Soil Moisture and Temperature Induced Facilitation of Urban Endogean Fauna in Two Shrub Hedges

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As the most important type of public green space, parks are crucial for delivering a wide range of ecosystem services that contribute to the well-being of urban residents. Nevertheless, the criteria for selecting vegetation structure and composition within urban parks is often limited to their ornamental value. Here, park hedges of Pittosporum tobira (Japanese pittosporum) and Rhamnus alaternus (Mediterranean buckthorn) are compared for their effectiveness in soil temperature and soil moisture regulation in support of soil fauna, thus contributing to lifecycle maintenance, habitat, and gene pool protection ecosystem services. The adjacent hedges, located in the gardens of the Hellenic Mediterranean University, were monitored for soil moisture, temperature, and fauna for a period of 6 months. For each hedge, soil temperature and water at 5 cm below ground were measured (N=3). Measurements showed that, during temperature extremes, soil under R. alaternus had a higher buffering capacity for temperature than that under Pittosporum, staying over 2.5 oC warmer during cold periods and over 3.5 oC cooler during warm periods. During the dry season, R. alaternus also retained soil moisture with higher minimum (0.08 versus 0.04 m3/m3) and average values (0.11 versus 0.07 m3/m3) than under Pittosporum. Berlese-Tullgren funnels and pitfall traps were used for capturing endogean fauna and bigger invertebrates, respectively. Invertebrates extracted during 3 samplings were identified mainly at the level of order with the most abundant taxonomic groups being slugs and seven arthropod taxa. The Shannon Index values revealed that the biodiversity of the fauna collected in pitfalls under R. alaternus was 1.2 times higher than that collected under Pittosporum. Specimens from funnels were also more abundant, with soil under R. alaternus showing a biodiversity 3 times higher than that under P. tobira. Results indicate that, in arid environments, R. alaternus urban park hedges may offer additional ecosystem services than P. tobira by providing more sustainable biodiversity hubs.

Keywords: Collembola, Japanese pittosporum, Mediterranean buckthorn, park hedge, soil temperature, soil moisture