

Using NDVI Time-series Profiles for Monitoring Corn Plant Phenology of Irrigated Areas in Southern Brazil

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Abstract

Among the factors that contribute the most for increasing maize cultivated area and grain yield in Southern Brazil are the crop genetic selection, soil, crop and water management and recent advances in crop remote monitoring techniques. The Normalized Difference Vegetation Index (NDVI) obtained with remote sensing techniques may be used to provide historical and real-time evaluation characteristics of a particular crop, such as density and vigor without neither field visits, nor interfering directly or indirectly in crop growth and development. This procedure may substantially reduce monitoring or control costs. In this paper, a temporal profile series of NDVI was generated during the maize crop growth period with the objective of evaluating the crop phenology of seven irrigated areas under center pivots. Eight images from LANDSAT5/TM satellite, of the 222/80 and 223/80 path/row were used. The quantitative intervals of NDVI mean values were evaluated from the temporal profile series based on the crop sowing and harvest dates. The NDVI values varied from: 0.18-0.53 for initial crop stage; 0.54-0.80 for rapid crop growth; 0.20-0.74 for mid-season; and 0.28-0.41 for late season. The use of NDVI allows a good differentiation among the maize crop stages of irrigated areas. There has been a drop in NDVI values in the R1 stage, at 54 days after sowing (DAS), due to detasseling. Maximum NDVI value (0.80) was observed at 63DAS, with maize phenology between R2-R5 stages. NDVI values decreased from R6 growth stage till harvest (134 DAS) due to crop maturity and senescence. During this period the average NDVI value was 0.40.

Keywords: SPRING, LANDSAT5, southern Brazil, center pivots