PESTICIDES DISTRIBUTION IN RAIN, SURFACE AND GROUNDWATER IN URBAN AND RURAL AREA OF CAMPO VERDE – MT, BRAZIL

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Campo Verde - Mato Grosso, Brazil, is the largest producer of cotton in the country, and a great consumer of pesticides. When applied in the agriculture, pesticides can reach different environmental compartments, such as atmosphere, soil and water resources[1]. The processes of volatilization, atmospheric dispersion, dry and wet deposition, run-off and leaching control the pesticides distribution between air, soil and water[2]. Taking into account that pesticides can reach areas distant to where they have been applied, this study presents an evaluation of the pesticides distribution in groundwater, surface water and rainwater collected in rural and urban areas of Campo Verde municipality. Sampling was carried out every month from November 2007 to May 2008. Rain water, surface water and groundwater and were collected at 4, 4 and 7 points, respectively. The points were mainly distributed at the rural area, but at least one sampling point for rainwater and groundwater was located at the urban area. The pesticides most frequently applied in the area were investigated. Acetamiprid, aldicarb, azoxystrobin, carbendazin, carbofuran, diuron, imidacloprid, methomyl, profenophos, teflubenzuron, thiamethoxan, thiacloprid and triflumuron were analyzed employing a multi-residue analysis method using SPE (SDVB) and HPLC/DAD. Atrazine and its metabolites (deethyl-atrazine (DEA) and deisopropyl-atrazine (DIA)), cypermethrin, chlorpyrifos, deltamethrin, alpha- and beta-endosulfan, endosulfan sulfate, flutriafol, malathion, methyl parathion, metolachlor, monocrotophos, permethrin, profenophos and trifluralin were analyzed by SPE (C18) and GC/MS-SIM. The pesticides analyzed by SPE-HPLC were not detected in any sample. Atrazine, alpha- and beta-endosulfan were found in all the matrices, being detected in around 40% of rainwater (nd-8.02 μg mL^{-1}, nd-1.14 μg mL^{-1} and nd-2.97 μg mL^{-1}), 10% of surface water (nd-0.93 μg mL^{-1}, nd-0.05 μg mL^{-1} and nd-0.09 μg mL^{-1}) and 5% of groundwater samples (nd-0.02 μg mL^{-1}, nd-0.0006 μg mL^{-1} and nd-0.0002 μg mL^{-1}), respectively. In rainwater and surface water, these compounds were found in highest concentrations in March, the end of the rainy season, even in urban and in rural area. Metolachlor and flutriafol were detected in both rainwater (nd-0.46 μg mL^{-1} and nd-0.12 μg mL^{-1}) and groundwater (nd-0.03 μg mL^{-1} and nd-5.95 μg mL^{-1}). Malathion, methyl parathion and DEA were present only in rainwater (nd-0.44 μg mL^{-1}, nd-0.07 μg mL^{-1} and nd-0.44 μg mL^{-1}) in less than 10% of the analyzed samples. This is the first characterization of pesticides distribution in water resources in Campo Verde-MT. The results show that pesticides reached areas where they have not been applied.

[1] Arias Estéves, M., López Periago, E., Martínez Carballo, E., Símal Gándara, Jesús., Carlos Mejuto, Juan., Gracía Río, Luis. 2008. The mobility and degradation of pesticides in soils and the pollution of groundwater resources. Agriculture, Ecosystems Environ. 123: 247–260.

[2] Racke, K. D., Skidmore, M. W., Hamilton, D. J., Unsworth, J. B., Miyamoto, J., Cohen, S. Z. 1997. Pesticides fate and tropical soils. Inter. Union Pure Applied Chem, 69: 1349-1371.