

Poster

Section 5 - Microbials

Assessing the impact of microbial plant protection product mixtures on honeybee workers

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Abstract

The importance of microbial plant protection products (PPPs) in agriculture is steadily increasing, especially since they are considered to substitute chemical PPPs. Tank mixes are often common practice by farmers to reduce costs and increase the effectivity by controlling a broader spectrum of pests. However, there is no available information on the possible interactions between microbial PPPs and bee's responses after exposure to such combinations. We studied several tank mixes of microbial PPPs depending on application of the products on the same crops. Five products with different microorganisms as active ingredients and their combination were tested, including *Bacillus thuringiensis* ssp. *aizawai* (strain: ABTS-1857), *B. thuringiensis* ssp. *kurstaki* (strain: EG 2348), *B. amyloliquefacien* (strain: QST 713), *Beauveria bassiana* (strain: ATCC 74040) and *Cydia pomonella* granulosis virus (GV0005). Caged winter honey bees were placed in an incubator at 26°C and 65% humidity and exposed orally either acute or chronic (over 10 d) to the maximum recommended application rate of solo-product or mixture of two products. Mortality and food uptake amount was recorded daily over 15 d. Our results show that mixture of products containing *B. thuringiensis* ssp. *aizawai* and *B. amyloliquefacien* caused higher mortality rate compared to the solo products, whereas the effects in other mixtures are mostly related to the solo products which have the strongest effects. On the other hand, mixtures containing *C. pomonella* granulosis virus and/ or *B. thuringiensis* ssp. *kurstaki* did not affect the bee's survival compared to the other microbial PPPs. In conclusion, further studies are necessary to assess the effects of such mixtures as the effects of tank mixtures of two or more PPPs on honey bees, as these are not routinely assessed in the risk assessment of plant protection products.

Keywords: *Bacillus thuringiensis*, *Apis mellifera*, tank mixture, microbial plant protection product