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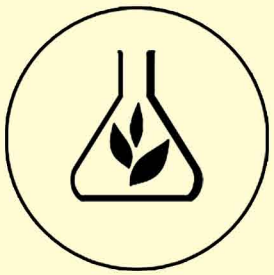

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ЗМІСТ

CONTENTS

INFLUENCE OF BRASSINOSTEROIDS ON DEVELOPMENT OF MYCELIUM OF BASIDIAL FUNGI

© 2021 O. N. Zhuk[1], D. A. Grushevskaya[1], I. M. Osochuck[1], R. P. Litvinovskaya[2], V. N. Zhabinskii[2], V. A. Khripach[2]

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Brassinosteroids (BS) are known as a group of steroidal hormones that have a comprehensive effect on plants (Khripach et al., 1999). Their regulatory role is manifested in the stimulation of growth processes, the intensity of photosynthesis, stress responses, changes in protein metabolism, transport of ions, and many other aspects of metabolism. There is limited information about the role of BS in the physiological and biochemical processes of fungi (Zhabinskii et al., 2015); the development of this direction is important both in a fundamental aspect and in a purely practical application. The latter relates to the cultivation of mushrooms, which are a rich source of various biologically active substances with a specific chemical composition that has no analogues in the plant and animal world. For the mass production of preparations or purified biologically active substances from mushrooms, both the collection of fruit bodies in nature and biotechnological methods of cultivation can be used. The collection of fruiting bodies in nature is limited by several factors: a short period of development, rare occurrence or paucity of the fungus in nature, and the possible damage that can be caused to the ecosystem by the procedure for removing fruit bodies. Biotechnological production is convenient due to year-round nature and a saving attitude to the environment, the nutrient medium in the fermenter is easily controlled and its composition can be enriched in strictly metered quantities with biologically active substances, including those that can be considered as growth factors. In this regard, the main goal of this work was to obtain new knowledge about the participation of BS in the vital processes of basidiomycetes.

The studies were carried out on a wild strain of oyster mushroom (*Pleurotus ostreatus*) isolated by an employee of the Department of Biotechnology Associate Professor E.O. Yurchenko from fruit bodies growing on cultivated poplar (*Populus sp.*). Four BS were studied: 24-epicastasterone (Khripach et al., 1994), 28-homocastasterone (Khripach et al., 2008), epicastasterone salicylate, and 6-deoxoepicastasterone salicylate (Litvinovskaya et al., 2016). As a nutrient medium for cultivation, potato sucrose agar was used. It was prepared from (g/L): potato varieties Skarb – 100; food sucrose – 10; agar-agar American type QP – 13; tap water – 1000. When *P. ostreatus* was inoculated onto a dense nutrient medium, fragments of uterine mycelium with an area of 1.0 cm^2 were placed in the center of a Petri dish and grown for 14 days in the dark at a constant temperature of 26 ± 1°C. The growth and development of the mycelium was assessed daily organoleptically; morphology was examined on the 7^{th} and 14^{th} days. The BS working solution was added to the nutrient medium at the rate of 0.5 ml per 1 L of the medium. The working solution was prepared by dissolving 1 mg of BS in 1 ml of ethanol and its subsequent dilution to 10 ml.

During the cultivation of the fungus, a visual assessment of the presence of oyster mushroom mycelium growth in each of the nutrient media was carried out. At the end of the cultivation, the macromorphological characteristics of the cultures, the wet and dry weight of the mycelium were analyzed. The biomass of the fungus from each replication was separated from the medium, and the excess culture fluid was removed using filter paper. Mycelium was also collected from the walls of the flasks. To determine the yield (by dry weight), the mycelium was dried at a temperature of 35-37°C until the complete loss of flexibility of the glued hyphal mass and weighed.

Already on the 3^{rd} day, in all variants of the experiment, changes were noted in the development of mycelium in comparison with the control, as well as between the groups of brassinosteroids, when *P. ostreatus* was cultivated on a nutrient medium containing BS. Differences in the development of the mycelium were qualitative (mycelium type, its structure, the presence of radiant outgrowths on the glomeruli, the shape of the glomeruli) and quantitative (mycelium mass).

The glomeruli of *P. ostreatus* mycelium grown on a nutrient medium supplemented with 24-epicastasterone had a rounded and oblong shape, radiant shoots, the length of which was visually greater than in the control. The color of the culture liquid did not change; the culture had a characteristic mushroom aroma.

When *P. ostreatus* was grown in a nutrient medium supplemented with 28-homocastasterone, radiant shoots were not observed in all mycelium glomeruli – large ones formed outgrowths, small ones were smooth. The shape of large balls was oblong in all repetitions, and the shape of small balls was round. This BS had no effect on the color of the culture liquid, but enhanced the mushroom aroma.

Epicastasterone salicylate, added to the nutrient medium, caused the development of a completely different type of mycelium – on the surface of the culture liquid, it was white wool-cotton colonies, the diameter of which reached 5.5 cm in 3 days of cultivation, and jellyfish-like formations were formed in the medium.

When *P. ostreatus* was grown in a medium supplemented with 6-deoxoepicastasterone salicylate, oyster mushroom mycelium developed on the surface and in the thickness of the culture liquid. In the thickness of the nutrient medium, as well as in the medium with epicastasterone salicylate, the formation of a jellyfish-like formation was observed. Part of the oyster mushroom mycelium was formed into glomeruli without radiant outgrowths.

The dry weight of the mycelium of the fungus grown using 24-epicastasterone exceeded the control values by 4.8 times, 28-homocastasterone – 4.9 times, epicastasterone salicylate – 5.4 times, and 6-deoxoepisakstasterone salicylate – 7.8 times.

Thus, the experiments performed have shown that the addition of brassinosteroids at a concentration of 1 mg/mL to the nutrient medium during submerged cultivation of *P. ostreatus* significantly increased the biomass of the mycelium. The addition of epicastasterone salicylates and 6-deoxoepisakstasterone to the culture medium promoted the development of an extensive colony of oyster mushroom mycelium both on the surface and in the depths of the culture liquid. With the use of 24-epicastasterone and 28-homocastasterone, only a deep culture of the fungus developed. Brassinosteroids also had an effect on the structure of the mycelium, depending on the hormone used. When using 24-epi- and 28-homocastasterones, the mycelium was formed into glomeruli, which had a dense structure. Medusa-like loose mycelium was observed in flasks with a medium containing epi- and 6-deoxoepicastasterone salicylates.

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