The Mass culture of the Valuable Microalgae by Using the New-type Photobioreactor

Seishiro Hirabayashi (Society for Agricultural Education-Research Development Abroad)
Hazel T. Gevarra (Former, Dept. of Natural Science, Los banos campus, Philippine University)

Summary

A newly designed photobioreactor that can efficiently work to mass culture of the valuable microalgae for application was developed and the mass culture of 5 species of marine algae were tested outdoor by using the photobioreactor. which is described in detail on the last year report.

Hitherto, microalgal mass production on a commercial basis have been operated in a huge open pond with a paddle wheel. However, there are many technical problems for examples, contamination, low cell density culture, no temperature control and non-efficient mixing system etc., in this conventional method of microalgal mass production. It, therefore, is not capable to have a high productivity, high quality products and a low cost performance. Moreover, there is a limit in microalgal species that can be cultured in the open pond system, since a only few species such as Chlorella, Spirulina and Dunaliella with special biological and physiological characters as tolerance to high pH, resistance to high salt concentration can be cultured in the open pond.

In order to resolve above mentioned problems, we have developed a more practical and useful photobioreactor that can efficiently work to mono-culture outdoor in many kind of microalgal species.

In this study, we tested mass culture outdoor of the following marine algae that are the very important species for aquaculture during from March to November in 1999:

1) *Nannochloropsis oculata*
2) *Palvola lutheri*
3) *Phaeodactylum tricornutum* (diaom)
4) *Chaetoceros* calcitrans (diatom)
5) *Isochrysis galbana*
6) *Tetraselmis suecica*

The results in mass culture outdoors of these marine algae by using photobioreactor showed the followings : 1) the mass culture in *Nannochloropsis oculata, Phaeodactylum tricornutum* (diaom) and *Tetraselmis suecica* showed the stable productivity for a long-term and then the possibility of commercial production was shown. 2) the mass culture outdoors in *Palvola lutheri, Chaetoceros* calcitrans (diatom) and *Isochrysis galbana* were difficult to maintain the stable culture on the cold winter and hot summer season in this area because these marine algae have a relatively narrow range in optimum temperature (15-25℃) and were sensitive to growth temperature. We are going to study the effects of culture condition and environmental condition outdoor on the productivity and fatty acid composition of these marine algae.