Living resources, fisheries, mariculture

Algae: The Raw Material For Biologically Active Substances

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Macro- and microalgae are a source of the organic matter rich in valuable biologically active substances (BAS). Lipids of diatoms contain polyunsaturated fatty acids (PUFA) which are vitally important to the human as an energy supplier and for prevention of cardiovascular disorders, atherosclerosis, etc. In diatoms, polyunsaturated eicosapentaenoic acid 20:5 (ω-3) can contribute to 40% of the total fatty acids content and more, thereby making this taxon different from the rest taxa. In Phaeodactylum tricornutum, Cylindrotheca closterium and Skeletonema costatum the lipid fraction is as large as 20% of dry biomass; moreover, 40% of fatty acids in them are due to PUFA. Diatoms also harbour β-carotenes and phylloxanthins, e.g., fucoxanthin, diadinoxanthin and diatoxanthin. Having the content greater than all other carotenoids compose together, fucoxanthin is the dominant carotenoid of diatoms. Depending on species, the percentage fucoxanthin contributes to total carotenoid content varies from 50% in S. costatum to 78% in C. closterium. Therefore, Black Sea microalgae Ph. tricornutum and C. closterium which have specific growth rate as high as to 1.0 in days are commercially promising mariculture objects. Brown algae genus Cystoseira, massively growing along the shores of the Black Sea, are another perspective raw material for manufacturing biotechnology-oriented BASs. The brown algae are rich in pigments, in particular, carotenoids such as fucoxanthin, β-carotene, and zeaxanthin. Fucoxanthin, the major pigment produced by the brown algae, is known for its high antioxidative activity. Like PUFA, carotenoids are of vital importance to living organisms. Owing to anticarcinogenic effect, these pigments can be applied for malignant growth prevention and for improving human body resistibility and reducing harmful effects of environmental pollution. As a collagenase and pigmentary activity inhibitor, fucoxanthin can soon be appreciated in cosmetology, too. Obviously, modern biotechnologies can furnish a variety of valuable biologically active substances through rational use of the huge plant stocks harbored in the Black Sea.