A Spatial Econometric Analysis of Within-field Crop Yield Variability
Using Yield Monitor Data from a Mississippi Farm

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Abstract

It is widely observed that the crop yields vary significantly within the field, primarily because of the intra-field variations in soil, landscape, water, and nutrient conditions. That variability forms the foundation for site-specific management in precision agriculture. However, thus far the studies about the within-field yield variability are mostly based on one or several sample fields, while the variability distribution for a real world farm or a larger region have received less investigations. In addition, due to the small number of sample fields, the determining factors of yield variability have not been fully examined. This study fill this research gap by collecting and analyzing high resolution yield monitor data of over a hundred fields from a large size farm in the Mississippi Delta. It quantitatively describes the extent of the within-field yield variability over a large scale area, and empirically examines the relationship between the yield variability and factors such as soil types, landscapes, weather conditions, management inputs, etc. A spatial econometric model is utilized to account for other unobserved but spatially correlated yield-impacting soil properties. This study contributes to exploring the method of analyzing GIS data from farming and turning the data into site-specific management decisions.

Keywords: Crop yield variability, within-field, precision agriculture, spatial model, Big Data

JEL Codes: Q16, Q12, C81