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Testing Environmental and Health Pesticide Use Risk Indicators: The Case of Potato Production in Boyacá, Colombia

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Abstract

Environmental and health externalities of pesticide use are considered among the most relevant threats to agricultural sustainability, particularly in developing countries. Indicators are a useful tool to assess these drawbacks, and support developing and assessing risk-reducing policies. However, it is often the case that different indicators yield different risk assessment results. Furthermore, indicators are mainly developed for use under European and North American conditions, which are different from those commonly present in developing countries.

Therefore, it is of vital importance to investigate the applicability of the indicators in specific contexts and for selected environmental compartments in developing countries. This research aimed to contribute filling this gap by testing selected indicators in the case of smallholder potato producers in the Department of Boyacá, Colombia, to identify the most suitable ones with respect to compartments considered, ease of use, data requirements, and accuracy.

Firstly, five environmental (EIQ, PestScreen, POCER, EPRIP, PIRI) and four occupational health (EIQ, POCER,PRI-Farm, Dosemici) risk indicators and their methodologies were characterised. Secondly, the indicators were calculated using real application data and site specific information. Finally they were compared through correlation coefficients.

The analysis showed that the indicators differ substantially when the overall risk was considered, but with respect to the individual compartments a higher agreement was found. EIQ and PestScreen estimates were largely governed by the amount of pesticide applied, while the other environmental indicators depend more on pesticide fate and toxicity characteristics such as soil organic matter partition coefficient or toxicity to the respective end-point. In addition, site specific information such as plant's phenological phase, slope, distance to water body and the related pesticide drift model played an important role in indicator outcome.

A trade-off is present between the depth of the assessment and the easiness of the calculations. The analysis suggested that a combination of indicators should be used to better characterise pesticide risks, and identified the indicators which could be used as a first screening tool in the study area and similar contexts.

Keywords: Colombia, pesticide risk indicators, pesticide health risk indicators

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