Exploring Medicinal and Aromatic Plant residues after distillation as a peat substitute component in growing media for *Sonchus oleraceus* production

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Abstract

Medicinal and Aromatic Plants (MAP) are attracting research interest with increased cultivation areas in nowadays for fresh and dry biomass and essential oil (EO) production. Indeed, EO are derived mainly through distillation and large amounts of wastes are generated being of environmental and human health concern. The research work was conducted in order to investigate the possibility of using *Origanum dubium* waste (ODW) and *Sideritis cypria* waste (SCW) derived through steam distillation, in different ratio (0-5-10-20-40% v/v) with peat in the production of *Sonchus oleraceus* (sowthistle) plants. Both MAP wastes increased pH, electrical conductivity, organic matter, and mineral levels of the growing media, but negatively affected several physical characteristics of the media, like total porosity and aeration. This resulted in decreased plant growth, which was more noticeable at the high wastes ratios. Plants responded to that by decreasing leaf stomatal conductance, decreasing chlorophyll content at 40% ODW and 20% SCW mixtures, and activating several non-enzymatic (phenols, flavonoids, and antioxidant capacity) and enzymatic (superoxide dismutase) mechanisms to challenge the observed stress conditions, indicated by the lipid peroxidation and the hydrogen peroxide increase. Plants grown in waste-media revealed in some mixture's mineral accumulation, even though both ODW and SCW were rich in minerals. Low level of MAP wastes when derived after the distillation process, can be explored further for a partially peat substitution, but further improvement of the growing media properties is needed to reflect adequate yield.

Keywords: Oregano, sideritis, hydrodistilation, Medicinal and Aromatic plants, wastes, growth, peat, sowthistle

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