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FRUIT POWDER AS A SOURCE AF HIGH-VALUE BIOACTIVE COMPOUNDS WITH ANTIOXIDANT POTENTIAL FOR FOOD APPLICATIONS

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Abstract

The hypothesis behind this research is that the bioactive substances from fruit have the potential to be exploited in a wide range of food applications. This study evaluated the bioactive potential of fruit powders obtained from the dehydration of sour cherries (SC), blackcurrants (BC) and cranberries (C) to highlight their suitability for use as functional food ingredients. The dehydration process was slowly carried out under controlled temperature and time conditions at a moderate temperature of 60°C for a total period of 15 hours. After conditioning, the resulting dried fruit was ground and the resulting powder, with a moisture content below 5%, was labelled according to the corresponding fruit as SCP, BCP and CP. The antioxidant properties were investigated in terms of total phenolic, total monomeric anthocyanins and ascorbic acid content, as well as 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity and the ferric reducing antioxidant power (FRAP). The resulting losses in antioxidant characteristics, as an effect of the dehydration, were also discussed. Assessing the impact of the dehydration process on the antioxidant characteristics of the fruits investigated, losses of about 30% compared to fresh fruit were observed, showing that SCP, BCP and CP are still sources of high value bioactive compounds. The highest content of bioactive compounds was recorded by BC, followed by C and SC. This finding was also observed for the powder obtained by the fruits dehydration. Antioxidant properties of fresh and dehydrated fruit followed the same trend as bioactive compounds. The results demonstrate that further incorporation of these powders into food recipes has good prospects of improving nutritional properties, functionality and extending shelf life.

Keywords: *sour cherries, blackcurrants, cranberries, fruit powder, bioactive compounds, antioxidant properties*

• Introduction

Due to the negative health effects of synthetic antioxidants in the meat industry, alternatives are being sought to combat these problems, namely the use of natural antioxidants such as fruits, vegetables, herbs, spices, in addition to increasing the health promoting bioactive components. Red fruits are among the best food sources of bioactive compounds. They have a delicious taste and aroma, are economically important and, due to the antioxidant properties of bioactive compounds, are also of particular interest to nutritionists and food technologists because of the opportunity to use bioactive compounds as functional food ingredients. The bioactive compounds in fruits such as sour cherries (SC), blackcurrants (B) and cranberries (C) contain mainly phenolic compounds (phenolic acids, flavonoids such as anthocyanins and flavonols, and tannins) and ascorbic acid.

• Material and method

Fruit such as sour cherries (SC), cranberries(C) and blackcurrants (BC) were subjected to a slow dehydration process at a temperature of 60°C for a total period of 15 hours and ground, obtaining fruits powder. In order to perform the phytochemical profile assessing of fruits powder, the phenolic content was spectrophotometrically evaluated according to the Folin-Ciocalteu procedure and expressed as mg gallic acid equivalents (GAE)/g dry substance (d.s), the total monomeric anthocyanins content was quantified by pH differential method and expressed in mg cyanidin-3-glucoside (C3G)/100 g d.s and the content of L-ascorbic acid was evaluated following the 2,6-dichlorophenolindophenol titrimetric method. The antioxidant activity of fruits powder was evaluated using a 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay and ferric reducing antioxidant power (FRAP) assay.

• Results and discussions

Figure 1 shows the investigated fruits obtained after the dehydration process.

BC | **C** | **SC**

Figure 1. Dehydrated blackcurrants (BC), cranberries (C) and sour cherries (SC)

Data obtained for bioactive compound content and antioxidant activity of fresh and dried fruit are presented in Table 1.

Table 1. Moisture content, bioactive compound content and antioxidant activity of fresh and dried fruit

Sample	Moisture content (%)	TP (mg GAE/g d.s)	TMA (mg C3G/100 g d.s)	FRAP (μM Fe^{2+}/g d.s)	DPPH (μM TE/g d.s)	AsAc (mg/100 g d.s)
BC	84.19	22.19	1209.85	624.47	432.38	881.77
C	86.59	17.77	949.35	555.92	381.57	100.68
SC	85.43	13.64	750.28	417.29	315.08	78.68
BCP	4.93	15.45	859.04	419.41	307.44	621.09
CP	4.71	12.07	657.31	370.47	278.65	69.47
SCP	4.59	10.01	509.73	294.59	220.71	51.72

After drying for 15 hours at 60°C, the final moisture content of the samples fell below 5%. An advantage of conditioning fruit at a moderate temperature is that, in addition to prolonging their shelf-life due to reduced water content, it also contributes greatly to the retention of bioactive compounds. The highest content of bioactive compounds was recorded by BC, followed by C and SC. This finding was also observed for the powder obtained by dehydration of the fruits investigated. Antioxidant properties of fresh and dehydrated fruit followed the same trend as bioactive compounds (BCP > CP > SCP). Evaluating the impact of the dehydration process on the antioxidant characteristics of the investigated fruits, losses of about 30% compared to fresh fruit were observed. A strong correlation was found between the content of bioactive compounds and the antioxidant activity assessed by FRAP and DPPH methods.

• Conclusions

Our data demonstrate that SCP, BP and CP are valuable sources of high-value bioactive compounds. Antioxidant properties of fresh and dehydrated fruit followed the same trend as bioactive compounds. The results are solid evidence of the bioactive properties of fruit powders and highlight that further incorporation of these powders into various food products has good prospects to improve their functionality.

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