Materials of Conferences

TOXIGENIC MYXOMYCETES OF LIGHT-CHESTNUT SOILS OF SOUTH VOLGA

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At the light-chestnut soils of South Volga there are widely spread the types of genera Penicillium and Aspergillus, reaching 60% from the whole number of selected myxomycetes. The rest of soil mushrooms is distributed among 18 genera: g. Mortierilla, g. Verticillium, g. Gliocladium and others. The types of genera Penicillium and Aspergillus reveal antagonism with respect to azotobacter in 50 and 70% correspondingly. Among the other genera of soil there are considerably less number of mushrooms antagonists. Among the types of the genus Aspergillus the most wide spreading there have types Aspergillus niger v. Thegh, A. fumigatus Fres., A. sydowii (Bain. et Sart.) Thom et Church. Almost all types of this genus includes antagonists az. The biggest percent of antagonists was in types A. niger v. Thegh – 100%, A. fumigatus Fres – 50%, A. alliaceus Thom et Church – 60%, A. flavus Lk. – 65%, A. wentii Wehm. – 60%/. The least number of antagonists was revealed at the isolates of the types A. sydowii (Bain. et Sart.) Thom et Church, A. flavipes (Bain. et Sart.) Thom et Church, A. ustus (Bain.) Thom (12%). But it makes itself conspicuous, that the maximal diameter of the zone of suppression of the height of azotobacter 9,7 mm is character for the isolates of the type A. flavipes (Bain. et Sart.) Thom et Church, while the isolates of the type A. niger v. Thegh, A. fumigatus Fres. Have 7,4 mm.

The phenomen of phytotoxicity, which is revealed by separated isolates of micromycetes not always coincide with antagonism to the azotobacter. To the most strong antagonists there are involved A. fumigatus Fres, A. alliaceus Thom et Church, A. flavus Lk., as suppressing of the azotobacter's height and detaining of the winter wheat's germination. By our facts A. alliaceus Thom et Church, which is separated also from other ecological zones of light-chestnut soils preserves toxic behavior.

Mechanic erosion rise the general number of micromycetes in the soil espessially the types of genera Penicillium and Aspergillus. Micromycetes of the genus Mortierilla M. alpina Peyronel reveal sensitivity to the compaction of the soil and can be used as indicators of the ecological condition of the soil.

The use of heavy machines leads to the increase of the whole number of micromycetes in the soil, it especially reveals at the initial phases of the plants' development. At the compacted by the agricultural machines soil there increases the content of mushrooms – antagonists to the 20% in comparison with the control, there decreases the whole biological activity and harvest of barley. But introduction of organic fertilizers restores the ecological environment.

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NATURE MANAGEMENT AND STRATEGY OF ENERGETICS

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Modern world economic situation is connected with the developing of scales of industrial and agri-culture manufacture. The progress of modern civilization is conditioned by the use of electricity; its producing at the majority of countries every 7–10 years doubles, meanwhile the big part of elec-tricity is outputted by thermal power station.

Existing technologies of producing the electricity at the thermal power stations cause damage to na-ture and human being as the result of pollution of environment. While the projecting and building of thermal power stations in Russian Federation the economic calculations traditionally take into con-sideration only the effectiveness of capital investment into a prospecting, exploitation of deposits and technological process of burning the fuel. But at every stage of producing the energy at the fos-sil fuel – while the prospecting, production, processing, transportation, deposit, burning of coal, wa-rehousing of slag – there are formed different polluting substances, which come in the environment and are involved into global biogeochemical processes.

The estimation of economical effectiveness of producing the energy at the coal and other fossil

types of fuel is defined by the permissible influence on the elements of nature anthropogenic complex, particularly, on the thermal regime and quality of water of the basin-coolers. Water factor plays decisive role while the placing and normal functioning of practically all types of manufacture, including the enterprises of heat power engineering. For the solving of problems of rational water use there is necessary the scientifically based analysis of factors of forming the quality of water in the basin-coolers.

The monitoring treatment of results of observations with the methods of mathematical statistic with the quantitative estimation of changing of parameters of water quality creates the scientific base for the prognosis of ecological condition of water object and guaranteeing of economically effective producing of energy. We developed and realized the program of monitoring of the quality of cool-ing water of the basin-coolers SDPS with the taking into consideration the specific peculiarities of nature anthropogenic ecosystems of these reservoirs for the output of practical recommendations, which guarantee the effectiveness of technological cycle.

The monitoring of the water quality of basin-cooler of Berezovsk SDPS-1 was carried out from the moment of filling in 1986 up to 2002. The eco analytic control was carried out with the use of modern methods of analysis of the quality of surface land water. The organization of nature ob-servations at the reservoir was carried out in compliance with the principles of complexity, systema-ticness of observations, coordination of terms of their carrying out with character hydrological phases. At the points of selection of tests at the reservoir there were controlled the coming in of substances with the river flow, the quality of water at the circulating stream of cooling water, the flow from the reservoir.

The procedure of selection the test guaranteed the carrying out of conditions of sufficiency and representativeness. The definition of indicators of the water quality, bottom detritus, vegetable materials was carried out by the methods, which carry the required exactness of definition, quality and reliability of information.

For the revealing of factors of forming the quality of water of the basin-cooler was carried out the treatment of results by the methods of mathematical statistic with the selection from the static number of facts with the periodicity of selection of tests six times a year. For studying the character of changes of observed behavior at the time there was carried out the mathematical apparatus of the analysis of time series. The massive of facts was treated by time series with the method of frequency of Fourier analysis from the packet of applied programs STATISTICA. Periodograms were used while the solving of tasks by the revealing of concealed periodicities at the time series.

Carried out researches showed that the incoming of biogenic compounds with the river flow and from the submerged peat into a basin-cooler, and also the geographical location, hydro meteorological conditions of location, the peculiarities of morphometric structure of stream caused the “launch” of mechanism of eutrophication of reservoir already at the initial period of its existing.

Basin-coolers have specific thermal regime, which is connected with the thermal escape of cooling water. The rising of temperature of water at the basin-cooler intensifies the processes of de-struction of organic substance, while the huge cost of dissolved oxygen in the water. The oxygen regime of reservoir influences the development of phytoplankton, which has the main role at the maintenance of homeostasis of water ecosystem. The level of permissible load to the ecosystem is defined by the degree of development of phytoplankton, which conditions the positive effect – the enrichment of water with oxygen, the balance of producing-destructive processes. The presence at the nature horizon of the zones with the restoration conditions of environment slows down the processes of mineralization of organic substances, leads to their accumulation, what promotes the eutrophication of water ecosystem. The accumulation of biogenic compound in the water promotes the development of macrovegetation; while this there is decreases the square of area of water of ac-tive zone, which is necessary for the effectiveness cooling of water, and thereby there lower the economic indicators of producing the energy.

The increase of thermal load to the reservoir leaded to the intensification of destructive processes, worsening of oxygen regime. At summer periods of further years at the whole area of water the dominating position is occupied by blue-green algae, the specific composition of which allowed supposing the presence of harmful effect (Aphanizomenon flos-aquae, Microcystis aeruginoza, Anabaena). For the estimation of toxicity of water there was carried out biotesting with the use of standard composition of biotest, including the cultures of Ceriodaphnia affinis; there was revealed sharp and chronic toxicity of the water tests of reservoir.

Thermal water escape and hydrometeorological conditions at the summer time from 1991 promoted the considerable exceeding of biological threshold, what leads in the sequel to the impo-verishment of fauna and flora of reservoir, there was caused the development of pathogenic micro-flora. At the water area there was settled the fact of exceeding of sanitary-chemical and microbio-logical norms.

Thereby the exceeding of temperature of water at the expense of thermal escape of thermal power station and peculiarity of hydrometeorological conditions while the morphometric parameters of reservoir promoted the creation of conditions for the origin and existing of biofond of "blos-soming", the realization of conditions for the thermal eutrophication of reservoir.

At basin-coolers of the channel type the meaningful part of water area is occupied by shoals, at which the cooling of escaped heating water is carried out efficiently. The shoals are overgrown with higher aquatic vegetation a lot, there exists more intensive siltation. The overgrowing with mi-crovegetation and "blossoming" of water cause economic damage to the technical water supply of thermal power stations; meanwhile there becomes worse the cooling ability of reservoir as the result of decrease of evaporation and lowering of heat irradiation into the atmosphere. The processes of silting of the basin-coolers have a great influence on the forming of circulating stream of the escaped heated water. There was revealed that silting of the basin-cooler BSDPS-1 is carried out at the result of detritus of solid river flow, collapse and processing of shoreline, flooded at the bed of the reservoir peat, sedimentation of weighted organic substance.

There was established that the incoming of compound of heavy metals into a basin-cooler is carried out from the territory of catchment area columbine with their further accumulation at the buttom detritus, from where they are pulled with macrovegetation. At the end of vegetation period while the decomposition of higher water vegetation the toxicants return into water, conditioning the "second" polluting of water area, what leads to the toxic eutrophication of reservoir.

For the analysis of the structure of the connections between the showings of the water quality and revealing general factors of eutrophication there was used the apparatus of multidimensional factor analysis of the matrix of cross-correlation. With its help there were revealed two latent factors, which are responsible for the 36,4% of total dispersion of thirteen observed parameters. Taking into consideration the character of studied object, which has big number of accidental and uncontrolled parameters, which influence the condition of object, this deposit of two factors can be called rather essential.

The nature of one of the factor is connected with the autochthonic and allochthonous incoming of biogenic compounds into the ecosystem of reservoir; the second factor is identified by us with the geographical showings, on which there are depend the temperature regime of the basin-cooler. The rising of the water temperature changes the physically-chemic parameters of the water quality, which in term cause the change of biological characteristics of water ecosystem; these suc-cessive processes elapse with different speeds and are "stretched" in time.

Using the results of monitoring of the reservoir, we carried out the mathematical modeling of the connections between the parameters of flow and incoming of autochthonic and allochthonous biogenic compounds. It allows producing the quantitative estimation of the deposit of tributary of feeding rivers, thermal escape of power station, incoming of organic and biogenic compound from the flooded soil for the long period of time, what creates the scientific base for the prognosis of ecological condition of the basin-coolers.

Consequently there were developed the scientifically-based recommendations by the optimal functioning of nature anthropogenic system of the basin-coolers, of the prevention of development of the processes of eutrophication; of guaranteeing the effective cooling of circulating channel of heated water, what increases the economic showings of the electricity producing (Morozova O.G., Pen R.Z., Repyah S.M. Peculiarities of forming of the hydrochemical regime of the basin-cooler of Berezovsk SDPS-1. – Novosibirsk: Publisher So RAN, 2001. – 214 p.).

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