Chokeberry and blackcurrant pomace – valuable bio-waste as a source of bioactive ingredients

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Chemical characteristics of the raw material and pomace of chokeberry and blackcurrant

Prameters	Units	CHOKEBERRY		BLACKCURRANT	
		FRUIT	POMACE	FRUIT	POMACE
Dry mass	%	21,3	46,1	22,5	45,6
Anthocyanins	mg/100 g	466 (36%)	1100	252 (79%)	314
Phenolic compounds	mg/100 g	1295	2759	320	651
Ascorbic acid	mg/100 g	-	-	266	142
Sugar	g/100 g	11,2	7,63	9,85	7,01
Total fibre	g/100 g	5,47	27,7	7,58	29,4
Anthocyanin balance – RESIDUES IN THE POMACE		44,2%		21,0%	

Materials & Methods

Eating habits – raw/ processed ???

Processing challenges–
- **Presence of pectin**
- **Compact, leathery skin**

Pre-treatment

Heating 50°C

Heating 50°C/ enzyme

A compromise between the obtained juice extraction efficiency and the loss of valuable ingredients.

Chokeberry pomace

Blackcurrant pomace

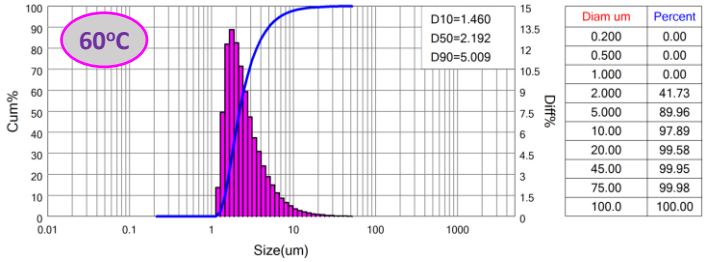
The research was carried out as part of a grant from the Ministry of Agriculture and Rural Development, Task 9.2: „Support for processing in the comprehensive management of berry fruit".

Aims

Development of a method for obtaining fiber-anthocyanin preparations from berry pomace.

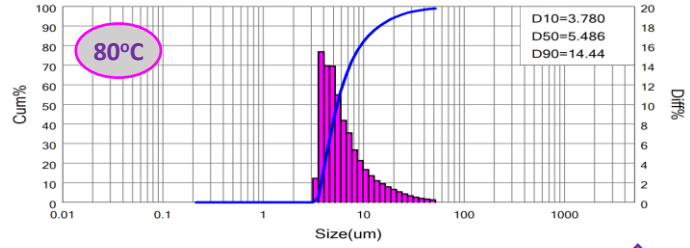
Our research investigated the effect of drying at 60 °C and 80 °C and micronization on polyphenolics, minerals and fibre content in dried chokeberry and blackcurrant pomace.

Figure: *Particle size distribution in micronized chokeberry pomace preparations, dried at 60°C and 80°C, laser diffraction method (Bettersizer S3).*



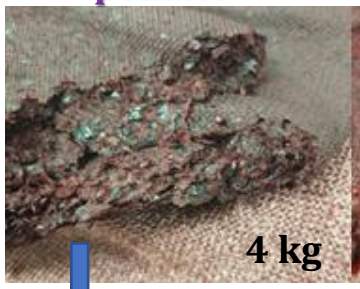
Diam um	Percent
0.200	0.00
0.500	0.00
1.000	0.00
2.000	41.73
5.000	89.96
10.00	97.89
20.00	99.58
45.00	99.95
75.00	99.98
100.0	100.00

Results: Preparations obtained from pomace dried at 60 °C are characterized by a higher proportion of smaller particles (89-90% of particles below 5 µm) than preparations obtained from pomace dried at 80 °C (82-89% of particles below 10 µm).

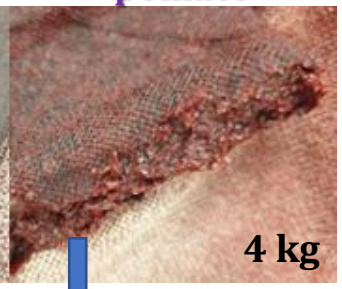


Diam um	Percent
2.000	0.00
5.000	41.20
10.00	82.20
20.00	94.25
45.00	98.65
75.00	99.44
100.0	99.68
200.0	99.94
300.0	99.98
400.0	100.00

ChB - Chokeberry pomace



BC - Blackcurrant pomace



Convective drying at 60 °C

Convective drying at 80 °C

Drying Time [min] – 240_{60oC} /180_{80oC} Constant weight

310_{60oC} /180_{80oC}

The dried pomaces were ground in a micronizer using a 1 mm sieve for the first grinding and a 0.5 mm sieve for the second one.

a_w: $0,09_{ChB}$ / $0,16_{CB}$

Anth $_{[mg/100g]}$:2013_{ChB} / 939_{CB}

a_w: $0,05_{ChB}$ / $0,09_{CB}$

Anth $_{[mg/100g]}$:2079_{ChB} / 918_{CB}

Micronized dried pomace Chokeberry & blackcurrant

60°C

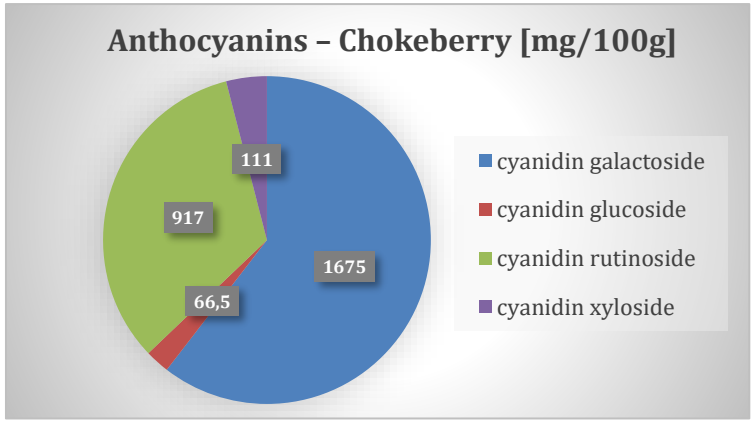
80°C

Micronizer – SR 300 Hammer Mill

Results

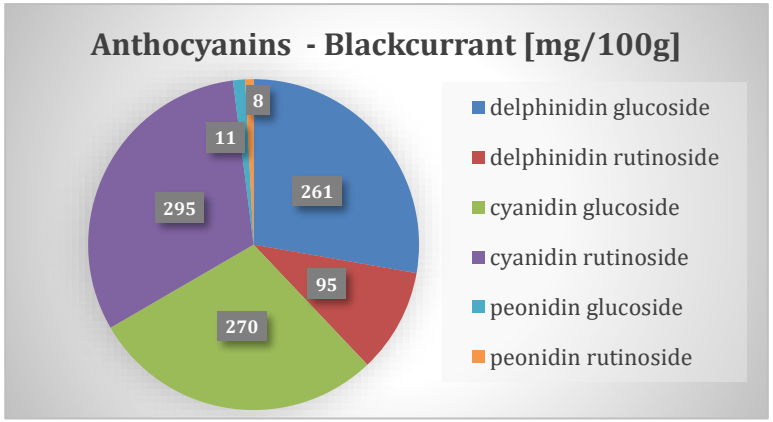
Micronized preparation of chokeberry

Parameter	Unit	Content
Dry mass	%	97.6
Total Anthocyanins	mg/100g	2770
Total Phenolics	mg/100g	3075
Ascorbic acid	mg/100g	-
Sugars	g/100g	16.2
Fibre TDF	g/100g	60.0
Fibre IDF	g/100g	51.0
Fibre SDF	g/100g	9.0
Calcium (Ca)	mg/100g	193
Potassium (K)	mg/100g	604
Magnesium (Mg)	mg/100g	68.7
Phosphorus (P)	mg/100g	175
Copper (Cu)	mg/100g	1.10
Iron (Fe)	mg/100g	4.46
Manganese (Mn)	mg/100g	3.23



Micronized preparation of blackcurrant

Parameter	Unit	Content
Dry mass	%	97.5
Total Anthocyanins	mg/100g	939
Total Phenolics	mg/100g	1006
Ascorbic acid	mg/100g	471
Sugars	g/100g	19.9
Fibre TDF	g/100g	54.2
Fibre IDF	g/100g	46.9
Fibre SDF	g/100g	7.3
Calcium (Ca)	mg/100g	184
Potassium (K)	mg/100g	797
Magnesium (Mg)	mg/100g	45.8
Phosphorus (P)	mg/100g	216
Copper (Cu)	mg/100g	0.90
Iron (Fe)	mg/100g	3.36
Manganese (Mn)	mg/100g	1.74



An excellent **source of fiber** (60-54 g/100 g), a significant portion of which is insoluble fiber (IDF – 51-47 g/100 g).

Mineral composition:

Chokeberry

- significant amounts (>15% RDA): calcium, magnesium, phosphorus,
- high content (>30% RDA): potassium, copper, iron, and manganese.

Blackcurrant

- significant amounts (>15% RDA): calcium, iron
- high content (>30% RDA): potassium, phosphorus, copper, magnesium.

Conclusion

The characteristics of the chemical composition of the micronized preparation of chokeberry and blackcurrant pomace confirmed that these products are an excellent source of anthocyanins, fiber, as well as minerals, which also gives them high nutritional properties. Additionally, the micronized preparation of blackcurrant pomace is rich in vitamin C. Products made from dried chokeberry and blackcurrant pomace may be interesting for use in food, pharmaceutical and cosmetics products.