

Investigating the presence of pesticide residues in royal jelly, worker jelly and honey bee larvae under semi-field conditions

Alexandra Bölling¹, Jakob H. Eckert², Gabriela Bischoff², Robert Kreuzig³ and Jens Pistorius²

¹Technische Universität Braunschweig, Institute for Geoecology, Braunschweig

²Julius Kühn-Institut, Institute for Bee Protection, Braunschweig

³Technische Universität Braunschweig, Institute of Environmental and Sustainable Chemistry, Braunschweig

E-mail of corresponding author: alexandra.boelling@julius-kuehn.de

Residues of pesticides have been found in several bee products such as honey, beeswax and bee bread. However, little is known about the quantities of residues in the food of honey bee larvae (worker jelly), in the food of queen bees (royal jelly) and subsequently in the larvae themselves. Since larval food is processed by nursing bees and contains 10-20 % protein that derives mostly from pollen, a contamination seems possible.

The aim of this study was to investigate this route of exposure by evaluating and measuring the pesticide intake in the course of a worst case scenario by confining honey bee colonies in tunnels to restrict their flight area. Flowering phacelia as a highly bee attractive crop was applied with a mixture containing 240 g/L thiacloprid (BISCAYA®), 200 g/L boscalid and 200 g/L dimoxystrobin (Cantus Gold®). For exposure detection,

samples of phacelia flowers, honey sacs and pollen loads were taken. Worker jelly was sampled directly from combs in the brood nest containing first and second instar larvae. In order to ensure the production of larvae with a same age, queens were confined in their own colony in an exclusion cage containing an empty comb. Royal jelly was sampled from queen-less colonies using rearing frames and queen-cells.

Samples will be analysed by Liquid Chromatography-Mass Spectrometry (LC-MS/MS) and the results will help to retrace possible exposure routes by taking into account the different chemical properties of the test chemicals. Furthermore, it will become apparent if the active ingredients transfer into the larval food of worker bees and queen bees or even the larvae themselves. If not, currently applied larval test systems would not address a relevant way of exposure.