

# **Analysis of Pesticide Residues in Rice Cultivated in Anuradhapura District Using Multi-Residue QuEChERS Method with LC-MS/MS Detection**

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Rice is the staple food of Sri Lanka and where different types of pesticides are used for paddy cultivation. Presence of agrochemical residues in human body has been identified as one of the major reasons for the chronic kidney disease with unknown aetiology (CKDu) identifying Anuradhapura as a district with a high level of risk. The aim of this study was to evaluate the level of pesticide residues available in rice in Anuradhapura district. Total of 60 rice samples were analyzed for 29 pesticide residues. The extraction and clean-up were performed using a validated modified QuEChERS method with liquid chromatography - tandem mass spectrometry (*LC-MS/MS*) detection. Twelve samples showed contamination with Pretilachlor exceeding the default European Union (EU) maximum residue levels (MRL) with significant contamination ( $p = 0.005$ ) were observed in Mihinthale. Among the 29 pesticide residues studied, BPMC was the mostly detected pesticide residue which was in the range of 0.003-0.01 mg kg<sup>-1</sup>. Further, significant contamination of Chlorpyrifos ( $p = 0.003$ ), which was a banned pesticide, was detected in Ipalogama, and Diazinon ( $p = 0.001$ ) was detected in Thalawa. However, the average residual levels were below the national and the Codex MRL's. Contamination from Carbosulfan exceeding the EU MRL levels were seen in two samples while Tebuconazole was the sole fungicide detected out of the 60 samples investigated however with values less than the MRL's. The highest number of contaminated samples was detected in the Nuwaragam Palatha East and Nochchiyagama while the least contamination from pesticide residues was observed in Galenbidunuwewa, Kahatagasdegiliya and Horowpothana. As a whole, 43% of the total samples either exceeded or equaled the EU MRL's for rice. Hence, the findings highlight the immediate requirement of a regular monitoring system for pesticide residues in rice and a strong national policy on safer use of pesticides in paddy cultivation in Sri Lanka.

**Keywords:** Pesticide residues, Rice, QuEChERS, Liquid chromatography – tandem mass spectrometry