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.

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2.6 Predicting wild bee sensitivity to insecticides utilizing phylogenetically controlled inter-species correlation models

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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

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.