Monitoring the effects of field exposure of acetamiprid to honey bee colonies in Eucalyptus monoculture plantations

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Abstract

Eucalyptus plantations occupy 26 % of Portuguese forested areas. Its flowers constitute important sources for bees and beekeepers take advantage of this and keep their honey bee colonies within or near the plantations for honey production. Nonetheless, these plantations are susceptible to pests, such as the eucalyptus weevil Gonipterus platensis. To control this weevil, some plantations must be treated with pesticides, which might harm non-target organisms. This study aimed to perform a multifactorial assessment of the health status and development of Apis mellifera iberiensis colonies in two similar landscape windows dominated by Eucalyptus globulus plantations - one used as control and the other with insecticide treatment. In each of the two selected areas, an apiary with five hives was installed and monitored before and after a single application of the insecticide acetamiprid (40 g a.i./ha). Colony health and development, resources use, and pesticide residues accumulation were measured. The results showed that the application of acetamiprid in this area did not alter the health status and development of the colonies. This can be explained by the low levels of residues of acetamiprid detected only in pollen and bee bread samples, ~52 fold lower than the sublethal effect threshold. This could be attributed to the low offer of resources during and after the application event and within the application area, with the consequent foraging outside the sprayed area during that period. Since exposure to pesticides in such complex landscapes seems to be dependent on the spatial and temporal distribution of resources, we highlight some key monitoring parameters and tools that are able to provide reliable information on colony development and use of resources. These tools can be easily applied and can provide a better decision-taking of pesticide application in intensive production systems to decrease the risk of exposure for honey bees.

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