Mediterranean coastal print and litter type drive litter microbial responses to drought stress.

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Abstract

Warming and disturbance of precipitation dynamics are expected in the Mediterranean basin, resulting in longer, more intense drought and heat waves. Here we investigated how litter microbial functioning and responses to stress may be shaped by the particular conditions of coastal environments, and whether this depends on litter species identity (*Pinus halepensis* and *Pistacia lentiscus*) and on whether litters are mixed or not. Mesocosms of monospecific and mixed litters collected from both inland and coastal areas were subjected to either control (25∘C, 60 % WHC) or stress conditions (5 drying-rewetting (D/rW) cycles: 1 week of drying at 35∘C, 1 week at 25∘C, 60 % WHC). Litters were characterized using chemical (C/N ratio and solid-state NMR13C) and microbial markers (lignocellulolytic activities, basal respiration (BR), microbial active biomass, fungal and bacterial catabolic profiles). The 'coastal print' depended on litter type for certain microbial markers (cellulases, BR and catabolic profiles), showing the importance of litter chemical signature on microbial functioning. Fungal and bacterial catabolic profiles were mainly shaped by the coastal print and litter type respectively, with fungi more sensitive to coast-specific conditions and bacteria to their immediate surroundings, i.e. chemical signature. After stress, the litter admixture showed a weaker microbial biomass with higher tyrosinase activities, suggesting a shift in microbial balance which favored fungal communities. Catabolic profiles revealed a more pronounced stress effect on inland microbial communities. Our findings show stress legacy and litter chemical signature to be major factors structuring microbial responses to drought stress.

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