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promoting climate resilient futures"

Evaluation of holzschaum-based substrates for peat-free horticultural production

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Abstract

Peat extraction is one of the main contributors of greenhouse gas emissions, reduction in biodiversity and wetland areas, creating an urgent need for peat-free or peat-reduced substrates in horticulture. Europe's current regulations and sustainability goals are prioritising this transition, showing the importance of renewable and climate-friendly alternatives. Holzschaum, wood-derived material, shows potential in terms of renewability, structural stability, and the ability to improve aeration and water. However, there is still limited understanding about how different Holzschaum particle sizes affect the physical properties of substrate and plant performance. In particular, we still need to study about the effects of particle size, the balance of water and air and how these conditions support mycorrhizal colonisation. Gaining a better understanding about Holzschaum is important for making multi-functional substrate systems that support both plant growth and environmental sustainability. This research aims to assess the effects of three Holzschaum particle size fractions (0–4 mm, 4–8 mm and 8–16 mm) on the physical, chemical, and biological characteristics of the peat-reduced substrate. The greenhouse experiment will be conducted using five different treatments: the peat-based standard substrate (C1), the peat-free base substrate without Holzschaum (C2), and the three treatments (T1–T3) in which the respective Holzschaum fractions are added to C2. The peat-free substrate will be composed of easyBASE, wood fiber, clay, and Holzschaum will be added at 30–35 % (v/v). The physical characteristics to be measured will be water holding capacity, air-filled porosity, bulk density, pH and electrical conductivity. Plant performance will be assessed through plant height, leaf number, SPAD value, and shoot and root biomass, while mycorrhizal colonisation will be measured microscopically. It is expected that Holzschaum will improve water holding capacity (WHC), overcoming a significant problem with peat-free growing media, without compromising aeration. The particle size is also seen as a significant factor for water-air balance, with intermediate sizes possibly showing optimal properties. Enhanced root development and mycorrhizal activity could also contribute to a more resilient and sustainable growing medium. Overall, this research aims to contribute to the production of climate-friendly growing media with reduced peat, as desired for multifunctional and resource-efficient agro-ecosystems.

Keywords: Holzschaum, particle size, peat-free substrates, sustainable horticulture, water retention

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