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Modelling temperatures of maize stand in Hungary in consequence of global warming

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The local consequences of global climate modifications in maize canopy were studied at Keszthely (Hungary). Every input of the model (both meteorological and plant features) was collected at Keszthely Agrometeorological Research Station during the past three decades. We applied the Crop Microclimate Simulation Model (CMSM) of *Goudriaan* (1977) using 6 scenarios, where the first one contains the actual data:

- Control: it represents the present climatic conditions (average July day), average soil moisture content in this period, and 380 ppmv ambient CO_2 concentration. The value of LAI was 3.0, the characteristic mean for maize grown at Keszthely.
- Scenario 1: Ambient CO_2 concentration was doubled together with reduction of soil water content by 25%. In addition we reduced LAI to 2.6.
- Scenario 2: Ambient CO_2 concentration was elevated to 760 ppmv with reduction of soil water content by 35%. In addition we reduced LAI to 2.1.
- Scenario 3: Ambient CO_2 concentration was doubled together with reduction of soil water content by 25%. In addition we reduced LAI to 2.3 and increased hourly temperature with 1.3˚C.
- Scenario 4: Ambient CO_2 concentration was elevated to 760 ppmv with reduction of soil water content by 35%. We reduced LAI to 2.0 and we rose the temperature by 2˚C.

- Scenario 5: Ambient CO_2 concentration was elevated to 760 ppmv with reduction of soil water content by 50%. We reduced LAI to 1.8 and we rose the temperature by 3˚C.

From the outputs of the model we focused on the crop- and inside canopy air temperatures. We have chosen the temperatures from the outputs because they are the main governors of the plant biochemical processes. We concluded that the temperature prognosis showed close connection not only with meteorological (environmental) elements, but also with actual canopy architecture, the leaf area index and density of leaves. Regarding the sensitivity of model runs to changes in leaf characteristics of plants, in global warming simulations the possible modifications of plant architecture must also be taken into account.