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Influence of pesticides residues on acute honey bee mortality episodes

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Honey bees play a crucial role in wildlife, and in agrarian lands carry out most of the pollination. Nectar collection from crops and beekeeping practices expose honey bees to many pesticides. Influence of these pesticides on acute honey bee mortality was demonstrated by comparing coincidence between death rate and concentrations of pesticides.

Samples of dead honey bees were collected periodically from4 different locations during citrus and stone fruit trees blooming season to evaluate the potential impact of agrochemicals on honey bee death rate. For the determination of mortality, dead honey bee traps were placed in front of the experimental hives entrance located in areas of intensive agriculture in Valencian Community (Spain). Honey bees samples were screened for 58 pesticides or their degradation products by QuEChERS extraction and liquid chromatography mass spectrometry (LC-MS/MS). Coumaphos, an organophosphate acaricide used against varroosis in the experimental hives, was detected in 94% of the samples. However, this acaricide was unlikely to be responsible for honey bee mortality because its constantly low concentration during all the monitoring period, even before and after acute mortality episodes. The organophosphates chlorpyrifos and dimethoate, as well as the neonicotinoid imidacloprid, were the most frequently detected agrochemicals. Almost 80% of the samples had chlorpyrifos, 68% dimethoate, and 32% imidacloprid. Maximum concentrations for these three compounds were 751, 403, 223 ng/g respectively. Acute mortality peaks were related to honey bee poisoning due to high concentrations of several pesticides in the samples. Chlorpyrifos and dimethoate concentrations were highly related to mortality peaks.

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References:

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