



Growth enhancement of benthic diatoms for industrial applications

Ana Gouveia, Ana Nicolau, Manuel Mota

*IBB-Institute for Biotechnology and Bioengineering, Centre of Biological Engineering,
Universidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal*

Diatoms are photosynthetic unicellular algae found in aquatic environments.^[1] They have many (potential) industrial applications due to their position at the basis of the aquatic food chain, peculiar fatty acid composition and intricately ornamented siliceous cell wall.^[2] This study aimed at the growth enhancement of benthic diatoms in tree-dimensional batch cultures using filamentous substrates.

Achnanthes intermedia and *Eunotia bilunaris* were grown, respectively, in F/2 and WC medium conditioned with filamentous cellulose DIACELL® 1000 and glass fibers. The effect of these substrates was evaluated by fluorimetry, dry and carbon weight analysis (this latter only for glass fibers). Two different experiments were performed: (1) growth rate and final biomass increase (stationary growth phase) and (2) biomass increase at the end of exponential growth phase. It was found that both substrates lead to a significant increase in growth rate and in final biomass. The biomass increase was higher in cellulose conditioned cultures especially in case of *Eunotia bilunaris*.

This study showed that filamentous substrates increase the carrying capacity of cultures by offering a suspended attachment surface. Moreover, an increase of biomass in suspension comparing to the control was observed, leading to easier harvesting. This method presents an opportunity of scaling-up diatoms cultivation, increasing even further the biomass production.

[1] Chapurnov VA, Mann DG, von Dassow P, Vanormelingen P, Gillard J, Inze D, Sabbe K, Vyverman W, "In search of new tractable diatoms for experimental biology", *Bioessays* (2008) 30: 692-702.

[2] Bozarth Andrew, Maier Uwe-G, Zauner Stefan, "Diatoms in biotechnology: modern tools and applications", *Appl. Microbiol Biotechnol.* (2009) 82: 195-201.