

STUDY OF TECHNOLOGY OF GROWING SPIROULINA

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ANNOTATION

In the article, high algae ppyrulin information is given. Currently, cyanobacteria are promising objects of phytobiotechnology. Studies on Spirulina fusiformis, Spirulina subsalsa and Spirulina major species are being conducted in a number of countries.

Keywords: Cook-green algae, spirulina, cyanobacteria, phytobiotechnology, Spirulina platensis, fusiformis, subsalsa, Coca Tekskoy Tekskoe lake, modernization.

In the early years, the quality of the products adopted by the firms was low due to the addition of other algae to Spirulina and the lack of careful control over their habitats. Since 1988, the technological processes of growing and harvesting spirulina have been modernized, in particular, the shores of the lakes have been covered with food-grade plastics, and quality control of the environment and the resulting products has been established. Since 1980, micrological algae have begun to grow in specially constructed industrial complexes with a shallow 15-25 cm deep pool system of tens to thousands of square meters, where the ideal chemical environment for spirulina is maintained, mixed and enriched. .

In laboratory experiments in France, 40 to 45 tons of dry spirulina with a protein content of 25 tons per hectare were obtained. Industrial and semi-industrial production of algae biomass is well developed in Bulgaria, Czechoslovakia, Germany, Israel, India and other countries. In 1999, global spirulina production reached 3,360 tons of dry biomass per year, according to research by Earthrise, America's largest spirulina biomass producer, which has been on the market for nearly two decades. Thus, there is a steady growth rate of demand for spirulina and demand for it around the world. As a result of many years of joint research, the technology of open algae cultivation has been developed in Bulgaria and Czechoslovakia. provided production of 40-60 tons of dry biomass from March 1 this year. One of the Sceneesmus strains is used as a manufacturer, which contains large amounts of carbonates and free carbon dioxide in natural thermal springs. For the cultivation of microalgae in an industrial way, the suspension is used in different shapes, sizes and depths, with different mixing of the suspension, open or closed, using different materials, solar energy or artificial lighting. Spirulina is obtained in open reservoirs where possible due to environmental and climatic conditions. Open-type devices, as a rule, provide a suspension with a low biomass density, and the yield depends in many respects on climatic conditions, which makes it difficult to grow microalgae. brings it closer to conventional fodder production. On the other hand, open-type devices are simple in terms of design, easy to operate, their cost is 2-3 times lower than closed systems. The advantage of the method of production of micro hammers in open structures is the possibility of using natural energy resources. The main disadvantages of such facilities are the difficulty of caring for algal crops, the need to use a system of thermal insulation in adverse weather conditions, open-type devices are used in Asia, Kazakhstan, Uzbekistan. A number of major American manufacturers are engaged in the cultivation of spirulina under natural conditions in the open air, using modern technologies for cleaning the product from contamination. Mo " In regions with temperate climates, the cultivation of algae in greenhouses is preferred (planar method). This will definitely increase the cost of construction, as well as extend the life of the production throughout the year. Separation of the cell suspension from the atmosphere and targeted regulation of cultivation parameters (mainly temperature

and lighting) allow to enhance the process of photosynthesis in algae, to obtain maximum production per unit area and a high concentration of biomass in the product.

Spirulina is grown in greenhouses in Japan, Italy, France, Holland, Moldova, Ukraine. Nowadays, closed photobio-reactors are more preferred, which is explained by the possibility of obtaining small cell density, high velocity of turbulent flow. The main problem of growing cyanobacteria in indoor photobioreactors is to control the temperature and oxygen concentration in the culture system. Ambient temperature and oxygen concentration have a strong effect on the protein content of *Spirulina platensis* biomass. The main advantage of spirulina over other microalgae is the ease of biomass collection and its high biological value. For example, in Ukraine, vertical stacking machines are used to grow spirulina. Natural and artificial a terrace-cascade structure has been developed for the cultivation of microalgae using judicious light. The process of growing microalgae is carried out in special photosynthetic blocks. Industrial cultivation of microalgae includes the following main technological operations: preparation of optimal nutrient environment, providing the necessary temperature conditions and lighting during cultivation, continuous enrichment of the suspension with carbon dioxide. Photo blocks placed indoors in the greenhouse repeat the composition of Lake Chad water and are filled with a nutrient medium of a strictly defined composition. Soda is added to it to alkalize the environment. In addition to soda, the nutrient medium contains potassium phosphate, sodium nitrate, ammonium nitrate, potassium sulfate, sodium chloride, magnesium sulfate, iron salts.

The morphological state of the culture depends on the ratio of the spiral shapes to the thread shapes. The steady superiority of this or that form indicates that the culture adapts to the given growth conditions. Fractional introduction of nitrogen and carbon into the environment in the form of ammonium bicarbonate increases the number of spiral forms in the culture. Mineral means are most widely used for the cultivation of microalgae. The main elements of the nutrient medium are nitrogen, phosphorus, potassium, sulfur, magnesium and a number of trace elements. Fertilizer-based means for growing spirulina - Zarruk and Albitskaya are used. The study of the cultivation of spirulina in the Zarruk environment was later carried out by AVBorodina. Growing spirulina in a bicarbonate-based particulate environment results in a decrease in the concentration of the latter, is accompanied by an increase in pH during the accumulation of carbonates and the active growth of the microalgae. Of the CO₂ ion forms present in this medium, spirulina prefers HCO₃. Once the algae reaches the stationary growth phase, a reverse process is observed, the concentration of carbonate ions decreases and the concentration of bicarbonate ions begins to increase. This is caused by the shift of the carbonate balance towards the hydrocarbons, which is associated with the destruction of the culture, a decrease in pH, and an increase in the rate of CO₂ assimilation in air. When this microalgae is grown in the Zarruk environment, the main source of inorganic carbon is the CO₂ air in the assimilated medium with a high pH value. However, Albitskaya argues that it is advisable to use the tool given its simple composition and very high efficiency in the cultivation of spirulina. It is better to use Albitskaya nutrient or fertilizer-based agent to increase the content of carotenoids. Systematic control is performed for the chemical composition of the nutrient medium and pH. An analysis of the literature data shows that spirulina is primarily affected by environmental factors such as light, temperature, and pH of the solution in water. As for the pH factor, the optimal value is 7,5 – 8,5. It is an important temperature that determines the growth, development and fertility of micro algae in culture. It is better to use Albitskaya nutrient or fertilizer-based agent to increase the content of carotenoids. Systematic control is performed for the chemical composition of the nutrient medium and pH. An analysis of the literature data shows that spirulina is primarily affected by environmental factors such as light, temperature, and pH of the solution in water. As for the pH factor, the optimal value is 7,5 – 8,5. It is an

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CONCLUSION

According to various sources, the temperature of the nutrient medium should be in the range of 25-30° C. It is considered necessary to maintain air temperature when growing spirulina to 28-35° C. Light intensity affects the qualitative and quantitative composition of pigments, including carotenoids. The spectral composition of light is of great importance. First of all, red or light is more suitable for these biosynthetic processes than green or blue.

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