MODELING AND EVALUATION OF SPATIAL FLUCTUATIONS OF TECHNOLOGICAL IMPACT INTENSITY ON YIELDS

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Mathematical models and methods to be used to evaluate the impact of variability in field structure and spatial heterogeneity on the effectiveness of technological operations are proposed. The paper analyzes the efficiency of the spatial differentiation of technologies for the three strategic models: undifferentiated (VAT), partially differentiated (NPV) and differentiated (DDS). The necessity to establish the optimal level of differentiation depending on the inhomogeneities distribution density, on the level of productivity and on several cost indicators is shown. The mathematical tool allows to evaluate theoretically attainable effect that can be achieved by spatial differentiation of technological solutions. It is found that the relative rate ω characterizes the potential effectiveness of the optimal undifferentiated strategy U_{nd}^{0} or, equivalently, identifies potential (theoretically attainable) effect of accounting statistical information within the average value of the varying agro meteorological factor *x*. It was determined by means of mathematical models that in cases where the dimensionless ω substantially less than 1, the differentiation may be appropriate because in this case it is the only way to eliminate the negative influence of the spatial homogeneity of the territory. Conversely, when the value of ω is close to 1, differentiation apparently has no reason.

Keywords: spatial fluctuations, intensity, technological impact, anthropogenic heterogeneity, efficiency, undifferentiated heterogeneity.