Distance from the sea as a driving force of microbial communities under water potential stresses in litters of two typical Mediterranean plant species

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Abstract

Though many studies have focused on the incidence of drought, little attention has been paid to osmotic stress and to how the interaction of the two stresses impacts microbial functioning. This study sheds light on the impact of matric and osmotic stresses (combined or not) on litter microbial communities potentially shaped differently by either plant species or distance from the sea. *Cistus albidus* L. and *Pistacia lentiscus* L., from both inland and coastal areas, were used to set up a total of 72 mesocosms. A first set of twenty four mesocosms 'control' were maintained under favourable conditions for 60 days (25∘C, 600 g.kg-1 water content). For matric stress, mesocosms were subjected to 5 drying/rewetting cycles and for osmotic stress, mesocosms received 10 mg of chlorine ions per g of litter using NaCl and then were incubated under favourable conditions. The last mesocosms were subjected to the combined drought and salt stresses for 60 days. Basal respiration (BR) resistance to added matric stress was also tested. Catabolic diversity was higher in coastal than in inland areas after stresses and catabolic profiles were shaped differently after stresses depending on the litter type. Microbial communities from the coastal area were more able to maintain their catabolic potential and thus to withstand matric stresses. BR withstood an added severe drought stress better in microbial communities previously subjected to combined stresses. Microbes previously subjected to water potential stresses were more capable to overcome additional stresses of similar nature, suggesting adaptation mechanisms to stresses.

Keywords: Cistus albidus, extracellular enzyme activities, Mediterranean coastal environments, osmotic and matric stresses, Pistacia lentiscus

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