

Abstract

Freshwater green algae within species complex *Haematococcus pluvialis* are best natural producers of secondary carotenoid astaxanthin famous for its strong antioxidant activity. Despite worldwide distribution, great biotechnological potential and extensive literature dealing with different approaches to the cultivation of these organisms, there still remains surprising gaps in knowledge of their complex life cycle and behaviour. First uncertainty concerns asexual cell division of zoospores, hypothetically limited to five cell doublings (Lee & Ding 1994). No such genetic limitation was observed in this thesis, number of cell divisions is thus influenced mainly by cultivation conditions. There is still considerable uncertainty regarding to the asexual reproduction, as well. Ambiguity might be caused by scarce observation of the whole process of gametogenesis and conjugation of gametes. Published studies differed in some particular points. Unfortunately, we did not succeed in induction of gametogenesis despite broad scale of tested cultivation conditions applied to two different species within the *H. pluvialis* complex, namely *H. pluvialis* and *H. rubicundus*. This failure might be caused by heterothalism of the studied strains. *Haematococcus pluvialis* inhabits mainly ephemeral pools. Its ability to survive unfavorable conditions in desiccated stage is crucial. Observed desiccation tolerance of akinetes of strain CCALA 357 was extreme. Akinetes survive even fast desiccation in 10% relative air humidity and three-month persistence in desiccated state. Furthermore, desiccation might serve as mechanism for survival of extreme temperatures such as -80 °C and 55 °C. This high resistance, caused probably by thick algaenan containing cell wall, may have crucial influence on life cycle and worldwide distribution of this organism.