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III. Bumblebees and other bee species

The impact of different concentrations of a pyrethroid insecticide on the cyclic gas exchange cycles on bumble bees

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Abstract

Minor effects of pesticides may remain unnoticeable in adult bees because of no visible changes in their behaviour throughout several days after coming into contact with pesticides. The hypothesis of this work is that changes which are not observable through the behaviour of the bumble bees can be seen through physiological patterns. The aim of the present research was to study the effect of low concentrations of Fastac 100 EC on discontinuous gas exchange cycles of bumble bee *Bombus terrestris* foragers. Using a system of flow-through CO_2 respirometry, the effect of different concentrations of alpha-cypermethrin on bumble bee foragers was studied. We found that the concentration of Fastac 100 EC that is used in the fields and a tenfold solution of that caused significant decrease in the frequency of bursts of CO_2 releases in bumble bees. 20-fold diluted solution did not cause the significant decrease. The lifespan of treated bumble bees also decreased by the field concentration and ten-fold diluted concentration. Alpha-cypermethrin caused changes in the respiration patterns of *B. terrestris* foragers although not always seen through the behaviour. These changes could potentially lead to a decreasing individual and colony survival.

Keywords: Respiration cycles, pyrethroid insecticide, bumble bees