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DETERMINATION OF THE CALORIFIC VALUE OF PLANT MATERIAL AND CHARCOAL

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It has been shown that the calorific value of plant material is related to its elemental composition, in particular the content of carbon, hydrogen and oxygen. Different types of plant material are characterized by different elemental compositions and, therefore, have different calorific values. The *purpose of the work presented in this article was to establish the relationship between the data of rapid analysis (moisture, ash content, volatile matter yield, non-volatile carbon content) and elemental (carbon, hydrogen, nitrogen, sulfur, oxygen) composition of various types of plant material and charcoal with the value of their higher heating value, as well as the impact of changes in the indicators of technical and elemental analysis on the value of the higher heating value of the studied samples. For the analysis, we used a unique database containing information on the composition and properties of plant material that can be used for the production of biogas, charcoal and torrefied biomass. A total of 362 samples were analyzed.*

Mathematical dependencies for predicting the higher calorific value of vegetable raw materials and charcoal based on the carbon and oxygen content and the atomic ratios between carbon and oxygen were developed. A statistical analysis of the relationship between the indicators of technical and elemental analyses, as well as the calorific value of 73 charcoal samples was carried out. The analysis of the studied dependencies has shown that they are generally characterized by satisfactory accuracy, as evidenced by the high values of the correlation and determination coefficients. Based on the data obtained, it can be concluded that the calorific value can be predicted with satisfactory accuracy based on the data on the yield of volatile substances or non-volatile carbon. The coefficient of determination in this case is 0,8002.

Key words: vegetable raw materials, biomass, charcoal, elemental composition, quality indicators, calorific value, mathematical dependencies.

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