A PRELIMINARY EVALUATION OF ALTERNATIVE RAW MATERIALS FOR PELLET PRODUCTION

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Abstract – The study focuses on alternative raw materials available in Latvia and their possible use in pellet production. Laboratory testing to determine the main quality parameters – the moisture content, the ash content, the calorific value and ash melting temperature – was carried out for 13 alternative biomass sources: pine mix pellets (PMP); pellets of wood shavings, synthetic and textile waste mix (SSK); hogweed (*Heracleum sosnowsky*, HW); the full plant of *Solidago canadensis L.* (SC); the full plant of *Solidago canadensis L.* outgrown (SCO); mowed grass from the municipality (MGM); mowed grass from the garden (MGG); chamomile full plant without stems (CF); hemp without roots (*Cannabis sativa L.,* HWR); hemp stems (*Cannabis sativa L.,* HS); hemp leaves with seeds (*Cannabis sativa L.,* HLS); spent grain (SG); damaged spent grain (DSG). The testing and determination of results were carried out according to the methodology set out in ISO standards regarding solid biofuels. The obtained results were compared to the quality parameters defined in *ENplus* certification for *B-class* wood pellets in requirements for producers. Additional analysis of chemical composition was carried out using XRD *(X-ray diffraction)* and SEM-EDX *(scanning electron microscopy – energy dispersive X-ray spectroscopy)* for the ash of two selected materials – SC and HLS – to gain an insight into possible combustion issues that can occur during the use of these materials. The main issue highlighted by the results is the ash content of alternative materials, which ranges from 1.34 % to 11.27 %. The other significant issue is the necessity to improve the ash deformation temperature, which was below 1100 °C for 5 of the studied materials. Considering this, an algorithm was developed to determine the optimal proportion of alternative material and wood in pellets to achieve a quality comparable to at least *B-class* wood pellets. The study offers a direction for further research to successfully develop new pellets that could be later used in existing boiler systems, reducing the dependence on wood in pellet production. A discussion on the use, quality and development of alternative material pellets is offered to promote the significance of the topic.

Keywords – Alternative biofuels; ash content; ash melting; biomass pellets; calorific value; chemical composition; energy; moisture content
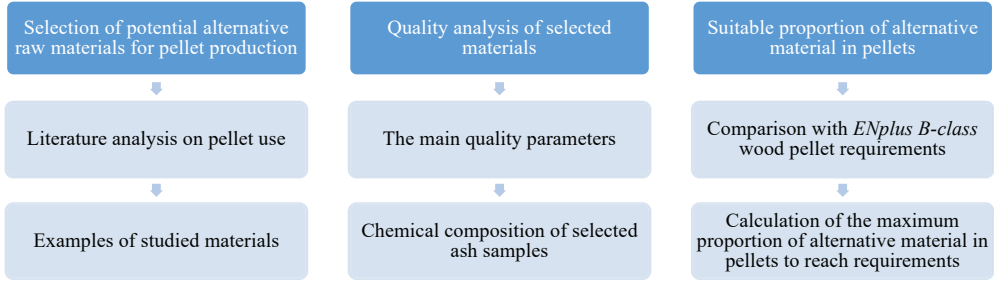
The algorithm of the study.

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