



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
Agroscope



^b
**UNIVERSITÄT
BERN**

Corporate Communication

Media release / 26 July 2016

EMBARGOED UNTIL 27 July 2016, 00:01H BST

Two neonicotinoid insecticides may have inadvertent contraceptive effects on male honey bees

Male honey bees, called drones, can be affected by two neonicotinoid insecticides by reducing male honey bee lifespan and number of living sperm. Both insecticides are currently partially banned in Europe. Researchers from Bern, Switzerland, together with partners from Thailand and Germany, call for more thorough environmental risk assessments of these neonicotinoids.

In recent years, beekeepers have struggled to maintain healthy honey bee colonies throughout the northern hemisphere. In the first study to investigate the effects of neonicotinoids on drones, and one of the first to study the effects of these agricultural chemicals on males in general, an international research team led by the University of Bern and Agroscope has found that two neonicotinoids may inadvertently reduce drone lifespan and number of living sperm. Because queen survival and queen productivity are intimately connected to successful mating with males, any influence on sperm quality may have profound consequences for the health of the queen, as well as the entire colony. In light of recent beekeeper surveys that identified poor queen health as an important reason for honey bee colony losses, this study further strengthens calls for more thorough environmental risk assessments of these insecticides, as well as other crop protection products, to protect bees and other beneficial organisms.

'We know multiple stressors can affect honey bee health, including parasites and poor nutrition. It is possible that agricultural chemicals may also play an important role', says senior author Geoff Williams of the University of Bern and Agroscope. In 2013, the European Union and Switzerland took a precautionary approach by partially restricting the application of the widely used neonicotinoid insecticides thiamethoxam, clothianidin, and imidacloprid, with the mandate to perform further environmental risk assessments. A new inter-governmental review is currently taking place. Previous research suggests that these chemicals cause both lethal and sub-lethal effects on honey bee females from exposure, but nothing is known about how they may affect males of the species.

A research team from the institutes of bee health and veterinary public health at the University of Bern (Switzerland) and Agroscope at the Swiss Confederation (Switzerland), alongside collaborators from Chiang Mai University and Mae Fah Luang University (Thailand) and the University of Koblenz-Landau (Germany) recently demonstrated in an article in the prestigious scientific journal *Proceedings of the Royal Society of London B: Biological Sciences* that male honey bees, also called drones, are vulnerable to the neonicotinoids thiamethoxam and clothianidin.

Reduced longevity and sperm quality

The study showed that males maintained in the laboratory after colony-level exposure had a shorter lifespan and produced fewer living sperm. This could have important consequences for colonies because queens, which are essential to colony functioning, must be properly inseminated with healthy sperm from multiple males. Factors affecting the health of drones could therefore have profound consequences not just for the queen, but for the entire colony, as replacement of poorly mated queens is resource intensive and not without risks.

‘Most neonicotinoid studies that employ honey bees have focused on workers, which are typically the non-reproductive females of the colony. Male honey bees have really been neglected by honey bee health scientists; while not surprising, these results may turn a few heads’, says lead author and doctoral student Lars Straub from the University of Bern. Co-author Peter Neumann from Bern states ‘these results, coupled with the importance of males to honey bee reproduction, highlight the need for stringent environmental risk assessments of agricultural chemicals to protect biodiversity and ecosystem functioning.’

Bees, pollination, and honey

Honey bees, like all insect pollinators, provide crucial ecosystem and economic services. Annually in Europe and North America, millions of honey bee colonies produce honey and contribute to the pollination of a range of agricultural crops – from carrots to almonds to oilseed rape – that is valued at billions of Euros.

Article citation:

Straub, L., Villamar-Bouza, L., Bruckner, S., Chantawannakul, P., Gauthier, L., Khongphinitbunjong, K., Retschnig, G., Troxler, A., Vidondo, B., Neumann, P., Williams, G.R. 2016. Neonicotinoid insecticides can serve as inadvertent insect contraceptives. *Proc. R. Soc. B* 20160506 doi: 10.1098/rspb.2016.0506. Available at: <http://dx.doi.org/10.1098/rspb.2016.0506>

The study was financially supported by the Swiss Federal Office for the Environment, Agroscope, the Vinetum and Ricola foundations, ETH Global (People Exchange Grant), and the Chiang Mai University Fund. It was performed by researchers at the University of Bern (Institute of Bee Health & the Veterinary Public Health Institute, Vetsuisse Faculty), Agroscope (Swiss Bee Research Centre, Swiss Confederation), University of Koblenz-Landau (Environmental Science Department), Chiang Mai University (Department of Biology, Faculty of Science), and Mae Fah Luang University (School of Science).

Contacts:

Mr. Lars Straub

Institute of Bee Health, Vetsuisse Faculty, University of Bern
Bern, Switzerland

+41 31 631 57 64 / lars.straub@vetsuisse.unibe.ch

www.bees.unibe.ch

Dr. Geoff Williams

Institute of Bee Health, Vetsuisse Faculty, University of Bern
Bern, Switzerland

+41 31 631 57 66 / geoffrey.williams@vetsuisse.unibe.ch

www.bees.unibe.ch

Prof. Dr. Peter Neumann

Institute of Bee Health, Vetsuisse Faculty, University of Bern
Bern, Switzerland

+41 31 631 23 27 / peter.neumann@vetsuisse.unibe.ch

www.bees.unibe.ch