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SUPERCRITICAL CO₂ EXTRACT OF *LAVANDULA STOECHAS* DISPERSED IN NATURAL DEEP EUTECTIC SOLVENTS: AROMA STABILISATION POTENTIAL

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Abstract

Aroma chemicals represent various volatile compounds with sensory characteristics. Their demand is on the constant rise in different industries including food, beverages, chemicals, cosmetics, perfume, and pharmaceutical industries. One challenge that significantly limits their use is their instability and susceptibility to changes caused by exposure to oxygen, light, and moisture during their attainment, storage, or application.

This work investigated the approach of obtaining and stabilizing volatile aroma compounds of *Lavandula stoechas* L. by using green solvents, supercritical carbon dioxide (scCO₂) and natural deep eutectic solvents (NADES). For obtaining the extracts, scCO₂ was used at 200 bar, 40 °C, and a CO₂ flow rate of 20 g/min, during 3 h. CO₂ extracts were then dispersed in different NADES mixtures (betaine:ethylene glycol (Bet:EG) (1:3), betaine:glycerol (Bet:Gly) (1:2), and glycerol:glucose (Gly:Glu) (4:1)) and their stability was monitored during 6 months of storage at room temperature by monitoring the headspace profile. CO₂ extract was used as the control.

It was initially determined that in the samples, there was a dominant presence of oxygenated monoterpenes (67.33-77.50%). During storage, significant changes occurred in the samples' headspace profile, such as the decrease in terpene hydrocarbons, which also affected the presence of oxygenated terpenes, which increased in certain cases. Moreover, the formation of new components was recorded which could be an indicator of decreased stability. The detected components include ethanol, furanones, and benzyl products and organic acids. Newly formed components were most present in the control, while in NADES-CO₂ samples, they were present in a significantly lower percent or not detected. The NADES-CO₂ were more stable than the CO₂ control and among them, Bet:EG stood out as the most adequate for maintaining the stability of *L. stoechas* headspace components. One explanation could be that the NADES acted as a stabilizing medium of headspace compounds *L. stoechas*, reducing the oxidative degradation of components. Additionally, due to the presence of components from different classes such as aldehydes, ketones, alcohols, esters, and hydrocarbons, it is possible that new NADES-extract intermolecular interactions were formed providing enhanced stability.

Keywords: *Lavandula stoechas*; volatile compounds, supercritical carbon dioxide; deep eutectic solvent;

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