

LABORATORY SIMULATED DISSIPATION OF RIMSULFURON,
PROSULFURON AND OXASULFURON IN SOIL

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Abstract

Rimsulfuron, prosulfuron and oxasulfuron are a group of sulfonylurea herbicides that have been widely used for controlling weeds in a variety of vegetables and other crops. Because of the high herbicidal activity of this sulfonylureas, they are beneficial at low application rates which are approximately 1000 times less than other of conventional herbicides. Hence the using of this herbicides is increasing constantly worldwide.

The fate of rimsulfuron, prosulfuron and oxasulfuron in soil type Calcic Chernozem Clayic, Pachic (according to the FAO-WRB classification) were investigated using ultra-performance liquid chromatography with diode array detection for herbicide detection. Their dissipation behaviour in soil were evaluated under laboratory incubated condition at 70% water holding capacity of soil and two temperature (25°C and 30°C) were maintained in thermostat. In order to investigate dissipation selected sulfonylureas were used as aqueous solution of commercial formulation herbicides. The recommended dosage of rimsulfuron, prosulfuron and oxasulfuron were 50, 20 and 80 g active ingredient (a.i.) per hectare, respectively. Representative soil samples were collected after 2 hours, and then after 2, 6, 15, 30 and 50 days after the application of herbicides. Initial residues of all investigated herbicides were higher at temperature 25°C than 30°C. The residues of rimsulfuron on both analysed temperature for tested dose were less than LOQ (3.04 µg kg⁻¹) after 2 days and 6 days for prosulfuron (2.97 µg kg⁻¹) and oxasulfuron (3.40 µg kg⁻¹). The dissipation of this three sulfonylureas in studied soil was described by using the Mittag-Leffler function $c E_a (-bt)$. Model coefficients a, b, c were received from the experimental data by using a fitting procedure. Rimsulfuron and prosulfuron showed faster degradation in tested soil with half lives of 0.49 and 0.03 days at temperature 30°C, respectively. The degradation rate of oxasulfuron appeared something slower with half lives of 0.64 day at temperature 25°C. These results indicate how herbicides belonging to the identical chemical class can behave in various way concerning dissipation in soil.