

## $\alpha$ -Pinene from *Pistacia atlantica* Desf. Subsp. *Kurdica* (Zohary) Rech. F.

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### ABSTRACT

The hydrodistilled essential oil from the gum of *pistacia atlantica* Desf. Subsp. was analyzed by GC and GC/MS methods. Eighteen components were characterized representing 99.5% of the total components detected. The four major components of the oil were  $\alpha$ -Pinene (81.9%),  $\beta$ -Pinene (7.4%), camphene (2.7%) and verbenol (2.5%). The essential oil of this sample, as it can be seen, was rich in  $\alpha$ -Pinene.

**Keywords:** *pistacia atlantica*, essential oil,  $\alpha$ -Pinene,  $\beta$ -Pinene.

### INTRODUCTION

*Pistacia* is a genus of flowering plants in the cashew family, Anacardiaceae. It contains ten species that are native to the Canary Islands, northwest Africa, southern Europe, central and western Asia and North America (Mexico, Texas). They are shrubs and small trees growing to 5-15 m tall. The leaves are alternate, pinnately compound and can be either evergreen or deciduous depending on species. All species are dioecious, but monoecious individuals of *Pistacia atlantica* have been noted [1, 2]. The genus is estimated to be about 80 million years old [3].

Antioxidant and antimicrobial activities of the *pistacia lentiscus* and *Pistacia atlantica* have already been studied. A strong antifungal activity and a weak antibacterial activity were also reported [4].

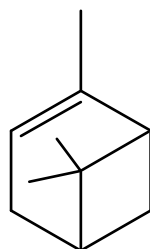


Fig. 1. Chemical structure of  $\alpha$ -Pinene

In Iran, the genus is represented by two species and grows in the some regions of Iran such as Kurdiatan, Kerman, Yazd and Semnan [5]. The present report deals with the  $\alpha$ -Pinene and serenteen orther compositions of the volatile oil obtained from the gum of *pistacia atlantica* Desf. Subsp. *Kurdica* (Zohary) Rech. F.

## MATERIALS AND METHODS

### *Plant material:*

The gum of *pistacia atlantica* was collected on 14 june 2009 in Bane area (Kurdistan province-west of Iran) at an altitude of 2200 m. A voucher specimen has been deposited in the Herbarium of the Department of Botany, Islamic Azad University, Ardabil, Iran. The gum was air-dried in the shade prior to isolation of its oil. The gum (100 g) was subjected to hydrodistillation for 2 h using a Clevenger type apparatus. The obtained essential oil (yield 7% V/W) was dried over anhydrous sodium sulfate and recovered with n-hexane, then stored in sealed vials at low temperature with the analysis was conducted.

### *Analysis of the essential oils:*

Oil sample analyses were performed on a shimadzu 15A Gras chromatograph equipped with a sphit/splitless injector (250 °C). N<sub>2</sub> was used as carrier gas (1 ml/min) and the capillary column used was DB-5 (50 m 0.2 mm, film thickness 0.32  $\mu$ m). The column temperature was kept at 60 °C for 5 min and then heated to 220 °C for 5 min. Alkanes (C8-C18) were used as reference points in the calculation of relative retention indices (RRI). The relative percentages of characterized components are given in table 1.

GC/MS analysis was performed using a Hewlett-Packard 5973 with an HP-5MS column (30 m 0.25 mm, film thickness 0.25  $\mu$ m). The column temperature was kept at 60 °C for 5 min and programmed to 220 °C at a rate of 5 °C/min and kept constant at 220 °C for 5 min. The flow rate of helium as carrier gas was 1 ml/min. Mass spectra were taken at 70 ev. Identification of the constituents of oil was made by comparison of their mass spectra and retention indices with those given in the literature and with those authenic samples [6].

**Table 1. Chemical composition of essential oil of *pistacia atlantica* gum**

NO	Compound	KI	Percentage
1	$\alpha$ -Pinene	939	81.9
2	Camphene	954	2.7
3	Sabinene	976	0.8
4	$\beta$ -Pinene	980	7.4
5	$\delta$ -Cymene	1025	0.1
6	Limonene	1029	1.2
7	1,8-Cineole	1031	0.1
8	$\delta$ -3-Carene	1033	0.1
9	$\alpha$ -Terpinolene	1088	0.4
10	Linalool	1097	0.1
11	$\alpha$ -Pinene Oxide	1099	0.1
12	$\alpha$ -Campholenal	1126	0.2
13	Trans-Pinocarveol	1139	0.9
14	Verbenol	1143	2.5
15	$\alpha$ -Terpineol	1192	0.1
16	Myrtenol	1196	0.1
17	Verbenone	1205	0.1
18	Bornyl acetate	1289	0.7
TOTAL			99.5

## RESULTS AND DISCUSSION

The results obtained in the analyses of the oil of *Pistacia atlantica* gum are listed in table 1, in which the percentage and retention indices of components are given.

As it is shown, the essential oil was characterized by large of  $\alpha$ -Pinene (81.9 %), camphene (2.7 %),  $\beta$ -Pinene (7.4 %) and verbenol (2.5 %) (bicyclic monoterpenes). As it can be seen, verbenol is an oxygenated monoterpene. Other components (fourteen compounds) were present in amounts less than 4%.

$\alpha$ -Pinene is mainly found in the essential oils of many species of many coniferous trees, notably the pine. It is also found in the oil of rosemary (*Rosmarinus officinalis*) [7]. Both enantiomers are known in nature; (-)- $\alpha$ -Pinene is more common in European pines, whereas (+)- $\alpha$ -Pinene is more common in North America. The racemic mixture is present in some oils such as eucalyptus oil.

## REFERENCES

- [1] M. Isfendiyaroglu, E. Ozekei, *International Journal of Plant Production*, **2009**, 3, 93-97.
- [2] J.C. Crane and B.T. Iwakiri, *Hort. Rev.* **1981**, 3, 376-393.
- [3] D.E. Parfitt, M.L. Badenes, *Proceeding of the National Academy of sciences of the United States of America*, **1997**, 94, 7987-7992.
- [4] N. Benhammou, F.A. Bekkara, T.K. Panovska, *African Journal of Pharmacy and Pharmacology*, **2008**, 2, 22-28.
- [5] V. Mozaffarian, *Adictionary of Iranian Plants Names*, Farhang Moaser, Tehran, **2007**.
- [6] R.P. Adams, *Identification of Essential oil components by Gas chromatography/ Mass spectroscopy*. Allured Publ. Corp., Carol Stream, IL. **1995**.
- [7] PDR for Herbal Medicine. Montvale, NJ, Medical Economics Company. P. 1100.