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*Abstract*

# Analysis of Pesticide Residues in Apples in the Institute of Public Health of Belgrade for 2022 †

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**Abstract:** Background and objectives: Apples are an important part of a healthy diet and one of the most widely consumed fruits globally. The use of pesticides in apple production has also increased, which can lead to pesticide residues in fruit. Pesticide residues in food have been a significant public health concern due to their potential adverse effects on human health, including their carcinogenic, neurotoxic, and endocrine-disrupting properties. To ensure food safety, and reduce unnecessary consumer exposure, regulatory agencies worldwide have set maximum residue limits (MRLs) for pesticides in fruits and vegetables. This study aims to analyze the levels of pesticide residues in apples and evaluate their compliance with regulatory MRLs. Methods: The analysis of the data regarding pesticide presence and compliance with defined MRLs from the results of testing apple samples (by GC MS/MS and LC MS/MS techniques) at the Institute of Public Health of Belgrade, including pesticide residue monitoring apples on the Serbian market in 2022, was performed. Results: Out of 34 apple samples tested, 21 samples (61.8%) were found to have pesticide residue levels below the MRL, 8 samples (23.5%) had no pesticides detected, while 5 samples (14.7%) exceeded the MRL. The number of detected pesticide residues in the apple samples varied widely, ranging from 0 to 11, with an average of 3.38 residues per sample. The most frequently detected pesticides were acetamiprid, captan, cypermethrin, fludioxonil, carbendazim, and chlorantranilprole. The five samples that exceeded the MRLs were found to contain the following pesticides and levels: three samples contained chlorpyrifos at 0.07, 0.011, and 0.015 mg/kg, respectively, exceeding an MRL of 0.01 mg/kg; one sample contained imidacloprid at 0.015 mg/kg, which exceeded the MRL of 0.01 mg/kg; and one sample contained flormetanate at 0.058 mg/kg, exceeding the MRL of 0.01 mg/kg. Discussion: Overall, the study's findings suggest that most of the samples analyzed are within the MRLs for pesticide residues, indicating that the apples are safe for consumption. However, the detection of pesticide residues above the MRLs underscores the need for the continued monitoring and enforcement of pesticide regulations to ensure food safety and minimize the potential health risks associated with pesticide exposure.

**Keywords:** apples; pesticide residues; health risks



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