Spectral profile approach for wheat yield modelling using MODIS data in India

Oza M.P., Bhatt H.P., Vyas S.P. and Patel N.K.
Crop Inventory and Modelling Division
Agriculture Forestry and Environment Group
Space Applications Centre
Ahmedabad 380 015
markand (hiren, spvyas, nkpatel)@sac.isro.gov.in

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Abstract: Development of reliable crop yield models with minimal ground data is a major thrust area for agricultural planning which encompasses managing agricultural inventory for ensuring food security. Remote sensing technology provides a systematic and reliable data source required for study of vegetation development. Exploiting temporal behavior in an agricultural environment is very informative as it provides a link for quantitative assessment of plant state and growing conditions to final grain yield. The present study aims at using multi-date MODIS data for wheat yield modelling over North-west India during 2005-06 rabi season. Spectral crop growth curves such as quadratic, cubic and power-exponential were fitted. The data set was grouped into two strata namely, high yield (yield > 3 t/ha) and low yield (yield < 3 t/ha) strata. A correlation analysis of the model estimated peak NDVI (called Gmax) and wheat yield was carried out. In-sample cross validation using leave-one-out method was performed. It was concluded that a significant correlation exists between wheat yield and the peak NDVI value and the prediction performance is satisfactory for high yield stratum but not for low yield stratum.

Keywords: NDVI, least squares fitting, spectral maxima, regression, wheat yield.