

**СЕКЦІЯ: ХАРЧОВА ХІМІЯ, БІОХІМІЯ, БІОТЕХНОЛОГІЯ ТА ФУНКЦІОНАЛЬНІ  
ХАРЧОВІ ПРОДУКТИ**

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**BIOMASS *DESMODESMUS ARMATUS* (CHOD.) HEGEW AS A SOURCE OF  
CAROTENOIDS FOR FOOD AND FEED NEEDS**

Today, most microalgae cultivation technologies are aimed at correcting their nutrient composition by saturation with various essential compounds, including carotenoids. The latter are used as feed additives and prophylactic agents; they are also indispensable components of feed and premixes in aquaculture of fish and crustaceans. Thus, the color of skin, muscles and eggs is associated with the content of carotenoids and their composition. Carotenoids are also an important factor in the formation of sex products of fish and the survival of their larvae.

*Desmodesmus armatus* is a green microalgae that is among the potential producers of secondary carotenoids due to their rather high content and the possibility of correcting the effectiveness of carotenogenesis.

It is known that an increase in the yield of the target product can be achieved by using biosynthesis precursors under conditions of a two-stage accumulative culture. In this case, the inductor used should not be toxic either to the algae biomass, or to the end-user of the target product.

C5-isoprenoids (precursors of carotenoids) can be synthesized both in the cytoplasm from acetate (acetate-mevalon pathway) and in chloroplasts from glucose (glyceraldehyde-3-phosphate-pyruvate pathway). However, this technique not only leads to the activation of carotenogenesis, but can also cause a redistribution of the main nutrients profile. Therefore, in the study of producers, in addition to the ability to produce the main target product, morphological changes in culture, and possible variations in the production of various valuable metabolites are necessarily analyzed.

The aim of the research was to develop a technique for obtaining high-yielding carotene-containing biomass *Desmodesmus armatus* by cultivation in the presence of glucose and sodium acetate.

Algologically pure culture of *D. armatus* was grown on the waste water from the recirculating aquaculture system by a two-stage accumulation process, under illumination (2500-4000 lux, 16hr/ day) at a temperature of  $21 \pm 2$  °C. The induction of carotenogenesis was stimulated by the introduction of glucose and sodium acetate at concentrations of 10, 25, and 50 mM. All manipulations were performed in an absolutely sterile laminar flow cabinet. This condition is mandatory for biomass, which will later be used as a food or feed additive.

The introduction of  $\text{CH}_3\text{COONa}$  and  $\text{C}_6\text{H}_{12}\text{O}_6$  made it possible to increase the growth activity of the culture and, at the terminal stage of cultivation, to obtain a productive culture with the number of cells around  $9 \cdot 10^6$  cells/l. At the same stage, the total amount of carotenoids in the *D. armatus* biomass reached a maximum of 18 mg / g dry weight, while a similar pattern was preserved with sodium acetate and glucose at concentrations of 25 and 50 mM. Most likely, the introduction of glucose or sodium acetate into the nutrient medium leads to an increase in the carbon / nitrogen ratio, which results in an increase in *D. armatus* culture carotenoid productivity. An increase in the content of total lipids to 42% was also noted against the background of a slight decrease in the content of total protein.

Thus, the ratio of basic nutrients and the increased content of carotenoids allows the use of *D. armatus* biomass as a feed substrate in aquaculture or as a source of biologically active additives in human food.