Growth and photoregulation dynamics of the picoeukaryote Pelagomonas calceolata in fluctuating light

Dimier, Céline, Christophe Brunet, Richard Geider, John Raven

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ABSTRACT: Growth, photosynthesis, and photoacclimation properties of batch cultures of *Pelagomonas calceolata* (Pelagophyceae) were compared for 1 week under three different fluctuating light regimes with the same total daily amount of light. Treatments consisted of a sinusoidal diurnal light cycle or a high-frequency fluctuating light simulating two different regime of vertical mixing (highly fluctuating light [HFL] or fluctuating light [FL]). Three to five samples were taken every day for analysis of pigments, absorption spectrum, variable fluorescence, nonphotochemical quenching (NPQ), electron transport rate vs. light curves, and cell concentration. *Pelagomonas* achieved the same growth rate during the exponential growth phas under all three light conditions, revealing a high degree of acclimation to light and also suggesti that the daily light dose is the main factor regulating growth and division. Photophysiological adjustments occurred in the cells in response to the three light regimes. *Pelagomonas* seems to adopt the n-type photoacclimation in HFL, whereas the o-type photoacclimation is applied in FL The cells rapidly trigger photoprotective mechanisms such as the xanthophyll cycle and NPQ, even though these do not appear to be able to fully prevent photoinhibition. The enhanced cos for maintenance and repair associated with HFL may have limited the allocation of energy to growth, thus explaining the shorter duration of the exponential growth phase in this regime wit respect to the two others.