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Using MODIS data for predicting regional yield of maize and soybean

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n preliminary analysis was attempted to develop a crop yield prediction method using remote sensing data forthe region thatcrop cultivation and management informationis not readily available. Illinois state(2000-2014 year) of USA and Heilongjiang province (2015-2011 year) of China, a major maize and soybean production region of each country, were selected as target regions of this study. Remote sensing data were used MOD13A2 data of 16-day interval from 129 to 289 juliandayin MoDerate Resolution Imaging Spectroradiometer (MODIS). Normalised Difference Vegetation Index (NDVI) value of MOD13A2 was converted to Leaf Area Index(LAI) using NDVI-LAI equation that was formulated with LAI and NDVI data measured in our laboratory. Land cover map for eachyear in Illinois state was downloaded from National Agricultural Statistics Service (NASS) in the USA. And land cover map of Heilongjiang province was obtained from Inha University in Korea. For standardization, all data were converted to 1km X 1km grid by UTM projection and WGS-84 coordinates using ENVI. LAI values for each crop in all the grids of target regions were extracted based onland cover mapusing MATLAB. Using the extracted LAI values, leaf area duration (LAD) were calculated for each grid and averaged over all the grids in each region by year and crop. Linear regression anlysis was performed between average LAD's and reported grain yields. LAD of maize in Illinois showed fairly close correspondence (R2 = 0.86) to the reported maize yield. However, the others showed low determination coefficients (soybean, Illinois, R2 = 0.19; maize, heilongjiang, R2 = 0.28; soybean, heilongjiang, R2 = 0.15). In these cases, the determination coefficients got improved much only by detrending the yearly increase of yield using linear regression. Even though LAD during whole growth period would be a good indicator for crop growth and yield, other factors such as drought, solar radiation, disease and pest, etc., should be taken into account for enhancing the accuracy of yield prediction.

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Biography

Ho-Young Ban is candidate of PhD degree in plant science at Seoul National Universityin Republic of Korea. And he has a master's degree in electronic engineering. Currently, he is studying crop modeling and remote sensing.

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