

# Analysis of Metals and Nutrients in the Mushrooms *Pleurotus Ostreatus* Cultivated on Wheat Straw in Albania.

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## ABSTRACT

Nowadays, the oyster mushrooms can be cultivated successfully under semi controlled conditions in a customized space by using agricultural as well as industrial waste and other refuse as substrate. In the Albania, for the first time we conducted grown of *Pleurotus Ostreatus* mushrooms in the farm in the favorite conditions (like natural conditions) from applied high technology, automatic control for each parameter. This study present content of metals and nutrient in the “*Pleurotus Ostretus*” mushrooms samples that was cultivated on wheat straw substrate compositions using Atomic Absorption Spectrometry. We are collected a total of 20 samples where 10 samples are edible mushrooms and 10 samples are substrate samples. The mean concentrations of the elements K, Ca, Mn, Fe, Cu, Zn, Rb, Cr, Ni and Pb were determined in mushrooms cultivated on wheat straw substrate and we have calculated bioaccumulation factor substrate to edible mushrooms. All results are presented in table and graphical forms. Also we have determined protein, carbohydrates, fat, acidity and humidity, in the *Pleurotus Ostreatus* mushrooms.

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**Key words:** *Pleurotus Ostreatus* mushrooms, metals and nutrient, atomic absorption spectrometry.



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## Introduction

Edible mushrooms such as *Pleurotus ostreatus* is popular and widely cultivated throughout the world mostly in Asia and Europe owing to its excellent flavor, taste and higher biological efficiency (Shah, Z. A., Ashraf, M., & Ishtiaq, M. Ch. 2004). Cultivated mushrooms are preferred and reliable source of supply. Oyster mushroom can be cultivated in any type of lingo cellulose material like straw, sawdust, rice hull, etc. (Hami 1990). Actually they are cultivated using a wheat straw bed. Mushrooms need a controlled environment with appropriate humidity, light, temperature, ventilation, air pressure, pH, CO<sub>2</sub> and nutrients. Oyster mushroom is rich in proteins, vitamin and minerals ad popularly called the vegetarian’s meat because it has same nutrients with meat. Mushrooms proteins are considered to be intermediate between that of animals and vegetables (Kurtzman 1976) as they contain all the nine amino acids required for human body (Hayes and Haddad, 1976). Essential trace elements like Fe<sup>2+</sup>, Zn<sup>2+</sup>, Cu<sup>2+</sup>, Ca<sup>2+</sup> etc. compete with nutrient elements for binding sites as transport and storage proteins, metalloenzymes and receptors (Wright and Frain, 1981). Edible mushrooms are recommended by the FAO as food. Among other Mineral elements are essential for human health. Metals play an important role in life processes of microorganisms. In the Albania, for the first time was cultivated and produced *Pleurotus Ostreatus* mushrooms in wheat straw in the farm under suitable conditions, using high technology, automatic control for each parameter step of their life (figure 1). Micelle was produce from tissue culture in microbiological laboratory, while substrate that we used, wheat straw is reached with mineral salts. In this farm we have determine the elements and nutrients in representative edible and substrate samples of mushrooms *pleurotus ostreatus*, using Atomic Absorption Spectroscopy.

## Material and methods

Both representative substrate and edible mushrooms samples were collected in the farm of Tirana, Albania. During the sampling we have collected 20 samples where 10 samples are edible mushrooms and 10 samples are substrate. All samples are analyzed using Atomic Absorption Spectrometer, Aanalyst 800 Perkin Elmer with Atomic Absorption Spectrometry, Flame method. Hollow cathode lamp used as radiation source. Acids used for the digestion have high grade purity. Both mushrooms and substrate samples are digested according Analytical Methods of Atomic Absorption Spectrometry, from Perkin Elmer.

**Results**

We have collected a total 20 samples, where 10 were mushrooms and 10 were substrate samples in a farm. All the samples were analyzed for their metal and nutrient content. In the table 2 are presented the content of metals in the edible and substrate mushrooms samples and Bioaccumulate factor substrate to mushrooms while are presented values of nutritional attribution, that are found in the pleurotus ostreatus mushrooms in Tirana Farm. Dates of table 1 are presented in graphical forms. In graph 1 is presented the concentration of metals in both mushroom and substrate samples. While in graph 2 is presented the correlation coefficient, from comparison of metals content in the samples.

Table 1. Mean concentration of metals in mushroom and substrate

Metals	Mushroom: (mg/kg) ± SD	Substrate: (mg/kg) ± SD	BAF
As	ND	ND	-
Ca	170 ± 0.3	265 ± 1.4	0.64
Cd	ND	ND	-
Cr	5 ± 6.3	11 ± 1.2	0.43
Cu	18 ± 0.2	31 ± 0.2	0.58
Fe	179 ± 0.1	380 ± 4.5	0.47
K	1.3 ± 0.5	2 ± 5.7	0.55
Mn	16 ± 1.6	43 ± 0.1	0.37
Ni	4 ± 2.8	7 ± 8.9	0.52
Pb	ND	ND	-
Zn	70 ± 0.3	93 ± 8.3	0.75

Table 2: Nutritional attribution

Pleurotus Ostreatus	Proteins %	Fat %	Acidity %	Humidity %	Carbohydrates %
Mean Value (DW)	2.6	0.4	0.14	90.5	0.2

Note: Dry weight (DW)



Figure 1: Photo of the mushrooms farm

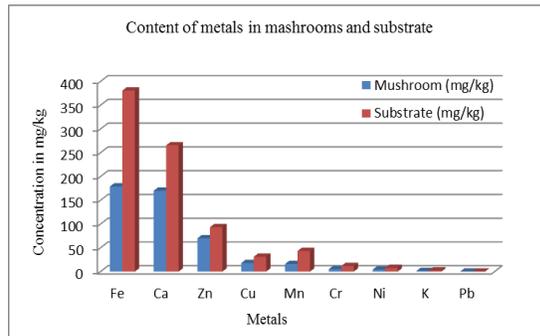


Figure 2: Metals in mushrooms and substrates

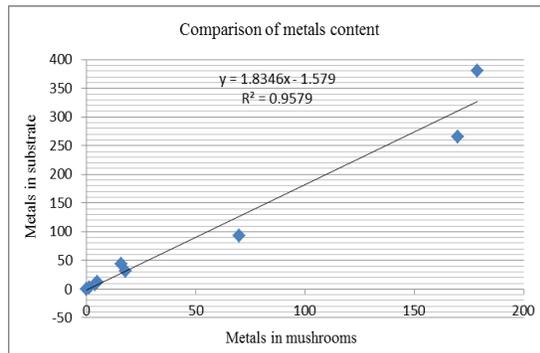
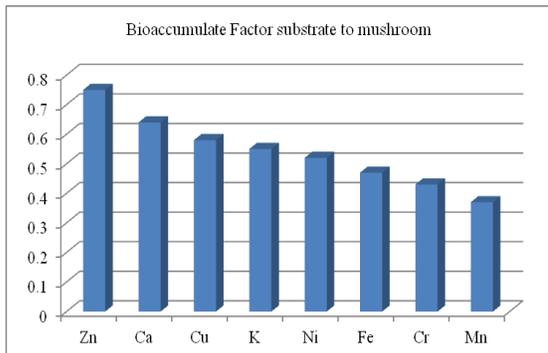


Figure 3: BAF substrate to mushroom

Figure 4: Correlation between mushrooms and substrates

### **Conclusions**

Mushrooms are a good cash crop. The content of plant's proteins in mushrooms has nutritional value. They even have medicinal properties. Humidity is high while acidity and fat is very low. The content of micro and macro elements in Pleurotus Ostreatus mushrooms indicate positive in health of human. So it using like food and medicine. Mushrooms from the genus Pleurotus are tasty and rich with proteins minerals. Among the reasons for the quick acceptance of mushroom is its nutritive content. Mushrooms are eaten as meat substitutes and flavoring. Oyster mushroom can be cultivated in cellulose material like straw. Biological efficiency is high, in 58-94% ranges.

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