

Risk assessment for leaching levels of mostly used pesticides in Wet zone soils

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Leaching of agro chemicals to ground water is an environmental issue of major concern in a number of countries. In Sri Lanka too, a number of agro chemicals are used in agriculture but no critical study has been carried out especially in catchments areas. Using simple indices, ranking of pesticides could be done according to their risk of leaching which will be employed to control future pollution levels. This ranking is essentially based on the intrinsic properties of the chemical and standardized environmental properties. Hence Retardation factor (RF) and Attenuation factor (AF) are the two simple indices introduced for this assessment. RF is based on some soil and chemical parameters like bulk density, pesticide soil partition coefficient and soil water content at field capacity (θ_{FC}). AF explains the pesticide retention, which includes half life of the chemical, water table depth, recharging rates and θ_{FC} . Each factor has its own classification scheme. Most popular and mostly used four pesticides (Carbofuran, Propanil, MCPA and Penthoate) were selected and their chemical parameters for above properties were calculated. AF and RF were calculated for 28 wet zone soil series of Sri Lanka. Based on these calculations each were categorized according RF and AF classification schemes. In the RF scheme, Carbofuran has the greatest potential of mobility compared to the other three pesticides and Negombo, Katunayake, Rathupasa, Kandy and Matale soil series have greater risk of leaching for Carbofuran. RF scheme also gives that Carbofuran has the least sorption ability in the soil. From the AF scheme, Carbofuran has a significant leaching potential but other three have no risk of leaching in all soil series. AF leaching potential relates to the soil series and therefore Negombo, Katunayake, Rathupasa, Kandy and Matale had the same risk of leaching potential. By combining the two classification schemes these four pesticides can be ranked according their leaching potential as Carbofuran, Propanil, MCPA and Penthoate. For Kandy and Matale risk of leaching is very high for Carbofuran and therefore more precautions and proper management are necessary in dealing with its contaminations.

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