Change of Soil Moisture and Temperature Regimes under Present and Changed Climatic Conditions

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The Newhall Simulation Model (NSM) was evaluated and applied in this study in order to determine soil moisture regime and drought probability. The main input for NSM is potencial evapotranspiration value for the specified soil layers. This key value was obtained through the FAO – Crop Water Balance Model, which was combined with a simple snowpack model to account for specific winter conditions. The method was evaluated on three most productive and in agricultural landscapes frequently apperaring soil types: deep grounded chernosem, sandy chernosem and black wet soil. Evaluation dataset was provided by lysimeters of Federal Office and Research Centre for Agriculture in Vienna, Austria. To allow for spatial analysis of the soil climate the NSM was run at 45 weather stations where daily temperature, wind, relative humidity, global solar radiation and precipitation sums for the period 1961-2000 were available. Four major groups of soil conditions according to their maximum soil water holding capacities were taken into account. In the next step the model was run over the climatic data corresponding to the conditions expected under future climatic conditions taking into account two Global Circulation Models (ECHAM and HadCM) and assuming a B1-SRES emission scenario for time slices of 2025, 2050 and 2100.

It has been found that under the present climate only a fraction of the territory is situated within the drought risk area with dry tempudic soil moisture regime. Drought risk area is confined only to well known dry region of the country i.e. South Moravia. Under the changing climate a notable gradual increase of the areas with a high proba-

bility of dry events was noted. When the model was run with data accommodating for increase of greenhouse gases emissions according to A2-SRES, the shifts in the soil climate characteristics were rather dramatic and took place within decades rather than centuries. It is obvious that by the year 2100 the most of the Czech Republic arable land would be faced with relatively frequent wet tempustic soil moisture regime events accompanied also by higher probability of drought spells. This type of the soil climate have not been recorded up to now at the territory and is in the same time accompanied by significant increase of soil temperature (especially towards the end of the century). As the aridization of the soil climate regimes is closely related to other drought impacts such as decrease of crop yields, damage to forest stands, low stream flow and reservoir levels or change etc., a significant increase of drought related economic and social economic losses is likely under the climate change conditions

Acknowledgement: This study was conducted with support of Grant Agency of the Czech Republic project no. 521/03/D059 as a part of the vulnerability assessment of spring barley production and National Agency for the Agricultural Research (project 1G46055 – "*Mitigation of the drought impact on the selected crops...*") as a part of the vulnerability assessment of spring barley production.