

The cell structure and growth rate of three species of marine microalgae (*Chlorella vulgaris*, *Tetraselmis chuii* and *Isochrysis* sp.) before and after cryopreservation

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Three species of marine phytoplankton *Chlorella vulgaris*, *Tetraselmis chuii* and *Isochrysis* sp. were cultured using Conway media in 20 °C with the light intensity of 90 $\mu\text{mol m}^{-2}\text{s}^{-1}$ and a photoperiod of 12:12 h L/D cycle. Cells were harvested in stages at logarithmic and stationary phases. Equilibration time for cyroprotectant exposure was 10 to 20 minutes before the samples was placed in the programmable freezer for a controlled rate of cooling at -1 °C /min. The temperature was reduced uniformly from 200C until it reaches -40 °C where the samples were maintained at this temperature for 30 minutes before direct immersion into liquid nitrogen at -196 °C. Samples were stored in liquid nitrogen for one week. Percentage of viable cells was relatively higher in the stationary phase for the three species that is 95.13 % for *Chlorella vulgaris*, 79.09 % for *Isochrysis* sp. and 69.36 % for *Tetraselmis chuii*. The growth rate of viable cells for *Chlorella vulgaris* a both logarithmic and stationary phases and *Tetraselmis chuii* at logarithmic phase showed insignificant differences ($p > 0.05$) before and after cryopreservation. *Tetraselmis chuii* of stationary phase and *Isochrysis* sp. of both phases gave significant differences ($p < 0.05$) for growth rate before and after cryopreservation due to photo-oxidation. The cell structure after cryopreservation showed disorganization and abnormality in the ultra-structure but this did not seem to affect the growth rate of the viable cells.

Keywords: *Chlorella vulgaris*, *Tetraselmis chuii*, *Isochrysis* sp., conway media