Combined Influence of Incident Light and Temperature in the Biochemical Profiles of *Pavlova lutheri*

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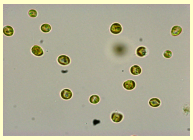
The facts

In terms of physical parameters, light and temperature are major factors that affect overall biomass productivities in algal systems. Consequently, it is of great interest to experimentally establish their independent and combined effects, aiming at the optimization of processes involving them. Although the study of each effect isolated has already been described in the literature, extrapolations from studies that hold irradiance constant while varying temperature, or hold temperature constant while varying irradiance may be misleading; there is indeed indication that some species may shift their acclimation strategies in response to the combination of said factors.

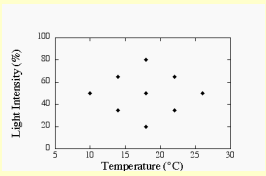
The problem

In what way does incident light intensity and temperature simultaneously affect the biochemical profiles of the microalga?

The experiment



The simultaneous effects of light intensity and temperature were assessed on growth of the microalga *Pavlova lutheri*, from Instituto Português de Investig. Marítima, Lisboa, Portugal.



The experiments were planned according to a factorial design The culture media was ASW (Borowitzka, 1988).

Culture flasks were incubated in a Gallenkamp orbital incubator (Sanyo, UK), stirred at 100 rpm and submitted to the desired temperature and light regimes.

THE MEASUREMENTSS

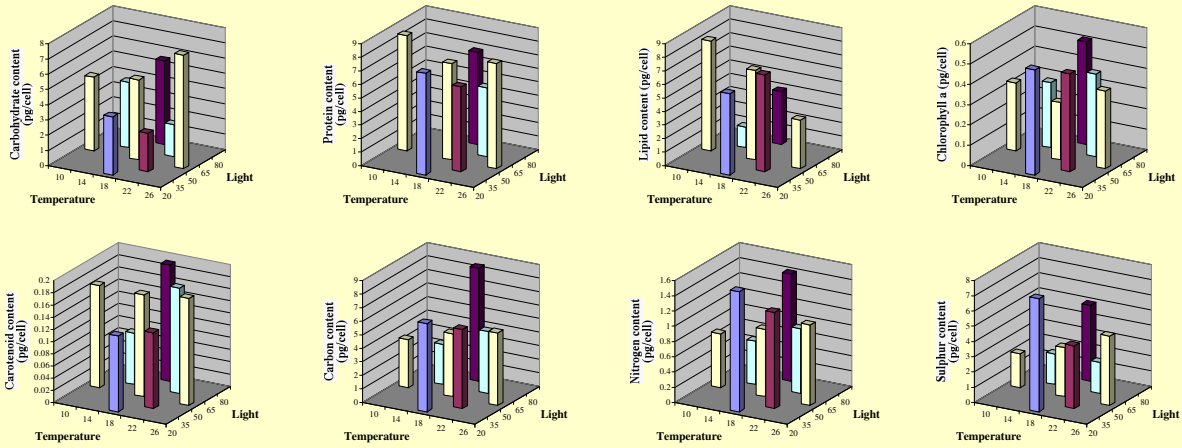
Biomass

Determinations of cell number were performed with a Neubauer Improved bright-line haemocytometer (Superior, Germany).

Biochemical compounds

Total proteins were assayed by the Lowry method (Lowry *et al.*, 1951), after previous hydrolysis in 2 N NaOH for 15 min in an ultrasonicator, and a further 5 min at 100°C. Bovine serum albumine was used as standard. Total carbohydrates were quantified as glucose, according to the phenol/sulphuric acid method (Dubois *et al.*, 1956). Total lipids were determined gravimetrically by the Bligh-Dyer method (Bligh & Dyer, 1959). The pigment contents were estimated after extraction with plain acetone saturated with magnesium hydroxide carbonate (Merck) at 4°C for 24 h, followed by spectrophotometrical measurements. The concentrations of pigments were calculated using the appropriate equations (Jeffrey and Humphrey, 1975). Intracellular content of carbon, nitrogen and sulphur was determined by elemental analysis (Fisons EA 1108).

The results



The conclusions

Results obtained at the mid-exponential growth phase show consistent trends along all temperature-light intensity conditions tested for some biochemical parameters, e.g. concentration of carotenoids, whereas for others it is not possible to depict consistent results; this is the case of the amount of carbohydrates, which increases with light intensity for the experiments at a constant temperature of 18°C, although the reverse is observed for the experiments at a constant temperature of 22°C.

Acknowledgments

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