

INTRODUCTION

Elderberry (*Sambucus nigra* L.) is a valuable source of anthocyanins, polyphenols, organic acids and other bioactive compounds, with potential applications as a natural food colorant and antioxidant agent. The chemical composition of elderberries can be influenced by the harvesting area, harvest year and storage method.

AIM

This study aims to identify the most effective storage methods and optimal harvest areas for preserving the bioactive compounds of *Sambucus nigra* L. fruits.

MATERIALS AND METHODS

Sampling

Săcălaia (S)

Hășdate (H)

Harvest years: 2023 and 2024

Elderberry fruits (ripe, destemmed, washed)

Storage methods

Frozen (C)

Lyophilized (L)

Dried at 70 °C (U)

Boiled (20–25 min) + dried at 70 °C (FU)

Analyses

Carbohydrates (HPLC-RID)

Organic acids (HPLC-RID)

Phenolic acids (HPLC-DAD-ESI)

Flavonoids (HPLC-DAD-ESI)

Anthocyanins (HPLC-DAD-ESI)

CHEMICAL COMPOSITION AND CHARACTERIZATION OF BIOACTIVE PROPERTIES OF ELDERBERRY (*Sambucus nigra* L.)

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RESULTS

Total carbohydrate content

- Lyophilized samples showed the highest carbohydrate content.
- Highest value: H24L – 312.30 ± 12.49 mg/g.
- Lowest value: S23C – 61.20 ± 2.45 mg/g.
- Fructose was generally the predominant carbohydrate.

Total organic acid content

- Citric acid was the predominant organic acid.
- Lyophilized samples showed the highest concentrations.
- Highest value: H24L – 16.29 ± 0.88 mg/g.
- Lowest value: S23FU – 4.07 ± 0.22 mg/g.

Total phenolic acids

- A total of 17 phenolic compounds were identified.
- Lyophilized samples showed significantly higher phenolic acid contents than frozen samples.
- Highest value: S23L – 7,418.51 ± 380 µg/g.
- Lowest value: H24C – 2,175.65 ± 115 µg/g.
- 3-caffeoylquinic acid was the most abundant compound.

Total flavonoids

- Procyanidin dimer showed the highest concentrations among flavonoids.
- Săcălaia samples generally showed higher flavonoid values.
- Highest value: S23L – 18,705.57 ± 800 µg/g.
- Lowest value: H24C – 4,915.36 ± 210 µg/g.

Total anthocyanins

- Three main anthocyanins were identified: cyanidin-sambubioside-glucoside, cyanidin-glucoside and cyanidin-sambubioside.
- Cyanidin-sambubioside was the predominant anthocyanin.
- Highest value: S23L – 11,840.33 ± 540 µg/g.
- Lowest value: H24U – 1,467.04 ± 70 µg/g.

CONCLUSIONS

- Freeze-drying proved to be the most advantageous preservation method for maintaining the bioactive compounds of elderberry fruits.
- Lyophilized samples generally preserved higher levels of carbohydrates, organic acids, phenolic acids, flavonoids and anthocyanins compared with frozen and dried samples.
- Săcălaia samples showed a slightly more favorable phytochemical profile, particularly for phenolic compounds.
- The results highlight the potential of lyophilized elderberries as a valuable source of bioactive compounds for food applications, including natural coloring and antioxidant functionality.