



E069

## Tebuthiuron herbicide bioconcentration in sugarcane plants

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Sugarcane is a very important crop for sugar and biofuel production in Brazil. This crop requires a high input of herbicides that can contaminate soil, water and plant. We developed a mathematical model that may aid the understanding the uptake by plants of these compounds and the subsequent environmental contamination. Herbicide physical–chemical properties and sugarcane plant physiological properties were used to develop the model to simulate herbicide uptake and the sugarcane herbicide bioconcentration factor (BCF). The model was developed assuming that the herbicide degradation in the soil and metabolism and dilution in the plant are described by first order kinetic equations and also, that herbicide uptake by plants from soil solution occurs through the plant water transpiration stream. The BCF value was calculated for the steady state chemical equilibrium between the plant concentration and soil solution concentration. An experiment was made in order to confirm the bioconcentration of tebuthiuron in sugarcane. Thus, different concentrations of tebuthiuron were applied in sugarcane (0.017; 0.17; 1.7; 170, and 170 mg/l) and after 50 days the samples were collected and analysed by High Performance Liquid Chromatography. The chromatographic conditions were: C-18 column, detection at 253 nm and mobile phase acetonitrile: water 50:50 (v/v). The extraction method was the QuEChERS (Quick, Easy, Effective, Cheap, Robust and Safe) modified for this matrix. Recoveries ranged from 90% to 98% and the limit of quantification was 0.04 mg/kg. Tebuthiuron was detected in all samples indicating that this herbicide is bioconcentrated in sugarcane and confirming the prediction of the mathematical model.

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