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Measuring thermal conductivity of green-walls components in controlled conditions

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Highlights:

- We measure conductivities thermal in granular state
- We compare the components of green-walls
- The humidity influences more or less thermal conductivities of the substrates
- In the dry state the substrates can be considered as isolating (λ=0.060W/m °C)
- The ivy and the Virginia creeper would be good complements to insulation

Abstract:

This study is the first stage of a larger multidisciplinary research program about the environmental performances and functions of green walls in urban ecosystems. It aims to determine how green-walls contribute to the thermal insulation of buildings by measuring the thermal conductivities of green-walls' components in controlled conditions. The study focused on complex green-wall systems, i.e. with a structure containing substrate in opposition with green-walls based on climbing plants. The four substrates were materials found in commercial substrate combinations. To compare, the thermal conductivities on two plants are carried out. In dry conditions, they showed conductivities of 0.062 W/m C° for sphagnum moss (*Sphagnum cristatum*), 0.060W/m C° for outdoor planting mix, and 0.105 W/m C ° for clay balls and 0.051 W/m C ° for substrate from a green-wall. Vegetation conductivities were also measured for ivy (*Hedera helix*) and Virginia creeper (*Parthenocissus quinquefolia*). As suspected, conductivities were quite high (between 0.220 and 0.274 W/m C°). With the building thermal simulation, green-walls are technically able to improve buildings' insulation.