

## Interference of Mild Drought Stress on Estimation of Nitrogen Status in Winter Wheat by Some Vegetation Indices

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**Abstract :** Nitrogen (N) is one of the most important agricultural inputs affecting crop growth, yield and quality in rain-fed cereal production. N demand of crops varies spatially across fields due to spatial differences in soil conditions. In addition, the response of a crop to the fertilizer applications is heavily reliant on plant available water. Matching N supply to water availability is thus essential to achieve an optimal crop response. The objective of this study was to determine effect of drought stress on estimation of nitrogen status of winter wheat by some vegetation indices. During the 2012 growing season, a field experiment was conducted at the Bundessortenamt (German Plant Variety Office) Marquardt experimental station which is located in the village of Marquardt about 5 km northwest of Potsdam, Germany (52°27' N, 12°57' E). The experiment was designed as a randomized split block design with two replications. Treatments consisted of four N fertilization rates (0, 60, 120 and 240 kg N ha<sup>-1</sup>, in total) and two water regimes (irrigated (Irr) and non-irrigated (NIrr)) in total of 16 plots with dimension of 4.5 × 9.0 m. The indices were calculated using readings of a spectroradiometer made of tec5 components. The main parts were two "Zeiss MMS1 nir enh" diode-array sensors with a nominal range of 300 to 1150 nm with less than 10 nm resolutions and an effective range of 400 to 1000 nm. The following vegetation indices were calculated: NDVI, GNDVI, SR, MSR, NDRE, RDVI, REIP, SAVI, OSAVI, MSAVI, and PRI. All the experiments were conducted during the growing season in different plant growth stages including: stem elongation (BBCH=32-41), booting stage (BBCH=43), inflorescence emergence, heading (BBCH=56-58), flowering (BBCH=65-69), and development of fruit (BBCH=71). According to the results obtained, among the indices, NDRE and REIP were less affected by drought stress and can provide reliable wheat nitrogen status information, regardless of water status of the plant. They also showed strong relations with nitrogen status of winter wheat.

**Keywords :** nitrogen status, drought stress, vegetation indices, precision agriculture

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