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**Performance of the wild type algal strains, of
Botryococcus braunii and of the reference
lipid producing strain outdoors**



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Editorial	
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Publishable Summary

All the wild type strains were cultivated outdoors in Green Wall Panel (GWP[®]) photobioreactors. The two cyanobacterial strains, *Synechocystis* PCC 6803 and *Synechococcus* PCC 7002 performed well outdoors in 10-L GWP[®] and were tolerant to high temperatures. However, *Synechococcus* PCC 7002 proved to be very sensitive to low temperatures, which strongly affected its productivity. Both strains showed a certain degree of euryhalinity grew well at salinities above (*Synechocystis* PCC 6803) or below (*Synechococcus* PCC 7002) that of their standard cultivation medium.

The four *Chlamydomonas reinhardtii* strains (CC1690 and CC124 with cell wall, CC1883 and CC400 wall-less mutants) were cultivated outdoors in 10-L GWP[®] reactors on different nitrogen sources (ammonium, nitrate, urea). A good growth was obtained with all the strains, but contamination appeared in many cultures at the end of the trials and in one case determined the crash of the culture. Fouling was also a problem in some of the cultures.

Phaeodactylum tricornerutum Pt1 was able to grow under limited light availability and low night temperatures, achieving the highest photosynthetic efficiency. Mixotrophic growth increased productivity.

The two reference strains, *Botryococcus braunii* Showa and *Nannochloropsis oceanica* F&M-M24, were also cultivated outdoors.

Botryococcus braunii Showa was cultivated in a 3-L GWP[®]-II reactor and was sensitive to low temperatures and grew slowly also during the summer. Cultures of these strains were also performed indoors in a 60-L annular column. Interesting productivities were achieved, although contamination represented a main issue. High hydrocarbon contents were obtained in the indoor produced biomasses.

Nannochloropsis oceanica F&M-M24 was grown outdoors to produce the inoculum for a pilot (up to 3000 L) GWP[®]-II photobioreactor, in which nitrogen starvation for lipid induction will be performed. The inoculum was produced in a 40-L GWP[®]-III photobioreactor and the productivities were in line with those reported in the literature for this strain.

Next steps will be cultivation in the pilot photobioreactor of two selected wild type strains to evaluate performance in a full-scale simulating plant, and of the reference strains to produce hydrocarbons and oil.