

Abstract

Waste biomass from plant production is an important raw material for the production of energy from renewable sources in Poland. Capabilities and technologies of processing are still being improved and modernized in order to achieve the most favorable energy efficiency.

The study assesses the energy properties of wheat straw, rape straw and willow grown in different agronomic conditions. Wheat and rape straw were taken from crops being on soils class II and IIIa. Willow samples were collected from crops with different growth cycles - 2 and 3 years. Researched biomass was heat-treated - torrefaction process at temperatures of 220, 240, 260, 280 and 300°C for 60, 75 and 90 minutes. A comparison of raw biomass and manufactured biochars was made. Materials were analyzed and compared towards the content of moisture, biogenic elements N, C, H, fuel value and the content of ash and volatile substances. There has also been study to assess the granulometric composition of studied biomass and chemical composition, namely the content of such elements as Ca, K, Mg, P, Mn, S, Fe and Zn, which have a significant impact on the alternative, in relation to energy, possibilities of using biochars. The analysis of the results made it possible to nominate optimal parameters for carrying out the torrefaction process and to assess the impact of agronomic factors on the quality of the harvested material.

This information will enable the development of biomass thermal treatment technologies towards the use of waste biomass from agricultural production.