CHEMICAL COMPOSITION OF COMMERCIALLY AVAILABLE BILBERRY-BASED JUICES

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INTRODUCTION

- **Superfruit juices** – consumption has risen globally
- The consumption of fresh raw and commercially available bilberry juices:
  - becoming a part of a healthy lifestyle
  - biological effects of naturally occurring phenolics in berries
- **Assessing the quality and safety** of food products (especially the ones considered as health beneficial) - of great importance

AIM - determination of total phenolic content (TPC)
total monomeric anthocyanin content (TAcy)
antioxidant activities
hydroxymethylfurfural (HMF) content
patulin content
the content of elements
} commercially available bilberry-based juices

MATERIALS AND METHODS

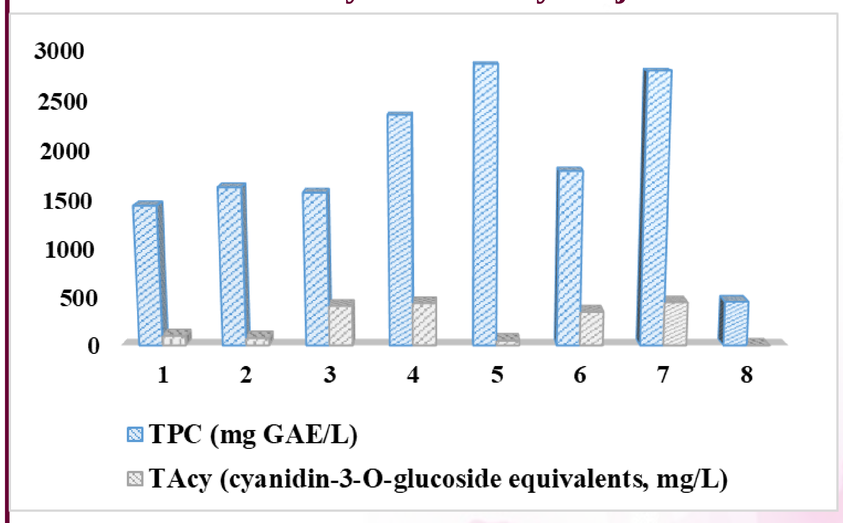
8 tested commercially available bilberry-based juices contained:

1-6: 100% of bilberry juice,
7: 55% of bilberry juice, 35.1% of *Melissa officinalis* extract and 9.9% agave syrup,
8: 35% of bilberry pulp and 65% of apple juice.

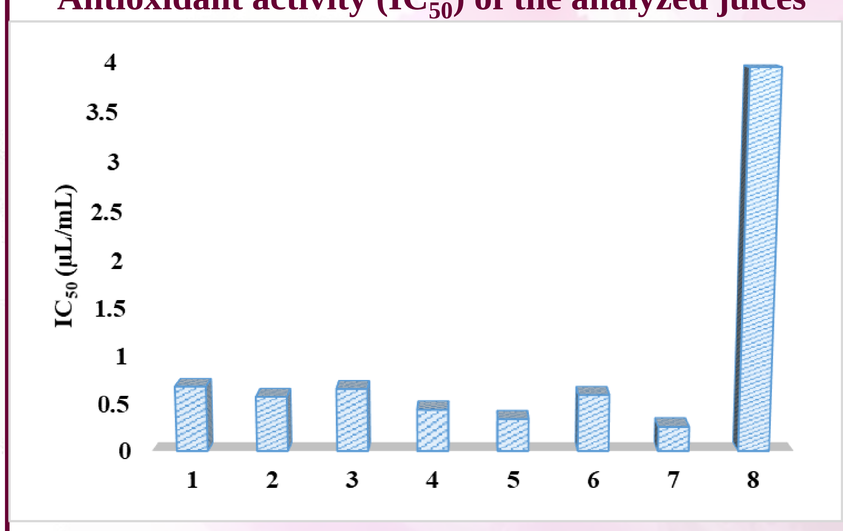
- **TPC - Folin-Ciocalteu method**
- **(TAcy) - pH differential method**
- ***In vitro* antioxidant activity - DPPH radical assay**
- **HMF and patulin - HPLC** methods
- Fifteen **elements - ICP-MS** method (nutritionally important minerals were not included)

RESULTS

TPC and TAcy of the analyzed juices



Antioxidant activity (IC_{50}) of the analyzed juices



- All samples except the one with 35% of bilberry pulp were rich in phenolic compounds and anthocyanins.
- **High antioxidant capacities** confirmed in the samples with **high total phenolic content and total monomeric anthocyanins**.

HMF and patulin content in the analyzed juices

Sample	HMF (mg/L)	Patulin (µg/kg)
1	16.6	< LOQ
2	1.5	< LOQ
3	0.4	< LOQ
4	2.3	< LOQ
5	5.5	3
6	1.3	< LOQ
7	4.1	< LOQ
8	17.9	< LOQ

- According to declarations natural composition of fresh juice has been mostly preserved (all the samples were pasteurized and without preservatives)
- **The HMF content in juices meets the regulation** (≤ **20 mg/L;** The Law on Food Safety of RS) ⟶ **thermal processing of juices (as indicated on the labels).**
- Mycotoxin **patulin content meets the regulation** (≤ **50 µg/kg;** EC and The Law on Food Safety of RS) ⟶ **good quality raw material used in juice manufacture.**

Content of elements (µg/L) in the analyzed juices

Sample	Pb	B	Al	Co	Ba
1	< LOQ	43	53	8	16
2	< LOQ	< LOQ	68	< LOQ	20
3	2	< LOQ	40	< LOQ	8
4	< LOQ	< LOQ	54	8	12
5	1	24	223	12	34
6	< LOQ	< LOQ	93	< LOQ	4
7	< LOQ	< LOQ	32	< LOQ	19
8	< LOQ	17	36	< LOQ	8

- 15 selected elements were analyzed.
- The amount of **Be, V, Ni, As, Cd, Sn, Sb, Te, Hg and Tl** was **under the limit of quantification in all samples**.
- Low amounts of **Pb** were found in two samples, but **below allowable level (≤ 50 µg/L;** FDA).
- The levels of **B** are **in accordance** with the recommendations - the lifetime exposure to **1 mg/L B in drinking water** is not expected to cause any adverse effects (U.S. Environmental Protection Agency).
- **Al** content was **in accordance** with the recommendations - a health-based guidance value for aluminum **in drinking water is 0.9 mg/L** (WHO).

CONCLUSIONS

- Commercially available bilberry-based juices can be **important sources of potent antioxidants**, such as phenolic compounds and anthocyanins in human diet.
- The HMF, patulin and content of elements were below allowable level, suggesting **acceptable quality and safety** of the analyzed health beneficial food products.

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