

PHOTOLUMINESCENT PROPERTIES OF POTATO STARCH

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A quick and reliable assessment of potato quality is of great importance for improvement of the crop processing and increasing starch production. The purpose of this study was to measure the photoluminescent properties of potatoes of various quality for further development of an optical method for starch content control. The tasks were to measure the spectral luminescent characteristics and calculate the parameters of pure starch and potato samples. Samples of potato with white and yellow flesh, as well as pure starch were examined. Measurements were carried out on a diffraction spectrofluorimeter. Integral and statistical parameters of the excitation and photoluminescence spectra were calculated. The excitation characteristics were located in the near ultraviolet and visible spectral regions (220–550 nm), while the main maxima were located at about 290 nm and 332 nm for potatoes, and at 352 nm for starch. The spectral characteristics of pure starch photoluminescence significantly exceeded similar characteristics of potato slices. The most optimal method for controlling starch content was to measure the photoluminescence flux in the range of 383–500 nm after excitation with 332 nm radiation. The asymmetry of all the graphs was right-sided. At the same time, the greatest differences in the asymmetry coefficients were visible for excitation and short-wave luminescence. For statistical parameters (dispersion, coefficients of asymmetry and kurtosis), the most significant difference in spectra was observed in the short-wavelength region of radiation (310–450 nm). However, unlike flow measurements, the calculation of statistical parameters was much more resource-intensive and required measuring of the entire spectrum. The results obtained can be used to develop a technology for photoluminescent diagnostics of potatoes.

Keywords: potato, starch, excitation spectrum, luminescence spectrum.