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STUDY REGARDING THE CONVECTIVE AND CONDUCTIVE DRY INFLUENCE FOR BORON CONCENTRATION FROM PLEUROTUS MUSHROOMS TREATED WITH SOLUTION OF BORON COMPLEX

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Abstract

For produce the Pleurotus mushrooms – like as functional foods, the mushrooms were treated in the growing phase with solution of Boron Complex. The new obtained mushrooms were treated using more thermal tasks (specially the new drying processes). In the work paper it is showed the changed concentration for boron and potassium follow the thermal tasks used for extension of preservation time.
Keywords: *mushrooms, Pleurotus, conductive and convective dry, boron*

Introduction

This work paper is a part of a complex study from a big research grant. In this grant were obtained the *Pleurotus Ostreatus* mushrooms like as functional food through treat the growing substrate with Boron complex solution.

The convective dry are the best method for eliminate water from raw material through quality, the short time of processing and the cheaper cost. The hot air is thermal agent and bearer for the moisture of the raw material (Gnielinski, 1993). The mass and heat transfer during the dry time are conditioned by the parameters of drying agent (the velocity, the temperature, the average moisture) and the moisture-raw material binder (Iordache, 1981).

Using the conductive dry technology it can dry solids and concentrate liquid products. The dryness can be realised by direct contact with a hot surface and the water will go out of products.

The *Pleurotus Ostreatus* mushrooms are transformed in functional foods through added solution of Boron Complex in the substrate.

Through the measured concentration of boron from the mushroom like as functional foods and compare the results with the corresponding concentration of boron after thermal treatments we can realised the conductive drying effect for these (Schlunder 1995, 1996).

Experimental

The optimal convective dry parameters were defined like the qualitative and quantitative parameters who present the lower decrease for nutrients after the dry task.

In the case to determinate the optimal time for dry was used the dryer Binder ED 400 series types (with natural convective regime) and the heat room with forced convection Binder FED 400 Series. In these dryers were tested the tasks for different temperatures: 58^{o}C, 63^{o}C, 70^{o}C, 105^{o}C. The optimal work time was established after chemical analysis for the dry mushrooms.

To determinate the optimal time and temperature for the conductive dry, it was tested the dry regime in time for Pleurotus classical and enriched with Boron Complex Solution (a functional food complex solution) in to special dryer with rotary drum with steam at 8 at circulation. The optimal dry time was establishing trough tests, after the chemical composition modifications.

Comparative to convective dry in this last case the optimal time was decreased and the changes of the chemical properties are more important.

From picked mushrooms were constituted the experimental variants:

- V1 – mushrooms *Pleurotus O*. type obtained by classical technology, after 30 minutes of convective dry;
- V2 – mushrooms *Pleurotus O*. type obtained by classical technology, after 60 minutes of convective dry;
- V3 – mushrooms *Pleurotus O*. type obtained by classical technology, after 120 minutes of convective dry;
- V4 – mushrooms *Pleurotus O*. type obtained by classical technology, after 150 minutes of convective dry;
- V5 – mushrooms *Pleurotus O*. type obtained by classical technology, after 180 minutes of convective dry;

- V6 – mushrooms *Pleurotus O*. type obtained by classical technology, after 240 minutes of convective dry;
- VB1 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 30 minutes of convective dry;
- VB2 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 60 minutes of convective dry;
- VB3 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 120 minutes of convective dry;
- VB4 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 150 minutes of convective dry;
- VB5 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 180 minutes of convective dry;
- VB6 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 240 minutes of convective dry;
- V7 – mushrooms *Pleurotus O*. obtained by classical technology, after 5 minutes of conductive dry;
- V8 – mushrooms *Pleurotus O*. obtained by classical technology, after 10 minutes of conductive dry;
- V9 – mushrooms *Pleurotus O*. obtained by classical technology, after 15 minutes of conductive dry;
- V10 – mushrooms *Pleurotus O*. obtained by classical technology, after 20 minutes of conductive dry;
- V11 – mushrooms *Pleurotus O*. obtained by classical technology, after 25 minutes of conductive dry;
- V12 – mushrooms *Pleurotus O*. obtained by classical technology, after 30 minutes of conductive dry;
- VB7 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 5 minuts of conductive dry;
- VB8 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 10 minutes of conductive dry;
- VB9 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 15 minutes of conductive dry;
- VB10 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 20 minutes of conductive dry;
- VB11 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 25 minutes of conductive dry;
- VB12 – inoculate mushrooms *Pleurotus O*. with boron complex solution, after 30 minutes of conductive dry.

In the new applied biotechnology was used a Boron Complex solution and for this reason it was determined the remainder boron follow the thermal treatment. We have been comparing the obtained results of classical mushrooms with some treated mushrooms – functional foods.

To determinate the concentration of remainder boron it was used the colorimetric method (Vauck, 1994).

For all variants were used the picked Pleurotus mushrooms and these were picked in same day, in same conditions and these were holder in same refrigeration conditions. For dilute the samples, for clean the cuvette, prepare the samples were used the bidistilled water. For prepare this water was use the special apparatus E-PURE Three-Holder Water Purification with reverse osmosis and three filters characterised by resins with exchanged ions.

Results and Discussions

The determined boron concentration of the experimental variants - treated by *convective dry* (figure 1) - can improve until 150 minutes – drying time and after 160 minutes this concentration decrease too. The bigger value for the boron concentration was registered at VB4, over registered value of VB3.

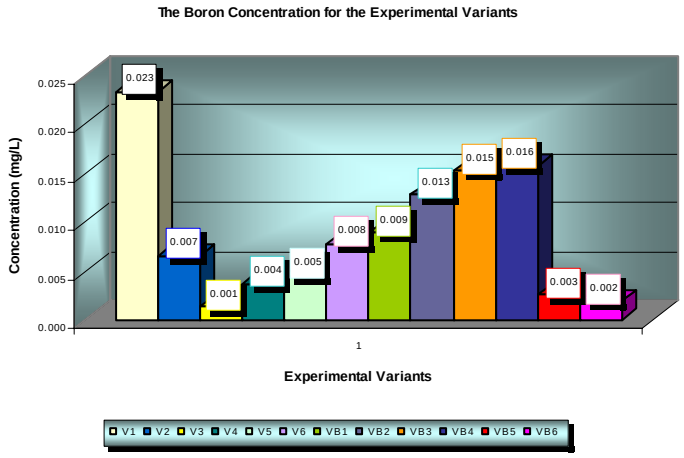

Figure 1. The Variation of the Boron concentration for the experimental variants treated by convective dry

For the mushrooms treated by *conductive dry* (figure 2), the bigger boron concentration are showed VB10 than the other variants (the difference between VB10 and VB9 are not significant).

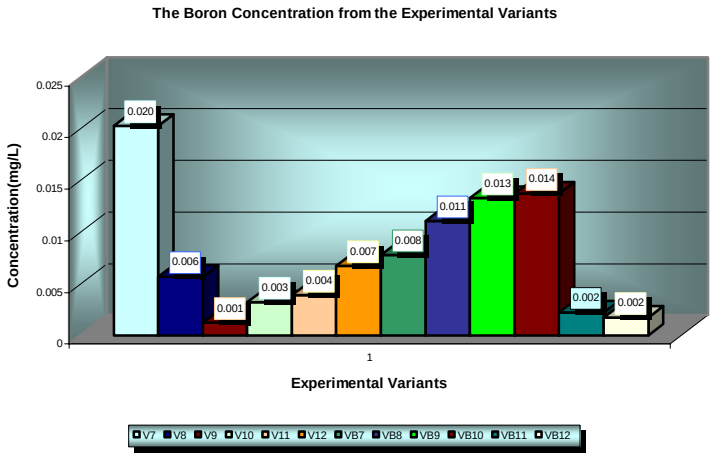

Figure 2. The Variation of the Boron concentration for the experimental variants treated by conductive dry

Follow laboratory's analysis and through comparative obtained results it is proved that for *Pleurotus Ostreatus* the convective dry are more superior to the conductive dry. The experimental variants are showed more changes for the sensitive properties, function as the drying time. The *Pleurotus Ostreatus* that were treated with Boron Complex solution are proved a stronger consistency than the classical mushrooms same type. The section aspect is improved and these mushrooms are proved a smaller deformation report by primary aspect than corresponding classical mushrooms.

The *Pleurotus Ostreatus* which were treated with Boron Complex solution proved a great consistency like the classical mushrooms. The sight in the section was improved and after the thermal treatments these functional foods have proved a smaller distortion like as the classical mushrooms.

It can observe that the used Boron Complex solution can assure a great stability for proteins and for organic polymers into case of thermal treatments use for processing. So, the new obtained mushrooms prove a great elasticity and the thermal treatments have a

smaller influence across the hemicelluloses, cellulose and lignin concentration.

Conclusions

For treated mushrooms *Pleurotus O*. type (with Boron Complex solution in the best doses) and for convective drying like as thermal treatment , the best experimental variant was VB3 (the experimental variant with Boron complex solution and 120 minutes convective drying time).The VB3 Variant prove the best sensitive properties than all variants of mushrooms *Pleurotus Ostreatus* type – like functional foods. The experimental variants treated by conductive dry are showed more changes for the sensitive properties, function as the drying time. The *Pleurotus Ostreatus* that were treated with Boron Complex solution are proved a stronger consistency than the classical mushrooms same type. The best experimental variant – from the enriched variants – are VB9 – who the mushrooms were treated through conductive dry during a 15 minutes.

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