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Natural Bioactive Compounds, Functional and Traditional Food Products
Global challenges and competitiveness

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A COMPARATIVE STUDY OF CHEMICAL COMPOSITION OF MORCHELLA ESCULENTA (L.) PERS. FROM PORTUGAL AND SERBIA SANDRINA

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Mushrooms contain a huge diversity of biomolecules with bioactive properties that should be explored. *Morchella esculenta* (L.) Pers. (morel) is one of the most highly prized edible mushrooms in the world. In the present work a comparative study on the chemical composition (nutritional value, primary and secondary metabolites) of the two samples from two countries, Portugal (SP) and Serbia (SS), was performed. Carbohydrates were the most abundant macronutrients, followed by proteins and ash. Fat contents were low and similar in both samples. The energetic contribution of SS was slightly higher due to the higher contribution of carbohydrates. Regarding the sugars, mannitol and trehalose were found in both samples, but fructose was only found in SP. Polyunsaturated fatty acids predominated over monounsaturated and saturated fatty acids. Linoleic, oleic and palmitic acids were abundant in both samples, but only SS gave considerable amounts of α -linolenic acid. Concerning the tocopherols, the α -, γ - and δ -tocopherols were also quantified in both samples; γ - and δ -tocopherols were observed in higher levels in SS. Oxalic and fumaric acids were in both samples; malic acid was found in SP, while quinic and citric acids were observed in SS. Finally, protocatechuic and *p*-hydroxybenzoic acids were found in both samples, but *p*-coumaric acid was quantified in SP. As far as we know, this is the first study reporting the chemical composition of morel samples from Portugal and Serbia.

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KEY WORDS: *Morchella esculenta*; nutrients; chemical composition

OBTAINING HYDROPHOBINS FROM SUBMERGED CULTURES OF THE FUNGUS

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Fungi are promising objects of biotechnology. Not long ago special proteins were found in mushrooms, which were later called hydrophobins. Hydrophobins are low molecular proteins (7-9 kDa), which have surface-active properties. They are able to self-assemble into amphipathic membranes at hydrophilic/hydrophobic interfaces. Also they can change the properties of the hydrophobic and hydrophilic surfaces and significantly reduce the surface tension of water. These unique properties open up broad prospects for application of hydrophobins. Such hydrophobin emulsions in their taste and consistency can resemble food fat. Combined with the ability of hydrophobins to stabilize the foam it makes promising their use in the food industry. Also the area of possible application of hydrophobins is tissue engineering, pharmaceuticals, etc.

As an object of research, we chose the filamentous fungus *Trichoderma sp.* The method of submerge cultivation was used to grow fungus. Fungal culture was grown for 3 days on glucose-peptone medium. After that the culture liquid was subjected to successive freeze-thaw for destruction of the cell wall of the fungus and increase the yield of hydrophobin into the culture medium. Culture liquid was foamed with aerator, then the resulting foam was dissolved in 70% ethanol. Undissolved substances and particles of biomass were separated by centrifugation at 6000 r / min. After that, ethanol was evaporated from solution on a rotary evaporator and the remaining aqueous solution was freeze-dried.

The protein concentration in the obtained extracts was determined using the method of Lowry. The presence of hydrophobins in the obtained extracts HPLC method was used.

Foam-stabilizing activity of obtained extracts was tested. For comparison we selected sodium caseinate - one of the most popular at present food foam stabilizers. 0.1% solution of the extract and 0.5% solution of sodium caseinate were prepared. In both solutions 0.5% xanthan was added as a thickener. The two solutions were foamed with aerator and then the volume of foam was measured every week for 2 month. The use of our extracts yielded resistant foam, and the loss of foam in the air phase for 9 weeks was not more than 45%. In the sample, stabilized with sodium caseinate, a week later there was complete loss of air phase and the deposition of foam.

KEY WORDS: Green tea, polyphenols, theanine