

# An assessment of the risk of neonicotinoid pesticides to harm non-target insects

- is current risk assessments sufficient?

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# Abstract

Neonicotinoids, e.g. clothianidin, imidacloprid and thiamethoxam, is the most used class of insecticides worldwide. However, lately, this group of insecticides has been subject to controversy. Due to the systemic traits of neonicotinoids, the active compound is translocated throughout the whole plant, which provides effective and long-lasting protection against herbivorous pests. On the other hand, non-target insects such as solitary bees and wasps, which feed on pollen and nectar from treated plants, may also get exposed. Laboratory studies conducted on bees have revealed lethal effects from neonicotinoid exposure at high doses, and both lab and field studies have revealed various sublethal effects such as impaired reproduction at lower doses. Nevertheless, the potential impact of neonicotinoid exposure on a wide range of non-target insects remains unknown, and most of current research is oriented towards the western honey bee (*A. mellifera*).

In the light of current knowledge gaps within this area of research, I conducted a case study to assess the risk of neonicotinoid exposure to solitary bees (genera *Hylaeus* and *Heriades*) and solitary wasps (genus *Trypoxylon* and subfamily Eumeninae). These taxa have been poorly studied, or not studied at all. I investigated potential effects on the reproduction of these taxa, when nesting near oilseed rape (*Brassica napus*) fields grown from clothianidin-coated seeds. This study shows that effects vary among taxa, and that they can be more complex than previously thought, which indicates that risk assessment schemes for pesticides should be reassessed.

Regarding observed and potential hazards for non-target insects from neonicotinoid exposure, the precautionary principle should be more broadly applied in future risk assessments and the widespread use of neonicotinoids should be questioned. This is further stressed, considering current knowledge gaps within this area of research and the persistence and prevalence of neonicotinoids in the surrounding environment.