

Photosynthetic Cell Factories

René H. Wijffels, Wageningen University, Food and Bioprocess Engineering Group, P.O. Box 8129, 6700 EV Wageningen, The Netherlands. Rene.Wijffels@wur.nl; www.marine.wur.nl

A major bottleneck for the application of microalgae is the low productivity obtained with the processes used presently. The fundamental reason for this is that in those processes algae are grown and after that (usually after application of stress) cells are harvested and products are purified. The growth of cells is a slow process, mainly because much energy (usually from solar illumination) is needed for the fixation of CO₂ in biomass (photosynthesis). By 'milking' products from biomass, grown biomass is reused and has not to be grown again.

In the past few years we worked on extractive fermentation of carotenoids from microalgae: 'milking of algae' (Hejazi *et al.* 2002a,b, 2003a,b, 2004a,b,c). Carotenoids like β -carotene and astaxanthin are grown in the presence of organic solvents. Compounds extracted from the algae are produced again by the microalgae and as such the lipophilic compounds are 'milked' from the microalgae. Presently we are studying the principle of milking of products from microalgae with the goal to enhance the rate of extraction further and to apply this principle for other products such as poly unsaturated fatty acids.

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