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**ICE2023 Poster Presentation,**  
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time 4 pm – 6 pm.

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# WASTE VALORIZATION IN THE TECHNOLOGY OF CULTIVATION SHIITAKE MUSHROOMS

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## Introduction

Numerous studies of spent mushroom substrate (SMS) in last couple of years shown that there are different ways of its reuse – from bioadditive to biofertilizer, fuel, building component etc.

For Ukraine, cultivation of shiitake is still a novelty. In today's conditions, those few companies that grow shiitake mushrooms faced the problem of providing raw materials for substrate production.

In order to solve this problem, an experiment conducted using SMS during substrate production cycle.



## Materials and Methods

Fresh spent shiitake mushroom substrate (SMS) received immediately after the completion of mushroom picking in blocks (20 x 10 x 15 cm) with an average weight of 1.3 kg each. Blocks were crushed to small particles (2-10 cm), stored on a flat concrete surface, under a roof, in small heaps for 14 days. During storing period, fermentation took place. To make this process uniform, heaps were periodically turned over. It was also done to prevent spreading of *Trichoderma spp.* (green mold), *Neurospora spp.* (orange mold) Average humidity and acidity level were measured: the average humidity was in range 66.1-71.3%, acidity – 3.5-4.





## Materials and Methods

The following ratio used (per 1 ton of substrate):

- EX1 – 50% of SMS and 50% of fresh raw materials (beech sawdust and supplements).
- EX2 – 40% of SMS and 60% of raw materials.
- EX3 – 50% of SMS and 50% of fresh raw materials (beach sawdust only).

As control, substrate made only from fresh raw materials was used (CS).

Substrates were sterilized for 13 hours – 9 hours under 95°C, 4 hours - 110°C. Cooling down took place in sterile room. As soon as inner temperature of substrates dropped below 28°C, they were inoculated with 1% of spawn. As inoculum, shiitake strain M3790 was used.



## Materials and Methods

Incubation took place in same room with following climate conditions: temperature 21-25°C, relative humidity – 60-80%, CO<sub>2</sub> concentration – 2000-10000 ppm (0.2-1%).

Fruiting took place in same room with following climate conditions: temperature 12-18°C, relative humidity – 85-90%, CO<sub>2</sub> concentration – 900-1700 ppm (0.1-0.17%).

Substrates evaluation was carried out based on yield data after 14th and 16th weeks of incubation and organoleptic evaluations of the picked mushroom (color, texture, taste).

The yield considered good if it is  $\geq 20\%$ . Organoleptic evaluation of picked mushrooms as follows: bad, good, satisfactory, excellent.





## Results

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Substrate	Yield after 14 <sup>th</sup> week (%)	Yield after 16 <sup>th</sup> week (%)	Average Yield (%)
CS	20.83	21.91	21.37
EX 1	24.8	26.41	25.61
EX 2	16.73	20.63	18.68
EX 3	10.71	17.98	14.35

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After 14th week, EX1 gave 16.73% of yield, EX2 – 24.8%, EX3 – 10.71% and CS – 20.83%.

After 16th week EX1 gave 20.63% of yield, EX2 – 26.41%, EX3 – 17.98%, CS – 21.9%.



## Results

Organoleptic evaluation of picked mushrooms from all types of substrates was good and excellent: brown color with white spots, fleshy closed cap, average size 45-50 mm.







## Conclusion

Based on these results, the following conclusions were made: SMS can has a potential to be used during new substrate production cycles, but it can only partially solve the problem.

For stabile yield, it is recommended to use ration 30% of SMS and 70% of fresh raw materials (beech sawdust and supplements), or even 20% by 80%, with minimum incubation period of 16 weeks.





# THANK YOU FOR YOUR ATTENTION !

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