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Sea Buckthorn Seeds Recovered from Pomace: Compositional, Colour and Antioxidant Characterization

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Abstract

Sea buckthorn (*Hippophae rhamnoides* L.) pomace represents a potential source of valuable food ingredients. This study characterized sea buckthorn seed powder (SBSP) recovered from dried pomace in terms of proximate composition, colour, total phenolic content (TPC), and antioxidant activity (DPPH and FRAP). SBSP contained 4.51% moisture, 70.61% carbohydrates, 16.51% protein, 10.92% fat, and 1.95% ash. Colour analysis indicated a predominant yellow component (b* = 20.41; h° = 77.19), with an L* value of 59.74. TPC reached 27.13 mg GAE/g d.w., while FRAP and DPPH values were 234.70 µmol Fe^{2+}/g d.w. and 80.84%, respectively. These findings highlight the nutritional and antioxidant potential of SBSP and support its valorization as a promising ingredient for functional food development.

Keywords: sea buckthorn pomace; seed recovery; by-product valorization; nutritional composition; antioxidant capacity.

• Introduction

Sea buckthorn (*Hippophae rhamnoides* L.) processing generates pomace containing peel, pulp residues, and seeds, whose valorization contributes to reducing food-processing waste. Sea buckthorn seeds contain nutritionally relevant amounts of proteins, lipids, minerals, and phenolic compounds associated with antioxidant activity. Previous studies have mainly focused on seed oil, lipid composition, and phenolic extracts, while the characterization of whole seed powder remains less explored. Therefore, this study aimed to characterize sea buckthorn seed powder (SBSP) recovered from dried pomace by evaluating its proximate composition, CIELAB colour parameters, total phenolic content (TPC), and antioxidant activity (DPPH and FRAP), highlighting its potential as a value-added food ingredient.

Materials and Methods

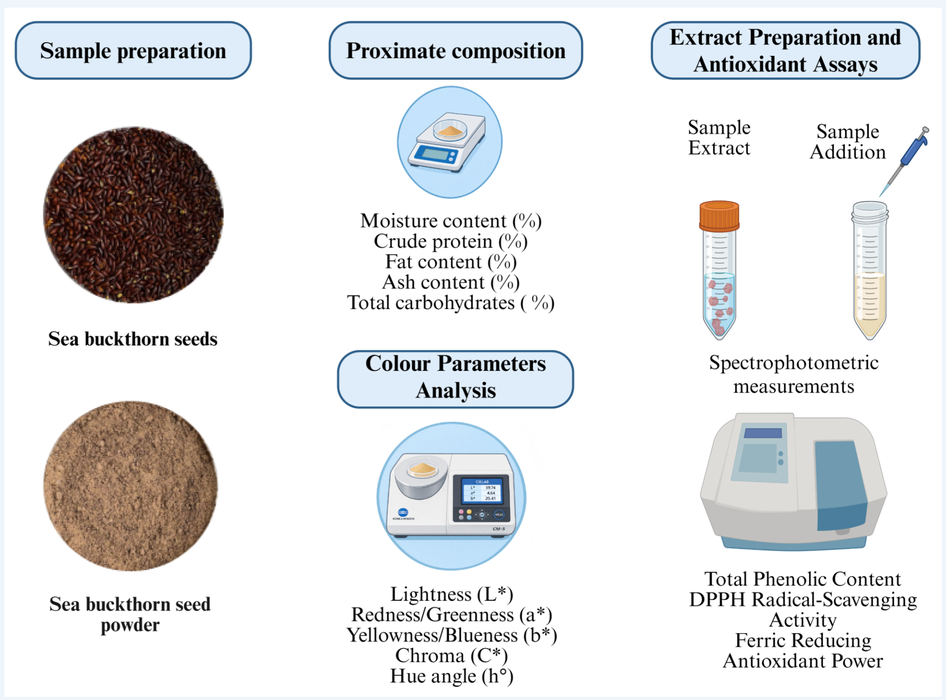


Figure 1. Schematic representation of sample preparation and analytical methods used for the characterization of sea buckthorn seed powder.
(Created with BioRender.com; photographs of seeds and seed powder: authors’ own images.)

• Results and Discussion

The compositional analysis of SBSP revealed a carbohydrate-dominated profile, together with appreciable protein and lipid contents, highlighting the nutritional relevance of the recovered seed fraction.

The powder also exhibited a low residual moisture content. The CIELAB colour analysis indicated intermediate lightness and a predominance of the yellow component, consistent with the yellow-brown appearance of SBSP.

The measured TPC, together with DPPH and FRAP results, indicated phenolic content and antioxidant activity, as reflected by considerable radical-scavenging and ferric-reducing capacities. These findings highlight the potential of SBSP as a source of nutritionally relevant constituents with antioxidant properties.

• Conclusions

SBSP exhibited a carbohydrate-dominated composition, with appreciable protein and lipid contents, highlighting its nutritional relevance.

The CIELAB colour profile revealed intermediate lightness and a predominance of yellow tones, consistent with the visual appearance of the powder.

The phenolic content, together with the DPPH radical-scavenging activity and ferric-reducing capacity, demonstrated the antioxidant potential of SBSP.

These findings support the potential use of SBSP as a food ingredient, warranting further studies on its functionality, sensory properties, and stability.