Vegetative and thermal performance of an extensive vegetated roof located in the urban heat island of a semiarid region

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Resumen

Vegetated roofs reduce temperature and heat flow fluctuations on the building's surface mitigating the urban heat island effects and improving other ecosystem services. The objectives of this work were to quantify thermal reduction and to evaluate the performance of vegetated-microcosm treatments during 15 months with different species composition and growth form combinations. Our results showed considerable attenuation of temperature through the whole system of extensive green roofs (EVRs) in both summer and winter periods. The EVRs decreased the outside temperature from 44.6 °C to 34.7 °C. Temperatures for the EVR showed a

lower peak-to-valley-gap and better anti-interference performance during the day and along the year. At the same time, thermal insulation provided by soil and vegetation layers resulted in a negative heat flux (−40 W/m2) reducing the incoming heat flux during the day. Almost all treatments showed ≥90% of plant survival and ≥60% of coverage after the experimental period. Microcosm treatments with the highest diversity showed the best performance in both the short and long terms (particularly those with the native Eustachys distichophylla and the exotic Sedum spp.). Consequently, diverse plant arrangements are recommended when designing EVRs in semi-arid climates because they show a better performance in mitigating urban heat island effects by reducing temperature and heat flow fluctuations and also because they provide ecosystem services in urban environments.

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