

SPRAY DRYING PRESERVATION: ENHANCING STABILITY OF BLACK ELDERBERRY POMACE POLYPHENOLS-RICH EXTRACTS

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Recycling waste from elderberry juice production is an important practice due to the high content of valuable compounds such as anthocyanins, flavonols, and phenolic acids, which are known for their health benefits and distinctive taste and color. This approach not only helps to reduce environmental impact by minimizing food waste but also creates economic value by transforming waste into high-quality products. Following an optimized extraction of elderberry pomace using ultrasound-assisted technology, a spray drying process was carried out. In this process, carriers, including maltodextrin (MD) and gum arabic (GA), were used in different ratios relative to the dry mass of the extract (100% MD; 80% MD and 20% GA; 60% MD and 40% GA; 40% MD and 60% GA; 20% MD and 80% GA; 100% GA), while the other process parameters were kept constant. The resulting powders were analyzed both physically and chemically. Among the different formulations, the powder produced with 100% maltodextrin showed the highest encapsulation efficiency. This formulation successfully retained 93.54% of cyanidin 3-O-glucoside (14.20 mg/g powder) and 91.60% of cyanidin 3-O-sambubioside (17.55 mg/g powder), which are the predominant compounds in elderberry fruit. Scanning electron microscopy showed that the spray-dried powders consisted of spherical particles on a microscopic scale. Microencapsulation significantly improved the stability of the extract and protected the polyphenolic compounds from degradation. The encapsulated elderberry pomace extract has the potential to serve as a natural flavor and color enhancer for finished products while contributing to a high polyphenol content. This innovation not only maximizes the utilization of elderberry waste but also increases the value of the product.

Keywords: elderberry fruit pomace, spray drying, polyphenols, anthocyanins, SEM

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