BIOMINERAL VALUE OF SOME MACROMYCETES SPECIES FROM FORESTRY AND GRASSLAND ECOSYSTEMS OF DAMBOVITA COUNTY

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Abstract:

The subject of this work is the biomineral value from the point of view of their concentrations in some macromycetes (mushrooms) species, harvested from the forestry and grassland ecosystems of Dambovita county. It is necessary to increase the research efforts in direction of identifying those biosystems which are hyperaccumulators for biominerals in order to be used as natural sources for biotherapy, because of the large variety of macromycetes species in our forestry and grassland ecosystems. It were analysed the following species: Armillariella tabescens, Armillariella mellea, Fistulina hepatica, Lactarius volemus, Macrolepiota procera, Russula virescens (from forestry ecosystems), Agaricus campestris and Pleurotus ostreatus (from grassland ecosystems). Chemical determinations were made by spectrometry advanced method in our own laboratories with ElvaX spectrometer. The resultes show a higher content in potassium in most of species analysed, and calcium only in one case, so these macromycetes species have a great hyperaccumulators potential for this biominerals types.

Keywords: biominerals, potassium, calcium, phosphorus, iron, macromycetes (mushrooms).

1. INTRODUCTION

All over the world are developing more and more in the last years the studies concerning biochemical and physiological features of macromycetes (mushrooms) in the view to promot them as natural sources for mineral bioreccuperation technologies, so as hyperaccumulator of biominerals, in order to used them in modern biotherapies and food technologies. It seems that the mushrooms have still much more to offer, but it is necessary to concentrate all studies for establishing a real metabolic features for one species in the view to recomend it as hyperaccumulator for one or other of biomineral species [1, 3]. The first results of our researches encourage us to continue. All species studied are growing in the forestry ecosystems of our country and also in Dambovita county, so they are common species which are growing allover in nature. They have two generations on year at least.
The substrate for developing is soil, forestry soil with a very lower pH (acidic one). So the potential of these macromycetes for accumulating biominerals is linked in this case with the pH natural values of substrate.

2. MATERIAL AND METHODS

Biological samples consisted in fresh mushrooms which were weight and drying at 105°C for 1 hour. The dried samples were weight for establish the mass of dried substance, and finaly were reduced at very fine dusty. Elemental content of samples was determinated using ElvaX Spectrometer having a X-ray tube with Rh anode [2, 4, 5].
The samples were excited for 300s and the characteristic X-rays were detected by a multichannel spectrometer based on a solid state Si-pin-diode X-ray detector with a 140 mm Be window and a energy resolution of 200eV at 5.9 keV. In this way were registered all the elements which were in a concentration higher then 1 ppm.
Every result presented in this work is the average of many determinations. The final results were reported to dry substances and calculated in percent.
Sensitivity of this method is 1 ppm.

3. RESULTS AND DISCUSSIONS

Figures 1 and 2 presents the comparative

graphics between macromycetes species (mushrooms) harvested from forestry ecosystems of Dambovita county.

First graphic (Fig.1) is presenting the potassium concentration in six macromycetes species. The study results show a highest quantity of potassium in *Armillariella tabescens* and a minimum concentration in *Fistulina hepatica*.

On second place, at a little difference from *Armillariella tabescens* concerning potassium concentration, there are *Armillariella mellea* and *Lactarius volemus*.

On third position there are *Macrolepiota procera* and *Russula virescens*.

So, it is clear that among the six macromycetes studied, only one, *Fistulina hepatica*, has not a very good affinity for potassium absorbtion and storage.

The others five species have a highest potential for absorbtion and keeping inside potassium.

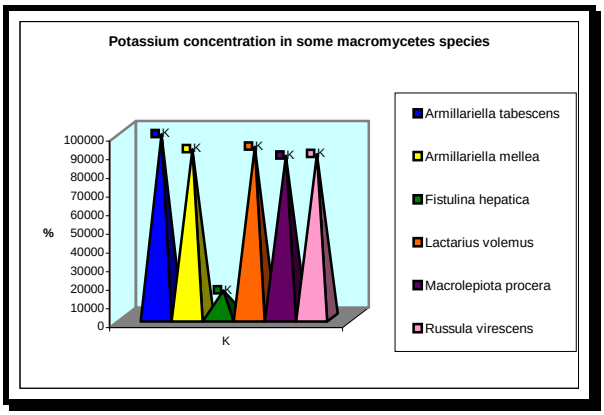

Fig. 1. Potassium concentration in forestry's macromycetes

The second graphic (Fig.2) presents the comparatively situation for chemical content of calcium, iron and phosphorus in the same six species. It can see a very different situation by comparison with potassium content because of some specific feature for calcium and phosphorus absorbtion.

Fistulina hepatica is only one between macromycetes studied species which accumulats calcium and in plus, in a very high quantity.

Armilariella mellea is the sole mushroom species which contains phosphorus, but only in trace.

It was determinated also iron presence in all cases, in different concentration from one species to others:

-the minimum content of iron had *Armillariela tabescens* and *Lactarius volemus*, and a little more had *Russula virescens*;

-moderate quantities of iron it were registered at *Macrolepiota procera, Fistulina hepatica* and *Armillariella mellea.*

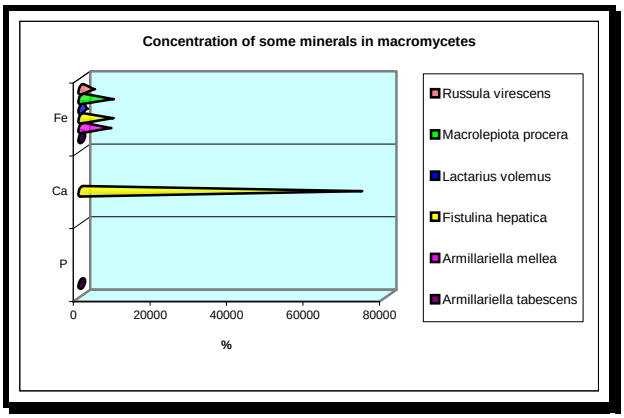

Fig. 2. Concentration of Fe, Ca, P in forestry's macromycetes

Third graphic (Fig. 3) contains the results about iron and potassium absorbtion in case of *Agaricus campestris* and *Pleurotus ostreatus*, grassland's mushrooms.

It was determinated a good absorbtion in both cases for potassium, maximum being determinated in second species, which is very close to the value obtained at forestry's macromycetes species.

Agaricus campestris had a higher quantity of iron. *Pleurotus ostreatus* doesn't have affinity for iron, this mineral being find only in trace.

Both mushrooms species had not others biominerals in their chemical content.

One overview shows that, all macromycetes species analysed, are very poor concerning the number of biominerals, but some of them are very rich in one or two elemental type.

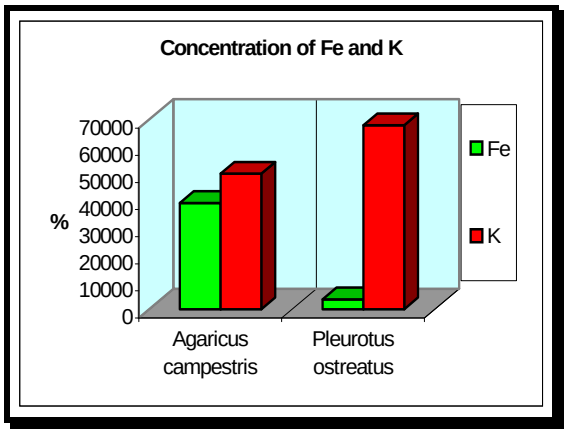

Fig. 2. Concentration of some biominerals in grassland's macromycetes species

4.CONCLUSIONS

- All macromycetes species studied have a high potential for potassium absorbtion and storage it inside.
- All species contains iron in different concentration from one species to other.
- Only one species, *Fistulina hepatica* has a great affinity for calcium absorbtion and storage.
- *Agaricus campestris* has one important iron content.
- *Armillariela mellea* is the only one macromycetes species which contains phosphorus, but only in trace.
- This study obviously makes in evidence that, by exception of *Fistulina hepatica*, all the others species studied are naturals reservoirs for potassium.
- Only *Fistulina hepatica* between all the others species is a one natural accumulator only for calcium.
- Finaly, this study done its aim because it relieves some very rich sources of potassium and calcium between the macromycetes very common for forestry and grassland ecosystems of Dambovita county.
- Macromycetes species which are recommended for extraction of potassium in the view to be used in biotherapy and food enriching, are: *Armillariella tabescens, Armillariella mellea, Lactarius volemus, Macrolepiota procera, Russula virescens* (from forestry ecosystems) and *Pleurotus ostreatus* (from grassland ecosystems) and for calcium is indicated *Fistulina hepatica*.

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