



Can lichen species of BSC acclimate to changing environments?

Laura Williams, Claudia Colesie, and Burkhard Büdel
Plant Ecology and Systematics, Kaiserslautern University, Germany

The Soil Crust International (SCIN) project aims to achieve improved appreciation of the importance and functioning of Biological Soil Crusts (BSC) in Europe.

Four sites throughout Europe were identified for having important, yet diverse BSC communities: Gössenheim in Germany, Almeria in Spain, Öland in Sweden and Hochtorn in Austria. These sites vary greatly in geographic and environmental conditions; and constitute, along with cyanobacteria, algae, bryophytes and fungi a host of green algal and cyanobacterial lichen species. Many of the lichen species occur in two-four locations, despite the climatic differences, and it has been observed that species are morphologically distinctive between sites.

Lichens may be adapted to different environmental conditions by symbiosis with photobionts that are suited to the local conditions. Therefore, we may expect to find that a lichen species that can survive in diverse habitats to be less photobiont specific than species with a narrow range. In recent years it has been discovered that lichens can switch their photobiont throughout the course of their lives. Whether lichens can associate with an available photobiont and switch when a preferred photobiont becomes available is not conclusively known, or whether as habitats are affected by climate change, lichens will be able to switch to a new photobiont to survive changing conditions.

A transplantation experiment of lichens between biomes was installed in each of the SCIN sites to investigate the potential of different lichen species to assimilate to a new environment. Where the same lichen species occurred in 2 or more locations samples were transplanted from their natural location to the foreign for a period of 2 years. Controls were also applied; this consisted of samples being transplanted within their own site to assess the effect of the transplantation itself.

The photobionts of key species are sequenced to analyse diversity of photobiont interactions within/between the sites. Lichen species are also analysed to investigate the variability within their morphological and physiological traits and whether this is site specific. From the transplant experiment lichen samples are analysed to find whether lichen species can readily switch their photobiont to a locally adapted symbiont and whether the morphological and physiological parameters change in order to acclimatise to the new conditions.

This work is currently ongoing and here the initial results from the lichen species *Psora decipiens*, *Fulgensia fulgens* (green algal lichens) and *Peltigera rufescens* (cyanolichen) are presented.