

UNIVERSITI TEKNOLOGI MARA

**OPTIMIZATION AND DETECTION
OF IMAZAPIC RESIDUES IN
SURFACE AND GROUNDWATER IN
PADDY FIELD AREA AND ITS
POTENTIAL DERMAL IMPACTS
AMONGST FARMERS**

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ABSTRACT

Pesticide is a well-known artificially synthesized substance used in agriculture practices as an effective way to control pests, plague and weeds, all of which can be harmful to crops and reduces productivity. Imazapic is one of the well-known herbicide used by farmers to kill weedy rice in paddy fields and it has been introduced in Malaysia for approximately three years prior to this research. However, there are limited studies carried in terms of its presence in environment especially in water. Thus, the objectives are: 1) to optimize the analytical method for detecting imazapic residues in water; 2) to measure the physical parameters in the surface and groundwater; 3) to assess the concentration of imazapic residues in the surface and groundwater; 4) to estimate potential dermal exposure of imazapic amongst farmers. The optimization of the analytical method was carried out using spike samples. For the environmental media, surface and groundwater samples were collected for two seasons of paddy cultivation consecutively at Sawah Sempadan. Prior to the water sampling, physical parameters were measured *in situ* using multiparameter meter. Several clean-up and extraction procedures using solid-phase extraction method was carried out before being analyzed using HPLC-UV for the presence of imazapic residues. A field survey was also carried out amongst the farmers by distributing a standard questionnaire. Result from method development showed that analysis of imazapic using HPLC-UV can be successfully carried out through optimum parameters as follows; wavelength at 252 nm, 1.2 ml min⁻¹ flow rate, mobile phase composition mixture of phase A (ACN) and phase B (distilled water, acetic acid, v/v) as mobile phase with elution ratio (45A : 55B) during the analysis time of 3.12 minutes, at the pH of phase B to be adjusted to pH 3.0 using acetic acid. Physical parameters analyzed showed that there are significant difference between surface water and groundwater for pH, DO, salinity, conductivity and TDS (*p*-value <0.05). Analysis on the water samples obtained showed that there are presence of imazapic in surface water samples (53%) and in groundwater samples (52%). There is also a significant difference for imazapic concentration between inlet and outlet (*p*-value = 0005). However, HI value calculated upon farmers dermal exposure to imazapic residue was found to be at minimum risk where HI < 1. In conclusion, imazapic residue was successfully detected in surface and groundwater using the optimized method obtained. Thus, it can be applied by other researchers for future potential study. There is a major concern over high concentrations of the residues detected in the outlet which indicate poor water management in paddy catchment by farmers or due to surface run off. Consequently, this will result in potential risk to the aquatic life, ineffective cost management for the agriculture practice as well as disruption of the ecology system especially in long term basis. More attention should be paid to educating the farmers on good agricultural practices and a tighter enforcement as a mitigation action on reducing pesticide pollution from paddy areas in Malaysia.

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