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PTFOS

BROWN ONION SKIN AS A SOURCE OF QUERCETIN

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INTRODUCTION:

Large amounts of bioactive compounds of the flavonol group remain in the brown onion skin, which represents waste biomass in an amount slightly greater than one-third of the mass of the processed red onion. Quercetin 4'-glucoside and quercetin 3,4'-diglucoside are the major flavonols (flavonoid subgroup) of the brown onion skin. In view of this, brown onion skin was tested as a potential source of high value bioactive components by performing a subcritical sequential batch extraction. Ethanol at concentrations of 96%, 75%, and 50%, and water were used to extract the components from brown onion skin. Prior to subcritical extraction, the brown onion skin samples were defatted with an automated extraction device (SoxROC) using n-hexane as solvent and 1.26 ± 0.30 g/100 g dry weight was extracted from the brown onion skin. The extracts from the brown onion skin after subcritical sequential batch extraction were analyzed for percent dry matter, with a total of 15% extracted, as indirectly indicated by the colours of the extracts obtained (Figure 1). Ethanol and water extracts of brown onion skin were analyzed for their polyphenolic profile using the HPLC-PDA method.

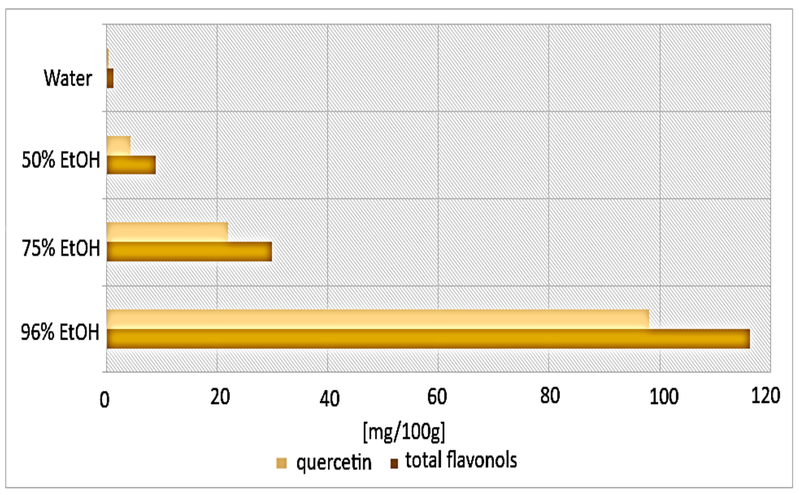


Figure 2: Distribution of polyphenols of brown onion skin in extracts after subcritical extraction of brown onion skin

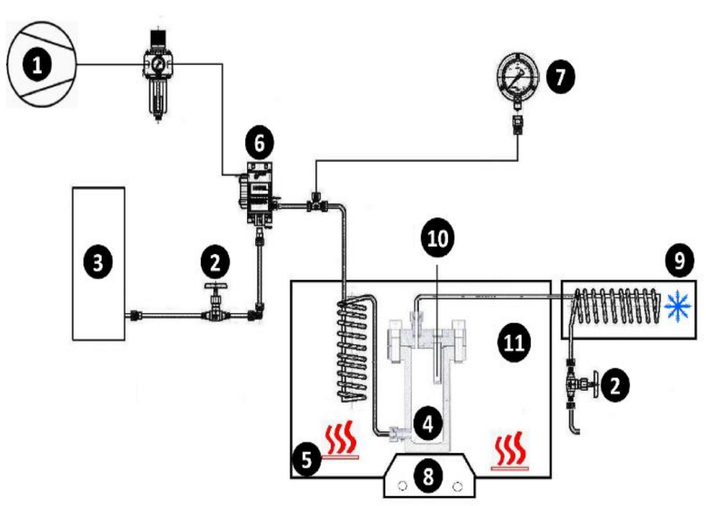
HPLC IDENTIFICATION

Table 1: Chemical composition of extracts after sequential extraction of brown onion skin. Extraction solvent: 96% ethanol (1), 75% ethanol (2), 50% ethanol (3), water (4)

Solvent	Total polyphenols [g/100 g]	Total flavonoids [g/100 g]	Soluble proteins [g/100 g]	Total sugars [g/100 g]
96 % EtOH	4,25 ± 0,30	5,26 ± 0,47	1,59 ± 0,11	0,61 ± 0,05
75% EtOH	2,51 ± 0,38	1,92 ± 0,17	1,14 ± 0,06	0,71 ± 0,08
50 % EtOH	1,07 ± 0,09	0,63 ± 0,07	0,52 ± 0,04	0,75 ± 0,05
Water	0,57 ± 0,11	0,35 ± 0,16	0,22 ± 0,11	2,04 ± 0,10
Total	**8,40 ± 0,38**	**8,16 ± 0,47**	**3,47 ± 0,11**	**4,11 ± 0,10**

BROWN ONION SKIN

SEQUENTIAL SUBCRITICAL EXTRACTION



Schematic presentation of constructed continuous solvent flow subcritical extraction system. Legend: 1 – compressor; 2 – valves; 3 – extraction solvent tank; 4 – extractor; 5 – heating oven; 6 – pump; 7 – manometer; 8 – thermoregulated heating plate (with optional stirring); 9 – cooling coil (bath); 10 – temperature sensor; 11 – temperature regulated controller

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Figure 1: 1-4 extracts after sequential extraction of brown onion skin. Extraction solvent: 96% ethanol (1), 75% ethanol (2), 50% ethanol (3), water (4)

CONCLUSION

The complete utilization of 100 g of brown onion peel resulted in the production of 8.40 ± 0.38 g/100 g of polyphenols, 8.16 ± 0.47 g/100 g of flavonoids, 3.47 ± 0.11 g/100 g of soluble proteins and 4.11 ± 0.10 g/100 g of sugar (Table 1). Considering the significant proportion of polyphenols after subcritical extraction, the profile of polyphenols was analyzed using the HPLC-PDA method, from which it is evident that the high-value compound quercetin is dominantly present in red onion peel extracts (Figure 2). Based on the evidence so far, it can be safely concluded that brown onion peel is a valuable raw material for the production of products with high added value instead of being disposed of in landfills.

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