

Session E: Groundwater Assessment & Management

Fate of Tebuthiuron Herbicide in a Recharge Area of Guarany Aquifer in Sugarcane Field in Brazil

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The region of Ribeirao Preto City located in Sao Paulo State, southeastern Brazil, is an important sugarcane, soybean and corn producing area. This region is also an important recharge area for groundwater of the Guarany aquifer, a water supply source of the city and region. Guarany aquifer has an intercontinental extension that comprises areas of eight Brazilian states, as well as significant portions of other South American countries like Argentina, Uruguay, and Paraguay, with a total area of approximately 1,200,000 Km². Intensive cultivation in this area has required the constant use of pre-emergent herbicides and fertilizers. The risk of groundwater contamination by those chemicals, which are normally reapplied annually, has been a major concern. Due to the high permeability of some soils present in this region, the mobility of the herbicides and fertilizers applied, and being a recharge area, it is important to investigate the potential transport of applied herbicides to underlying aquifer. The herbicide tebuthiuron is regularly applied in the area. Tebuthiuron (N-[5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-N,N'-dimethylurea) is a phenylurea herbicide used in sugarcane culture for pre and post-emergence control of weeds. In order to understand the movement of tebuthiuron it was an area chosen in the city of Santa Rita do Passa Quatro, Sao Paulo State, Brazil. Santa Rita do Passa Quatro is located 40km from Ribeirao Preto city, is out of the recharge area of Guarany aquifer and the soil of the selected experimental field is representative of the highly permeable soils cropped in Ribeirao Preto. Laboratory studies were conducted at the Research Division of the Brazilian Department of Agriculture, Embrapa/Environment, Jaguariuna city, Sao Paulo State, Brazil. Soil samples were collected at each 20 cm down to 120 cm and taken to the laboratory for determination of tebuthiuron. Before the study started up in the field, soil density (Mg/m³), total porosity, micro and macroporosity were determined. Also evaluated were the % organic matter and physical properties of the soils for each depth. Soil samples were collected in trenches at 10 cm depths for determination of properties. Tebuthiuron was applied at the recommended label rate for sandy soils at 1.0 kg/ha a.i. with and without sugarcane coverage. Tebuthiuron was measured at those depths in 10 different sampling times up to 300 days. Tebuthiuron half-lives varied from 69 days in sugarcane cropped area to 49 days in non-cropped area. After 180 days there were no measurable residues in the soil and tebuthiuron was not found below 40 cm depth in any time. This supports the lack of tebuthiuron residues found in groundwater in the monitoring program being performed in Ribeirao Preto. Tebuthiuron groundwater monitoring program is still on progress.

KEYWORDS: *Agriculture, Ground Water, Nonpoint Source Pollution, Solute Transport, Water Quality*

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