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

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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). The Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA) adopts the United States Environmental Protection Agency (USEPA) methodology (IBAMA, 2016), using the "standard farm pond" scenario (Parker et al., 1995) for surface water in the Tier 1 evaluation, and, therefore, it may lead to the registration of pesticides without considering Brazilian agricultural scenarios in environmental risk assessment - ERA. Thus, the aim of this paper is to present a methodology for mapping landscapes with reservoirs and crops and calculating the relation between the watershed (with soybean crop and reservoirs) area and the reservoirs area to support the establishment of scenarios for ERA of pesticides in Brazil. A case study to soybean crop in the Cerrado biome in Mato Grosso (MT) state was conducted.

The initial selection of municipalities was performed using soybean planted area and predominant geomorphology. Visual interpretation of satellite images was carried out in the selected municipalities to identify landscapes with soybean crop and reservoirs, using as the basic unit of mapping watersheds generated from SRTM (3 arc-seconds) DEM with ArcSWAT in ArcGIS 10.3. The area of each selected watershed with reservoirs and soybean crop and the area of the reservoirs were estimated and some statistics of the relation between the watershed area and the reservoirs area were calculated.

The municipalities selected was Sapezal/MT, Nova Ubiratã/MT and Sorriso/MT. The statistics calculated are summarized in the Table. The presence of reservoirs was observed in less than 3% of watersheds with soybean crop. In all mapped reservoirs, with the exception of only one, values of the relation between the watershed area and the reservoir area were greater than the reference value, which is 10 $m^2.m^{-2}$ (Parker et al., 1995; FOCUS, 2001).

Table: Minimum, maximum, and quartiles values of the relation between the watershed (with soybean crop and reservoirs) area and the reservoirs area ($m^2.m^{-2}$) in the municipalities selected.

Statistical Variable	Sapezal/MT	Nova Ubiratã/MT	Sorriso/MT	All
Minimum	69	6	19	6
Q1	433	410	103	162
Q2	992	746	225	380
Q3	1,751	1,927	492	884
Maximum	4,416	5,956	4,231	5,956

The presented methodology was effective for generating information necessary to establish scenarios at first level of ERA for pesticides in surface water, supporting modelling applications in the Brazilian pesticide registration process. The existing model *ARAquá* (SPADOTTO and MINGOTI, 2014) will be modified and parameterized for the scenarios mapped.

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