Abstract

Snow algae are psychrophilic microorganisms, that inhabit snow fields in mountains and polar regions, which creates colored snow in good conditions. Most species belong to order Chlamydomonadales (Chlorophyta) with complicated life cycles, containing flagellates and immobile stages (cysts). Extreme environment of snow is characteristed by low temperature, problems with availability of water and lack of nutrition. Depending on location and phase of life cycle, snow algae have to deal with excess or lack of solar radiation, the important component of which is also dangerous UV radiation. The light conditions differ substantially from open location above the forest level or polar regions to forest habitats.

In the first part of this work I compared reactions of photosynthetic apparatus of snow algae strains from forest and forestless habitats to different intensity of radiation, then I dealt with assessing any changes related to long-term cultivation in laboratory. Based on measurement of rapid light curves on PAM fluorometer I have determined some characteristics of photosynthetic apparatus of individual strains (parameters α and Ik), which indicate adaptation to low or high light intensity. For some strains, it was possible to compare the results obtained at a three-year interval. In the second part of the thesis I compared the reactions of algae from forest and open habitats to UV-A radiation. This experiment was based on the determination of the maximum quantum yield of photosystem II by PAM fluorometry, which is a good indicator of the photosynthetic function. Measurements were taken before the start of the experiment, after 24 hours of UV-A exposure and 24 hours after recovery.

The results show that the photosynthetic characteristics of the studied strains, despite long-term laboratory cultivation, reflect the characteristic of the original habitat. The experiments confirmed the differences between algae responses from open and forest habitats, with strains from shaded habitats having a more effective photosystem II at lower radiation intensities and at the same time having previously saturated the photosystem compared to strains from exposed habitat. Comparison of measurements in the interval of three years did not show significant shift of the monitored parameters. Exposure to UV-A radiation caused a significant decrease in the maximum quantum yield for both habitat strains, but there were no irreversible changes in either case. Algae from open habitats were more resistant to UV-A radiation, as we assumed.