Abstract:

This thesis summarizes the current knowledge of the mechanisms that allow green algae to tolerate even severe desiccation. It provides a comprehensive overview, ranging from the definition of desiccation stress and its impacts on algal cells, through mechanisms that algae employ in defense, to the evolutionary background as well as a synthesis of recent research on the acquisition of desiccation tolerance and factors conditioning it. The first chapter defines the desiccation stress itself and breaks down the processes by which it can damage algal cells, including both morphological and physiological effects. The second chapter discusses diverse mechanisms involved in protection against desiccation. From mechanisms aimed at prevention of water loss (e.g. mucilage production or modification of cell wall permeability), through mechanisms that cause desiccation tolerance (e.g. accumulation of antioxidants, stabilization of proteins and phospholipids etc.), to the formation of resilient life stages. The third chapter is devoted to the evolutionary-historical background behind the emergence of desiccation tolerance per se and overview in which algal groups it is observable today. The last section is a synthesis of modern knowledge regarding acquisition of desiccation tolerance during algal life and discusses both the possibility of gradual acclimation and the role of other factors, such as light exposure or the effect of other stresses (e.g. nitrogen deficiency).

Keywords: desiccation, green algae, desiccation tolerance, acclimation, antioxidants