parameters studied included: mortality, foraging activity, brood development, hive weights, disease analysis (e.g. *Nosema apis*, *Varroa destructor*, American foulbrood, bee viruses).