METHODS AND MEANS OF THERMOPHYSICAL CHARACTERISTICS MEASUREMENT FOR VEGETABLES AND FRUITS TISSUES

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The thermophysical characteristics of vegetables and fruits plant tissues depend on their type and variety, structure, water content, as well as the presence of mechanical damages or phyto-diseases. The last circumstance makes it possible to apply thermal methods of non-destructive and noncontact control with using the technical vision systems in the infrared range of the spectrum (8000-14000 nm) when sorting out agricultural products. To determine the regime parameters of the thermal effect, it is necessary to know the real control object thermophysical characteristics in the surface and subsurface plant tissues, which is possible with the use of both contactless and contact measurement methods.

To implement non-contact measurements, the absolute method was used [1], in which the object surface heating was organized by using a laser with a power of 0.5 W and a wavelength of 405 nm through a surface area in the form of a circle during several minutes. To obtain the initial information about the surface temperature of the body, a thermal imager A35 model by FLIR Company was used. The software developed in the LabVIEW 2016 environment serves for image processing, temperature measurement and calculation of thermal conductivity and thermal diffusivity of the tissue.

To determine the thermophysical characteristics of the subsurface plant tissues, a contact regular mode method of the third kind and a pulsed flat-layer method were used.

Conducted calibration measurements on standard samples allowed to reach a maximum thermal conductivity error not more than 7 %.

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