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Outdoor cultivation of a bioactive *Tolypothrix* sp. in Green Wall Panel (GWP®) photobioreactors

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Abstract:

The work here described was performed within the EU funded project NOMORFILM, which aims to discover novel bioactive compounds from microalgae for medical applications in both treatment and prophylaxis against biofilm infections on implanted prosthetic devices.

Within this study, a *Tolypothrix* sp. strain from the culture collection of CIIMAR (Portugal) was selected for its interesting antimicrobial activity and was cultivated outdoors in reactors of increasing volume: 8-L bubble tubes, 40-L GWP®-III (50° tilted, south facing panels) and 290-L GWP®-II (vertical east-west facing panels). The highest daily productivity (44.2 g m^{-2} of directly illuminated surface area, equivalent to 34.1 g m^{-2} ground surface area) was obtained in the 40-L GWP®-III photobioreactor in late June (27.5 MJ m^{-2} d^{-1} of average global solar radiation on the horizontal). The daily productivity decreased to 34.6 g m^{-2} of directly illuminated surface area, equivalent to 26.7 g m^{-2} ground surface area in late August (18.7 MJ m^{-2} d^{-1} of average global solar radiation on the horizontal). In early September, with similar average global solar radiation on the horizontal (16.3 MJ m^{-2} d^{-1}), the strain was cultivated in the 290-L GWP®-II reactor attaining much lower productivities (17.4 g m^{-2} of directly illuminated surface area d^{-1}, equivalent to 16.5 g m^{-2} ground surface area d^{-1}), mainly because of the lower irradiance at the panel's surfaces (11.8 MJ m^{-2} d^{-1} on the vertical reactor against 24.7 MJ m^{-2} d^{-1} on the 50° tilted one).

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