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Drought stress determination of crops by means of ground based thermal remote sensing

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Drought stress is known to have a restricting effect on plant growth and thus inevitably decreases crop yield. In the presence of drought stress, occurring whenever the evaporative demand of the atmosphere can no longer be met by the water uptake of the plant, transpiration rates of the leaves are reduced leading to higher leaf-temperatures. Remote Sensing in the thermal infrared region has been proved to be useful for acquiring information about canopy temperature and thus crop condition. Consequently, the adequate interpretation of these observations provides an instrument for irrigation scheduling, needed to avoid the negative effects of yield losses and to support a sustainable use of water in agriculture.

In this study, thermal measurements by means of CIR-5 were routinely performed during the growth period from May to July 2006, on an irrigated and a rainfed wheat (Triticum aestivum L. (cv. Xenos)) plot at the study test site 'Augarten', Vienna. Physiological measurements, such as leaf water potential and relative water content, were performed on the youngest fully expanded leaf at the three developmental stages. Additionally, spectral measurements with a portable field spectrometer were performed and meteorological data including net radiation and shortwave global radiation were continuously recorded.

The objective of the present study was to assess the potential of crop water stress indices (CWSI, WDI) to determine the level of drought stress and thus irrigation needs.

The results of the analyses will be presented and discussed, also in terms of a potential application in irrigation management systems.