COMPARING OF EUCALYPTUS (*Eucalyptus camaldulensis* AND *Eucalyptus grandis*) ESSENTIAL OIL COMPOSITIONS GROWING IN HATAY ECOLOGICAL CONDITIONS

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Essential oils obtained by hydrodistillation of *Eucalyptus camaldulensis* and *Eucalyptus grandis* from Hatay (Turkey), were analyzed by GC/MS. The total ratio of twenty-three components in *Eucalyptus camaldulensis* volatile components with 98.15%. This ratio is seen as forty-seven components and 99.66% in *Eucalyptus grandis.* Eucalyptol, limonene and α-pinene were identified as the main components of the essential oils of *Eucalyptus camaldulensis.* Cymene, α-pinene, isoborneol, trans-pinocarveol and eucalyptol were identified as the main components of the essential oils of *Eucalyptus grandis.* When compare the components of *E. camaldulensis* and *E. grandis* essential oils, the main component was determined as eucalyptol with 74.11% and cymene with 31.67% respectively.

Keywords: Essential oil, GC-MS, *Eucalyptus grandis*, *Eucalyptus camaldulensis*

INTRODUCTION

The world forest industry has recently been changing to shift at an increasing rate towards the tropics and subtropics. Especially eucalyptus species play a significant role in this process (Kellison, 2001). Highly productive eucalyptus forests provide high-quality raw materials for pulp, paper, wood and energy from native tropical forests (Grattapaglia, and Kirst 2008). In traditional popular medicine, *Eucalyptus* spp. essential oil traditionally used to treat respiratory disorders (Harkenthal *et al*., 1999; Nicoletti and Quaglio, 2022; Salari *et al.,* 2006). The area afforested with eucalyptus in our country is approximately 20,000. around a hectare. There are eucalyptus afforestation areas belonging to the private and public sector, which develop very well in places where the choice of location and species is well made (Gürses, 1990; Baser *et al*., 2001).

In this study, essential oil contents of *Eucalyptus camaldulensis* and *Eucalyptus grandis* plants were investigated.

EXPERIMENTAL

Plant Material

The plant materials were collected from Kırıkhan-Hatay-Türkiye (*Eucalyptus camaldulensis*) and Dörtyol-Hatay-Türkiye (*Eucalyptus grandis*).

Essential Oil Isolation

The essential oil was obtained from dried leaves. A total of 50 g of the ground plant samples was used for hydrodistillation experiment. A sample weight was individually and carefully placed into a 2000 ml flask. Distilled water was added until it covered the sample completely. Essential oils were obtained by hydrodistillation method which was conducted in an all-glass clevenger-type distillation. The essential oil ratio was calculated according to dry weight of plant materials and amount of essential oils obtained. The obtained essential oil samples were dried over anhydrous sodium sulfate and stored in amber vials at +4 .

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GC-MS Analysis of the Essential Oils

Analysis of the essential oil was carried out using a Thermo Scientific Focus gas chromatograph equipped with MS, auto sampler, and TR-5MS (5% phenyl polysilphenylene-siloxane, 0.25 mm i.d. x 60 m length, film thickness 0.25 µm). The carrier gas was helium (99.9%) at a flow rate of 1 mL/min, ionization energy 70 eV. Mass range m/z 50–650 amu. Data acquired at scan mode. MS transfer line temperature 250°C; MS ionization source temperature 220°C, injection port temperature 220°C. The samples were injected with a 250 split ratio. The injection volume was 1 µL. Oven temperature was programmed from 50°C to 220°C at 3°C /min. The structure of each compound was identified by comparison of their mass spectrum with the Wiley Registry, 9th edition. Data acquisition used the Xcalibur software program.

RESULTS AND DISCUSSION

In *E. camaldulensis* essential oil, twenty-three components were determined at a rate of 98.15%. When the components of *E. camaldulensis* were examined, the main component was determined as eucalyptol with 74.11% (Table 1). This was followed by α-pinene with 6.82% and limonene with 6.55%, respectively (Figure 1). The present study showed differences from those who reported eucalyptol as a main component in *E. camaldulensis* essential oil (Tsiri *et al*., 2003; Su *et al*., 2006; Rasooli *et al*., 2009).

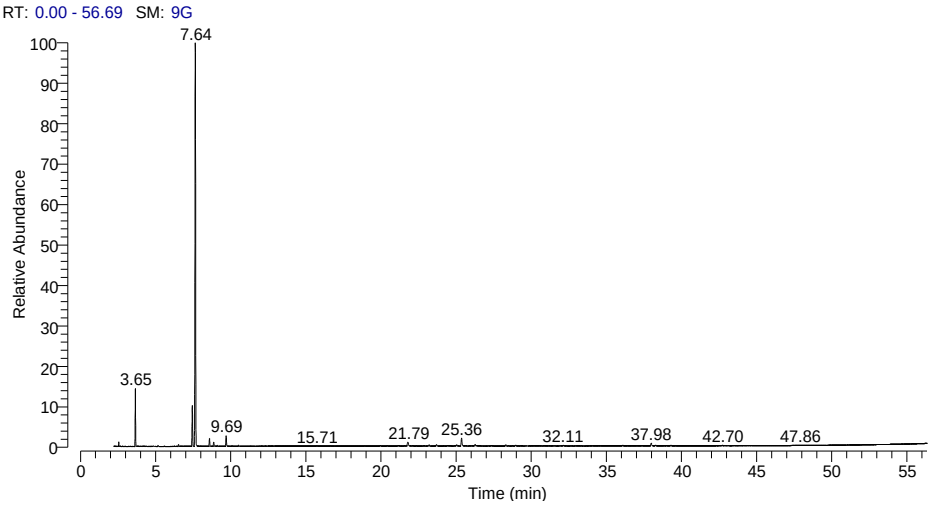

Figure 1. Essential oil chromatograms obtained from *Eucalyptus camaldulensis*

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Table 1. Comparison of essential oil components of *Eucalyptus camaldulensis*

RT	Compound Name	Area (%)
2.54	Methylpentaldehyde	0.45
3.65	α-pinene	6.82
5.16	β-pinene	0.16
6.52	Myrcene	0.33
7.44	Limonene	6.55
7.64	Eucalyptol	74.11
8.58	cis-ocimene	1.30
8.86	γ-terpinene	0.74
9.11	trans-β-ocimene	0.17
9.69	o-cymene	1.92
10.52	Isovaleric acid, isopentyl ester	0.22
19.93	Linalool	0.11
21.79	Nerolidol	1.10
23.18	Alloaromadendrene	0.22
23.69	trans-pinocarveol	0.33
24.42	α-terpineol	0.12
25.01	E-citral	0.24
25.36	α-terpineol	1.81
26.24	Isopiperitone	0.32
28.28	Hotrienol	0.23
28.94	p-mentha-1(7),8-dien-2-ol	0.17
37.98	Veridiflorol	0.62
39.28	Rosifoliol	0.11

When *Eucalyptus grandis* essential oil components are examined, forty-seven components are found at a rate of 99.66%. When the components of *E. grandis* essential oils were examined, the main components were determined as cymene, α-pinene, isoborneol, trans-pinocarveol and eucalyptol (Figure 2). The main component was determined as cymene with 31.67%, followed by α-pinene with 21.96%, isoborneol with 8.41% and trans-pinocarveol with 6.02%, respectively (Table 2). It is seen that the essential oil components determined by Soyingbe *et al*. (2013) in their study on *Eucalyptus grandis* essential oil are similar to this study.

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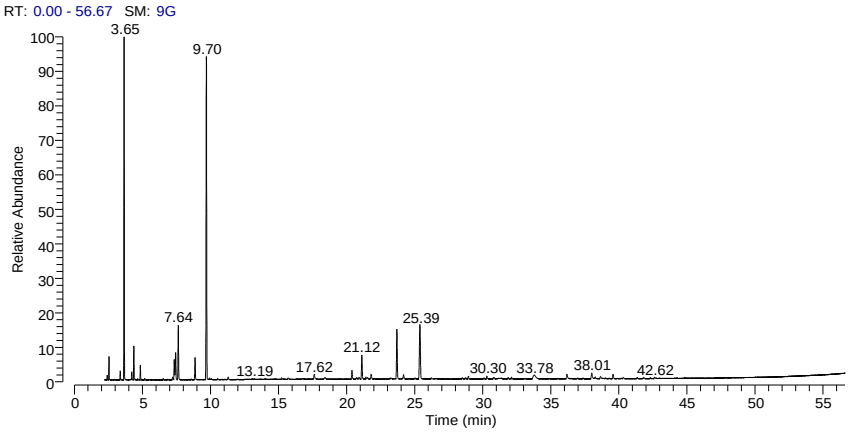

Figure 2. Essential oil chromatograms obtained from *Eucalyptus grandis*

Table 2. Comparison of essential oil components of *Eucalyptus grandis*

RT	Compound Name	Area
2.41	Butanal	0.26
2.54	Methylpentaldehyde	1.25
3.37	3-pentanone, 2,4-dimethyl-	0.64
3.65	α-pinene	21.96
4.22	α-fenchene	0.57
4.37	Camphene	2.46
4.85	2-methylpropyl isobutyrate	1.03
5.16	β-pinene	0.14
6.53	α-phellandrene	0.14
7.22	Amyl propionate	0.3
7.34	1-methylbutyl butyrate	1.74
7.44	Limonene	2.54
7.64	Eucalyptol	5.17
8.87	γ-terpinene	2.06
9.7	Cymene	31.67
9.92	3-methylbutyl 2-methylbutanoate	0.14
10.07	α-terpinene	0.15
10.53	3-methylbutyl pentanoate	0.15
11.3	3-methyl-4-cyclohexene-1,2-dicarboxylic anhydride	0.33
15.22	α-campholene aldehyde	0.21
15.71	2,5-octadecadiynoic acid, methyl ester	0.24
17.62	α-campholene aldehyde	0.61

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RT	Compound Name	Area
18.42	Isopinocamphone	0.28
20.39	Pinocarvone	1.07
20.71	Bornyl formate	0.16
20.91	Fenchyl acetate	0.21
21.12	D-fenchyl alcohol	2.82
21.41	trans-caryophyllene	0.24
21.54	Terpene-4-ol	0.81
23.69	trans-pinocarveol	6.02
24.19	Cryptone	0.56
25.39	Isoborneol	8.41
26.23	Verbenone	0.16
28.72	Myrtenol	0.14
28.94	cis-p-mentha-1(7),8-dien-2-ol	0.32
30.3	trans-carveol	0.39
30.79	1,3-propanediol, 2,2-dibromo-	0.24
31.85	2-Phenylethyl butanoate	0.14
32.11	cis-p-mentha-1(7),8-dien-2-ol	0.24
36.19	1,5-cyclododecanediol, diacetate	0.63
38.01	Octadecanal, 2-bromo-	0.81
38.26	Veridiflorol	0.19
38.65	Isochiapin B	0.34
39.57	Spathulenol	0.57

CONCLUSIONS

In this study, it is seen that the essential oil contents of *Eucalyptus* spp. differ according to the species. According to the results of this study, breeders will be able to decide more easily which type of eucalyptus to grow.

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