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The Environmental Fate of Agrochemicals in Paddy Rice Fish Farming Systems in Northern Viet Nam

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Abstract

During the last decades, high population growth and export-oriented economics have led to a tremendous intensification of rice production in North Viet Nam, which in turn has significantly increased the amount of agrochemicals applied in rice cropping systems. Since pesticides are toxic by design, there is a natural concern on the impact of their presence on the environment and human health. In Northern Vietnam, irrigated and rain-fed paddy rice production systems were identified to be the major non-point source of agrochemical pollution to surface and ground water, which are often directly used for domestic purposes. Hence, the quantification and forecast of pesticide losses to ground and surface water from paddy rice fields is of indispensable concern and a prerequisite for accessing the potential environmental exposure and risk of water pollution across vulnerable landscapes. The aim of the present study was to investigate the environmental fate of pesticides in paddy rice fish farming systems and to evaluate the risk of surface and ground water pollution. The study site is the Chieng Khoi watershed located in the mountainous region of Northern Vietnam. During consecutive rice cropping seasons (2007 and 2008) we intensively measured the water regime (inflow, outflow, water level, soil moisture) and the pesticide concentration in various system components (paddy water, soil water, pond water, soil sediment, inflow and outflow water) of an integrated paddy field - fish pond system. Two pesticides (Dimethoate and Fenitrothion) with different physico-chemical properties were manually applied. Preliminary results of the field experiment indicate that under current management practices considerable quantities of pesticides are lost to the surface and ground water.

Keywords: Agrochemicals, VietNam, paddy rice