

Creating Risk Maps on the Spatiotemporal Occurrence of Agricultural Insecticides in Sub-Saharan Africa

Authors : Chantal Hendriks, Harry Gibson, Anna Trett, Penny Hancock, Catherine Moyes

Abstract : The use of modern inputs for crop protection, such as insecticides, is strongly underestimated in Sub-Saharan Africa. Several studies measured toxic concentrations of insecticides in fruits, vegetables and fish that were cultivated in Sub-Saharan Africa. The use of agricultural insecticides has impact on human and environmental health, but it also has the potential to impact on insecticide resistance in malaria transmitting mosquitos. To analyse associations between historic use of agricultural insecticides and the distribution of insecticide resistance through space and time, the use and environmental fate of agricultural insecticides needs to be mapped through the same time period. However, data on the use and environmental fate of agricultural insecticides in Africa are limited and therefore risk maps on the spatiotemporal occurrence of agricultural insecticides are created using environmental data. Environmental data on crop density and crop type were used to select the areas that most likely receive insecticides. These areas were verified by a literature review and expert knowledge. Pesticide fate models were compared to select most dominant processes that are involved in the environmental fate of insecticides and that can be mapped at a continental scale. The selected processes include: surface runoff, erosion, infiltration, volatilization and the storing and filtering capacity of soils. The processes indicate the risk for insecticide accumulation in soil, water, sediment and air. A compilation of all available data for traces of insecticides in the environment was used to validate the maps. The risk maps can result in space and time specific measures that reduce the risk of insecticide exposure to non-target organisms.

Keywords : crop protection, pesticide fate, tropics, insecticide resistance

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