

Chemical constituents of the flower oil of *Acacia luciana* from Iran

Ali Reza Sardashti*, Jafar Valizadeh, Mostafa Heidari Majd

Department of chemistry, Faculty of sciences, Sistan & Baluchestan University, Zahedan, Iran

Corresponding author email: sardashti@chem.usb.ac.ir

ABSTRACT: *Acacia luciana* is a plant from the Mimosaceae family on many yellowish flowers. Regarding the type of soil and a tropical climate. The flower oil of *Acacia luciana* was extracted by hydro distillation with an efficiency of 0.63w/w. The components were characterized by means of GC-MS and GC using Kovat's retention indices. 17 components of the flower oil which composed of 96.88% (C>0.1%), trans- ferruginol (32.18%), hepta- 1,3,5-triyne <1-phenyl> (23.26%), phytol acetate (9.72%), manool (8.90%), ace anisole (4.56%), eugenyl acetate (3.16%). The findings of the research revealed that the *Acacia luciana* essential oil has a considerable percentage of oxygenated diterpenoids with the anti-microbial property.

Key Words: Flower of *acacia luciana*, Essential oil, Trans- ferruginol, Manool, Hepta- 1,3,5-triyne <1-phenyl>

INTRODUCTION

Acacia is a plant from the Mimosaceae family. It is the dominant tree species. Given the type of soil and its tropical climate (Zargari ,1993., Hocking,1970).

The average tree is about 2m in height and tree densities can be up to 400 per acre, with an average of 200. This species are found in tropical and sub-trop regions. Many are armed with thorns capable of cause mechanical injury. Baluchestan region of Iran is the major habitat of *Acacia luciana*. Since the flowers of this tree are aromatic, they contain essential oil (.Stanton et al, 1999).

MATERIALS AND METHODS

Plant material

The flowers of the *Acacia* tree were collected from the Iranshahr (south east of Iran) in Baluchestan region of Iran in April 2005 and identified at the herbarium of faculty of agronomic Zabol, *Acacia luciana* (Mozaffarian,1996).

Oil extraction

The dried flower of the *Acacia* tree (12.80g) was subjected to hydro distillation for 4h using a Clevenger apparatus type to produce oil in 0.63 w/w yield. The obtained essential oil was collected in hexane-solvent and was dried with anhydrous sodium sulphate, weighed and stored at 4 °C in dark until use (Cao et al ,2004).

GC-MS analysis

The oil from the flower of *Acacia luciana* was analyzed by gas chromatography-mass spectrometry (GC-MS) using an apparatus Thermo Finnigan 2000 equipment on a Thermo Quest 2000 GC equipped with a flame ionization detector DB-5 plus capillary column (30m x 0.25mm) cross lined methyl siloxane (0.25µm film thickness). The carrier gas was helium at a flow rate of 2 ml/min. The gas chromatograph was programmed ;the oven temperature was kept at 60 °C for 4 min with a rate of 3°C/min , then the temperature increased to reach the temperature of 280 °C at a rate of 30° C/min Injector temperature 250° C and detector temperature of 285°C. For GC-MS detection, an electron ionization system was used with ionization energy of 70 eV. The injector and MS transfer line temperatures were set at 220 °C and 290 °C , respectively. The percentage composition was calculated from the GC peak areas without using correction factors (Sateen GC-MS,1992., Van Den Dool and Kratz ,1963).

Identification

The identified components and their percentages are listed according to their elution order (table 1). Identification of the components was based on GC retention indices, computer matching with Wiley GC-MS library (Peerzada ,1997).By comparison of the fragmentation patterns of the mass spectra with those reported in the mass spectra with those reported in the literature (Adams ,1995).

RESULTS AND DISCUSSION

The *Acacia luciana* flowers were collected from the Iranshahr in Sistan and Baluchestan province of Iran, in late April 2005. Having a yield of 0.63 w/w , its essential oil was extracted using the hydro distillation method with water .The essential oil was analyzed using GC-MS technique. The results of the GC-MS analysis C>0.1 % of essential oil are listed in table1 in the order of elution from DB5 capillary column according to Kovats retention indices values. 17 compounds which constitute 96.88% of the whole essential oil were identified with respect to the indices of base-having. 6.85% of the total essential oil contained oxygenated monoterpene compounds among which linalool acetate (0.92%), octanol acetate (1.03%), cis- linalool oxide (0.54%), terpineol (2.20%), geraniol (0.99%), hexenyl butyrate (1.17%) were the most important ones. Sesquiterpene hydrocarbons compounds made up 1.06% of the total essential oil from which delta- cadinene (1.06%) was the most important. Oxygenated diterpene compounds, 50.80% of the essential oil and the most important of them were manool(8.90%),trans- ferruginol (32.18%), phytol acetate(9.72%), (Table 1).Therefore, oxygenated terpenoid formed 57.65% of the total essential oil(Table 2).This amount indicates that the essential oil had antimicrobial property. Qualitative comparison of the flower oil constituents of *Acacia leucina* was characterized by high percentages of oxygenated compounds except fortrans- ferruginol (32.18%) which is oxygenated diterpene. The major components of the flower oil were trans- ferruginol (32.18%), hepta- 1, 3,5-triyn e <1-phenyl>(23.26%) (no terpenoid) and phytol acetate (9.72%).

Table 1. Chemical composition of essential oil from the flower of *Acacia leucina* by GC-MS technique

Compound	Retention indices	percentage
linalool acetate	938	0.92
octanol acetate	991	1.03
methyl pentanoate <2hydroxy-4-methyl>	1010	1.08
linalool oxide <cis->	1014	0.54
lavandulyl acetate <hydroxy dihydro>	1033	1.04
manool	1039	8.90
hexenyl butyrate	1041	1.17
carvyl propionate <trans->	1075	3.53
terpineol	1121	2.20
hepta- 1,3,5-triyn e <1-phenyl>	1126	23.26
geraniol	1178.	0.99
acetanisole	1223	4.56
eugenyl acetate	1262	3.16
dodecane	1356	1.54
ferruginol <trans->	1359	32.18
cadinene < delta >	1399	1.06
phytol acetate	1662	9.72

Table 2. Chemical composition of essential oil from the flower of *Acacia leucina* by chemical class

Chemical class	percentage	Number of compounds
Oxygenated monoterpenes	6.85	6
Sesquiterpene hydrocarbons	1.06	1
Oxygenated diterpene	50.80	3
other hydrocarbons compounds	24.80	2
other Oxygenated compounds	13.37	5
Total terpenoids	58.71	10
Total	96.88	17

CONCLUSION

In essential oils of *Acacia leucina* 10 terpenoid compounds with a 58.71 percent were recognized. Both the plants were extracted and the resultant essential oils showed an acceptable level of quality. The constituents of manool and terpineol that are the most common components in essential oil and are widely used in the production of antiseptic and anesthetic medicines. In essential oils there were oxygen-containing terpenoid constituents. In the essential oil, there exist the flavonoid compounds (number of compounds 3,5,8,12,13 in the table 1).

ACKNOWLEDGMENTS

The authors are grateful to professor Sefidkon and Professor Isla Yavari for cooperation in this work.

REFERENCES

- Adams RP. 1995. Identification of essential oil components by gas chromatography/mass spectroscopy Allured Publ. Corp. Carol Stream. IL.
- Yuhua C, Qingcui Ch, Jiannong Y. 2004. Journal of chromatography B. 812:231-240.
- Hocking B. 1970. Inset associations with the swollen thorn acacias. Trans. R. Entomol. Soc. Lond. 122:211-255.
- Mozaffarian V. 1996. A Dictionary of Iranian plant names, farhang moaser publishers Tehran Iran., 344-345.
- Peerzada N. 1997. Chemical composition of the essential oil of *Hyptis suaveolens*. Molecules. 2(11):165-168.
- Sateen GC-MS reference manual 03-914350-00. Varian associates Inc. 1992.
- Stanton ML, Palmer TM, Young TP, Evans A, Turner ML. 1999. Sterilization and canopy modification of a swollen thorn acacia tree by a plant-ant. Nature. 401:578-581.
- Van Den Dool H, Kratz PD. 1963. A generalization of the retention index system including linear temperature programmed gas-liquid partition chromatography. J. Chromatogr. 11:463-471.
- Zargari A. 1993. Medicinal plants. Vol 4. Tehran university publication., 4: 106-112. 2. 255.