IECD 2022

Abstract

Thermal Heterogeneity in Epiphytic Communities Depends on their Functional Diversity

Giulia Canali, Luca Di Nuzzo, Renato Benesperi, Juri Nascimbene, Paolo Giordani

Absract: The study of microclimatic patterns is a key element in improving our understanding of the physiological and ecological responses of different groups of organisms. In this regard, the structural complexity of forest ecosystems influences the thermal characteristics at the macro- but also at the microscale. At this level, non-vascular epiphytes, such as lichens and bryophytes, through chemical-physical processes, constitute the ecosystem component capable of regulating the climate, having for example significant effects on the microbiome and on microfauna and, consequently, carrying out apparently hidden ecosystem functions. In this work, we aim to investigate the thermal heterogeneity at the microscale of epiphytic communities under varying water availability. We hypothesize that thermal heterogeneity at tree scale, in terms of abundance, distribution and connectivity of hot and cold spots, depends on the taxonomic and functional diversity of epiphytic communities. For achieving this goal, we assessed the epiphytic diversity on 50 sycamore trees (Acer pseudoplatanus L.) in a forest site of the Ligurian Apennine (Northern Italy) and calculated a set of functional diversity indices. On the same trees, by means of a FLIR thermal camera that provides fine-scale surface temperature patterns, we captured thermal images under contrasting humidity conditions (dry vs. wet). The results support the vision that understanding the relationship between the thermal model of the microclimate and the traits of epiphytic community could be a key to identify ecosystem functions throughout the landscape.

Keywords: epiphytes; thermic images; functional diversity; poikilohydric

Academic Editor: Michael Wink

Published: 31 March 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Copyright: © 2022 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).