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Short Communication

Satellite Data for Yield Estimation: A Short Review

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Abstract

When NASA started the Earth Resources Technology Satellites Program (later called Landsat); the researchers began studies on monitoring the vegetation cover horizontally and vertically by studying the variation in cultivated areas[1-3]. Comprehensive and intensive studies were conducted on vegetation and thermal indices such as NDVI [4], Soil Adjusted Vegetation Index (SAVI)[5], Crop Water Stress Index (CWSI) [6-8], and Water Deficit Index (WDI)[9]. These indices applied to estimate the yield. Idso et al. [10,11] used RS to estimate wheat yield based on linear regression equations and suggested Stress Degree days (SDD) method for scheduling the irrigation. Tucker et al. [12]related the yield to NDVI at specific periods through the growing period.

Yield Estimation Accuracy

The accurate crop yield estimation is a focal point for farmers, traders, and decision-makers which hope to optimize the beneficiaries of their resources. The traditional yield estimation methods rely on field data collection and reports, i.e., random sampling survey and cutting aboveground biomass to measure the weight and generalized the results over the region. Though these techniques are highly cost, time-consuming, takes significant efforts, has accumulated errors, and could be possible at the field scale, but at the regional scale, it will be difficult[13]. High accurate yield estimation on a global scale has a high importance level to detect the ability of plant on growth and production under different degrees of stresses in different locations to understand the plant behavior in various environmental conditions. It also will give a good indicator to know strategic crop's densities and yields distribution maps. The accurate and timely crop yield estimation before harvest at a regional scale has started to be drawn by NASA's first launching mission.

Landsat data series are still used around the world to monitor and estimate the crop yield, i.e., Landsat MSS, TM, ETM+, OLI and TIRS [14,15]. The reflected waves of a farm or field carry the real situation of vegetation distribution and productivity because chlorophyll mass, water content, and nutrients shape the wave's reflection (Prasad, 2006). The high correlation between VIs and biomass guide the scientists and researchers to investigate more in this part. Therefore, yield estimation before harvesting was an early produced by combining the VIs and biomass and yield [16]. Crop yield is affected with a sophisticated environmental condition, i.e., soil and air temperature, relative humidity, wind speed, solar radiation, daytime, water and nutrients availability, soil and water salinity, and ground and arial pests, beside the crop type genetics constrictions. The yield estimation methods varied and graded from very simple to very complex.

The relation between productivity and satellite-derived indices began to form a new methodology, and a new era was beginning to shape the regional scale of crop YEP. The simple empirical models were the conventional methods. Then dynamic models took its place starting from the SAIL model developed by[17,18]. The biggest question mark which is putted at the end of the talking regarding estimation the crop yield based on RS to predict the crop yield is "WHAT THE RESULTS ACCURACY IS?"[19].

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