

SCIENTIFIC, METHODICAL AND ALGORIRITHMIC BASICS FOR ESTIMATING PRODUCTIVITY INDICATORS AND PHYTOSANITARY STATE OF CROPS USING REMOTE SENSING DATA

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A method for a crop state evaluation on the basis of the space remote sensing data and vegetation indices is being discussed. The method essentially reduces the informativity of the spectral channels as the vegetation indices represent convolution signals of individual channels. Besides, both a stochastic character of the problem and an initially high uncertainty do not allow to solve the problem of weed detection, as well as detection of plant diseases and pests using vegetation indices. To solve the problem, we propose to use a set of spectral channels with the highest informativity. The selection of the channels is based on the Shannon theory of information. The problem of weed, plant disease and pest detection can be solved in two steps. The first step includes the use of the information from all the spectral channels and space remote sensing facilities to develop a classification for such groups as «weeds», «diseases» and «pests». To fulfill the first step a statistical approach is used with an assumption that the reflectance parameters of the sensing channels have the normal distribution when the three above mentioned groups are being separated. The second step includes an exact specification for different types or classes within the three selected groups. The Bayesian classification procedure with a subsequent input of information from different sensing channels is used for this purpose. A software and hardware complex was developed to test the proposed method. It uses the information format from the Russian spacecraft «Resurs-P». The results of testing confirmed the functionality and high reliability of the proposed method. The reasons for hindering the implementation of the method were analyzed. These reasons are considered to be an absence of systematic studies on the reflection spectra of weeds, diseases and pests for individual crops. The developed software and hardware complex can be an effective tool in such studies.

Keywords: remote sensing, productive and sanitary condition, livestock, crops, evaluation, recognition, informative channels