

### **3.12 Comparative chronic toxicity of three neonicotinoids on New Zealand packaged honey bees**

**Sarah C. Wood, Ivanna V. Kozii, Roman V. Koziy, Tasha Epp, Elemir Simko**

Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Canada

DOI 10.5073/jka.2018.462.039

#### **Abstract**

Thiamethoxam, clothianidin, and imidacloprid are the most commonly used neonicotinoid insecticides on the Canadian prairies. There is widespread contamination of nectar and pollen with neonicotinoids, at concentrations which are sublethal for honey bees (*Apis mellifera* Linnaeus). We compared the effects of chronic, sublethal exposure to the three most commonly used neonicotinoids on honey bee colonies established from New Zealand packaged bees using colony weight gain, brood area, and population size as measures of colony performance. From May 7 to July 29, 2016 (12 weeks), sixty-eight colonies received weekly feedings of sugar syrup and pollen patties containing 0, 20 (median environmental dose), or 80 (high environmental dose) nM of one of three neonicotinoids (thiamethoxam, clothianidin, and imidacloprid). Colonies were weighed at three week intervals. There was a significant negative effect ( $P < 0.01$ ) on colony weight gain (honey production) after 9 and 12 weeks of exposure to 80 nM neonicotinoids and on cluster size ( $P < 0.05$ ) after 12 weeks. A significant effect of neonicotinoid exposure was not observed for brood area or number of adult bees, but these analyses lacked adequate ( $> 80\%$ ) statistical power due to marked variation within treatment groups. Thus, continued reliance on colony-level parameters such as brood area and population size for pesticide risk assessment may not be the most sensitive method to detect sublethal effects of neonicotinoids on honey bees.

#### **Reference**

This study has been published in PLoS One (2018 Jan 2;13(1):e0190517. doi: >> 10.1371/journal.pone.0190517). PLoS One is an open access journal and the entire paper can be accessed at the following site: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0190517>

### **3.13 Tank mixtures of insecticides and fungicides, adjuvants, additives, fertilizers and their effects on honey bees after contact exposure in a spray chamber**

**Anna Wernecke\*, Malte Frommberger, Abdulrahim Alkassab, Jakob H. Eckert, Ina P. Wirtz, Jens Pistorius**

Julius Kühn-Institut (JKI), Federal Research Centre for Cultivated Plants, Institute for Bee Protection, Messeweg 11-12, 38104 Braunschweig, Germany

\*corresponding author: [anna.wernecke@julius-kuehn.de](mailto:anna.wernecke@julius-kuehn.de)

DOI 10.5073/jka.2018.462.040

**Keywords:** honey bees, tank mixtures, synergistic impacts, contact exposure, EBI-fungicide

#### **Abstract**

In agriculture honey bees may be exposed to multiple pesticides. In contrast to single applications of plant protection products (PPP), the effects of tank mixtures of two or more PPP on honey bees are not routinely assessed in the risk assessment of plant protection products. However, tank mixes are often common practice by farmers. Mixtures of practically non-toxic substances can lead to synergistic increase of toxic effects on honey bees, observed for the first time in 19921 in combinations of pyrethroids and azole fungicides. 2004 Iwasa et al. already reported that ergosterol-biosynthesis-inhibiting (EBI) fungicides strongly increase the toxicity of neonicotinoids in laboratory for the contact exposure route. Furthermore, in agricultural practice additives, adjuvants and fertilizers may be added to the spray solution. For these additives usually no informations on potential side effects on bees are available when mixed with plant protection products. Therefore, it is considered necessary to investigate possible additive or synergistic impacts and evaluate potentially critical combinations to ensure protection of bees. Here, we investigated the effects on bees of combinations of insecticides, fungicides and fertilizers under controlled laboratory conditions. A spray chamber was used to evaluate effects following contact exposure by typical field application rates. Subsequently, mortality and behaviour of bees were monitored for at least 48 h following the OECD acute contact toxicity test 2143. Dependencies of synergistic effects and the time intervals between the applications of the mixing partners were evaluated.

# 462

## Julius-Kühn-Archiv

Pieter A. Oomen, Jens Pistorius (Editors)

### Hazards of pesticides to bees

13<sup>th</sup> International Symposium of the  
ICP-PR Bee Protection Group

18. - 20. October 2017, València (Spain)

- Proceedings -



Julius Kühn-Institut  
Bundesforschungsinstitut für Kulturpflanzen

### History ICPPR-Bee Protection Group conferences

- 1<sup>st</sup> Symposium, Wageningen, the Netherlands, 1980
- 2<sup>nd</sup> Symposium, Hohenheim, Germany, 1982
- 3<sup>rd</sup> Symposium, Harpenden, UK, 1985
- 4<sup>th</sup> Symposium, Řež, Czech Republic, 1990
- 5<sup>th</sup> Symposium, Wageningen, the Netherlands, 1993
- 6<sup>th</sup> Symposium, Braunschweig, Germany, 1996
- 7<sup>th</sup> Symposium, Avignon, France, 1999
- 8<sup>th</sup> Symposium, Bologna, Italy, 2002
- 9<sup>th</sup> Symposium, York, UK, 2005
- 10<sup>th</sup> Symposium, Bucharest, Romania, 2008
- 11<sup>th</sup> Symposium, Wageningen, the Netherlands, 2011
- 12<sup>th</sup> Symposium, Ghent, Belgium, 2014
- 13<sup>th</sup> Symposium València, Spain, 2017
- 14<sup>th</sup> Symposium scheduled, Bern, 2019

### Organising committee 13<sup>th</sup> conference

- Dr. Jens Pistorius (Julius Kühn-Institut, Germany)
- Dr. Anne Alix (Dow Agrosciences, United Kingdom)
- Dr. Carmen Gimeno (Trialcamp, Spain), local organiser
- Dr. Gavin Lewis (JSC, United Kingdom)
- Dr. Pieter Oomen (Wageningen, The Netherlands)
- Dr. Veronique Poulsen (ANSES, France)
- Dr. Guy Smagghe (Ghent University, Belgium)
- Dr. Thomas Steeger (US Environmental Protection Agency, USA)
- Dr. Klaus Wallner (Hohenheim University, Germany)

### Editors

- Dr. Pieter A. Oomen, Wageningen, The Netherlands
- Dr. Jens Pistorius, Braunschweig

### Group photo of all symposium participants, standing in front, from left:

- Thomas Steeger (new board member),
- Jens Pistorius (new chairman),
- Françoise & Pieter Oomen with award (editor & former chairman),
- Guy Smagghe (organiser, symposium host and new board member),
- Job & Margreet van Praagh with award,
- Anne Alix (secretary of the board)

### Foto

Pieter A. Oomen (Bumble bee *Bombus lapidarius* on thistle)

The proceedings of the symposia (such as these) are being published by the Julius Kühn Archive in Germany since the 2008 symposium in Bucharest, Romania. These proceedings are also accessible on internet, e.g. the former symposium proceedings published by JKI can be found on <https://ojs.openagrar.de/index.php/JKA/issue/archive> (Issues 423, 437, 450). Furthermore, proceedings of former meetings have meanwhile been digitalized and can be found on [https://www.openagrar.de/receive/openagrar\\_mods\\_00032635](https://www.openagrar.de/receive/openagrar_mods_00032635).

### Bibliografische Information der Deutschen Nationalbibliothek

Die Deutsche Nationalbibliothek verzeichnet diese Publikation. In der Deutschen Nationalbibliografie: detailierte bibliografische. Daten sind im Internet über <http://dnb.d-nb.de> abrufbar.

ISSN 1868-9892

ISBN 978-3-95547-064-7

DOI 10.5073/jka.2018.462.000



Alle Beiträge im Julius-Kühn-Archiv sind unter einer Creative Commons - Namensnennung - Weitergabe unter gleichen Bedingungen - 4.0 Lizenz veröffentlicht.

Printed in Germany by Arno Brynda GmbH, Berlin.