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## Chemical compounds and essential oil release through decomposition process from *Lavandula stoechas* in Mediterranean region

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### ABSTRACT

All aromatic plants emit volatile substances into the environment either during their life or during the decomposition process. During decomposition, these volatile constituents affect the top soil microflora and the nutrients recycle process. *Lavandula stoechas* is a perennial aromatic shrub, rich in aromatic substances which can be found abundant across the Mediterranean. The aim of the present study was to investigate the essential oil degradation during decomposition process of *L. stoechas* and how the essential oil major compounds are released during this process. Fresh leaves and flowers of lavender were used for this study using the litter bag technique. The essential oil content of the initial plant was 1.46% dw and after seventeen months period dropped at 0.06%. There were no differences in oil degradation among the different experimental sites. Most of the essential oil compounds had disappeared after a year. However, the most toxic compounds in the plant material still remained after seventeen months.

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### 1. Introduction

One of the major plant categories growing in the Mediterranean region is that of aromatic plants which contain essential oils. These plants have the capacity to synthesize, accumulate and emit volatiles that may act as aroma and flavor molecules due to interactions with living organisms. These low-molecular-weight substances derived from the fatty acid, amino acid and carbohydrate pools, constitute a heterogeneous group of molecules with saturated and unsaturated, straight-chain, branched-chain and cyclic structures bearing various functional groups (e.g. alcohols, aldehydes, ketones, esters and ethers) and also nitrogen and sulfur (Schwab et al., 2008). Almost all plants, and mainly the aromatic ones, emit volatile substances (Yang et al., 2009). It is clear that essential oils do not survive forever in plant material and the decomposition of these oils following leaf fall is a topic that requires more research.

The essential oil into aromatic plants represents 0.1–3% of the dry weight, and there are several ways that these secondary metabolites escape into the environment. According to Margaris and Vokou (1986) the terpenoid emissions participate in photochemical reactions leading to aerosol production. Plant essential oils are complex mixtures of different compounds, and their constituents are insoluble or almost insoluble in water. Essential oil decomposition can occur even when plants are in a dark place. As Sombbrero (1992) stated, the percentage of oil in the leaves showed a gradual decrease the longer the plant remained in the dark losing approximately 40% of oil in a period of twenty-four days. He also reported that not only does the total amount of the oil decrease but the composition of the oils change. For example, levels of some compounds decrease, whereas others such as  $\alpha$ -pinene.

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