



UNIVERSITY OF LIFE SCIENCES
"KING MIHAI I" FROM Timisoara
**Multidisciplinary Conference on
Sustainable Development**
15 – 16 May 2025



ANALYSIS OF HONEY AND POLLEN EXPOSURE TO MULTIPLE PESTICIDES RESIDUES IN THE HIVE

1Aleksandra Tasic, 2Sara Simeunovic, 1Ivan Pavlovic, 1Nemanja Zdravkovic
1Scientific Institute of Veterinary Medicine of Serbia, Serbia
2University of Belgrade, Faculty of Agriculture, Serbia

Abstract: The presence, levels, and types of pesticides found in honey can vary greatly based on the region and the various pesticide treatments applied to the environment. The use of agents against Varroa mites, Varroa destructor, leads to the possibility of the presence of pesticides in the hive, bees and their products. The food – processing by worker bees contribute to the degradation and metabolism of pesticides in the hive over time. The presence of the pesticide amitraz and its metabolites was confirmed in the samples obtained for the analysis of honey and perga. These tests are important in terms of looking at the consequences, but also the health risks that can be caused by the effects of pesticides.

• Introduction

The active agent employed against Varroa mites is Varroadez.



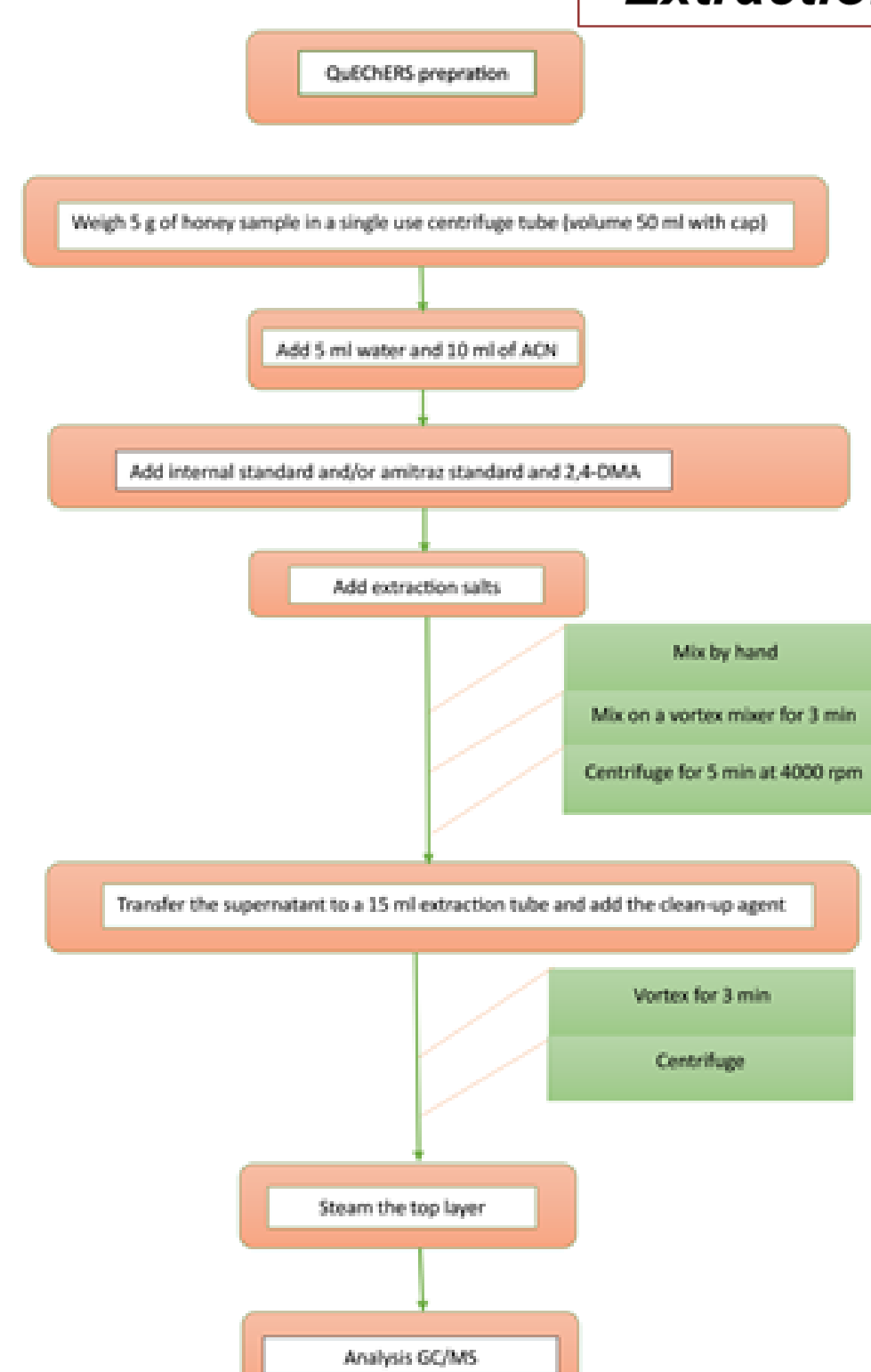
• Material and method

The analytical method used for sample preparation and analysis of pesticides in bee matrix was modified and adapted QuEChERS extraction. For analysis, 10 samples of honey and 10 samples of perga (fermented pollen) were taken from ten different hives that were treated in the same way but were arranged at different distances.

Table 1. GC-MS validation data for amitraz and metabolite 2, 4 -DMA in honey and perga

Compound	Retention time, min	Calibration curve	Correlation coefficient, r^2	LOQ, $\mu\text{g/kg}$	Expanded Uncertainty (%)
2,4- DMA	5.15	$y=1.005 - 12.125$	0.999410	5.0	22.5
Amitraz	29.82	$y=1.301 - 15.847$	0.999059	5.0	21.9

Extraction and clean up



GC/MS detection



• Results and discussions

Using the technique of gas chromatography with mass detection, the presence of the following residues was examined: Amitraz, 2,4-dimethylaniline, Acrinathrin, Aldrin, Cyfluthrin, Chlorfenvinphos, Chlorobenzilate, Chlorpyrifos-methyl, Chlorpropham, Chlorpyrifos, Coumaphos, Cyproconazole, Diazinon, Dieldrin, Fluquinconazole, Fipronil, Azinphos-Ethyl, Iprodione, Lambda Cyhalothrin, Methidation, Methoxychlor, Methyl Parathion, Pendimethalin, Tau - fluvalinate, Tetraconazole.

Of the analyzed pesticides, the values above the LOQ were for amitraz and its metabolite (2,4-DMA), while for the other tested pesticides the values were below the LOQ.

Amitraz (amitraz including the metabolites containing the 2,4 -dimethylaniline moiety expressed as amitraz)
Reg. (EU) 2017/623
Applicable Annex II **Honey products**
MRL = 200 $\mu\text{g/kg}$ = 0.2 mg/kg

• Conclusions

In the tested samples, amitraz was in the amount of 100.3 $\mu\text{g/kg}$ to 145.3 $\mu\text{g/kg}$, while the amount of 2,4 -dimethylaniline was below the quantification limit up to a maximum of 7.7 $\mu\text{g/kg}$. In perga, the amount of amitraz was significantly higher up to 596.3 $\mu\text{g/kg}$, and the amount of 2,4 - dimethylaniline up to 29.2 $\mu\text{g/kg}$. The results obtained are the result of the use of the Varroadez product applied against Varroa mites.

The detected values indicate that after using products that contain pesticides, they can be detected. The amount obtained in honey is below the maximum residue level (MRL), but the amount in perga is significantly higher, which is worrying for human health.

Acknowledgement: The study was funded by the Serbian Ministry of Science, Technological Development and Innovation (Contract No 451-03-136/2025-03/ 200030).

