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NUTRIENT CONTENT OF CHAMPIGNON MUSHROOMS CULTIVATED ON 2 DIFFERENT SUBSTRATES

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Abstract
During the traditional growing of button mushrooms on composted substrate various environmentally harmful substances are generated whose are eliminated with expensive closed systems. There is another way to make mushroom substrate, where it is only heat treated, not composted, and no harmful substances are generated. In our research we investigated the nutrient content of champignons grown on 2 different substrate, one is traditional composted, the other is heat treated straw enriched with nitrogen.

1 Introduction

During the composting of traditional substrates various environmentally harmful substances are generated [1, 3, 6], which is eliminated with expensive, closed systems. There is another way to make mushroom substrate, where it is only heat treated, not composted, and no harmful substances are generated. This procedure was invented by Huhnke [4]. There is a similar technology called rapid composting [5], but in this case the substrate is made of barn manure, which is not composted. There were other methods for making sterile, not composted substrates, but these are not adapted in practice [8]. According to van Greinsven [2] Laborde came to the conclusion, that composting cannot be eliminated, or only can be eliminated in part. Similar investigations have been carried out by Sándorné [7] in her doctoral thesis. In her research she enriched the heat treated straw substrate to increase its nitrogen content. In our research we investigated the nutrient content of champignons grown on 2 different substrate, one is traditional composted, the other is heat treated straw enriched with nitrogen.

2 Method

The trial was set up in the spring of 2018 in the mushroom house of the Faculty of Horticulture and Rural Development of the John von Neumann University. One of the treatments were composted straw with poultry manure, then heat treated (in the following manure). The other was heat treated straw enriched with nitrogen (in the following straw). Substrates were filled in boxes in triplicates, then were put under the same conditions.

Samples were picked from the first flush for analysis in triplicates, and have been analyzed in the Soil- and Plant Testing Laboratory of the Faculty. The digestion of the samples were carried out in concentrated nitric acid and hydrogen peroxide in the Milestone Microwave Digestion System. The nitrogen content of the air-dried samples were determined with the method of

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Kjeldhal. Macro- and microelement contents were determined with specified standards of ICP-OES spectrometer.

3 Results

The following parameters were measured: nitrogen content (KjN), phosphorus, potash, calcium, magnesium, sodium were measured in m/m % of the air-dry sample (*Table 1*).

Table 1. Macro element content of champignon mushrooms grown on 2 different substrate

Treatment	K_jN	P	K	Ca	Mg	Na
	m/m% air dry sample					
Straw	6,32	1,5	4,99	0,115	0,147	0,078
Manure	5,51	1,1	3,89	0,02	0,105	0,064

In the case of iron, manganese, zinc, copper, boron and molybdenum results are shown in mg/kg air dry sample (*Table 2*).

Table 2. Micro element content of champignon mushrooms grown on 2 different substrate

Treatment	Fe	Mn	Zn	Cu	B	Mo
	mg/kg air dry sample					
Straw	60,30	7,78	62,90	29,60	<1,5	<0,5
Manure	40,02	6,00	56,77	28,58	52,17	<0,5

In the case of macro elements the content was somewhat higher on straw, between 14-40%, but the magnitude was the same, except for calcium. Calcium content on straw was more than five times higher than on manure.

Micro element content was also higher on straw, 4-50%, except boron, which was one magnitude higher on manure.

The visual appearances of the mushrooms were the same.

4 Discussion, conclusion

In the case of nutrient content we conclude:

- the vast majority of the elements analyzed were not significantly different between the substrates
- mushrooms grown on straw had a higher nutrient content
- exception is boron, in this case the manure had a higher content

So mushrooms grown on heat treated straw was as good as on composted manure. Our aim is to stabilize the yield over 30 kg/100 kg in the case of straw.

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