Spatial Analysis of Recent Trends in Soybean and Second Season Corn Production in Brazil

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In Brazil, the adoption of second-season corn during the period 2005-2020 led to a significant increase in planted area, driven by the expansion of the land input. This practice, previously feasible only in the South and Southeast regions, became feasible with the development of earlier-maturing soybean cultivars, resulting from genetic improvement and improvements in crop management. In the last two decades, there was a significant shift in corn production volumes, with second season corn surpassing first season production. Since then, second-season corn has remained the main corn crop in the country.

This change in production has been accompanied by a simultaneous increase in soybean output in the main producing states, pointing to a transition from a single-cropping system to a double-cropping system. Therefore, the economic literature has examined this temporal evolution between crops by investigating patterns of concentration or dispersion across agricultural areas using Exploratory Spatial Data Analysis (ESDA).

This study investigates the spatial associations using ESDA considering areas cultivated with soybeans and second-season corn and identifying the production relationship between soybean and second-season corn. The analysis aims to determine whether the expansion of soybean-cultivated areas exhibits a direct spatial correlation with second-season corn–planted areas at the municipal level. The results reveal significant spatial correlations characterized by "High–High" clusters in selected municipalities of the states of Mato Grosso (MT), Mato Grosso do Sul (MS), and Goiás (GO). These findings indicate a strong interdependence between the expansion of soybean cultivation and second season corn production in neighboring areas within these states, as well as providing insights into production volumes.

Keywords: Spatial interdependence, ESDA, Brazil, Soybean, Corn