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# A simulation study in crop-water relationship

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A simulation study on local consequences of global climate change on plant-water relationship was carried out at Keszthely, Hungary for the time period of 2071-2100. We applied the Crop Microclimate Simulation Model of Goudriaan (1977). A mid-season maize hybrid was applied as test plant. The „average" weather, soil- and crop properties during July (1961-90) served as a control run. We presented hourly resolution of daily means of the analysed character of plant-water relations. Beside the downscaled IPCC (2007) scenarios A2 and B2, the past decade (1996-2007) and extremely hot days were included in the study, which has recently increased in number at Keszthely. In our future projections the present atmospheric CO2 concentration level was doubled (760 ppm). Investigations were extended to daily energy distribution (sensible and latent heat fluxes), diurnal variation in stomatal resistance and daily water losses. Model runs were evaluated by using paired t-test. The significance level was fixed at 5% in the course of the process. The daily mean of stomatal resistance has significantly increased in all scenarios. The doubled CO2 -at unchanged weather- approximately halves the stoma openings. It was a surprise that the increment in stomatal resistance during extremely hot days was under the expected. The common impact of environmental and biological factors has been emphasized when changed (normalized) LAI was also taken into account. Transpiration amounts followed the modifications of stomatal resistance, though we registered significant differences only in extremely hot days. The locally determined small sized change in evapotranspiration has shown existence in reserve available soil moisture even in extreme hot weather situations. Probably this is the reason why decline in the intensity of photosynthesis is also lower than the expected one. Our scenarios did not contain significant precipitation decreases due to the forecast uncertainties of meteorological element. This is why we do not propose the extension of our results in the case of significant precipitation declines of the Carpathian basin.