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More than ten years of the bee poisoning incident diagnostics programme in Poland - experiences and conclusions

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Poland has had an official system for diagnosing bee poisoning cases since 2014. During the 11 years of its functioning, more than 500 cases of suspected bee poisoning were diagnosed. Samples of dead bees came from apiaries where it was suspected that the poisoning may have been caused by improper use of plant protection products (PPPs) in neighbouring crops. The symptom of the poisoning was a sudden and massive number of dead bees in front of the hives. The apiary was inspected by a veterinarian, who at the same time took samples of the dead bees for toxicological analyses. Investigations into the correct use of PPPs were carried out by staff of the Plant Protection Inspectorate.

Samples of dead bees were subjected to toxicological analyses to determine residues of pesticides that may be active substances of PPPs, biocidal products or veterinary medicines. The analyses were carried out using a specially developed analytical procedure[1].
Pesticide residues were detected in 96% of the dead bee samples. Up to 25 different pesticides were determined simultaneously in a sample of dead bees. In 80% of the diagnosed cases, analysis of the bees revealed the presence of residues of highly toxic pesticides. Insecticides accounted for almost half of the substances detected, often several at the same time. Residues of various fungicides, herbicides, acaricides and amitraz were also detected very frequently. The three main substances most frequently causing bee poisoning in Poland were chlorpyrifos, clothianidin and dimethoate.

With the withdrawal from use of PPPs containing chlorpyrifos or dimethoate, there has been a significant decrease in the number of reported cases of bee poisoning. This confirms the effectiveness and correctness of the system for diagnosing and recording bee poisonings in Poland. It not only provides individual assistance to beekeepers, but also enables a detailed characterisation of the problem of bee poisoning in Poland and confirmation of its causes.

[1]Kiljanek et al, 2016, Multi-residue method for the determination of pesticides and pesticide metabolites in honeybees by liquid and gas chromatography coupled with tandem mass spectrometry—Honeybee poisoning incidents, Journal of Chromatography A,1435, 100-114,https://doi.org/10.1016/j.chroma.2016.01.045