A STUDY OF THE VOLATILE OIL CONTENT OF *XANTHIUM PUNGENS*, COMPOSITAE

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SUMMARY: The volatile oil of the herb of Xanthium pungens, Wallr. emend. Widd. Family Compositae was prepared by steam distillation. The oil was investigated by TLC as well as GLC-mass spectrometry. The results revealed the presence of 18 terpenoidal constituents, of which, limonene was the most abundant.

Key Words: Essential oil, xanthium pungens, compositae.

INTRODUCTION

The plant of *Xanthium pungens*, Wallr. emend, Widd. Compositae is an annual weed which is growing widely in the Nile region of Egypt. The decoction of the stems and leaves of Xanthium plant with water was applied externally in folk medicine, for the treatment of eczema, while an ointment was prepared from the tincture of *Xanthium riparium* (5) and showed antiflammatory properties without any toxic or irritant effects when applied to the skin of guinea pigs.

Reviewing the current literature (1), prepared an essential oil from the shade dried leaves of *Xanthium strumarium*. They concluded that the oil contained 35% of d-limonene and 25% of d-carveol and could serve as a good natural source of the two components, while (2) concluded that the essential oil prepared from the leaves of *Xanthium strumarium* possess potent antifungal activity. A volatile oil was prepared from the aerial parts of *Xanthium pensylvanicum* (4) and was reported to contain an essential oil with limonene as the major component (65%), camphene, α-pinene, sabinene, bornyl acetate, P-cymene, β-pinene, 4-terpineol, carveol, α-ionene, myrecene, terpinolene were also identified. Taher *et al.* (6) reported the composition of the essential oil of *Xanthium carvanillesii*, monoterpene hydrocarbons (55.2%) especially limonene (43.6%), constitute the bulk of the essential oil, oxygenated monoterpeneoids represent 14.2% and the sesquiterpene hydrocarbons 11.3%. From our results of preliminary phytochemical screening, a volatile oil was detected in the stem, leaf and fruit of *Xanthium pungens* widely growing in Egypt. So, it was of interest to achieve this study using chromatographic and spectral tools.

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MATERIALS AND METHODS

Plant material

The aerial parts of *Xanthium pungens*, Wallr. emend, Widd. Family Compositae were collected from the Nile Delta, Guiza Egypt and authenticated by Prof. Dr. Loutfy Boulos Professor of Taxonomy at the National Research Center, Egypt.

Preparation of the volatile oil

The volatile oil of the serial parts of *Xanthium pungens* was prepared by steam distillation and the prepared oil was subjected to thin layer chromatography and GLC/MS analysis as follows:

Thin layer chromatography

The volatile oil was chromatographed on silica gel (Whatman Plates of TLC HP-KF, High Performance, Silica Gel, layer thickness 200 μ) using benzene-ethyl acetate (95:5) as developer. The spots were visualized by spraying with vanillin sulphuric acid reagent (3) and heating the plates at 120°C until the spots attain maximum color intensity.

GLC/MS analysis

The GLC and GLC/MS technique were employed for the quantitative as well as the quantitative analysis of the volatile oil by using Gas Chromatograph, Packard model 427 with FID, Quartz capillary Column: SE 30 (50 m x 0.22 mm),

Table 1: Constituents of the essential oil of the aerial parts of *Xanthium pungens*.

	Identified components	Percentage
1	α-pinene	0.9
2	Camphene	0.7
3	β-pinene	0.3
4	Sabinene	2.5
5	Myrecene	5.7
6	Limonene	40.2
7	Cineol	0.6
8	P-cymene	0.2
9	$C_{15}H_{24}$	0.7
10	Linalool	1.5
11	Bornyl acetate	3.4
12	4-terpineol	0.9
13	Caryophyllene	3.3
14	Humulene	1.6
15	$C_{15}H_{24}$	25.7
16	Aromadendrone	3.3
17	Nerol	0.7
18	Patchoulane	2.2

Temperature Program: 60-285°C, 2°C/min, GLC/MS analysis : MS apparatus, Brucker 70eV, direct inlet. Identification of the compounds in the mixture was carried out by comparison with authentic samples and a MS spectral data library and the results are tabulated in Table 1.

RESULTS AND DISCUSSION

The essential oil of the aerial parts of *Xanthium pungens*, Compositae, was prepared by steam distillation to yield 0.15% of a bright yellow pungent oil. The oil was resolved firstly by thin layer chromatography. Several spots were separated on the chromatogram which attained a deep violet color with the visualizing reagent. From which three major spots with R_f 53, 96, 46 were identified as limonene, myrecene and linalool respectively by co-chromatography and comparison with authentic samples. Accurate and complete qualitative and quantitative analysis of the volatile constituents of the essential oil was determined by GLC/MS technique which revealed the presence of mono and sesquiterpene hydrocarbons as well as oxygenated components of which limonene, was the most abundant (40.7%). The oil was also characterized by a relatively high amount of $C_{15}H_{24}$ (25.7%), myrecene (5.7%), bornyl acetate (3.4%) caryophylene and aromadendrone (3.3%), patchoulane (2.2%), sabinene (2.5%), humulene (1.6%), linalool (1.5%) and a lesser percentage of 4-terpineol (0.9%), α-pinene (0.9%), camphene (0.7%), nerol (0.7%), Cineol (0.6%), β-pinene (0.3%) and P-cymene (0.2%).

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