

Design consultation and testing of a membrane photobioreactor suitable for advanced biologic production from microalgae

AIMS

At present, the production of high-value biologics in plankton is uneconomical, primarily due to the demands of mixing and harvesting low biomass concentrations from large volumes. This issue is almost entirely negated by the use of bioreactors that use a biofilm-membrane design, in which the biomass is retained within a high-density, low-volume system. To our knowledge however, there is no commercially available membrane system suitable for the growth of algae as a biofilm.

In this project, Plymouth Marine Laboratory (PML) collaborated with Varicon Aqua Solutions (VAS) to develop a prototype membrane photobioreactor — about 5l volume — for the production of high value biologics from microalgae and assessed biologic production capability using a reference algal system.

OUTCOMES

We designed and tested a novel solid-state photobioreactor. Growth rates, productivity and algal concentration was measured in several green algal species. Inoculation tests were also carried out to assess the best starting conditions within the bioreactor. We generated a wealth of baseline data for two very different microalgae species and assessed the potential for the system to enter into the competitive market for photobioreactors for the generation of high-value products.

“The fledgling BioProNET-funded collaboration resulted in a successful application to Innovate UK.” Varicon Aqua Solutions



MOVING FORWARD

The prototype system will continue to be used at PML for academic research and to provide baseline data to aid VAS with sales of the product. The algal media recipes developed and tested during this work are already generating sales for VAS, and it is envisaged that the PML—VAS relationship will continue to grow. The fledgling BioProNET collaboration resulted in a successful application to Innovate UK to take the technology forward.

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Plymouth Marine Laboratory working with Varicon Aqua Solutions