

## The composition of green roof substrates influencing the provision of ecosystem services: a review

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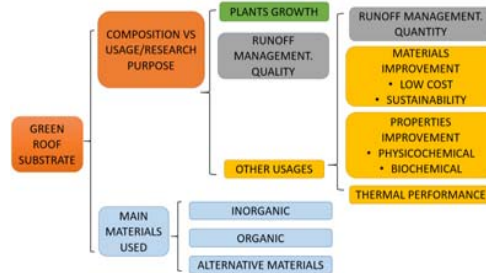
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### Highlights

- For green roof substrates, mixtures of organic and inorganic matter are used.
- Compost and peat were among the organic content.
- Sand and crushed brick were mostly used as mineral part.

### Graphical abstract



### Results

**Compost** is the major used substance in the making of substrate with 38 out of 62 papers reviewed. Peat came in the second place with 31 articles, followed by sand and crushed brick with 26, then clay and perlite with 17 and vermiculite with 15 papers (Figure 1). Moreover, a variation in the percentages of each component is presented in Figure 2.

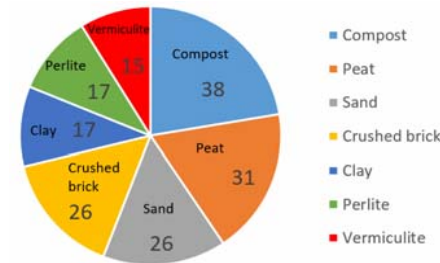


Figure 1. Frequency of components used in substrates for green roofs out of 62 papers

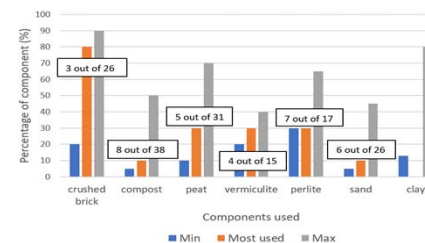


Figure 2. Percentages of components used in substrates used for green roofs

### Introduction

A **green roof** is a building envelope system that encourages the development of plants on rooftops that allow improving environmental **building performance**. It consists of many layers, mentioned in the following order from top to bottom: vegetation, **substrate**, filter sheet, drainage, root resistant barrier, thermal insulation layer, waterproof membrane, and roof assembly. Of these layers, the substrate is probably the most important, since not only the survival of plants, but most of the **ecosystem services** provided by the green cover depend on it. Nevertheless, despite the importance of the substrate layer, there are still many doubts about its **composition**. In fact, no typical compositions of the substrate are agreed to be used.

### Methodology

- This paper inspected research work conducted throughout the past ten years.
- The papers were chosen depending on the number of citations existing.
- Keywords used to recognize literature were: green roof, substrate, growing media, composition.

### Conclusion

The main green roof substrate components include inorganic matter (perlite, vermiculite, crushed bricks), organic matter (compost and peat) and alternative materials such as recycled ones, biochar and mushroom. The substrates of the green roofs should have compositions depending not only on the agronomic aspect, but also the ecosystem services.

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