

Harmful Microalgae: Their Role in the Black Sea and Biotechnology

Evgeny B. Gol'din

*BREMA Laboratory, Simferopol, Crimea, 333043, Ukraine
Tel +380-652-221389 Fax +380-652-253503
e-mail: AlexeiBirkun@home.cris.net*

Abstract

Cyanobacteria and microalgae are important in forming of water quality and they are the most susceptible to environmental alteration among living organisms. Some water pollutants cause their elimination, but the others can be conducive to cyanobacterial and microalgal mass propagation and deterioration of water quality. The increase of water saturation with biogenic compounds leads to eutrophication and intensive growth of some microalgae stimulating red tides in coastal zone and cyanobacteria causing "water bloom" in saline lakes and estuaries. In these cases their poisonous action and transmission of toxic compounds by trophic chains correlate to reduction of water transparency and oxygen concentration. The results are displayed in elimination of seaweed and zooplanktonic organisms, mass mortality of fishes and human diseases in some situations. The rising anthropogenic load can extend a number of negative phenomenon stimuli in the future. There are many active products of toxic compounds among about 700 cyanobacterial and microalgal species known in Black Sea for today. Besides some of originally non-toxic species may produce toxins in unfavourable conditions. Moreover mass propagation of non-toxic species brings a damage to environment because decomposition and putrefaction of enormous biomass is attended with deterioration of water quality and mortality of marine inhabitants. There are no effective algicidal preparations in the Black Sea countries for decision of the problem without any damage for environment. Some specialists suggest a number of measures concerning general control of biogenic elements in sewage. But favourable results would be obtained even at the best case in tens of years later. They will be not comprehensive for removal from this threat because stipulated deficiency in phosphorus connected with surplus nitrogen can increase the toxicity of some species and provoke producing of toxins in others. So the main task in this sphere is to find alternative modes either to pure the coastal waters or to use toxic species in human interests. For example, one of the hopeful ways is development of biotechnological investigations in the Black Sea countries directed to employment of algal biocidal characteristics and design of algal bioindicative systems. It is possible to form a new approach to environmental monitoring on the base of algological criteria. In this way the examining of algae-vegetation in dolphin skin overgrowing, their environment and capture places has permitted to reveal correlation between distribution of some species and the status of animal health and water quality in the Black Sea dolphinaria and coastal area. The experimental data about biological activity of cyanobacteria and microalgae were obtained in relation to the organisms of different evolutionary levels (bacteria, helminths, insects, rodents etc). So it is interesting to use the products of

active and toxic substances to obtain new biological preparations for pest control. The available results assume the existence of specific action of algal metabolites to the diverse test objects. It is necessary to take it into account for design of practical aspects of cyanobacterial and algal employment in agriculture and medicine. The technologies to produce indispensable cyanobacterial and microalgal material were examined in several aspects: using of the natural source by withdrawal of surplus biomass; employment of controlled methods of continuous cultivation; design of enclosed systems of sewage utilization as a nutrient substratum for growth of active species. There is an expediency to form the special Mediterranean Programme providing for joint combined investigations in biochemical ecology, biological indication and biotechnology of cyanobacteria and microalgae, the prognosis of their propagation, distribution and role in interspecific relations, for exchange of scientific information and creation of general data base.