

Estimation of maize yield using a process-based remote sensing mechanism model in the Northeast China Plain

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Abstract: Accurately estimating of the crop yield is very important for food safety. In this study, a process-based remote sensing mechanism model was developed to estimate yield of C₄ crops through modifying the crop photosynthetic pathway in the remote sensing–photosynthesis–yield estimation for crops (RS-P-YEC) model, and the Harvest Index (HI) derived from the ratio of grain to stalk yield was adopted in the developed model. The developed process-based model was used to simulate the maize (*Zea mays* L, C₄ crop) yield in the Northeast China Plain during the period 2007-2009. The 69 statistics data at county-levels from study area was used to validate the simulated results. The results showed that the correlation coefficient (R^2) was 0.637 (n=69) between simulated yield and statistics yield, the root mean square error (RMSE) of the simulated yield and the statistics yield was 1060 kg ha⁻¹, with a relative error of 11.9%. The spatial pattern of simulated yield was consistent with the actual distribution in the Northeast China Plain, with an increasing trend from the northeast to southwest parts. The results implicated that the developed process-based model was suitable for yield prediction of C₄ crops.

Key words: Maize yield; C₄ crop; RS-P-YEC model; Remote Sensing; Northeast China Plain