

Hazards of pesticides to bees - 14th international symposium of the ICP-PR Bee protection group, October 23 – 25 2019, Bern (Switzerland)

**Abstracts: Oral Presentation****Tab. 4.** Final total population of workers, drones and queens and mean weight of the hive at the final assessment.

Product	Final total population of workers and drones		Final total population of queens		Mean (SE) weight (in gr)
	Median (Min-Max)	% reduction compared to control	Median (Min-Max)	% reduction compared to control	
Control – SW	321 (293-357)		27 (13-32)		1160.3±32.7
Control – P					
Agree – SW	342 (327-367)	-6	16 (10-19)	26	1075.1±33.0
Agree – P	310 (241-341)	8	19 (13-26)	17	1059.9±51.8
Control (Water)–T	313 (261-360)		29 (12-35)		1121.3±43.2
Agree - T	353 (337-362)	14	34 (19-39)	-19	1175.9±37.1

**Conclusion**

When *B. thuringiensis aizawai* GC91 (Agree WG) was provided to R&D *B. terrestris* through all three treatments (topical treatment, oral application through pollen, oral application through sugarwater) at the MFRC (0.4%), there were hardly any significant differences in the formation of workers, drones and queens compared to the untreated or water treated colonies. Although *B. thuringiensis aizawai*, (Xentari WG) at the MFRC (0.1%) has been recorded in the past as toxic for workers when provided through sugarwater and pollen (Mommaerts *et al.* 2010), this new commercially available strain of *B. thuringiensis aizawai* is harmless and no specific measures are recommended when used together with bumblebees.

**References**

- MOMMAERTS, V., K. JANS, G. SMAGGHE, 2010. Impact of *Bacillus thuringiensis* strains on survival, reproduction and foraging behaviour in bumblebees (*Bombus terrestris*). Pest Management Science, Vol. 66 (5), 520-525.
- MOMMAERTS, V., G. STERK, G. SMAGGHE, 2009. Side effects of commercial *Bacillus thuringiensis* insecticides on micro-colonies of *Bombus terrestris*. 10th International Symposium of the ICP-Bee Protection Group. Hazards of pesticides to bees. Bucharest, Romania, 8-10 October, 2008. Julius-Kühn-Archiv 2009 No.423, 68-69.
- STERK, G, F. HEUTS, N. MERCK, J. BOCK, 2002. Sensitivity of non-target arthropods and beneficial fungal species to chemical and biological plant protection products: Results of laboratory and semi-field trials. 1<sup>st</sup> International Symposium on Biological Control of Arthropods, 306-313.
- STERK, G., B. PETERS, Z. GAO, U. ZUMKIEL. 2016. Large-scale monitoring effects of clothianidin-dressed OSR seeds on pollinating insects in Northern Germany: effects on large earth bumble bees (*Bombus terrestris*). Ecotoxicology, 2(9): 1666-1678.

**2.6 Predicting wild bee sensitivity to insecticides utilizing phylogenetically controlled inter-species correlation models****Tobias Pamminger<sup>1</sup>, Nicole Hanewald<sup>1</sup>, Christof Schneider<sup>1</sup>, Matthias Bergtold<sup>1</sup>**<sup>1</sup>BASF SE

E-Mail: tobias-pamminger@basf.com

DOI 10.5073/jka.2020.465.022

**Abstract**

Plant protection products (PPP), are a vital pillar of modern agricultural practice, but their potential adverse effect on bees has emerged as an intensively discussed topic. Historically, research on the effects of PPP on bees has focused on the honey bee (*Apis mellifera*), while non-*Apis* bee species remain largely understudied. This study is intended as a first step to address this obvious knowledge gap and hope that it may be used to facilitate the development and implementation of a scientifically sound wild bee risk assessment with limited additional testing needs. We have compiled a comparative data set on bee sensitivity (acute contact exposure) against acetylcholine esterase (AChE) inhibitors, pyrethroids, neonicotinoids, organochlorides and bee bodyweight, a trait likely influencing bee sensitivity to PPP exposure. In total, we collected sensitivity data for up to 24 bee

**Abstracts: Oral Presentation**

species per insecticide group covering five of seven bee families. Using this information, while controlling for their phylogenetic non-independence, we build inter-species correlation models to predict bee sensitivity to PPPs belonging to different modes of action based on their bodyweight. We find that 1) bee weight is a robust predictor of bee resilience against insecticide exposure in many cases and 2) *Apis* is a particularly sensitive bee genus especially when body weight is taken into account. In contrast the currently proposed non-*Apis* surrogate species (*Bombus terrestris* and *Osmia* sp.) for European risk assessment as well as many stingless bee species, are comparatively resilient to many classes of insecticides. We discuss the consequences of these findings in the context of the global non-*Apis* risk assessment debate in Europe and the Americas.