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Qualitative characteristics of the fungus Cyclocybe Aegerita Strains 2229, 2230, 2231 under industrial cultivation conditions

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Relevance. *Cyclocybe aegerita* (V. Brig.) Vizzini (synonyms *Agrocybe aegerita*, *C. cylindracea*) is named poplar honeysuckle in Ukraine. The fungus is an exceptional species on the domestic market but is widely cultivated worldwide on crop waste and processing of industrial crops substrates as an edible mushroom and a producer of bioactive substances. Ordinary consumers appreciate it for its special rich aroma due to the presence of 11 aromatic compounds. Medicinal properties of the fungus attract the attention of the connoisseurs of healthy eating and the professional bioactive supplements manufacturers. Likely, due to these reasons the current price of the poplar

honeysuckle is 2–6 times higher than the cost of mushroom, that makes it an attractive crop for fungus growers.

The aim of the research. The search for new strains, which are interesting for commercial sale and biotechnical use, is a topical issue for practical mushroom growing around the world. Therefore, the aim of the presented research was the determination of the quality of three strains grown on substrates from local plant residues in the existing farms of Ukraine. The possibility of the introducing strains into industrial culture was substantiated due to the results of the analysis of technical characteristics: vegetation cycle duration, yield, and biological efficiency. The morphological features of the fruiting bodies were studied: weight, size, external features of the strains for the formation of their qualitative indicators' characteristics.

Materials and methods of the research. Cultures of the three strains *C. aegerita* 2229, 2230 and 2231 were received from the IBK Mushroom Culture Collection of the M.G. Kholodny Institute of Botany. Substrates were prepared by the sterilization method in an industrial autoclave in polypropylene bags with four air filters. The bags were filled with the substrate weighing 3120±150. Rapeseed was added to the composition of the substrate mixture of plant residues (barley straw and sunflower husk). The inoculation of the 1% grain mycelium substrate (by weight) and the incubation was performed in aseptic conditions of the controlled microclimate of the laboratory to produce sowing grain mycelium LLC SPE "Grybnyi Likar" (Sadove village, Melitopol district, Zaporozhye region).

The efficiency of the strains and the features of cultivation were studied in parallel at the facilities of three enterprises: LLC SPE "Grybnyi Likar", LLC "ESMASH-3" and LLC "Fungoterra" (Kyiv, Podilskyi district) during three growing cycles from February to May 2020 with the using of the same batches of 2019 harvest of vegetable raw materials.

Results of the research. Incubation requires the maintenance of the optimal microclimatic conditions during the certain period; thus, any delay in the process leads to the increase in energy and labor costs. Strain 2229 is characterized by a longer vegetation cycle, which on average ended 6 days later, than in 2231 and 2230. Strain 2230 had the shortest vegetation in the experiment – fruiting bodies were collected after 41,1±0,3 days. According to the duration analysis of the three growing cycles between

strains 2230 and 2231, no significant difference was found, due to the average result, the fruiting bodies of the strains were obtained after 42 days from the inoculation moment.

In terms of yield and biological activity, no differences were found between strains 2230 and 2031, while strain 2229 differed significantly ($p<0,0001$). The highest yield of 220,1±9,7 g/kg of substrate in the experiment was determined for strain 2231, the lowest 72,8±14,1 g/kg – for strain 2229. Accordingly, the indicators of biological efficiency also differed: the highest of 60,42 ±3,31% was calculated for strain 2231, and the lowest-9,78±3,88% – for 2229. Therefore, strains 2230 and 2231 are perspective for implementing into industrial crops, but the opportunity of improving yields and biological efficiency by optimizing the substrate formula and growing conditions requires further studies.

The required condition for the effective strain implementation into the industrial crops is the study of morphological characteristics of growths or fruiting bodies, that are necessary for planning and organizing post-harvest activities for the sale or storage of raw materials of the appropriate quality. Several phenotypic qualities were identified in the studied strains, by which they could be distinguished visually. Particularly, strains differed in the color saturation of the caps, the surface texture of the caps and stalks, the covers had certain features. The biggest average fungus weight was determined for strain 2229 (7,46 ±0,42 g), while the fruiting bodies of strains 2231 and 2230 weighed on average 2 g less (5,53±0,59 and 4,91±0,27 respectively).

Conclusions and perspectives. The technical indicators analysis of the cultivation efficiency and morphological features of three strains *C. aegerita* substantiates the possibility of their implementation into industrial culture. Fungus strains 2230 and 2231 were obtained on the 42 ±1 days with the yield of 214–220 g/kg substrate on the first stage of fruiting, which is consistent with the results of other researchers. Strain 2229 had a low yield and an elongated duration of the vegetation cycle in comparison with strains 2230 and 2231 but differed in some interesting morphological features: milk-cream color of the cap, the largest mass of the fruiting bodies (7,5 ±0,4 g) and the thickest stalk in the experiment (10,8±0,3). Consequently, its outer attractiveness provides the opportunity to increase the selling cost, compensating for the reduced cultivation

efficiency. The variability of the strain morphological features was analyzed, and the asymmetry coefficients of the samples were calculated, which allows us to predict the production of fruit bodies of a certain size. It was also proved that the studied strains have stable morphological features, and therefore they can be recommended for distribution. Nevertheless, the great results of growing foreign strains *C. aegerita* on the substrates with optimized formulas encourage further scientific research to improve the cultivation techniques of the valuable edible and medicinal species.