

INFLUENCE OF BIOLOGICAL PRODUCTS ON HYPERSPECTRAL IMAGING OF GRAIN FODDER CROPS IN WESTERN SIBERIA

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Digital agricultural production technologies are rapidly developing, enabling non-invasive monitoring of the physiological state of agricultural crops to manage qualitative and quantitative yield indicators. Comprehensive studies were conducted to determine the effect of bacterial preparations Mizorin and Flavobacterin on hyperspectral imaging and the yield of grain forage crops in the Omsk Irtysh region. Ten flag leaves of plants were non-invasively assessed using a CI-710 portable minispectrometer using 38 vegetation indices; 20 spectra of adjacent spectral bands were recorded for each pixel of the hyperspectral image. The study subjects were the Omskiy 101 spring barley and Sibirskiy Gerkules spring oat varieties. Seeds were inoculated with complex biopreparations on the day of sowing. The spring barley showed a significant increase in yield (by 0.45 t ha^{-1}) after seed inoculation with Mizorin (0.37 t ga^{-1}) and after inoculation with Flavobacterin compared to the control value. The spring oat showed a significant increase in yield (by 0.37 t ha^{-1}) after seed inoculation with Flavobacterin. To identify genetic traits (at the phenotype level) that influence the formation of increased yields when inoculating seeds with Mizorin in spring barley crops, the following hyperspectral imaging indices are recommended: ZMI, WBI, VREI1, SPAD, RENDVI, NDVI, Lic1, GM2, GM1, CNDVI, and CCI ($r = 0.736...0.932$; $\text{CAO} < 0.008$). In spring oat crops: PSRI, NPCI, MDATT, Ctr1, ARI2, ARI1 ($r = 0.798...0.998$; $\text{CAO} < 0.009$).

Keywords: hyperspectral imaging, vegetation indices, biological products, yield.