

**RESEARCHES REGARDING THE SIMPLE EXTRACTION
EFFECT, IN TO STATIC REGIME, FOR THE BORON AND
ANOTHER IONS CONCENTRATION FROM PLEUROTUS
OSTREATUS MUSHROOMS TREATED WITH SOLUTION OF
BORON COMPLEX**

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Abstract

The work paper is an side of complex study from a Researches Grant that prove to obtain the Pleurotus Ostreatus mushrooms like as functional foods. This new mushrooms were obtained follow the treatment with noted solution of boron complex. The aqueous and alcoholic extracts from Pleurotus mushrooms prove the therapeutic properties for different diseases and for this reason these extracts are very interesting for study.

Keywords: mushrooms, Pleurotus, extraction effect, boron, potassium

Introduction

The extraction is characterized to be the part or full separation of the constituents from a mixture trough the difference of their solubility (Banu, 1993). The separation is constructing by follow phases: the implement of the strong contact between the mixtures prepared for extraction and solvent, the cleavage for the formed phases, the recovery of solvent and solvate (Banu, 1999).

For our case it is specific the solid-liquid extraction and this extraction are based by the properties of diffusion for the liquid substances with different concentration at direct contact. In this time, the behavior for the solid phase is like an inert phase, the solid (mushrooms) can be appearing in the diffusion process like a permeable membrane (Banu, 1998).

The solid-liquid extraction present other properties like as blocked solvent on the surface and pores of mushrooms (Geana, 2000). The

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extract can be formed from liquid homogenous phase that can capture the micro-particles of mushrooms (Aspen Tech, 2001).

In the extraction of liquid phase (for our case this phase are constituted from any vitamins and enzymes) the mushrooms can react with solvent during the diffusion of liquid phase in to solvent and in this time, part of solvent pass in to mushrooms in the place of diffused substance. For obtain a pure substance must concentrate the solution (the diffusion juice) in the special evaporators until the wished concentration (Petculescu, 1977).

The extraction can be influenced by:

- *temperature* - that will be different function by solvent. The improve of temperature can produce the decrease of viscosity, the increase of rate of convective transfer and the rate of diffusion (Schlunder, 1995);
- *the rate of extraction* – constituent of productivity;
- *the time of contact solvent-mushrooms* - are different function of case. This factor is function of rate of extraction and can lead to concentrated extracts. For the dried mushrooms this time are increased (Strumilo, 1961).

The aqueous and alcoholic extracts from classical *Pleurotus* mushrooms prove the therapeutic properties for different diseases and for this reason these extracts are studying too.

Used the treatments with noted solution of Boron Complex (a functional food complex solution) for classical *Pleurotus Ostreatus* mushrooms in to mycelium phase it can obtained the enriched *Pleurotus Ostreatus* mushrooms like as functional foods and their aqueous and alcoholic extracts is better than similar extracts from classical mushrooms.

Experimental

The new mushrooms (the enriched mushrooms) were obtained follow the treatment with noted solution of Boron Complex. In coordination of the extraction principles were establish the experimental variants.

The used experimental variants are:

- V1 – the variant which are used the extract of classical obtained Pleurotus mushrooms in water at 20°C;
- V2 – the variant which are used the extract of enriched Pleurotus mushrooms in water at 20°C;
- V3 – the variant which are used the extract of classical obtained Pleurotus mushrooms in water at 60°C;
- V4 – the variant which are used the extract of enriched Pleurotus mushrooms in water at 60°C;
- V5 - the variant which are used the extract of classical obtained Pleurotus mushrooms in methanol 60°C;
- V6 - the variant which are used the extract of enriched Pleurotus mushrooms in methanol 60°C;
- RV1 – the reference variant which are used the diluted solution 1:200 Boron complex;
- RV2 – the reference variant which are used the diluted solution 1:10 methanol 60°C .

For begining, we are started with more of experimental variants but after apply the specifics economically and processing factors were selected this important variants.

We are proved the extraction at different temperature for the Pleurotus mushrooms: 20°C, 25°C, 37°C, 50°C, 60°C, 70°C, 100°C but the temperatures 25°C, 37°C, 50°C, 70°C, 100°C are not corresponding for the best condition for the optimal extractor agent, for the optimal temperature, for the optimal time of extraction, for keep the value of nutrients.

The criterions of selection were:

- decrease of the loss of nutrients (proteins, amino acids, vitamins, enzymes);
- keep the real condition of extraction with the optimal extractor agents. These agents must be cheap, easy to manipulated, easy tu separated;
- the optimal temperature are defined by the temperature that allow the extraction of the main nutrients of Pleurotus without their distort.

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The boron concentration was determined through ASTM D 3082 Standard Test Method IHS for Boron in water product. This test method covers the determination of boron in water, wastewaters and alcoholic extract by the curcumin colorimetric-extraction method in concentrations between 0.1 and 1.0 mg/L. The range can be extended by dilution of the sample. Only dissolved boron is determined. This test method requires that the water sample be filtered through a 0.45- μm membrane filter before analysis.

This test method is a colorimetric method that is very sensitive to low concentrations of boron in water and requires a relatively small sample volume for analysis (<http://engineers.ihs.com/document/astmcollections/d3082.asp>).

The methalic ions analysis from the classical and enriched Pleurotus mushrooms were determined by Atomic Absorption Spectrophotometry – Gas Furnace using an apparat Thermo Electron Spectroscopy type (AAS-GF Cook Book, 2004).

Results and Discussions

From figure 1 can be observed that for the boron extract the best variant was V2, which use the water at 20°C as solvent. This variant is the nearly variant for the RV1. The V2 prove 0.031mg boron/L and the RV1 show 0.033 mg boron/L. From the analysis of results can be observed that V2 – which use the extraction of boron from the Pleurotus mushrooms with water at 20°C are the best variant of extraction.

Probably, by using the curve of absorption for the molecular spectra in the near UV- Vis range (190-700nm) can be proved that the more changes for nutrients concentration from the Pleurotus extract are registered for V3 and V4 (variants which use like as solvent water at 60°C).

The methalic ions analysis from the classical and enriched Pleurotus mushrooms (table 1) prove the increased concentration for zinc and iron, over normally average. These ions are caused by using the non inox recipients for culture of Pleurotus and substrate.

The increase of mangan content are normally and this prove the activity of manganperoxidase from Pleurotus.

The increase of copper concentration follow as action the solution of Boron complex across the substrate and the enriched Pleurotus mushrooms. The used solution of Boron complex not affect the other main methalic ions from the Pleurotus mushrooms.

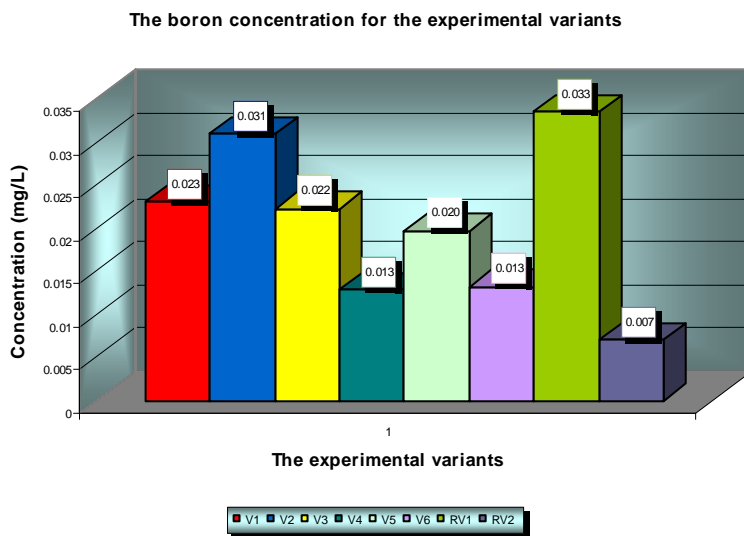


Figure 1. The boron concentration for the experimental variants of extraction

Table 1. The concentration of the main methalic ions ($\mu\text{g} / \text{g}$ dry matter) from the Pleurotus

Metalic Ions	The classical Pleurotus Mushrooms	The enriched Pleurotus Mushrooms with Boron complex
Cr	0.02	0.02
Ni	0.02	0.039
Zn	51.02	56.66
Pb	0.02	0.02
Cd	0.95	1.07
Cu	3.11	3.96
Fe	60.67	50.12
Mn	6.86	6.27

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Conclusions

The variant V2 – which use the extraction of boron from the Pleurotus mushrooms with water at 20°C – is the best variant of extraction. The increase of manganese content are normally and this prove the succession of manganese peroxidase activity from Pleurotus. The used solution of Boron complex not affect the other main methalic ions from the Pleurotus mushrooms. The increased concentration for zinc and iron, over normally average can be produced with changes of colour for the extract of the enriched Pleurotus mushrooms extract.

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