

Changes in spectral reflectance of selected Antarctic and South American lichens caused by an artificially-induced absence of secondary compounds

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Abstract

Recently, spectral characteristics of lichens are in focus because of increasing number of applications of spectral data in remote sensing of treeless polar and alpine regions. Therefore, species-specific spectral reflectance indices are measured in lichen species dominating polar ecosystems. Apart of hydration status of a lichen thallus, presence of intrathalline secondary metabolites affects the spectral reflectance curves as well as numeric values of spectral reflectance indices. In this paper, the reflectance spectra in 380-800 nm were measure to evaluate the effect of full hydratation on spectral characteristics of selected lichens. To evaluate the effects of secondary metabolites, they were wash out of the thalli by acetone rinsing and the spectra were measured again. For the experiments, Antarctic (*Xanthoria elegans*, *Leptogium puberulum*, *Physconia muscigena* and *Rhizoplaca melanophthalma*) and Argentinean lichens from alpine habitat (*Parmotrema* sp. and *Ramalina* sp.) were used. It was found, that in majority of cases, dry lichen thalli exhibited higher values of spectral reflectance troughout the range of 380-800 nm. Species-specific peaks were identified on the spectra and related to UV-B absorbing compounds and carotenoids. Hydration- and the absence of UV-B absorbing compounds-related changes in spectral reflectance indices (NDVI, MCARI, SRPI, PRI, NPCI, LI) were evaluated and discussed. For a great majority of the studied lichens, MCARI (Modified Chlorophyll Absorption in Reflectance Index) was found the most sensitive for the changes between dry and wet state of thallus.

Key words:

Abbreviations: AR – acetone rinsing, acetone-rinsed, DRY – dry sample , WET – wet (fully hydrated) sample

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