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Reduction of fungicide concentration by de-husking of seeds by the Wood mouse

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The study species

The Wood mouse *(Apodemus sylvaticus)* is a nocturnal, granivorous rodent which is a standard species in the risk assessment of seed treatments for small mammals. Wood mice are widespread in the agricultural landscape and are associated with a number of farmland habitats. Furthermore the species represents one of the most common small mammals in Europe. For comparison we also studied the House mouse *(Mus musculus)*.

Aim of the study

The purpose of this study was to link the ecology of the Wood mouse (in particular the de-husking behaviour while eating cereal grains) with ecotoxicology (the exposure of the mice) to get a better estimate about the dose ingested when feeding on treated seeds. The residue concentration in fresh feed represents the tier 1 estimate for the theoretical exposure for small mammals. We were interested if the real exposure is reduced by the de-husking behaviour.

Test design Laboratory and Semi-Field Basins

In the laboratory Wood mice *(Apodemus sylvaticus)* and House mice *(Mus musculus)* were studied in standard Macrolon cages (T4: 59 x 38 x 20 cm) . Some experiments were also conducted under more natural semi-field conditions with Wood mice held in basins of at least 2 m x 3 m.

All mice had access to standard feed (consisting of wheat, barley, oat flakes and bird feed) and fresh water during an acclimatisation period.

Figure 1: Semi-Field Basin

Figure 2: Laboratory Cage

Method

After a starvation period all mice received 6 g wheat for 24 hours and on the following day 6 g barley. The grains of both cereals were coated with a fungicide treatment with a concentration of 0.1 g active ingredient per 100 g. The husks and the quartz sand of the laboratory cages and from the feeding trays in the semi-field were analysed for residues of the seed treatment.

The maximum theoretical intake of residues per mouse was calculated based on the amount of consumed grains. By subtracting the amount of remaining residues that we found in the husks and in the sand from this value we calculated the maximum actual intake of residues. The retrieval of all husk particles and other residue remains for the chemical analysis is more difficult and therefore less complete under semi-field conditions than under laboratory cage conditions.

Results

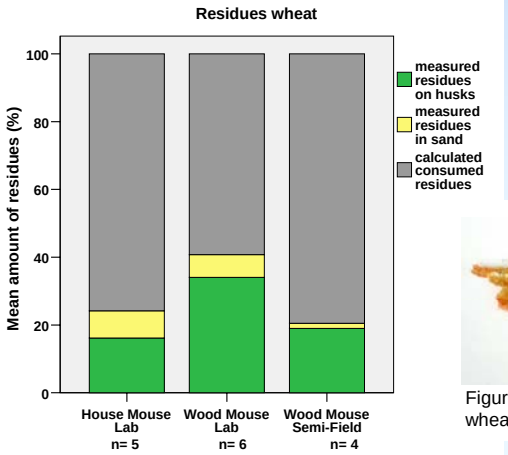

Figure 3: Remaining husks of wheat from a Wood mouse

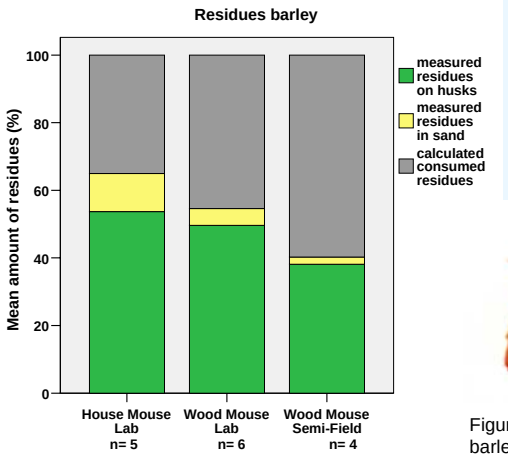

Figure 4: Remaining husk of barley from a Wood mouse

Discussion and Conclusion

The residue analysis of the remaining husks and quartz sand demonstrated that the de-husking behaviour of the two mice species led to a reduction of fungicide exposure of 40 to 60 %. Under semi-field conditions, retrieval of all unconsumed seeds, husks and particularly of residues in sand was more difficult (and therefore more incomplete) than in the laboratory trials. Accordingly, the estimated reduction of consumed residues in the semi-field experiment was lower than in the laboratory. However, the results of the semi-field experiments confirm that de-husking behaviour can also be expected under semi-field or field conditions, but quantification was more reliable under laboratory conditions.

The test results for both mice species demonstrate that de-husking is a relevant factor and support the integration of a de-husking factor in the risk assessment of seed treatments for small mammals.

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