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BIOTECHNOLOGY OF RAPID AND MASS CULTIVATION OF SPECIES AND STRAINS OF ALGAE

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Abstract. Based on the process of photosynthesis, promising species and strains of algae are grown technologically in special machines, obtaining more biomass and extracting biologically active substances from biomass, and using it in various sectors of the national economy.

Key words: Euglena clara, Chlamydomonas parietari, Chlamydomonas rein, Chlorella vulgaris.

Algae cells are superior to higher plants due to their high growth rate, photosynthetic activity and productivity, as well as the ability to store more protein, fat, and vitamins in the biomass. In Uzbekistan, a method of mass cultivation of promising species and strains of the chlorella and stenedesmus family was developed, and the methods of using their suspension as a biostimulant in livestock, poultry, and cocoon breeding were put into practice [4].

Based on the process of photosynthesis, promising species and strains of algae are grown technologically in special machines, obtaining more biomass and extracting biologically active substances from biomass, and using it in various fields of the national economy. The biology and ecology of nitrogen-fixing blue-green algae were studied, cultivation methods were developed, and it was recommended to use their promising species in rice cultivation to increase the rice yield [4,5].

The process of photosynthesis of promising species and strains of single-celled green algae, the amount of biologically active substances contained in them, was studied, the biotechnology of intensive and mass cultivation was developed, and the biomass of the promising strain of hamidomanada was recommended to be used as a protein-vitamin food in fur breeding. [1].

Physiological and biochemical characteristics of single-celled green, blue-green and red algae representatives were comparatively studied, their methods of adaptation to high light and temperature, as well as strains that retain more protein, fat, carotenes in biomass were selected, and photobiotechnological was recommended for production as an object. In particular, the method of obtaining highly effective face skin care lotion and cream from the alcohol mixture of chlomidomanada algae was shown [5].

Algae grow fast mainly in mineral nutrient environment. Due to the fact that the price of chemical reagents added to the mineral nutrient medium is rapidly increasing, it is necessary to look for ways to reduce the cost of growing algae and obtaining biomass. For this reason, in 2001-2005, it was started to solve the problems of separating species and strains of algae that can grow in organic waste, developing methods that reduce the cost of biomass [5].

Two species and one new strain (Kazirahimova) belonging to the Chlamydomonada family were isolated from the ponds of the Namangan city wastewater treatment plant, and Euglena

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clara Skuja species (Eshpol'atova M.) was isolated for the first time in the water basin of the Samarkand city chemical plant. a method of collecting and storing them in the collection was developed. Their bio-ecological, physiological-biochemical properties were studied under conditions of intensive cultivation. The new strains were continuously grown in a laboratory device for 7-8 days in a modified nutrient medium at a temperature of 25-32 °C, 20-80 W/m2 FAR light, and it was shown that 5-7 g/l of dry biomass can be obtained. The photosynthetic activity of Chlamydomonas parietari Dill .UA-5-24 strain is slow and lasts longer in the stationary phase, the methods of increasing the amount of carotene, fat and oxyl substances in its biomass under the influence of optimal food and light were shown. Thus, 2 types of Chlamydomonas, one strain, one strain of Euglena, and one strain of Chlamydomonas were isolated from wastewater of industrial and household service enterprises in an algologically pure state, and their adaptation to mixotrophic nutrition, photosynthetic activity, and biologically active substances in biomass were positively evaluated. orientation characteristics were determined and it was shown that it is possible to control the biotechnology of rapid cultivation [7].

Algae belonging to different systematic groups: Chlorella vulgaris Beijer from green algae; UA-1-8; Chlamydomonas reinhardtii, 449; Ch. parietaria Dill., UA-5-24; Synechococcus elangatus Naeg from blue-green algae; Nostoc linckia f.calcicola (Breb.) Elenk.; Euglena clara Skuja, E. oblonga Schmitz from Euglena algae were grown continuously for 10 days in a special device under optimal conditions in the laboratory, and their photosynthetic productivity was analyzed under different light conditions. Among the studied algae, Chlorella vulgaris Beijer; UA-1-8; Chlamydomonas reinhardtii, 449; Ch. Parietaria Dill., UA-5-24; it grew well at high temperature (30-35°C) and high light (200-300 W/m2 FAR), productivity was 5-6 g/l of dry biomass. Therefore, these algae were included in the group of light-loving algae. The studied representatives of blue-green and euglena algae grew normally at a temperature of 25-30°C and 100-150 W/m2 FAR light, and the productivity was 2-3 g/l of dry biomass. Representatives of this group are included in the group of mesophilic algae [9].

In 2007-2008, the tasks of searching for promising strains of salt-resistant algae from nature, selection of breeding environments, light regime, and development of active preservation methods were researched. Chlorella vulgaris Beijer from the sample of algae brought from the water basin around Moynak; new UA-1-29 strain, new D-30 strain of Dunaliella minuta species and new D-31 strain of D. salina species were isolated in algal purity and modified mineral nutrient media were developed for them. A new strain of Chlorella vulgaris species UA-1-29 was found to be able to adapt to 10-15 g/l NaCl salt in the mineral nutrient medium [1].

Currently, 68 cultures are kept alive in the laboratory of the scientific and production center "Botany" of the UzR FA. They belong to 68 strains, 41 species, 18 genera, and 4 divisions. As a result, the collection of algae was replenished with newly isolated species and strains, and it can be recommended to produce them as new photobiotechnological objects [4].

In the future, the following issues should be studied more deeply and widely:

- Separating promising species and strains of algae from fresh, salt and wastewater waters of our republic and replenishing the collection;

- to introduce new methods of active preservation of the gene pool of algae and to create a passport of promising species and strains and obtain their legal status;

- to determine the specific laws of newly isolated algae based on the study of their bioecological, physiological and biochemical characteristics;

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- development of biotechnology for intensive and mass cultivation of promising species and strains, as well as recommending their use in various sectors of the economy [4].

Sources indicate that Chlorella contains 50-60% protein, 88% protein, 30% carbohydrate, and 15% lipid dry mass. Stsenedesmus contains 7% carbohydrate, 24% protein, 13% fat, and 89% nitrogen. These algae are rich in vitamins such as E, B, B2, RR, B6 (Muzaffarov et al. 1974). In addition, all 20 different amino acids are found in large quantities in these algae. Among the elements K, Na, Mg, Ca, S, Cl is available [3;].

Of course there are many strains of this algae. All of them have their own composition, yield and nature. For example, Chlorella pyrenoidosa Chick. - grows well in thermophilic (30-40oC) organomineral environment, large cell, 6-16.2 mm in diameter. The chloromotophore is round, and when the suspension is stirred, the sunken cell rises rapidly. Culture media lysis is rare [8].

The length of the cell of Scenedesmus obliquus (Tirp) Kutz is 9-15 mm. Width 3.5-5.4mm. The chromophore is plate-like, one perenoid. Cell senobis are connected to each other by lateral vessels. Cell sedimentation is slower than Ch pyrenoidosa. Thermophilic strain 35-39 CoAlmost all strain cultures have organic nutrients, depending on the nature of their habitat. feels the need for sources. Most local strains live in waters rich in nitrogenous organic matter. The photosynthetic organ of green algae is very sensitive to unfavorable environments. As a result of frequent changes in conditions, cultures in open basins undergo high morphological changes.

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