Monitoring of residues of commonly used pesticides in well-water, around vegetable cultivations in the Colombo district

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Usage of agro-chemicals has rapidly increased in the last few decades in Sri Lanka. This could lead to contamination of the environment with pesticide residues including water sources in agricultural areas. Residue levels of the commonly used pesticides, Alachlor, Captan, Chlorpyrifos, Diazinon, Profenofos and Oxyfluorfen were determined in 60 well-water samples, collected from areas where leafy vegetables were cultivated in the Colombo district. The sampling sites were selected from six Assistant Government Agent divisions (AGA) in the Colombo district where vegetables are cultivated, according to a statistical plan. A cluster sampling technique was employed when collecting the samples. For validating the efficiency of the method, a recovery study was performed by spiking in the laboratory distilled water samples with the target pesticides in the range of 0.005–1 μg/L and determining the amounts recovered after the extraction process. The percentage recoveries obtained for all six pesticides were in the acceptable range of 85 to 107. The MDL of the pesticides were calculated according to an EPA method: Alachlor (0.09μg/L), Captan (0.13μg/L), Chlorpyrifos(0.04μg/L), Diazinon (0.45μg/L) , Profenofos (0.09μg/L) and Oxyfluorfen (0.18μg/L).

The samples were extracted by Solid Phase Extraction and analyzed by GC with an Electron Capture Detector and a Nitrogen Phosphorous Detector. Pesticides were detected in only three samples. This corresponds to 5% of the analysed samples. These three samples were obtained from shallow wells (depth of 1m to 2m) from the Hanwella area. The wells were located at a distance of about 50 -100 meters from each other and bordered an area of about 4-5 acres cultivated with the leafy vegetables Mukunuwena, Gotukola and Sarana. The detected pesticides were Alachlor (0.04μg/L), Chlorpyrifos (0.72μg/L) and Profenophos (0.01μg/L). As specified by WHO, the guideline for Alachlor in drinking water is 20 μg/L, the Health Advisory Level (HAL) defined by EPA for Chlorpyrifos is 10.5 μg/L. Safety values for Profenophos have not been specified by these organizations. The detected Alachlor and Chlorpyrifos residue levels in the water samples are well below the values given in the guidelines. Although the pesticide levels are well below the specified guidelines, studies of this nature are important and essential to ensure the safety of the public.

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