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Characterization of by-products from the production of blackberry juice and liqueur

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INTRODUCTION & AIM

The growing preference for natural additives is driving the recovery of bioactive compounds from food industry by-products. The **objective** of this study was to characterize the powered products obtained from by-products from the blackberry juice and liqueur production industry and evaluate their antioxidant effect.

METHOD

SAMPLES

The residues obtained from two types of by-product (blackberry juice or liqueur) were studied in two ways: as a whole (seeds plus skin, S+S) and considering only the seeds (S). Thus, four samples were analyze.

ANALYSIS

The proximate composition, water activity (a_w), pH, acidity, and phenolic families and antioxidant activity were determined. The capacity to inhibit fat oxidation (Rancimat method) was studied at three concentrations: 4%, 6%, and 8%.

RESULTS & DISCUSSION

Table 1. Nutritional composition and physicochemical parameters

Parameters	JS	JSS	LS	LSS	p-value
Moisture (%)	5.59 ± 0.02 ^{b}	13.15 ± 0.22 ^{d}	2.71 ± 0.19 ^{a}	10.44 ± 0.02 ^{c}	< 0.001
a_w	0.343 ± 0.005 ^{c}	0.266 ± 0.001 ^{b}	0.221 ± 0.000 ^{a}	0.349 ± 0.005 ^{c}	< 0.001
pH	4.13 ± 0.10 ^{b}	3.54 ± 0.01 ^{a}	4.13 ± 0.07 ^{b}	3.67 ± 0.01 ^{a}	0.001
Acidity (g citric acid /100 g w.m.)	0.474 ± 0.018 ^{b}	1.891 ± 0.109 ^{d}	0.205± 0.000 ^{a}	1.432 ± 0.002 ^{c}	< 0.001
Protein (% w.m.)	8.7 ± 0.3 ^{b}	7.3 ± 0.3 ^{a}	8.6 ± 0.3 ^{ab}	10.4 ± 0.4 ^{c}	0.003
Fat (% w.m.)	11.7 ± 0.1 ^{c}	4.3 ± 0.0 ^{a}	12.5 ± 0.0 ^{d}	8.4 ± 0.2 ^{b}	< 0.001
Reducing sugars (g/100 g w.m.)	10.62 ± 1.24 ^{ab}	42.24 ± 6.71 ^{c}	1.50 ± 0.71 ^{a}	21.43 ± 0.09 ^{b}	0.001
Soluble sugars (°Brix)	0.20 ± 0.00 ^{a}	2.20 ± 0.00 ^{c}	0.10 ± 0.00 ^{a}	1.00 ± 0.14 ^{b}	< 0.001
Fiber (% FDT d.m.)	81.6 ± 2.7 ^{c}	28.3 ± 1.1 ^{a}	83.5 ± 3.6 ^{c}	53.4 ± 2.5 ^{b}	< 0.001

The residues containing only seeds (JS and LS) were characterized by a higher fiber and fat content and lower levels of sugars and acidity, respectively, than the residues containing seeds plus skin (JSS and LSS, respectively).

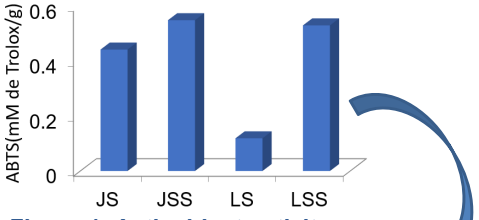

Figure 1: Antioxidant activity

- ✓ The antioxidant activity was higher in the JSS and LSS products.
- ✓ The LS product showed the lowest antioxidant activity, explained by its low polyphenol content and lack of anthocyanins (Table 2).

Table 2. Phenolic compounds

Parameters	JS	JSS	LS	LSS	p-value
Polyphenols	27.205 ± 0.173 ^{b}	27.692 ± 0.177 ^{bc}	16.377 ± 0.001 ^{a}	28.437 ± 0.527 ^{c}	< 0.001
Anthocyanins	0.752 ± 0.026 ^{a}	6.116 ± 0.024 ^{c}	N.D.	2.211 ± 0.010 ^{b}	< 0.001
Catechins	7.309 ± 0.044 ^{c}	4.058 ± 0.173 ^{a}	5.861 ± 0.095 ^{b}	5.957 ± 0.268 ^{b}	< 0.001

- ✓ The content of polyphenols and anthocyanins were higher in the seeds plus skin fraction (JSS and LSS) than in the seeds (JS and LS).
- ✓ The LS product had the lowest polyphenol content, and catechins were not detected.

Figure 2: Fat oxidation inhibition

- ✓ The fat oxidation inhibition capacity was higher in the JSS and LSS products.
- ✓ The higher the concentration, the greater the protection factor in all products, except LS.

CONCLUSION

The studied by-products could be used as functional ingredients in the development of healthier foods due to their high content of polyphenols with proven antioxidant activity.

ACKNOWLEDGMENT

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