POSTER SUMMARY

INVESTIGATING THE INFLUENCE OF MOISTURE STRESS ON THE NORMALIZED DIFFERENCE VEGETATION INDEX ON THE ENTUMENI SUGAR ESTATE

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Abstract

Remote sensing (RS) provides a means to gather spectral data at time intervals over large areas, which are useful in deriving spectral vegetation indices. The Normalized Difference Vegetation Index (NDVI), which is derived from red and near-infrared bands, is a good indicator of plant stress. The South African sugar industry spans two provinces, with much of the sugarcane grown on diverse soil types in KwaZulu-Natal, which is rainfed and therefore prone to moisture stress. Although the NDVI is useful for detecting plant stress, it does not provide information on the source of stress. The Moisture Stress Index (MSI) provides information about plant canopy stress. Moisture stress prevails mostly during dry seasons, when stressed crops may become susceptible to pests and diseases. However, the response and tolerance of crops to moisture stress conditions also differs based on the varieties and soil types. The MSI has been used to estimate soil moisture variability, to which a strong correlation was found to exist at a depth of 20 cm (R^2=0.79, $p<0.05$) for average growing seasons. The aim of the project was to determine how much of the stress detected by the NDVI in the Entumeni Sugar Estate is accounted for by lack of moisture. The indices calculated for different months spanning across winter and summer were compared with each other using regression analysis. Results showed that there is a significant inverse relationship between the NDVI and the MSI on the estate, i.e. the minimum R^2=0.01 in May 2015 and maximum R^2=0.92 in October 2015. In this case, it can be concluded that where the R^2 is at its maximum, stress is accounted for by lack of moisture. This study, therefore, demonstrates the possibility of RS to be utilised as a tool to geographically track and monitor crops which may be prone to moisture stress.

Keywords: remote sensing, Entumeni, Landsat, normalized difference vegetation index, moisture stress index