

Abstract

Snow algae like typical extremophiles are ideal model organisms for study of adaptation for life on the boundary of physiological possibilities. So far, it is not clear how these psychrophilic organisms on the molecular level optimize function of photosynthetic processes in temperatures about 0°C and often in very high radiation. This thesis evaluates growth limits and monitors the composition of fatty acids in selected subclade of psychrophilic and psychrotrophic algae of mainly the Chlamydomonadaceae (Chlorophyta) class isolated from localities in European area (as received from Culture collections UTEX and CCCryo), including the subclade from Czech republic and Slovakia.

I found out optimal conditions of growth using cultivation in crossed gradients (temperature/irradiance) for two subclades snow algae. In *Chloromonas reticulata* Luční (red snow), there is 8-20°C growth optimum and optimal irradiation exceeds $423 \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$. I classified this alga as psychrophilic. The second tested alga was *Chloromonas pichincha* Meandry. Optimal temperature of growth is in interval 4-10°C. Maximal temperature does not exceed 30°C and in this experiment it is the second psychrophilic algae found in area of the Czech republic. This discovery should be checked and data on growth in temperatures between 9-20°C should be added. *Chloromonas pichincha* Meandry is a snow alga which likes shadow and grows well in low irradiation of $34 \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$.

The thesis also studied fatty acids profiling of psychrotrophic and psychrophilic algae after cultivation in temperature conditions 3-30°C. I did not prove the trend of shorten chains and increase double bonds. Ratio of monounsaturated and polyunsaturated fatty acids depends on different temperatures of growth. In low temperature of cultivation (psychrophilic algae 3°C, psychrotrophic algae 3°C and 9°C) dominate MUFA and in high temperature of cultivation (psychrophilic 9°C and more, psychrotrophic 15°C and more) dominate PUFA. Results did not show trend of dependence profiles on temperature, change of DBI (double bond index) and did not show different strategy for survival in non optimal conditions for two ecological groups – psychrophils and psychrotrophic algae.

key words: snow algae, psychrophil, psychrotroph, *Chloromonas*, *Chlamydomonas*, fatty acids, unsaturated fatty acids, cold adaptation