

Many authors use freeze-dried fruit pomace to improve the nutritional and health value of cookies without investigating whether the application of a significantly cheaper and more common dehydration method, such as convective or contact drying, could have a similar impact on the quality and nutraceutical value of the cookies. During baking, shortbread cookies are subjected to high-temperature thermal processing, which can result in significant degradation of bioactive compounds. This raises the question of whether and when the energy-intensive and time-consuming method of obtaining fruit powders through freeze-drying is justified. The aim of the project is to determine whether freeze-dried fruit pomace has a similar impact on the antioxidant properties and potential bioaccessibility of bioactive compounds in thermally processed food (crispy cookies) enriched with dehydrated fruit powders under different conditions compared to the classical method of contact drying.

In recent years, the issue of managing waste from food processing has become a significant challenge, especially considering the growing concerns about malnutrition and depletion of natural resources. Large quantities of fruit waste, such as pomace, are often disposed of in landfills, leading to serious environmental issues and potential threats to human health and aquatic ecosystems. Therefore, minimizing waste generation and implementing effective waste management strategies have become crucial for promoting sustainable development in the food industry. Approximately 50% of the world's fruit harvest is processed into juice, leaving behind pomace, which accounts for 10% to 35% of the input raw material mass. Fruit pomace is a rich source of fiber and a concentrate of many bioactive compounds. There have been several studies on the potential use of fruit pomace as functional additives in cookies. Shortbread cookies are among the most popular grain products. During baking, they undergo high-temperature processing, which often leads to the degradation of bioactive compounds. Currently, there are no studies in the available literature that analyze the enrichment of cookies with dehydrated fruit powders under different conditions and determine which powder production method is optimal in terms of obtaining a final product (cookies) with the best nutritional and consumer quality. To address this issue, pomace from apples, plums, and strawberries will be subjected to freeze-drying and contact drying, using variable dehydration temperatures. From the prepared pomace, powders will be produced, and their physicochemical properties will be analyzed to determine the best-quality material for food enrichment. The obtained powders will then be used as functional additives in shortbread cookies. Evaluation of the antioxidant activity of the cookies, potential bioaccessibility of bioactive compounds, quantitative and qualitative analysis of phenolic compounds, and sensory evaluation of the cookies will allow determining the extent to which the drying conditions of fruit pomace determine their physicochemical properties and how powders from fruit pomace obtained under different conditions and subjected to secondary thermal processing in a food matrix affect the nutritional value, health-promoting properties, and consumer acceptance of cookies. This knowledge will contribute to understanding the impact of the initial and secondary thermal processing of pomace on the nutraceutical potential of food and will enable the selection of optimal processing conditions for their use as functional additives in food products.