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EVALUATION OF HUMAN HEALTH RISKS ASSOCIATED WITH PESTICIDE DIETARY INTAKE - AN OVERVIEW ON QUANTITATIVE UNCERTAINTY ANALYSIS

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Abstract

The probabilistic estimation and the risk analysis of the exposure to pesticides through the ingestion of plants and food products is an important task for ensuring informed decision making and appropriate consumer protection. Monte Carlo-based methods are powerful tools in this regard, allowing for the empirical estimation of the distribution of exposure values, as well as for carrying out a corresponding uncertainty analysis. Such findings are important for assessing the exposure risk for multiple categories of the general population, divided by age groups, body weight, food consumption etc. The general model used for determining the exposure allows for a detailed assessment and analysis of the distribution of exposure values along a determined range, and of the probabilities of occurrence for acute and chronic exposure levels, while also accounting for potential uncertainties in the input parameters. Researchers in the related fields propose various probabilistic approaches using several distribution shapes to estimate each parameter of the model. Furthermore, the related literature contains a series of guidelines for carrying out the aforementioned tasks, for various types of data with a wide assortment of distributions. Consequently, this study presents a general framework and characterization of exposure as a result of food consumption, as well as common practices for carrying out an assessment of exposure levels, with an emphasis on significant related work from the state-of-the-art in the field. The findings of the present study indicate that probabilistic approaches are powerful tools for aiding the regulatory decision-making process in the case of acute or chronic dietary exposure.

Key words: exposure, fruits and vegetables, Monte Carlo analysis, pesticide residues, probabilistic modeling

Received: March, 2018; Revised final: August, 2018; Accepted: August, 2018; Published in final edited form: September, 2018

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