

REMOTE MONITORING OF WEED INFESTATION BEFORE AND AFTER POTATO EMERGENCE

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As a result of the studies conducted during 2012–2017 in the field experiment at Menkovsky branch of the Agrophysical Research Institute (Leningrad Region, Gatchinsky District), it was established that the NDVI vegetation index is a reliable diagnostic criterion for weed monitoring before potato emergence. The correlation coefficients between the number of weeds and the values of the NDVI index for the studied sites in the pre-emergence period varied within 0.31–0.82 for different years and dates of measurements and were statistically significant. Remote sensing of weed infestation during the pre-emergence period is most effective when perennial weed species (with more developed vegetative mass) prevail in the field. It is supported by a closer statistical relationship between the NDVI index and the number of perennial weeds ($r = 0.51\text{--}0.77$, $p \leq 0.05$). In the post-emergence period, the presence of cultivated plants makes assessment of weed infestation using the NDVI vegetation index difficult. Separation of weeds and potato plants requires extra knowledge in the spectral characteristics of both. In the framework of this study it was found that most weed species had significantly lower values in all channels of the visible part of the spectrum compared to potato plants. The decryption of aerial photographs in GIS programs is based on the differences in spectral characteristics of sites and these spatial characteristics were different for the sites with low and high weed infestation. The sites with high weed infestation were characterized by significantly lower rates of the red (0.119 versus 0.132) and blue (0.817 versus 0.972) channels. The weed infestation of potato crops was reliably determined using remote methods in the pre-harvest period, when the development of weeds continued, and the vegetation of cultivated plants ended. According to the results of spectral estimation, the presence of a large number of weeds led to a significant decrease in the values of the red (from 0.476 to 0.304) and blue (from 0.483 to 0.351) channels. The obtained results can be used as a basis for determining the spatial distribution of weeds and for spatially differentiated herbicidal treatments in the periods before and after potato emergence.

Key words: potato, weeds, remote sensing, spectral characteristics, Normalized Difference Vegetation Index (NDVI).

