INVESTIGATION OF THE ESSENTIAL OIL COMPONENTS OF *Calamintha nepeta* (L.) savi. subsp. *glandulosa* PLANT

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ABSTRACT

Essential oils are usually complex mixtures of natural compounds of both polar and apolar structure. Essential oils consist mainly of terpenoids and their oxygenated derivatives. Essential oils, which have antioxidant and antimicrobial activities, have therapeutic properties and are the raw materials of cosmetics, as well as acting as natural additives in foods and food products. *Calamintha nepeta* (L.) savi. subsp. *glandulosa*, a perennial plant belonging to the Lamiaceae family, is a medicinal and aromatic plant that stands out for its rich essential oil components. In traditional medicine, the plant has been used as an antiseptic, stimulant, antispasmodic and diuretic. The genus *Calamintha* is represented in the flora of Turkey by a total of 13 taxa with subspecies, 6 of which are endemic, among 9 species. In this study, the essential oil components of *Calamintha nepeta* plants were investigated collected from the Amlakit (1900 m) and Çat (1750 m) plateau of Rize at the time of flowering. The proportion of essential oils of the plant harvested during the full flowering period and the aromatic components in the essential oil of the plant were determined using the SPME (Solid Phase Microextraction) method in a Gas Chromatography (GC-MS) device. Almost 30 different components were found as a result of the analysis. The main components were found as pulegone (30.3%) and menthone (12.1%) in Amlakıt plateau and pulegone (25.5%) and menthone (16.7%) in Çat plateau.

Keywords: *Calamintha nepeta*, Aromatic Compounds, GC-MS

INTRODUCTION

The genus *Calamintha* Miller spread out in the Central Asia, Europe, Mediterranean region, America and North Africa (Bonnier, 1959; Bown, 1995). In Turkey, *Calamintha* taxa are distributed widely in the South, West and North Anatolia in Turkey and it is represented by a total of 13 taxa with subspecies, 6 of which are endemic, among 9 species (Alan et al., 2007). Among with these species, *Calamintha nepeta* (L.) savi. subsp. *glandulosa* is known due to its rich essential oil content. The plant has been used as an antiseptic, stimulant, antispasmodic and diuretic in traditional medicine (Şarer and Pançalı, 1998). There are some studies on the composition essential oil of *C. nepeta ssp. glandulosa*. Şarer and Parkalı (1998) reported that the main components of essential oil of *C. nepeta ssp. glandulosa* collected in northern Turkey were pulegone (40.5%) and menthone (23.6%). Also, a study conducted by Baldovini

et. al (2000) aimed to determining essential oil content of the 40 samples of *Calamintha nepeta*, growing wild in Corsica. The researchers reported that half of the samples were characterized by a menthone/pulegone chemotype, 13 samples present pulegone as the major component associated with menthone. According to a study carried out by Kitic and Jovanovic (2002) revealed that the main constituents in the essential oil of *C. nepeta ssp. glandulosa* collected from Montenegro were pulegone (37.5%), menthone (17.6%), In this study, the volatile components of the *C. nepeta ssp. glandulosa* were investigated which collected from the Amlakit (1900 m) and Çat (1750 m) plateau of Rize at the time of flowering.

MATERIAL AND METHOD

This experiment was conducted at Faculty of Agriculture, Recep Tayyip Erdoğan University in 2021. The plant materials collected from Amlakıt (1900m) and Çat (1750m) plateau in Rize/Turkey (Figure 1.). The collected aerial parts of *Calamintha nepeta* (L.) savi. subsp. *glandulosa* at the flowering time were used as plant material. The plants were cut at a height of 10-15 cm above the soil level and the flower parts were separated.



Figure 1. Collection sites of *Calamintha nepeta* (L.) savi. subsp. *glandulosa* plants

Dried plant samples weighed 100 g and distilled with Neo-Clevenger apparatus. The essential oil content in herb was calculated as the volume of essential oil in 100 grams of dry sample (ml/100g). In order to determine essential oil components, Shimadzu model GC-MS (2010 Plus) present in RTEU Faculty of Agriculture, Plant Analysis Laboratory was used. SPME (Solid Phase Microextraction) method was used to determine essential oil components. Analysis results were evaluated and reported using related library (Seyis et al., 2021).

RESULTS AND DISCUSSION

Almost 30 different essential oil components of *C. nepeta ssp. glandulosa* were found as a result of the analysis. The main essential oil components of the samples collected from Amlakıt (1900 m) plateau were pulegone (30.3%) and menthone (12.1%) and others found as neodene (8.59%), germacrene D (8.56%), carvacrol (5.71%), limonene (5.1%) (Figure 2.).

The main essential oil components of the samples collected from Çat (1750 m) plateau were pulegone (25.5%) and menthone (16.7%) and others as neodene (10.2%), germacrene D (10.2%) and limonene (6.8%) (Figure 2.).

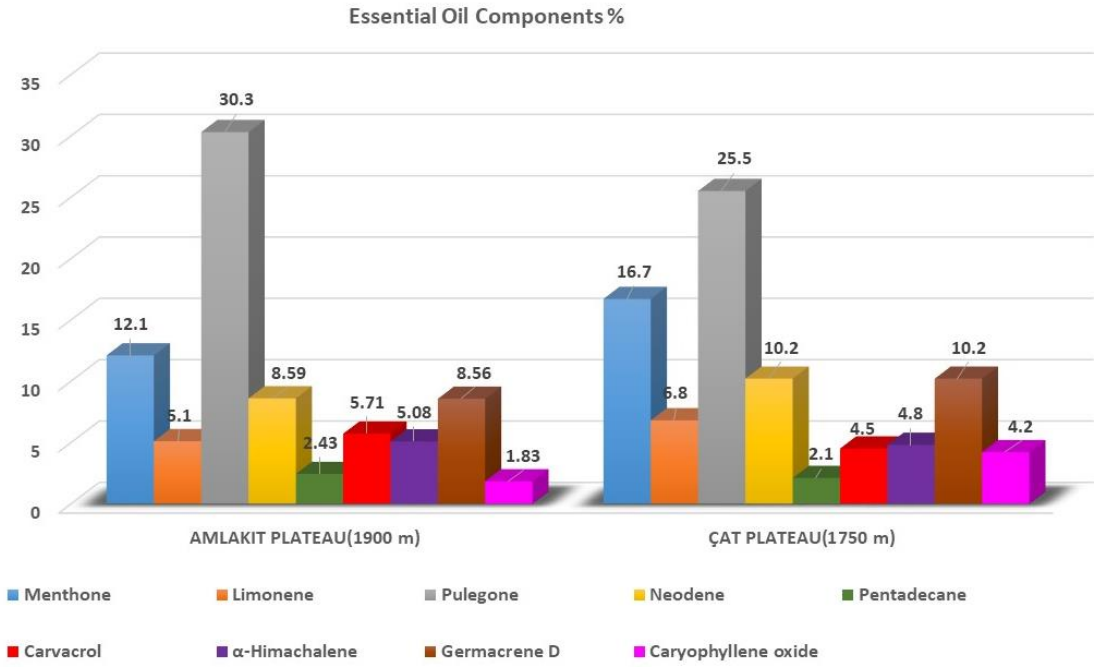

Figure 2. Essential oil components of *C. nepeta ssp. glandulosa* collected from Rize Province

These results are in agreement with a study conducted by Şarer and Parkalı (1998). The researchers reported that the main components of essential oil of *C. nepeta ssp. glandulosa* collected in northern Turkey were pulegone (40.5%) and menthone (23.6%). Also, Baldovini et. al (2000) found similar results. They reported that essential oil content of 20 out of 40 samples of *Calamintha nepeta* were characterized by a menthone/pulegone chemotype, 13 samples present pulegone as the major component associated with menthone. Moreover, our results are in agreement with a study carried out by Kitic and Jovanovic (2002). The researchers reported as the main constituents in the essential oil of *C. nepeta* ssp. *glandulosa* were pulegone (37.5%), menthone (17.6%) collected from Montenegro.

Three types of oil were distinguished for *Calamintha* genus by Baldovini et al. (2000). In the first type, pulegone is the dominant constituent, associated with different components such as menthone and/or isomenthone, menthol and its isomers, piperitenone, piperitone and piperitenone oxides. The second type is characterized by the predominant components piperitone oxide and/or piperitenone oxide. Last type is distinguished by the presence of carvone and 1,8-cineole as major constituents. Our collected genotypes can be placed in the first group.

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