

1. Streszczenie w języku angielskim + słowa kluczowe

Poland is a country with a relatively high production of fruits and vegetables. Based on the data prepared by Central Statistical Office (GUS), in 2020 in Poland fruit harvests reached 4.2 million tons – where apples themselves contributed 3.4 million tons, with vegetables reaching 4.1 million tons. Based on the available sources, approximately 60% of fruits and 10-30% of vegetables go to processing, which results in significant amounts of waste materials, mainly in the form of pomace, that require immediate handling due to environmental safety.

Based on this information, there is a need of handling these waste materials in the fastest possible way by processing them using methods that prevent the pomace from developing microbiological activity and thus, preserve their functional properties implied by bioactive potential. One of the processing methods that guarantee the microbiological stability of plant-derived materials, is drying. This procedure removes water from the material of a given moisture to extend the life of the product during storage. Drying inhibits the growth of microorganisms and biochemical processes, as well as prevents physical and chemical changes, thus providing microbiological safety of the product. That makes the drying process one of the most important technological processes in the agri-food industry. Despite the abovementioned benefits, drying can cause multiple unfavorable changes in the quality of the product assessed based on the physio-chemical properties of plant material. Therefore, optimization of the drying process through proper selection of temperatures, microwave power, partial drying time, or any other pretreatment that can affect e.g. shortening the drying time, is necessary and of great importance in terms of energy saving.

The present study was therefore undertaken in order to optimize the drying process of waste materials delivered from the fruit and vegetable industry based on pomace examples from blueberries (3 varieties), cranberries, and red beets, taking into account functional additives in the form of fresh raw materials particles with various share (% of weight) in pomace samples to increase native compounds content from virgin raw material. The quality of dried samples was assessed based on their physical and chemical properties, such as color parameters, water activity, bulk density, total phenolics concentration, and antioxidant capacity.

The drying methods used were: convective drying, freeze-drying, microwave-vacuum drying, and combined drying using convective drying, and followed by vacuum-microwave drying. Selected drying processes were repeated in three technological replications with the

application of different processing parameters, such as drying temperature, magnetrons power, time of convective pre-drying, and power of vacuum-microwave post-drying in the combined drying method.

Obtained results show that high temperature and long processing time with a low temperature in convective drying, as well as a high power of magnetrons in microwave-vacuum drying, decreased the antioxidant activity of pomace from blueberries, which greatly depended on the variety itself as well. In convective drying of root beet cubes and composition based on root beet pomace with root beet cubes, the high temperature increased retention of phenolic compounds in opposite to convective drying with the amendment of apple cubes. On the other hand, increasing the power of magnetrons during microwave-vacuum drying of root beet pomace affected slight degradation of phenolic compounds and reduced their retention in composition with root beet cubes or apple cubes. It was noted that osmotic dehydration in concentrated juice from chokeberry is a suitable pre-treatment method for increasing the bioactive potential of composition based on pomace and fruits

Key words: Pomace, fruits, vegetables, drying, antioxidant capacity