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ANTIBIOTIC ACTIVE METABOLITE OF FUNGI OF THE GENUS *TRICHODERMA*

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Summary. Were studied by the hole effect of metabolites of fungi *Trichoderma harzianum* on the number of gram-pozitive and gram-negative microorganisms: *Bacillus subtilis*, *Micrococcus luteus*, *Salmonella moskow*, *S. typhimurium*. Shown antibiotic activity of metabolites of the fungus *T. charzianum* against *M. luteus*, *S. moskow*. These metabolites are promising as producers of new antibiotic drugs.

Key words: bactericidal action, imperfect fungi, metabolites of fungi of the genus *Trichoderma*, the method of holes, gram-negative and gram-pozitive microorganisms.

Introduction

It is known that the culture fluid of the lower fungi contain substances with antibiotic properties. Research in this area being quite active, constantly found new metabolites with useful properties. [1,2,4,8,9,11,12,13,14]. Fungi of the genus *Trichoderma* are well known as producers of exoenzymes and has long been widely used by man. Of them receive a cellulase, xylanase, lipase, lignindegidrogenazy, chitinase, pectinase, a number of specific oxidases used in medicine [3].

Trichoderma fungi are producers of metabolites having high antibiotic activity against fungi and bacteria. Research in this direction being very active, constantly find new metabolites with useful properties [3]. The initial task of our research was to study the biological activity of native fungal strains of *Trichoderma* species against a number of opportunistic microorganisms. Were studied following strains of fungi *Trichoderma*:

Table 1

Found that the greatest spectrum of activity against the studied strains of opportunistic mikroorganizmov have metabolites produced by strain M 99/5 *Trichoderma charzianum*. Unfortunately, systematic studies on the biological activity of metabolites native fungal strains of *Trichoderma* species in Central Siberia against opportunistic microorganisms to date are not held in proper amount. Such studies would be particularly promising for the treatment of diseases caused by endemic to the area strains of bacteria [10].

The search mechanisms to lower fungi to successfully withstand the competition for resources with microorganisms, could help to find a very effective medication [5].

The aim of this work was to study the antibiotic activity of metabolites of the strain M 99/5 of the fungus *Trichoderma charzianum* on a number of opportunistic strains of microorganisms.

Materials and methods

The object of the study were sterile metabolites derived from fungi of the species *T. charzianum* strain M 99/5. The influence of selected metabolites in strains of opportunistic microorganisms *Micrococcus luteus*, *Klebsiella pneumoniae*, *Salmonella moskow*, *S. typtimurium*, isolated from patients pankreanekrozom ill patients Clinical Hospital № 7 of the city of Krasnoyarsk.

Pre-cultivation of each strain was carried out on nutrient agar (RM-agar production of Federal State Unitary Enterprise State Scientific Center of Applied Microbiology and Biotechnology), followed by incubation in thermostat during the day at 37 ° C. Received isolated typical colonies of each species were collected for bacteriological loop and suspended in test tubes with sterile saline according to the standard turbidity. Sown dose suspensions of microorganisms were 1.5×10^8 CFU/ml (0.5 turbidity standards McFarland). Sowing prepared suspensions was performed pressed with a cotton swab in three directions at the plate dried Mueller-Hinton agar, poured a thick layer in Petri dishes.

Determination of bactericidal activity of the investigated extracts was performed by the wells. Immediately after seeding, the standardized suspension of microorganisms in each inoculated petri dish with a sterile cork borer 1 cm in diameter were doing at the same distance six holes, then the automatic constant-volume pipette, Biohit volume of 100 ml in each well of a disposable sterile tip Axygen studied the culture fluid was added. Control study was saline.

After making the culture fluid petri dishes were incubated without turning in an incubator at 37 ° C for six days. All experiments were performed in triple replicates. Observations on the growth of test cultures started after days of incubation. Measuring the diameter of growth

inhibition of microorganisms held metal ruler with millimeter scale on the second, fourth and sixth day of incubation. Statistical analysis was performed using software package STATISTICA v.6.0. Calculated the mean and standard deviation, significant differences were determined by nonparametric Mann-Whitney test.

Results and discussion

In the course of this work was established antibiotic activity of metabolites of the strain M 99 / 5 of the fungus *T. sharzianum* M 99 / 5 against *M. luteus* and *S. moskow*. The greatest value of the inhibition of growth ($20,6 \pm 0,5$ mm, $p < 0,05$) was found for strains of *M. luteus*. For strains of *K. pneumoniae*, *S. typhimurium* growth inhibition zone was not determined.

Table 2

The results suggest features of the mechanism of action of antibiotic substances isolated from the studied fungi. Presumably, it is associated with the effect on the cell wall of microorganisms. Action of metabolites of the fungus studied one species of Salmonella and the absence thereof, to another due, apparently, with differing levels of resistance to antibiotics of strains obtained earlier. The literature has been described to obtain from the culture liquid antibiotics trihopolinov A and B. These antibiotics are highly active against fungi, Gram-positive bacteria and mycobacteria [6,7].

Thus, against several strains of bacteria observed antimicrobial activity of metabolites of native strains of fungi of the genus Trichoderma. The obtained results allow us to justify the importance and prospects derived metabolites as raw material for new microbiological preparations.

Conclusion

At the moment, described five groups protivogribnyh antibiotics; they include, in particular, 6-pentyl-a-pyrone, trihoviridin, dermadin, trichodermine, trihodermol, diatsetoksistsirpenol (T-2 toxin), gliotoksin, gliovirin and other antibiotic metabolites with unspecified structure. At this stage of investigation is not possible to specify whether this effect of some of the above antibiotics or a combination thereof. Obviously, the borrowing of methods used by lower fungi to increase their competitiveness in a changing environment are extremely promising. At the same time, increasingly there is a need to increase the already high doses of traditional antibiotics used in medicine. In addition, many of these drugs developed an almost universal resistance, and receiving economically promising way of allocating new antimicrobial agents from the substrate with a small amount of waste can be considered as one of the priorities in modern pharmacology.

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Table 1

Indigenous strains of fungi of the genus *Trichoderma*

Strains	
MK	<i>Trichoderma citrinoviridae</i>
TH4	<i>Trichoderma citrinoviridae</i>
0-97	<i>Trichoderma harzianum</i>
01-00	<i>Trichoderma asperellum</i>
МГ 6	<i>Trichoderma asperellum</i>
K 12	<i>Trichoderma asperellum</i>
M 99/5	<i>Trichoderma harzianum</i>
119/85	<i>Trichoderma sp.</i>
MO	<i>Trichoderma hamatum</i>
30	<i>Trichoderma asperellum</i>

Table 2

The value of the absence of zones of growth of microorganisms around the wells containing solutions the culture fluid of strain M 99 / 5 of the fungus *T. charzianum* ($M \pm \sigma$, mm)

	The duration of incubation of microorganisms, day.		
	2	4	6
<i>M. luteus</i>	19,8±0,4	20,0±0,7	20,6±0,5
<i>S. typhimurium</i>	—	—	—
<i>S. moskow</i>	18,4±1,1	18,6±1,1	18,8±1,3
<i>K. pneumoniae</i>	—	—	—

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