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Application of the Czech soil information system PUGIS and pedotransfer rules for the assessment of pesticide mobility in soils of the Czech Republic

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The goal of this study was: 1) Selection of representative soils of the Czech Republic for assessment of pesticides mobility and possible groundwater contamination by pesticides. 2) Measurement of adsorption isotherms of selected pesticides for all studied soils. 3) Determination of pedotransfer rules based on the measured data and their application for assessment of pesticides mobility in soils of the Czech Republic.

1) Based on the soil maps of the Czech Republic and various climatic conditions eleven humic horizons of different soil types (four Chernozems, one Phaeozem, one Luvisol, one Arenosol, and four Cambisols) and two parent materials (sand and loess) were selected. Soil properties (soil specific density, pHKCl, pHH2O, CaCO3 content, salinity, organic matter content, organic matter quality as a A400/A600, CEC, base saturation and particle size distribution) were determined using the standard laboratory techniques. Obtained data and comparison with the soil database PUGIS (Kozak et al., 1996) and soil map 1:250 000 (Nemecek et al., 2001) showed that selected soils represent the most important agricultural soils. 2) The following pesticides were used for adsorption isotherms determination using a standard laboratory procedure: metribuzin, chlorotoluron, terbuthylazin, prometryn and trifluralin. The Freundlich and Langmuir equations were used to fit experimental data points. Results showed that the wide variety of soils were suitable for investigation of varying pesticide behavior in soils. 3)

Pedotransfer rules (Kozak and Vacek, 1996 a 2000) for determination of parameters of the Freundlich and Langmuir equations from the soil properties (organic matter content, clay content, CEC, pHKCl and so on) were investigated using the multiple linear regression. Resulting pedotransfer rules and the Czech soil information system PUGIS were applied for the estimation of the Czech agricultural soils sorption properties. The maps of the predicted sorption properties were evaluated for each pesticide.

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