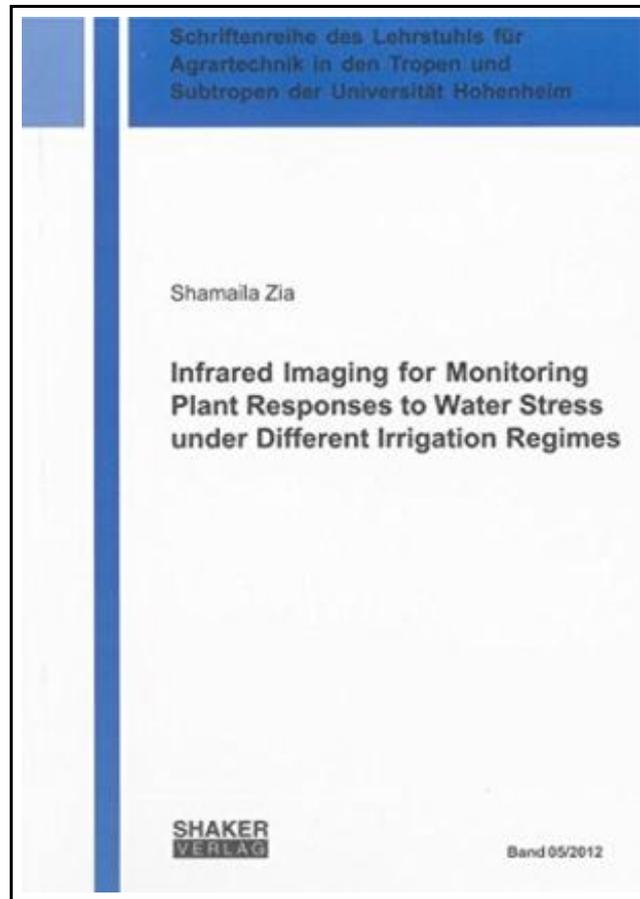


# Infrared Imaging for Monitoring Plant Responses to Water Stress under Different Irrigation Regimes



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## INFRARED IMAGING FOR MONITORING PLANT RESPONSES TO WATER STRESS UNDER DIFFERENT IRRIGATION REGIMES



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Shaker Verlag Okt 2012, 2012. Buch. Book Condition: Neu. Neuware - In the framework of this study greenhouse and field experiments were established at three locations comprising Germany (greenhouse), China (field), and Mexico (field) and three different crops which were grapevine, winter wheat and maize. Water status detection for advanced irrigation scheduling is frequently done by predawn leaf water potential or leaf stomatal conductance measurements. However, both methods are labor intensive and time consuming as leaf to leaf variations require much replication for reliable data and are not yet possible to be automated. The basic principle of using infrared thermography as an indicator of water stress is that plants close stomata under water stress, which results in decrease of energy dissipation and increase of canopy temperature. Infrared thermography visualizes this increase in leaf temperature and the magnitude of the rise in canopy temperature among water stressed plants is influenced by successive stress imposition. Therefore, thermography is a non-contact method and thus very fast and practical. It is capable to estimate large leaf populations simultaneously and provides an overview on stomatal conductance variation and dynamics. The results of the study show that although a linear correlation existed between stomatal conductance and CWSI in maize under greenhouse conditions, in winter wheat it depends on the phenological stage of the crop. For example, a correlation of  $r^2 = 0.44$  at pre-heading and  $r^2 = 0.77$  at post-heading stage was found. This is due to the change in the baselines of some crops including wheat as the plant height varies from vegetative to reproductive growth stage. A higher canopy diffusion resistance prevails in the post-heading stage than in the pre-heading stage, resulting in cooler canopy. This indicates the importance of taking crop growth parameters into consideration like plant height, which effects canopy reflectance and...



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