



Application of PTFs for soil water retention curves estimation and soil water retention curves database.

S. Matula, M. Mojrová, K. Špongrová

Czech University of Life Sciences in Prague, FAFNR, Dept. of Soil Science and Geology,
Czech Republic (matula@af.czu.cz)

Soil hydraulic characteristics, especially soil water retention curve and hydraulic conductivity are essential for many agricultural, environmental and engineering applications. Their measurement is labor, time-consuming and thus costly. Hence a lot of researchers were focused on methods regarding their indirect estimation. In this paper, continuous pedotransfer functions of Wösten et al. (1998) were applied on the data from selected locality in the Czech Republic, Tišice. Available data set for this locality consists of 140 measured soil water retention curves, and also information about the soil texture, bulk density ρ_d and organic matter contents, determined at the same time. Own continuous pedotransfer functions, following the methodology of Wösten et al. (1998) were derived. Two types of fitting, 4-parameter and 3-parameter, were tested. In 4-parameter fitting all parameters of the van Genuchten's equation, θ_s , θ_r , α , n (van Genuchten, 1980) were optimized; in 3-parameter fitting only three parameters θ_r , α , n were optimized, while the measured value of θ_s was set as constant. Based on the results it can be concluded, that the general equations of Wösten et al. (1998) are not very suitable to estimate the soil water retention curves for the locality Tišice in the Czech Republic. However, parameters of the same Wösten's equations, which were calculated only from the data for each particular locality performed much better. The estimates can be improved, when the value for the saturated soil water content θ_s is known, applied and not optimized (the case of 3-parameter fitting). It can be advantageous to estimate SWRC for a locality with no data available, using PTFs and available basic soil properties. In addition to measure some retention curves and/or some their parameters, like θ_s can improve the accuracy of the SWRC estimation.

The database of SWRC was created for better saving and user friendly application.