Faculty of Science, Department of Chemistry,
Technical University of Istanbul — Turkey

THE VOLATILE LEAF AND BERRY OILS FROM JUNIPERUS COMMUNIS L. AND JUNIPERUS OXYCEDRUS L. HAVING TURKISH ORIGIN

Naciye Talinli, Olcay Anaç, A. Cevdet Aydogan

The chemical composition of volatile oils obtained by steam distillation from the leaves and berries of Juniperus communis L. (var. communis) and Juniperus oxycedrus L. (var. oxycedrus) were investigated by gas chromatography. The yields and some physicochemical properties were also measured. According to the data obtained, it seemed that the chemical composition of volatile leaf and berry oils from Juniperus communis L. weren't significantly different from those of Juniperus oxycedrus L.

Introduction

In general, Juniper grows wild and is very important in pharmaceutical and cosmetic industries. Its essential oil is also employed for flavoring in the beverage industry.

One of the varieties of Juniper is *Juniperus communis L.*, it grows in many parts of Europe, Asia and North America. But in Turkey[1] it grows only in the distinct area of Kalfaköy-Istanbul. Juniperus communis L. has green (unripe) and blue (ripe) berries. The appearance, flavor and the essential oil content of the berries depend a great deal upon their geographical origin and upon local conditions[2,3]. Trees growing at elevated altitudes and in warm sunny places produce the best berries. Those from Italy have always been considered of best quality; Hungarian berries follow next[2].

Another aldurate of Juniper berries, formerly used extensively is the berry of *Juniperus oxycedrus L.*, so-called "prickly Juniper". This shrub grows wild and profusely in Spain, Italy, Dalmatia, and in many parts of Turkey. The berries of the species oxycedrus have a reddish-brown color, and are larger than those of the species communis, but of inferior odor and flavor which recalls turpentine oil.

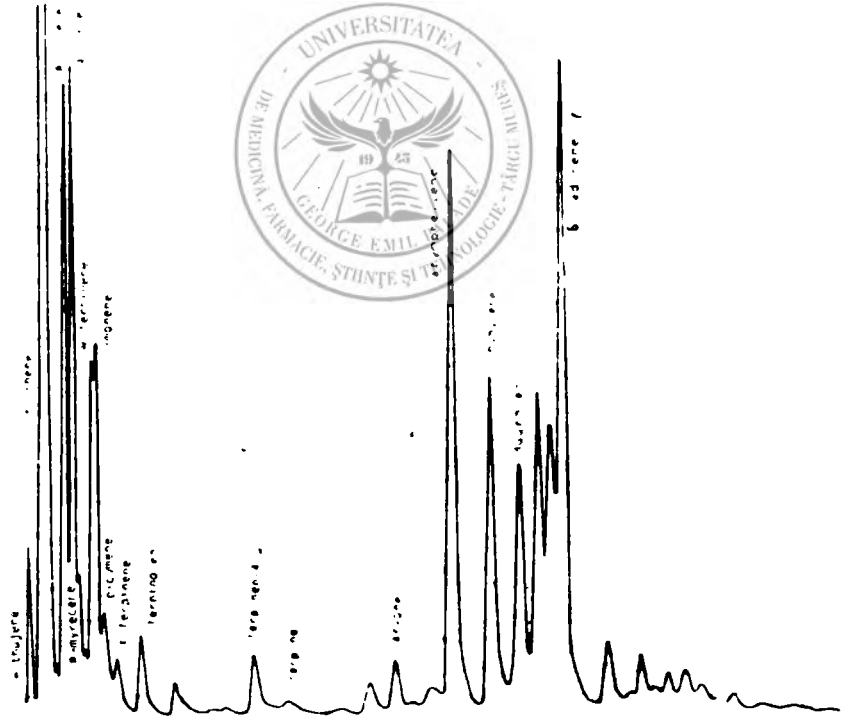
The essential oils obtained only from the leaves and fruits of Turkish *Juniperus nana Willd.* were studied by N. Tanker et al[4]... In our research, the volatile oils of berries and leaves of J. communis and J. oxycedrus were also studied and compared to each other.

For this purpose, J. oxycedrus and J. communis berries and leaves were collected at harvest time between August 15—September 5. Yields and some physicochemical properties of volatile oils obtained by steam distillation were measured.

Experimental

Berries and leaves were collected from Kalfaköy-Istanbul. Volatile oils of ground materials were prepared in our Laboratory by steam distillation using an apparatus similar to Clevenger system[5]. The materials were treated with 4—6 fold weight of distilled water and boiled for 4—6 hours. The distillate had two layers, the upper layer of Juniper oil was separated from water and dried over anhydrous sodium sulphate.

Gas chromatography was carried out by using a Schimadzu 5A apparatus equiped with F. I. detector. An OV-17 3% on Chromosorb W 100/120 mesh, 3 mm I.D.×3 m column was used. The following conditions were imposed; Injector and detector temperature : 250°C, carrier gas (N_2), 100 ml/min. Temperature programme : 65°C ⟶ 100°C at 2°C/min,



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100' ⟶ 200°C at 3°C/min, heating rate. Integrator: ITG-4A. Compounds were identified by peak enrichment. In Figure I, one of the chromatograms was illustrated.

The yields and some physicochemical properties which were measured according to Iso were given in Table I, and the results of gas chromatographic analysis were collected in Table II.

Table I: **The yields and psysicochemical properties of Juniper oils.**

Material	Yield % (cc/gr)	Specific gravity	Optical rotation $[\alpha]^{20}_{D}$	Refractive index $[n]^{20}_{D}$
J. communis L. leaves	0.68	0.86456	+13.8°	1.4714
J. communis L. berries (ripe)	1.00	0.86046	—4.9°	1.4668
J. oxycedrus L. leaves	0.066	0.9680	+16.2°	1.4808
J. oxycedrus L. berries (ripe)	0,84	0.8547	—3.4°	1.4740

Table II: Gas Chromatographic analysis of the Juniper oils.

Components	R_t (min)	Ripe berries of J. communis	Leaves of J. communis	Ripe berries of J. oxycedrus	Leaves of J. oxycedrus
α-Thujene	1.84	—	—	0.03	0.76
α-Pinene	2.55	58.5	45.25	54.82	59.4
Camphene	3.39	Trace	Trace	Trace	0.019
β-Pinene	3.76	—	—	2.7	4.23
Sabinene	3.86	9.4	17.06	21.98	2.33
β-Myrcene	4.10	3.6	0.88	—	0.02
Phellandene ɣ-Carene	4.90	0.001	0.002	—	0.09
α-Terpinene	5,00	—	1.54	—	2.04
Limonene	5,23	2.08	1.68	2.17	0,39
p-Cymene	6.03	0.05	0,23	—	0.09
γ-Terpinene	6.59	0.32	3.12	0.001	1.15
Terpinolene	7.85	0.7	2.23	4.46	0.94
Terpinene-4-ol	13.73	0.92	7.4	0.56	1.09
α-Terpinol	15.4	0.015	0.1	0.066	0.001
Carvone	21.58	0.12	0.73	—	0.04
Caryophellene	24.80	4.72	4.62	2.1	7.76
Humulene	27.00	5.35	3.88	1.83	4.93
Muurolene	28.67	7.25	3.96	8.78	3.3
δ-Cadinene	31.18	0.6	0.86	1.6	3.8

Results and Discussion

As shown in Table II, the composition of the oils of *J. oxycedrus* and *J. communis* weren't significantly different. It is interesting to note that the presence of Carvone which hadn't been previously found in Juniper oil, was identified by using GC and TLC.

The largest fraction of *J. communis L.* oils from the leaves and berries consists of monoterpene hydrocarbons (69 area %), of which α-Pinene hydrocarbons were about 18%, the others except Humulene, Muuro- agreement with the results of other researchers[6,7,8]. Amount of sesquiterpene hydrocarbons were about 18 % the others except Humulene, Muurolene, Caryophenene and Cadinene couldn't be identified. In literature, it can be seen that the α-Pinene content differences depend upon the geographical and local conditions. While the amount of α-Pinene was found as 55% in Hungarian berries[7], it was found 33% in Italian berries[7] α-Pinene content of Turkish *Juniperus communis L.* oils both from the berries and leaves were higher than Hungarian and Italian berry oils.

In oxycedrus berries, the amount of monoterpenes is approximately 70 percent. α-Pinene and Sabinene are main constituents. The monoterpene content of the leaf oil is approximately the same as that of the berry oil. But the oil of the leaf is richer for α-Pinene and poorer for Sabinene than the berry oil. In addition, approximately, 12 area % of sesquiterpene hydrocarbons have also been found. Although the amount of monoterpenes is the same as the other, the yield of the leaves is rather poor as shown in Table II. But when compared with a recent literature value, it can be seen that the berries of Turkish *J. oxycedrus* contain (0.84 %) more essential oil than Yugoslav berries[10].

According to these results, *Turkish J. oxycedrus L.* berries can be used in some industries instead of *J. communis L.*, because it grows in many parts of Turkey and has comparable constituent with *J. Communis L.*

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