



GC/MS STUDY OF ESSENTIAL OIL FROM *HELICHRYSUM CHASMOLYICUM* P.H.DAVIS

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ABSTRACT

The essential oil of the aerial parts of *Helichrysum chasmolyicum* P.H.Davis collected from Isparta province growing endemic in Türkiye were analysed by GC-MS. The oilyield of dried plant (v/w) obtained by hydrodistillation was found as 0.4%. Five compounds representing 65.9% of the oil from Isparta were identified. The main constituents of the oils were: β -caryophyllene (23.6%), unknown (18.7%), carvacrol (12.0%), caryophyllene oxide (7.8%) and α -pinene (3.8%).

Keywords: Asteraceae, β -caryophyllene, *Helichrysum chasmolyicum*, essential oil composition.

HELICHRYSUM CHASMOLYICUM P.H.DAVIS UÇUCU YAĞININ GC/MS ÇALIŞMASI

ÖZET

Türkiye’de endemik, Isparta yöresinden toplanan *Helichrysum chasmolyicum* P.H. Davis’ in toprak üstü kısımlarının uçucu yağı GC-MS ile analiz edilmiştir. Kurutulmuş bitkiden su destilasyon metodu kullanılarak elde edilen uçucu yağ miktarı (v/w) % 0.4 olarak bulunmuştur. Toplamın % 65.9’ unu oluşturan beş bileşen tanımlanmıştır. Bileşenler β -karyofilen (23.6%), tanımlanamayan (18.7%), karvakrol (12.0%), karyofilen oksit (7.8%) ve α -pinen (3.8%)’ dir.

Anahtar Kelimeler: Asteraceae, β -karyofilen, *Helichrysum chasmolyicum*, uçucu yağ bileşimi.

INTRODUCTION

Helichrysum chasmolyicum P.H.Davis belonging to the family Asteraceae is perennial herbaceous plant known as “Gold flower” in Anatolia (Baytop 1984). At various regions of the world different organs of *Helichrysum* genus are profited for several purposes. The herbs and /or their essential oils are used commonly in the food, drug and perfumery industries. These oils are used as flavorings, fragrances in the food industry, and for medicinal purposes in several regions. For the preparation of the infusion only 4-6 stems per cup will be used as the flavor is rather strongly aromatic. Many herbs and /or spices the genus *Helichrysum* is known as medicinal plants. Many *Helichrysum* species have a characteristic scent, caused by sesquiterpene hydrocarbon, which in many cases, are the reason for their application in folk medicine. Such herbs are used worldwide in folk medicine (Paris and Moise 1971, El-Massry et al. 2002). It is an important plant, used in Turkish folk medicine especially for its stimulant, carminatives, tonics, digestive, choleric agents, antiinflammatory and diuretic and in cosmetics as fragrants (Walheim 1981, Baytop 1984, Coşar and Çubukçu 1990, Meyer and Afolayan 1995, Chinou et al. 1996, Chinou et al. 1997).

Although *H. chasmolyicum* is known since many years for folk medicinal use especially on Turkey, very few research papers on the chemical composition and bioactive compounds have been published until now. Only some papers report about flavonoids and phenolic components of *H. chasmolyicum* (Coşar and

Çubukçu 1990, Afolayan and Meyer 1997, Cavalli et al. 2001). Many studies on essential oils of *Helichrysum* species have also been carried out (Ramanoelina et al. 1992, Cavalli et al. 2001, Ruberto et al. 2002, Başer et al. 2002) The objective of this research Project is to identify the volatiles of the essential oil of *H. chasmolyicum* spikes and to discuss the constituents responsible for the characteristic aroma impressions of this oil.

MATERIAL AND METHOD

Plant material

Aerial parts of *Helichrysum chasmolyicum* P.H.Davis were collected from plants growing wild as endemic in Isparta province, the south western part of Turkey in August at altitudes of 1400–1600 m. Plant was dried in the shade at room temperature. It was identified by Hasan Özçelik, director of the herbarium section. Herbarium specimens were deposited at the Department of Biology, Faculty of Science and Education, Süleyman Demirel University, Isparta, Turkey.

Recovery of the essential oil

Dried aerial parts of the plant (20 g) were ground and placed in a distillation apparatus with 250 ml distilled water and hydrodistilled for 2 h. and the oil obtained was stored –18. The essential oil was light yellow with yield of 0.4% v/w, on dry basis.

Determination of chemical composition of essential oils by GC and GC-MS

The gas chromatographic analysis of the essential oils was performed with a Hewlett-Packard 5890

series gas chromatograph, fitted with a flame ionisation detector (FID). The gas chromatograph was employed under the following conditions: capillary column, HP-INNOWAX (60 m x 0.25 mm, id; film thickness = 0.5 µm); oven temperature program, 80 °C raised to 120 °C at a rate of 4 °C /min, 120 °C raised to 200 °C at a rate of 10 °C /min and than held at 200 °C for 35 min injector temperature, 250 °C and detector temperature 280 °C; carrier gas, hydrogen at flow rate of 1 ml/min; split ratio, 1/40 ml/min.

The gas chromatographic analysis of the essential oils was performed with a Hewlett-Packard 5890 series gas chromatograph, fitted with a flame ionisation detector (FID). The gas chromatograph was employed under the following conditions: capillary column, HP-INNOWAX (30 m x 0.25 mm, id; film thickness = 0.5 µm); oven temperature program, 80 °C raised to 120 °C at a rate of 4 °C /min, 120 °C raised to 200 °C at a rate of 10 °C /min and than held at 200 °C for 30 min injector temperature, 250 °C and detector temperature 280 °C; carrier gas, helium at flow rate of 1 ml/min; split ratio, 1/20 ml/min. MS were taken at 70 eV. Mass range was from m/z 27 to 300. Library search was carried out using Wiley GC/MS Library and NBS75K. Relative percentage amounts were calculated from chromatograms by the HP computer program.

RESULTS AND DISCUSSION

The volatile oil obtained from the flowers of *H. chasmolyticum* collected from the west Anatolia was light yellow with a pleasant and distinct odour. The percentage composition of the essential oil is given in Table 1. Five compounds could be identified in the oil accounting for about 65.9% of the oil. The major compounds, which were identified by GC-MS, were β-caryophyllene (23.6%), unknown (18.7%), carvacrol (12.0%) and caryophyllene oxide (7.8%).

Table 1. Constituents of *H. chasmolyticum* oil

Constituents	(%)
α-pinene	3.8
β-caryophyllene	23.6
unknown	18.7
caryophyllene oxide	7.8
carvacrol	12.0

In previous investigations on the volatiles of *H. bracteiferum*, 1,8-cineole (18%), α-humulene (11.6%) and β-caryophyllene (9.6%) were found to be the major components (Ramanoelina et al. 1992). The main components of *Helichrysum* species were 1,8-cineole (59.7%) for *H. gymnocephalum* and (27.3%) for *H. bracteiferum* (Cavalli et al. 2001). It was reported that β-caryophyllene (24.4%), α-pinene (23.2%), γ-curcumene (5.6%) and rosifoliol (3.1%) were the predominant components of flower essential oil of *Helichrysum litoreum* (Ruberto et al. 2002). Main constituents in the oils were found as 1,8-cineole in *H. hypnoides* (51.5%) and *H. bracteiferum* (24.8%);

β-caryophyllene in *H. cordifolium* (46.4%) and *H. rusillonii* (29.5%) (Başer et al. 2002).

When the results compared with results of other researchers, the oils showed some differences and similarities. These variations in the essential oil content and chemical composition of *H. chasmolyticum* plant were related to a variety of factors, such as season plant age and different plant parts. It is therefore concluded that these differences reflect environmental differences between the populations (Coşar and Çubukçu 1990, Bianchini et al. 2001, El-Massry et al. 2002, Bianchini et al. 2003).

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