Biological responses to aridity in Mediterranean ecosystems: stress and adaptation in mosses and lichens

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Effects of aridity on the ecophysiology of Biological Soil Crusts

Munzi, Varela, Paoli – 2019. Journal of Arid Environments 166 (2019) 86–90. Is the length of the drying period critical for photosynthesis reactivation in lichen and moss components of biological soil crusts?

Prolonged dry periods negatively affect the reactivation of photosynthesis in terricolous lichens and mosses in a Mediterranean environment

Short dry (dark grey) and long dry (light grey) periods. Chlorophyll fluorescence emission in lichens and mosses



Combined effects of excess nitrogen and aridity in lichens: ecophysiological responses and lichenassociated microbial communities

Model species: lichen *Xanthoria parietina* (N tolerant). Design: sites impacted by ammonia (selected livestock farming) and remote control areas in Portugal and Italy.

Questions: • Does ammonia excess influence microbial communities associated to lichen thalli? • Does the response change along aridity gradients?

Effects of habitat fragmentation and aridity on sensitive forest macrolichens.

Background of the study...



Paoli L et al. 2019 - iForest 12: 383-388. Impact of forest management on threatened epiphytic macrolichens: evidence from a Mediterranean mixed oak forest (Italy)

Logging for timber in a Mediterranean mixed oak forest in central Italy **depleted forest epiphytic organisms**, including a large population of the macrolichen *L. pulmonaria*: 40% of the lichen biomass (up to 12.3 kg ha⁻¹) was lost (in the core area, up to 1.8 kg every 100 m²), in particular large and fertile thalli.

Fačkovcová Z et al. 2019 - iForest 12: 187-192. Retaining unlogged patches in Mediterranean oak forests may preserve threatened forest macrolichens

Chlorophyll *a* fluorescence transients (left) of *Lobaria pulmonaria* from **isolated trees (red)** and **forest patches (green)**. For comparison, the average curve of (*in situ*) individuals in the unlogged area is given (white). On the right: water holding capacity of thalli from **isolated trees** and **forest patches**.



Ongoing activities and next steps...



1) Assessing whether transplantations of *L. pulmonaria* thalli to remote or protected areas ensure their effective survival.

2) Assessing to what extent recent atmospheric pollution still limits the recolonization and survival of the species.

3) Assessing the effects of distance from forest margins. Which is the best size for forest patches?

4) Assessing the effects of coppice. Which is the influence of different coppice systems on the performance of sensitive macrolichens?

5) Assessing to what extent habitat fragmentation and aridity threaten sensitive forest macrolichens.