

AGRICULTURAL FIELD HETEROGENEITY AND ITS RELATIONSHIP WITH SOIL COVER

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The introduction of modern, locally adapted agricultural technologies requires information about the spatial heterogeneity of crops that can occur in a given field during the process of crop cultivation. One of the factors that can predetermine the spatial heterogeneity of crops (field heterogeneity) is the heterogeneity of soil cover. The relationship between field heterogeneity and soil cover inhomogeneity was analyzed in an experimental field with a predominance of soddy soils and white mustard crops. Field heterogeneity was detected by analyzing images taken by an unmanned aerial vehicle 4 times during the growing season. The NGRDI vegetation index was used as an indicator of crop condition. The pairwise spatial correlation of all received images of the index was analyzed, and the comparison of the index with the zones of potential soil fertility of the field, identified by the image with the maximally open soil surface, was made. The maximum spatial correlation coefficients were 0.3–0.4. It was found that the field diversity was very dynamic in time and it was impossible to get a complete picture of it on the basis of a single satellite or UAV image. The analysis of several images during the growing season is necessary to reveal its specificity. The diversity of the field correlates more with the zones of potential soil fertility in the field than with the units of a traditionally made soil map, but this relationship also manifests itself to a different extent in different zones and in different crop phenological phases. The results obtained for the experimental field confirmed the conclusions of the previous similar studies for several other experimental fields and crops in Tver, Tula Oblast and Kabardino-Balkaria. To identify more general regularities and to develop recommendations for remote monitoring as well as for crop condition and yield forecasting, it is necessary to extend such studies to other crops in other soil conditions.

Keywords: spatial heterogeneity, crops, UAV, crop monitoring, soil patterns.