

Combined stressors of insecticides, fungicides and pollen quality on honey bee health

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Honey bee health has been reported to be affected by multiple factors including resource quality, exposure to agrochemicals and pressure of pests and pathogens. Currently, concerns are growing about potential interactions between multiple stressors and their impacts on bee health.

Therefore, we performed a semi-field study to investigate the combined impacts of different pollen qualities and exposure to a mixture of agrochemicals. Twenty-four tents with crops with a gradient of different pollen quality for honey bees were realized: Phacelia with high pollen quality, maize with less pollen quality and tents planted with 50% maize and 50% flower mixtures with diverse pollen qualities. Additionally, the variants were sprayed with a tank mixture of the pesticides Mirage 450 EC (Prochloraz) and Biscaya (Thiacloprid). Various parameters were investigated such as mortality of adults, larvae and pupae, activity of detoxification enzymes, weight and longevity of newly hatched bees.

On the other hand, while several studies have reported the synergism between EBI-fungicides and different classes of insecticides, few studies have focused on the effects on honey bee larvae and their activity of detoxification enzymes. Therefore, we aimed to investigate the mortality of larvae in the laboratory fed with artificial diet spiced with the EBI-fungicide Prochloraz, the neonicotinoid Thiacloprid and the novel butenolide insecticide Flupyradifurone (active substances) in single and combined exposure.

Our preliminary results show potential synergistic effects on larval mortality with different magnitudes compared to reported effects on adults. This indicates a lower susceptibility of larvae to tested plant protection products. Activity of the primary detoxification enzymes P450, glutathion-S-transferase and acetylcholinesterase will be analyzed in collected larvae from laboratory as well as semi-field studies.