REGRESSION MODELS BASED ON PHYSICO-CHEMICAL PARAMETERS OF BEE HONEY

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Abstract

Constantly increasing demand and consumption of honey establish it as a valuable and indispensable food product. This determines the need for high knowledge of the sources and conditions of extraction, proper storage, and knowledge of possible changes in its composition. In this regard, it is necessary to deepen and expand the physico - chemical analyzes of honey in order to preserve its valuable qualities and prevent its adulteration. The present study aims to determine some physicochemical parameters in Bulgarian bee honey and to compile and compare regression models defining the relation between physicochemical parameters and the types of honey.

The study is based on an experiment conducted during the 2019 beekeeping season. A total of 89 bee honey samples of different botanical origins (acacia, coriander, limetree, rapeseed, sunflower, and multifloral honey) were collected from apiaries located on the territory of the Republic of Bulgaria. To determine the botanical origin pollen analysis was performed at the Central Scientific Research laboratory at Trakia University, Bulgaria. The following physico-chemical parameters were studied: glucose + fructose (%) via liquid chromatography, and the detector used is differential rafractometer; active acidity (pH) by pH-meter; electrical conductivity (µS/cm) by Conductometer with an electrical conductivity cell; refraction index and water content (%) by Abbe refractometer. Multivariate data analysis was applied to develop predictive regression models defining the connection between physico-chemical parameters and the type of honey. Four types of models were compared (linear, logarithmic, compound, and power) at $p < 0.05$.

It was found that for the parameters pH and electrical conductivity the most suitable is the compound model. The determination coefficients (R^2) showed that 4.7% of the variation in the data of the pH parameter and 14.5% of the electrical conductivity are accounted for by the type of honey. For fructose and glucose content, respectively, 15.6% of the variations depend on the type of honey. They are best described by the linear model. No statistically significant models have been found for the parameters water content and refractive index.

Studies can continue in the direction of searching for suitable models to describe the relation between these two parameters and the type of honey.

***Key words**: Honey, Physico-chemical parameters, Multivariate data analysis.*