Developing Realistic Exposure Scenarios for Environmental Risk Assessment of Pesticides in Brazil: Groundwater

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Using theoretical combinations of soil, weather and crop parameters lead to detachment of Brazilian conditions in the definition of agricultural scenarios in environmental risk assessment - ERA. Standard scenarios increase the consistency of the regulatory evaluation process by minimizing the subjective influence when performing the pesticide environmental concentration - PEC calculation, also make interpretation much easier, and enable the adoption of a consistent scientific process for a Tier 1 evaluation (FOCUS, 2000). In order to verify the realistic conditions for groundwater contamination in Brazilian agricultural areas, a remote method of identifying relevant and critical exposure scenarios was developed and implemented in an exploratory study for annual crop areas in the Cerrado biome in the Central-West region of Brazil.

The water retention time – TR index (Mingoti et al., 2016) was determined with mean values obtained by a filtering method in databases of soil properties (bulk density, organic carbon content, and field capacity). The net water recharge for the study area was estimated by the difference between historical averages of rainfall and evapotranspiration from October to March. The water table depth was estimated using the *HAND* model (Nobre et al., 2011). The lower the value of TR, the greater the susceptibility of groundwater. Spatial distributions of input data and TR index results were obtained using a GIS software.

Soils with the largest total area are Oxisols and Entisols: *Latossolos Vermelhos Distróficos* (41.80%), *Latossolos Vermelho-Amarelos Distróficos* (17.98%), *Latossolos Vermelhos Distroférricos* (14.09%), and *Neossolos Quartzarênicos Órticos* (11.88%), according to the Brazilian Soil Classification System. Soils with the lowest TR values (≤ 0.5 year) totalize 6,385 km^2 (or 638,459 ha), corresponding to 6.52% of the total area of the region considered. In 65.97% of this area (with TR ≤ 0.5 year), there are *Neossolos Quartzarênicos Órticos* (Entisols), which occupy 11.88% of the total area. This work has derived and mapping scenarios representing land areas, which are homogeneous with respect to the critical factors that control the fate of pesticides. These scenarios provide basis for supporting lower-tier modelling applications within the Brazilian pesticide registration process. The existing model *ARAquá* (Spadotto et al., 2010; Spadotto and Mingoti, 2014) will be modified and parameterized for the scenarios defined. Further refinement of the method could be based on incorporating finer resolution data on crop area, soil distributions, and weather conditions.

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