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Karpovich A. O.

OPTICAL QUANTIFITION OF ANTHOCYANINS IN MAIZE GRAINS

Scientific supervisor: senior teacher Zolotova O. V.
Department of Foreign Languages
Belarusian State Medical University, Minsk

Relevance. Natural dyes – anthocyanins do not only give color to plant materials, but also have a well-known antioxidant activity.

Evaluation of the content of biologically active substances in various products is carried out by various methods, suggesting the need for the destruction of plant organs for the subsequent extraction of the desired substances. The anthocyanin content in corn grains varies greatly. Therefore, it is relevant to search deferent methods for assessing the content of biologically active substances, including anthocyanins, in corn grain for further extraction and saving time at pharmaceutical enterprises.

Aim: to create a non-invasive method for comparative analysis of the content of anthocyanins in corn grains.

Materials and methods. The object of the research included 179 grains extracted from 12 ears, obtained by free pollination of various corn samples grown on the territory of the Republican Center for Ecology and Local History. We used various methods to analyze the content of anthocyanins in corn grain: optical and biochemical.

Results and discussion. To determine the relationship between the variability of the anthocyanin content and the colorimetric indicators of corn grain, we calculated the specific optical density of the extract taking into account the weight of the flour sample for comparative analysis, since the optical indicators of the anthocyanin content depend on the weight of the sample.

We tested various mathematical models of the relationship between color parameters and anthocyanin content. All calculations were performed in Excel using built-in functions. Calculation of the Pearson correlation coefficient between R, G and B values and anthocyanin content did not give us significantly high results. The correlation coefficients were 0.58, 0.56 and -0.05, respectively.

To test all available nonlinear hypotheses, namely logarithmic, power, polynomial and exponential, we calculated an approximation for each chromaticity index. Thus, we have compared five forecasts, including a linear one, for each of the five calculated indicators: R, G, B, 1 / G, and RG.

However, the polynomial model showed the best result for the chromaticity index G. The approximation value for this model approaches 0.9, which is a very reliable value. Therefore, the most appropriate model for the optical determination of the anthocyanin content is:

$y = -7E\text{-}09x^2 + 6E\text{-}05x + 0.318$, where

y -the relative content of anthocyanin,

$x = G / (R + B)$, where

G-green channel saturation indicator,

R-the saturation index of the red channel,

B-blue channel saturation indicator.

Conclusion. As a result, a non-invasive method for the comparative analysis of the anthocyanin content in the corn grain was developed.