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### Soil and Water Research

Field study of chlorotoluron transport and its prediction by the BPS mathematical model

Kočárek M., Kodešová R., Kozák J., Drábek O.:

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The chlorotoluron transport in the soil profiles was studied under field conditions on three different soil types of the Czech Republic. The herbicide was applied on 21. 4. 2005 on a four-square meter plot using an application rate of 2 kg/ha. Soil samples were taken on days 35 and 150 from the herbicide application to study the remaining chlorotoluron distributions in the soil profiles. The chlorotoluron distributions in the monitored soils were very similar 35 days after the herbicide application. The major part of chlorotoluron was detected in the top layer of the soil profile (0– 8 cm). The highest concentration was obtained in the top 2 cm layer and it decreased gradually with the depth. The percentages of the remaining chlorotoluron 35 days after the herbicide application were similar in Haplic Luvisol (29.97%) and Greyic Phaeozem (30.78%), and slightly higher in Haplic Cambisol (38.58%). The chlorotoluron distributions in the monitored soils differed considerably 150 days after the herbicide application.

Chlorotoluron was detected in the entire monitored soils profiles (0– 50 cm). The highest concentration was found in all cases in the top 2 cm layer and it decreased gradually with the depth to the depth of approximately 10 cm. Below this level, the herbicide contents were low and the values oscillated randomly. The percentages of the remaining chlorotoluron 150 days after the herbicide application were in the increasing order: Greyic Phaeozem < (5.45%) < Haplic Luvisol (11.7%) < Haplic Cambisol (17.48%). The BPS mathematical model connected with the soil database was used to simulate the chlorotoluron distribution 35 and 150 days after the herbicide application. The comparison of the measured and simulated data indicated probably varying chlorotoluron half-life during the experiment. The results showed that, if the chlorotoluron half-life is estimated based on the remaining chlorotoluron content in the soil profile on the 150th day after the herbicide application, the simulated herbicide content on the 35th day is twice as high as the measured one. On the other hand, if the half-life degradation of chlorotoluron is estimated based on the

remaining chlorotoluron content in the soil profile on the 35th day, the herbicide is almost totally degraded on the 150th day of the model simulation.

## **Keywords:**

chlorotoluron; contaminant transport; field study; half-life degradation; herbicides; mathematical model BPS

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