

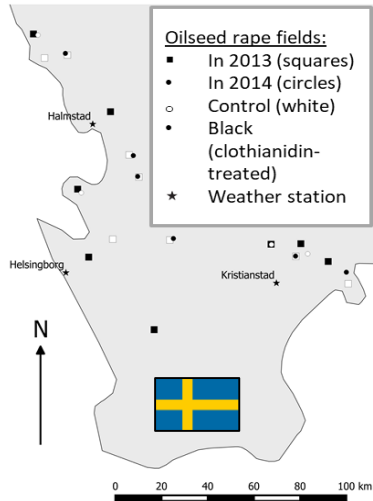
How does an insecticide seed-treatment affect honeybee and bumblebee colonies and their pathogens, parasites and beneficial bacteria?

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Background

Neonicotinoids are systemic pesticides when applied as a seed-treatment, meaning their active compounds can be found in all plant parts including nectar and pollen, potentially threatening bees. In addition to direct effects on bees, exposure to this type of insecticide might promote **pathogens and parasites of bees** as neonicotinoids have been shown to reduce immune gene expression, antimicrobial activity and hygienic behaviour. Here we investigate this question using the neonicotinoid clothianidin.

Experimental setup




Bumblebees
(*B. terrestris*):
2013




Honeybees
(*A. mellifera*):
2013 & 2014



Results: Clothianidin negatively impacted bumblebee reproduction and body size, but no adverse effects in honeybees

Honeybees

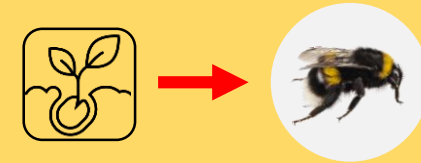
No impacts on swarming, overwinter mortality, honey production. No impacts on number of adult bees and brood in the first year but more bees and more brood in the second year when exposed to clothianidin.



No negative effects

Bumblebees

Negative impacts of clothianidin on bumblebee reproduction: Reduced worker size (-5%), reduced male pupal body mass (-23%), fewer males (-66%), fewer queens (-74%) but no impact on the number of adult bees



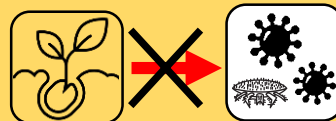
Severe negative effects

Further support for testing the effect of pesticides on more species than just the honeybee!

Honeybee colonies consisting of several thousands of individual bees might be **more resilient** to stressors in the environment **than the smaller bumblebee colonies**. This research indicates that **pollinator groups can react differently** to pesticide exposure, and this should be considered in future research.

Results: Clothianidin exposure did not increase disease levels

We found **no negative effects** of clothianidin on honeybee or bumblebee health with respect to the prevalence and abundance of **RNA viruses**, ***Nosema* spp**, ***Crithidia bombi*** (only tested in bumblebees), ***Varroa destructor*** (only tested in honeybees), and **beneficial bacteria**, or **immune gene expression** (only tested in honeybees).



No negative effects

PoshBee related publications

Rundlöf *et al.* (2015) Seed coating with a neonicotinoid insecticide negatively affects wild bees. *Nature* 521, 77-80. [Link](#)

Wintermantel *et al.* (2018) Field-level clothianidin exposure affects bumblebees but generally not their pathogens. *Nature Communications* 9, 5446. [Link](#)

Osterman *et al.* (2019) Clothianidin seed-treatment has no detectable negative impact on honeybee colonies and their pathogens. *Nature Communications* 10, 692. [Link](#)

