

After calculating the risk based on a “dietary no observable adverse effect concentration” – the highest experimental point before there is an adverse effect on a species – of five parts per billion, the study’s results suggest low potential for neonicotinoids to harm bee behavior or colony health.

UNDERSTANDING RISK VS. HAZARD

“Calculating risk, which is the likelihood that bad things will happen to a species based on a specific hazard or dose, is very different from calculating hazard, which is the potential to cause harm under a specific set of circumstances,” said co-author Allan Felsot, WSU Tri-Cities professor of entomology and environmental toxicology.

“Most of what has dominated the literature recently regarding neonicotinoids and honey bees has been hazard identification,” he said. “But hazardous exposures are not likely to occur in a real-life setting.

Felsot said the study shows that the risk of bee exposure to neonicotinoids is small because bees aren’t exposed to enough of the pesticide to cause much harm in a real-world scenario.

Lead author Timothy Lawrence, assistant professor and director of WSU Island County Extension, said many sublethal toxicity studies, whether at the organism level or colony level, have not done formal dose-response analyses.

“The question we posed focused on the risk of exposure to actively managed honey bee colonies in different landscapes,” he said.

RISKS IN LANDSCAPES NONE TO VERY LOW

With the cooperation of 92 Washington beekeepers, the team collected samples of beebread, or stored pollen, from 149 apiaries across the state.

Throughout the one-year trial, neonicotinoid residues were detected in fewer than five percent of apiaries in rural and urban landscapes. Two neonicotinoids, clothianidin and thiamethoxam, were found in about 50 percent of apiaries in agricultural landscapes.

Although neonicotinoid insecticide residues were detectable, the amounts were substantially smaller than levels shown in other studies to not have effects on honey bee colonies. The WSU researchers referenced 13 studies to identify no observable adverse effect concentrations for bee populations, which they used to perform a risk assessment based on detected residues.

“Based on residues we found in apiaries around Washington state, our results suggest no risk of harmful effects in rural and urban landscapes and arguably very low risks from exposure in agricultural landscapes,” Felsot said.

CARE REQUIRED TO REGULATE EXPOSURE

While exposure levels were found to be small, Lawrence said it is still important to be careful with use of neonicotinoid insecticides and follow product label directions.

For example, insecticides should not be used during plant flowering stages when bees are likely to be foraging.

“While we found that bees did not have chronic exposure to adverse concentrations of neonicotinoids, we are not saying that they are not harmful to bees – they are,” he said. “People need to be careful with pesticide use to avoid acute exposure.”

Other researchers on the study included Elizabeth Culbert, WSU Food and Environmental Quality Lab (GEQL) research technician; Vincent Hebert, WSU associate professor of entomology and laboratory research director; and Steven Sheppard, WSU professor and department chair of entomology.

HIGH REPUTATION OF U.S. HONEY THREATENED BY CHEAP HONEY IMPORTS

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The United States is flooded with cheap fake honey from China. Most recently in June 2016, special agents with U.S. Immi-

gration and Customs Enforcement’s (ICE) Homeland Security Investigations (HSI) seized almost 60 tons of illegally imported Chinese honey.¹ Chinese honey of very low quality ends up on the shelves and eventually in American kitchens as there is often no information or false information on the label. The consumer today may see the lack of quality daunting, or to feel that the quality of honey is decreasing.

But that’s not true! U.S. beekeepers know very well how to produce top quality honey!

The team at Quality Services International (QSI) in Bremen, Germany, made it their goal to provide a method to prove the quality of honey. You are asking how? Well, we are using the latest technology combined with a worldwide unparalleled dataset on honey: HoneyProfiling™.

The technology behind HoneyProfiling™ is called Nuclear Magnetic Resonance spectroscopy (NMR) combined with chemometric analyses. Don’t worry, “nuclear” in this case only refers to the “core” of an atom (nucleus). The technique uses a magnetic field, but has nothing to do with radioactivity.

A great advantage of HoneyProfiling™ lies in the ability to detect many substances simultaneously creating a chemical “fingerprint” or profile of your honey.^(2,3) We then compare the fingerprint of your honey with the fingerprints of the authentic honeys in our database (fig. 1). Our database already contains several thousand reference profiles. To ensure authenticity of our reference

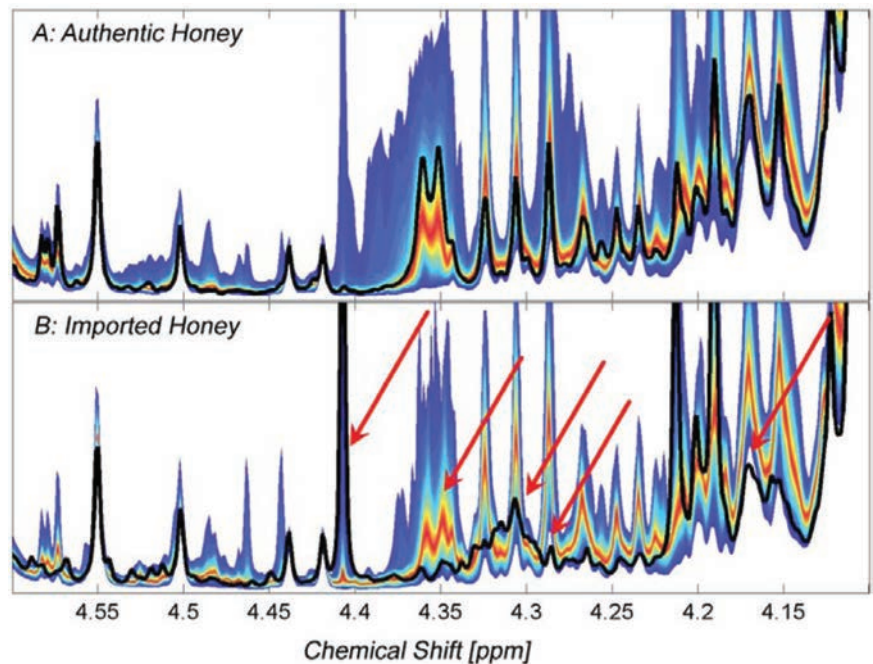


Fig. 1. The picture shows a section of the NMR-profile of sugars of two honey samples, one authentic honey (top) and one imported Chinese honey. The scale on the x-axis shows the chemical shift in ppm, the y-axis shows the intensity at a given chemical shift. The bold black line represents the current sample in question while the colored band represents all authentic honeys in the database. The NMR-profile of an authentic honey should follow the red band as can be seen in the top picture (A). In the picture on the bottom (B) obvious deviations from authentic honey in the profile of sugars are visible instead, which strongly indicate an adulteration. As a matter of fact, HoneyProfiling™ proved this imported Chinese honey to be fake honey.

samples, we performed more than 50,000 additional analyses to test for general quality parameters and markers for adulteration.

Based on that foundation of comprehensive data of HoneyProfiling™ we are not only able to extract information on geographical and botanical origin from the NMR-profiles, but they additionally provide information on adulteration, such as with sugar syrup.

HoneyProfiling™ can be used to prove adulteration of, for example, imported honey or to verify the purity of your own product.

Did we spark your interest in our work? Please get in touch with us if you have any questions or remarks.

- ¹ U.S. Immigration and Customs Enforcement, “HSI Chicago seizes nearly 60 tons of honey illegally imported from China”, 2016, <https://www.ice.gov/news/releases/hsi-chicago-seizes-nearly-60-tons-honey-illegally-imported-china-0>; last accessed 07/12/2016.
- ² A. Dübecke, NMR-Profiling of Honey – The New Approach in Honey Authenticity Testing, eFoodLab International, pages 14-16, 3/2015.
- ³ S. Schwarzingler, F. Brauer, P. Rösch, B. Schütz, B. Kämpf, G. Beckh, C. Lüllmann, A. Dübecke, Authentic food – Why a single analysis parameter is not enough, q&more, pages 36-43, 1/2016.

THE BUSINESS OF BEES

AN INTEGRATED APPROACH TO BEE DECLINE AND CORPORATE RESPONSIBILITY

Edited by Jill Atkins, Barry Atkins

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Our bee populations are under threat. Over the past 60 years, they have lost much of their natural habitat and are under assault from pesticides and intensive farming. We rely on bees and other insects to pollinate the majority of our fruit and vegetables and, without them, our environment and economy will be in crisis.

The Business of Bees provides the first integrated account of diminishing bee populations, as well as other pollinators, from an interdisciplinary perspective. It explores the role of corporate responsibility and governance as they relate to this critical issue and examines what the impact will be on consumers, companies, stock markets and ultimately on global society if bee populations continue to decline at a dangerous rate.

The book considers the issue of global bee population decline from a variety of



perspectives: historical, ethical, scientific, economic, and financial and brings together the perspectives of academics in accounting, science, classics and humanities with those of practitioners in the finance industry. The chapters explore the impact of the rapid decline in pollinator populations on the natural world, on corporations, on the stock market and on accounting. They frame the discussions within a historical context, exploring the age-old relationship between bees and humans from historical, philosophical and ethical perspectives. *The Business of Bees* will be essential reading for those in academia, business and finance sectors and anyone invested in the future of our planet.

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WASHINGTON

The West Sound Beekeepers Association is bringing in Michael Palmer to speak. This is a great opportunity for beekeepers and bee friendlies in our area to hear from a well traveled beekeeper. Michael will be speak-