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Mapping the risk of the use of carbofuran in the wet zone in Sri Lanka

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Pesticides play an important role in global agriculture. However, potential adverse impacts of the use of pesticides on ecosystem and human health continue to be a cause for concern in Sri Lanka. The agriculture system, therefore, needs to minimise the usage and develop a better understanding of the management of pesticides applications. Pesticides residues, fate and other type of analysis are highly expensive and time consuming. Therefore, modeling strategic innovation can play a great role for a better understanding of pesticides practices.

Pesticides Impact Rating Index (PIRI) is one of the best management models. It can be used to rank the pesticides according to their relative pollution and to compare different practices, and land use at regional scale. In this study, PIRI was used to rank the pesticides according their risk levels in various soil types in the wet zone in Sri Lanka and the risk was mapped according to their relative potentials.

PIRI needs some data on chemical, environmental and farmer practices, such as land use, soil type, soil organic matter, half life and adsorption coefficient of pesticides, rainfall, recharging rate, temperature, water table depth, catchments information, topography of land, soil erosion, pesticides application, application period and frequency and amount of pesticides used. Among them adsorption coefficients (Kd) and half life of pesticides for Sri Lankan conditions were lacking and they were experimentally determined for carbofuran as a widely used pesticide in the selected area. Surface soils were collected from 28 wet zone soil series and Kd values were determined. Four soils were selected from them for half life determination, and the risk from carbofuran to surface and groundwater was modeled.

According to PIRI, risk for surface water depends on slope of the land, distance to the edge of the water body, buffer zone size, rainfall and width of the water body. Risk to groundwater mainly depends on the level of groundwater table and rainfall. The risk was estimated for groundwater for the depth of 1m, 10m and 20m and the rainfall of 750 mm, 1500 mm and 3000mm levels. Risk maps for surface water were produced by varying the slope of the land and rainfall levels. Hence, it can be seen that awareness programmes are needed for users to be educated on water consumption and selection of pesticides according to the geographical conditions of the area.

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