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Pesticides in Cambodia: usage, fate, and health risk

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Akademisk avhandling

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Abstract

Pesticide use in Cambodia is substantial, and related to the vital role of agriculture. In the last few decades, misuse of pesticides has increased, partially due to many vendors and farmers not understanding the safety instructions that accompany pesticides imported from Vietnam, Thailand, and China. This situation poses direct risks to farmers and potential risks to consumer health, and harms the environment. This thesis addresses significant pesticide contamination in Cambodia's Mekong River basin through four interconnected papers, emphasising the urgent need for improved agricultural practices and regulations. Paper I assessed 64 pesticides in surface water and soil, reporting on the detection of 56 in water and 43 in soil samples, with maximum concentrations of 1300 ng/L (tebufenozide) and 1100 ng/g dry weight (bromophos-ethyl). Interviews with farmers revealed inadequate guidance on pesticide use, leading to overapplication and mismatched pesticide-crop pairings. Risk assessments indicated that bromophos-ethyl, dichlorvos, and iprobenfos pose high risks to aquatic organisms, underscoring the necessity for better monitoring and regulatory improvements. Paper II analysed 520 rice, vegetable, and fish samples, detecting four pesticides in rice, 45 in vegetables, and 19 in fish. Teufenozide was found to be prevalent in rice and vegetables, while flufenoxuron appeared frequently in fish due to its high bioconcentration. Many pesticides, including bromophos-ethyl and tebufenozide, exceeded maximum residue limits (MRLs) by over tenfold, primarily due to misuse, highlighting the need for enhanced regulatory measures for food safety. Paper III evaluated the health risks of 39 pesticide residues in 616 samples using a health risk index (HRI). The study identified dichlorvos as a significant risk (HRI value of 1.2 in the normal scenario and 5.1 in the high-risk scenario), despite its restricted use. Vegetable consumption was found to pose the highest risk in relation to this, indicating a need for improved pesticide management and consumer protection. Paper IV examines pesticide stability, noting that azamethiphos and dichlorvos degrades rapidly at higher temperatures due to hydrolysis, with degradation increasing with increasing temperatures. In contrast, iprobenfos, tebufenozide, and thiacloprid are moderately stable but degrade faster at elevated temperatures. This paper advocates for integrated pest management (IPM), dynamic application guidelines, and biodegradable pesticides to enhance agricultural practices. Overall, these findings reveal critical issues of pesticide contamination and health risks in Cambodia, calling for comprehensive monitoring, regulatory enhancements, and sustainable agricultural practices to protect public health and the environment.

Keywords

Pesticides, Cambodia, usage

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