Figure S1: Homogeneous grass stand equipped with two pyranometers (upward and downward, for each hemisphere), a non-contact infrared thermometer for canopy temperature and a combined air temperature and relative air humidity sensor shielded by wooden panel.

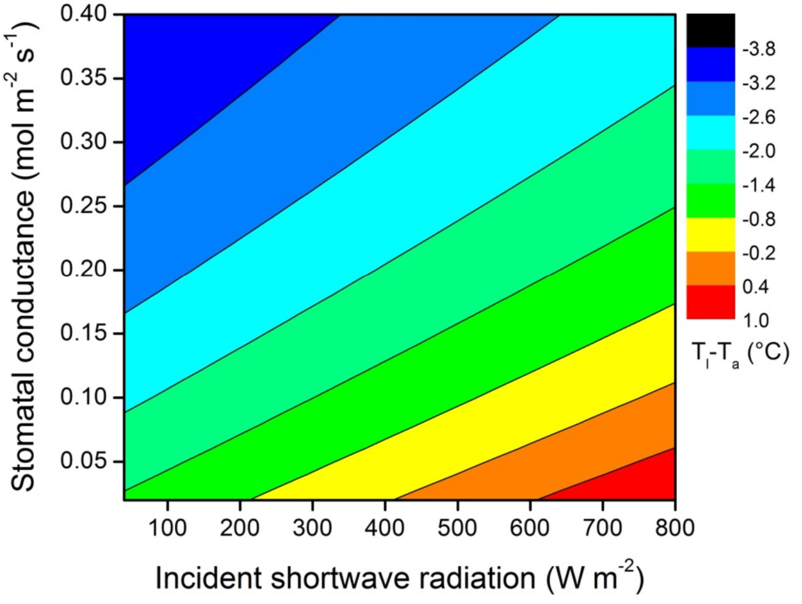

Figure S2: The influence of incident shortwave radiation and stomatal conductance on the difference between leaf (T_l) and air (T_a) temperatures (depicted by different colours). Generally, more radiation leads to relatively warmer leaves, as does lower stomatal conductance. When stomatal conductance is low, effects of radiation on the leaf – air temperature difference are exacerbated. Other variables were kept constant: air temperature = 40 °C, wind speed = 1.5 m s^{-1}, relative air humidity = 0.6 and leaf diameter = 0.005 m.

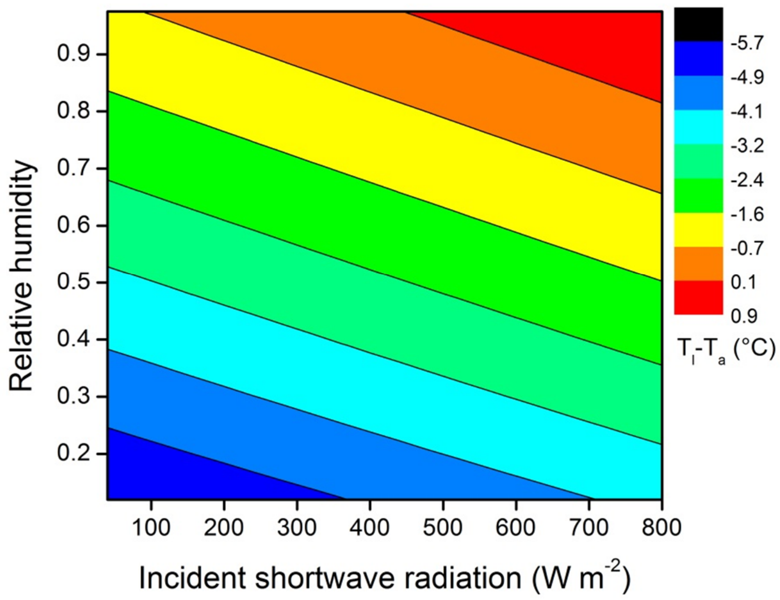

Figure S3: The influence of incident shortwave radiation and relative air humidity on the difference between leaf (T_l) and air (T_a) temperatures (depicted by different colours). Generally, more radiation leads to relatively warmer leaves, as does higher air humidity. Radiation effects are equivalent at higher and lower air humidity. Other variables were kept constant: air temperature = 40 °C, wind speed = 1.5 m s^{-1}, stomatal conductance = 0.2 mol m^{-2} s^{-1} and leaf diameter = 0.005 m.

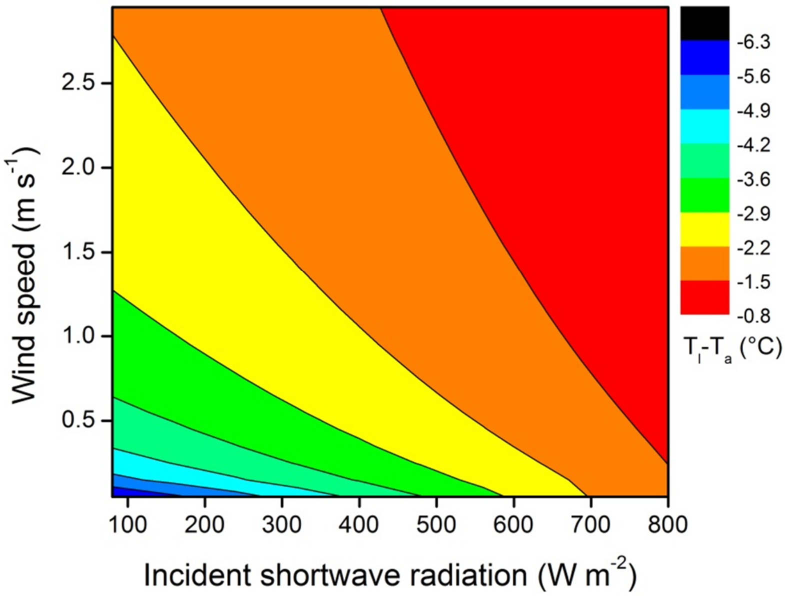

Figure S4: The influence of incident shortwave radiation and wind speed on the difference between leaf (T_l) and air (T_a) temperatures (depicted by different colours). Generally, more radiation leads to relatively warmer leaves. When wind speed is low, effects of radiation on the leaf – air temperature difference are exacerbated. Other variables were kept constant: air temperature = 40 °C, stomatal conductance = 0.2 mol m^{-2} s^{-1}, relative air humidity = 0.6 and leaf diameter = 0.005 m.

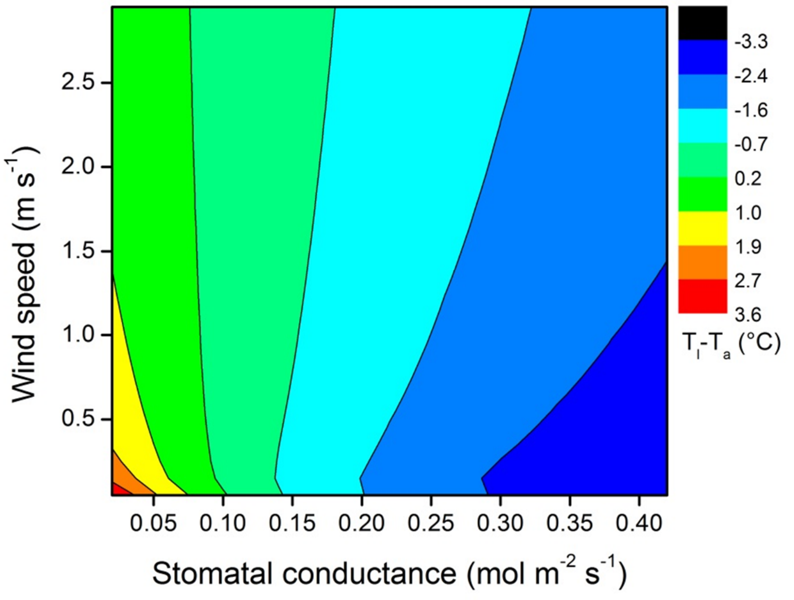

Figure S5: The influence of stomatal conductance and wind speed on the difference between leaf (T_l) and air (T_a) temperatures (depicted by different colours). Generally, lower stomatal conductance leads to relatively warmer leaves. Low wind speed exacerbates effects of stomatal conductance, while high wind speed dampens these. Other variables were kept constant: air temperature = 40 °C, incident shortwave radiation = 800 W m^{-2}, relative air humidity = 0.6 and leaf diameter = 0.005 m.

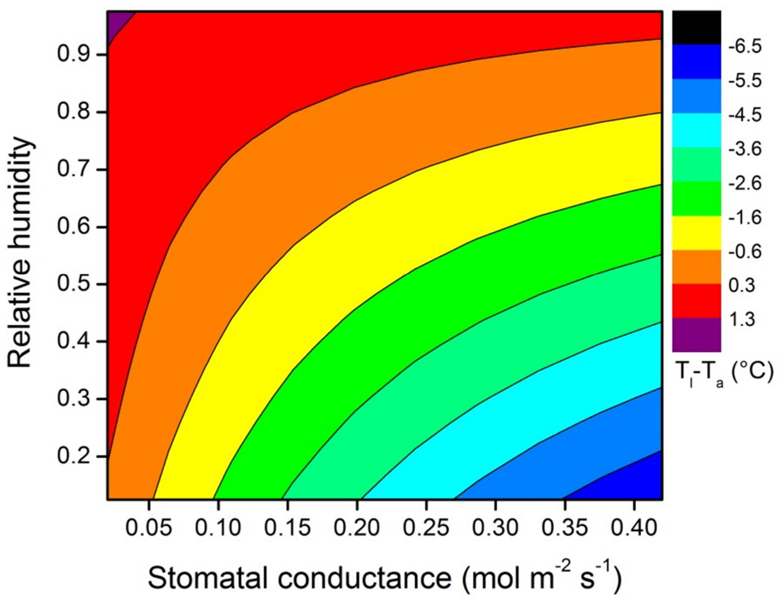

Figure S6: The influence of stomatal conductance and relative air humidity on the difference between leaf (T_l) and air (T_a) temperatures (depicted by different colours). Generally, lower stomatal conductance leads to relatively warmer leaves, as does higher air humidity. High air humidity dampens the influence of stomatal conductance. Other variables were kept constant: air temperature = 40 °C, wind speed = 1.5 m s^{-1}, incident shortwave radiation = 800 W m^{-2} and leaf diameter = 0.005 m.

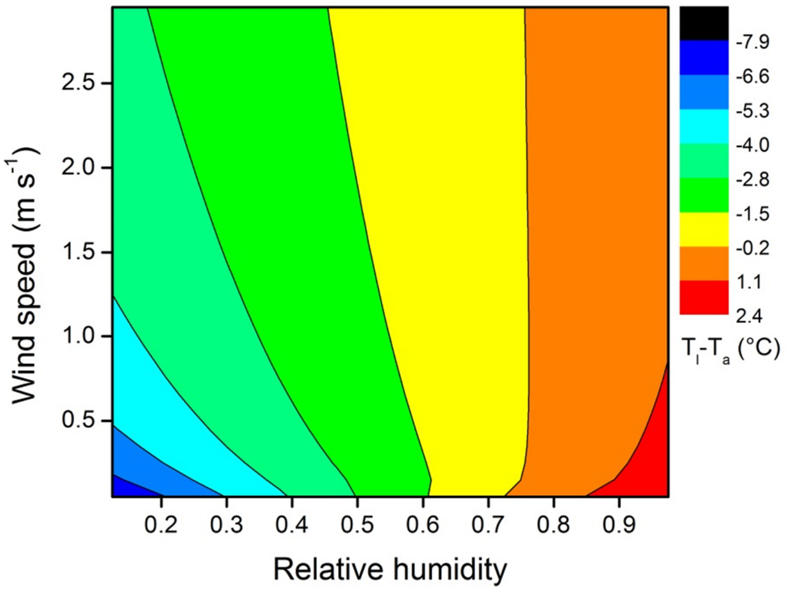

Figure S7: The influence of relative air humidity and wind speed on the difference between leaf (T_l) and air (T_a) temperatures (depicted by different colours). Generally, higher air humidity leads to relatively warmer leaves. Low wind speeds exacerbate effects of air humidity, while high wind speeds dampen these. Other variables were kept constant: air temperature = 40 °C, stomatal conductance = 0.2 mol m^{-2} s^{-1}, incident shortwave radiation = 800 W m^{-2} and leaf diameter = 0.005 m.

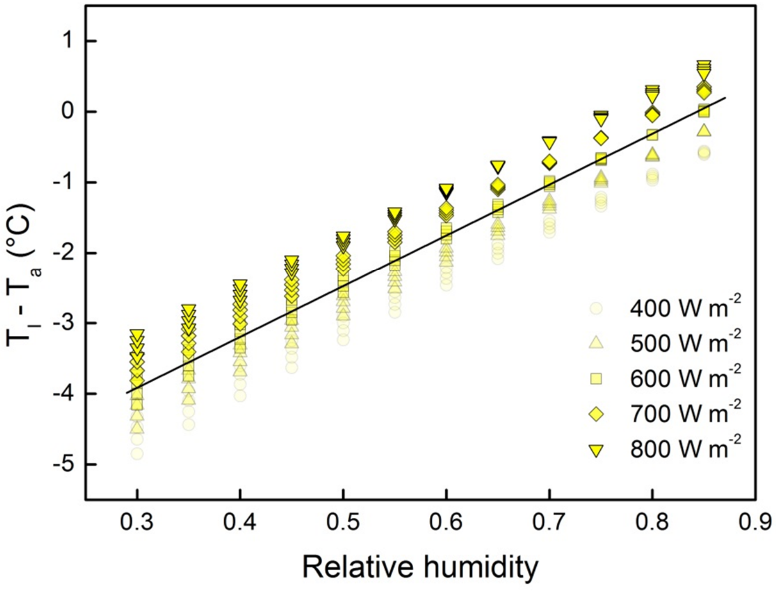

Figure S8: Modelled influence of relative humidity on leaf (T_l) – air (T_a) temperature differences. Input data reflect conditions similar to those in Fig. 2: T_a = 30 °C, incident shortwave radiation = 400-800 W m^{-2} (marked with different symbols and shades), stomatal conductance = 0.4 mol m^{-2} s^{-1}, wind speed = 0.5-0.8 m s^{-1} (lower wind speed leads to lower T_l-T_a for identical other environmental conditions). Wind speed data at our site were unfortunately not measured during the heat wave due to sensor malfunction and were derived from data of a nearby meteorological station (Lint, Belgium) and correlation (R^2 = 0.80) with data registered on later days (9-23 July).

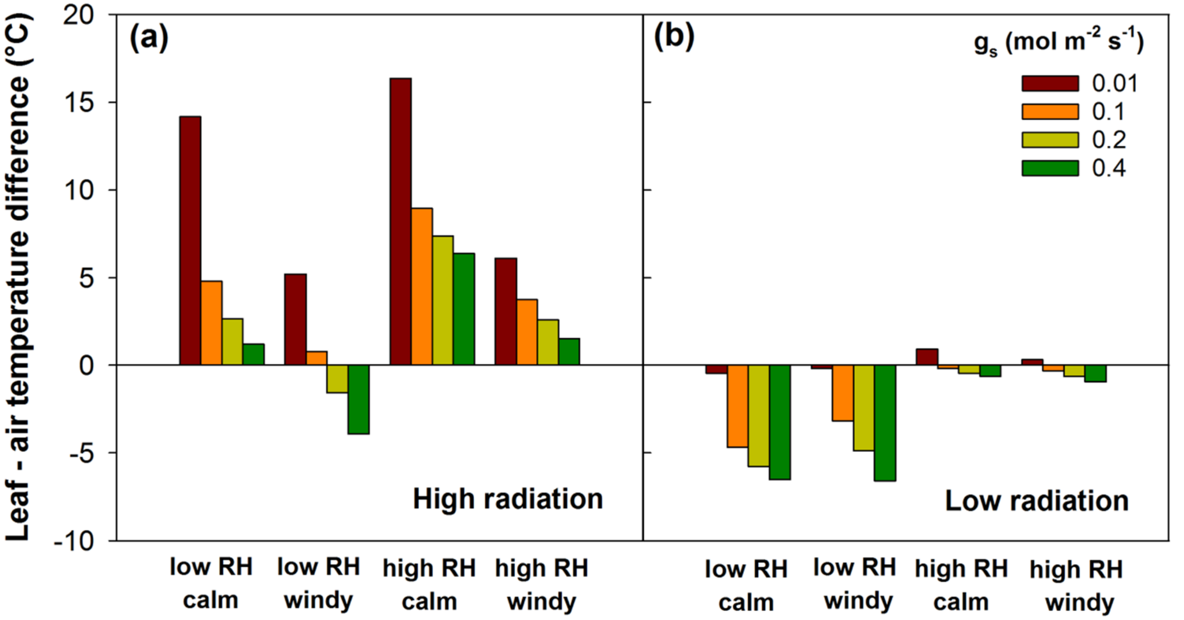

Figure S9: Modelled leaf-to-air temperature difference depending on type of heat wave and stomatal conductance (g_s). Type of heat wave: high (A) or low (B) incident shortwave radiation (800 or 100 W m^{-2}), high or low relative humidity of the air (RH = 0.90 or 0.45), and calm or windy weather (wind speed 0.1 or 6 m s^{-1}). Air temperature was set to 40 °C in all simulations, and leaf width to 0.2 m.