



Unexpected effects of low doses of a neonicotinoid insecticide on behavioral responses to sex pheromone in a pest insect

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In moths, which include many agricultural pest species, males are attracted by female-emitted sex pheromones. Although integrated pest management strategies are increasingly developed, most insect pest treatments rely on widespread use of neurotoxic chemicals, including neonicotinoid insecticides. Residual accumulation of low concentrations of these insecticides in the environment is known to be harmful to beneficial insects such as honey bees. This environmental stress probably acts as an "info-disruptor" by modifying the chemical communication system, and therefore decreases chances of reproduction in target insects that largely rely on olfactory communication. However, low doses of pollutants could on the contrary induce adaptive processes in the olfactory pathway, thus enhancing reproduction. Here we tested the effects of acute oral treatments with different low doses of the neonicotinoid clothianidin on the behavioral responses to sex pheromone in the moth *Agrotis ipsilon* using wind tunnel experiments. We show that low doses of clothianidin induce a biphasic effect on pheromone-guided behavior. Surprisingly, we found a hormetic-like effect, improving orientation behavior at the LD20 dose corresponding to 10 ng clothianidin. On the contrary, a negative effect, disturbing orientation behavior, was elicited by a treatment with a dose below the LD0 dose corresponding to 0.25 ng clothianidin. No clothianidin effect was observed on behavioral responses to plant odor. Our results indicate that risk assessment has to include unexpected effects of residues on the life history traits of pest insects, which could then lead to their adaptation to environmental stress.

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Liens

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