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Chemical characterization and Toxicity of POEA – 15, surfactant of commercial glyphosate (Round up) and effect of round up on heavy metals in Paddy Soil

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Use of commercial glyphosate, round up has been a very controversial issue over the recent past in Sri Lanka due to the hypothesis that it causes the chronic kidney disease of unknown etiology (CKDu) prevalent in Sri Lanka. Consequently, round up was banned in Sri Lanka in 2015 although it was re permitted to use in tea and rubber cultivation in 2018. In this study we report two main findings: First, chemical characterization and toxicity studies of POEA 15, surfactant of Round up available in Sri Lanka. Main surfactant of round up was confirmed to be POEA-15 with an authentic sample. Toxicity studies conducted with animal experiments (with rats) and cell lines (Hamster kidney) clearly indicated that it is a nephrotoxin (at very low concentrations). Second, in order to study the effect of Round up for the behavior of heavy metals in rice fields, a detailed study of adsorption and desorption of heavy metals on paddy soil and the kinetics of these processes were investigated. According to the studies performed with paddy soil after application of Round up, reduced the adsorption and desorption of Cd (II) on soil in comparison to the other heavy metal cations. Furthermore, this research also indicated that the soil to grain (rice) transfer factor was highest for Cd (II). Therefore, our investigation concluded that POEA -15 is a possible nephrotoxin and, in the presence of commercial glyphosate, round up increases the available concentration of Cd (II) in water phase. Having the highest transfer factor (soil to grain), there is a possibility of contamination of rice grain with Cd (II).

Speaker Biography

Ayanthi Navaratne obtained her B. Sc in Chemistry (Honors) from University of Peradeniya Sri Lanka in 1984 and her MS and PhD in 1989 and 1992 respectively from University of Hawaii at Manoa, USA in Analytical Chemistry. Currently she is a professor in Chemistry at the University of Peradeniya and was the Head of the Department of Chemistry from 2005 to 2018. She is a Fellow of National Academy of Science, Sri Lanka (FNASS). She has trained about 40 postgraduate students and produced many publications in refereed journals during her carrier.

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