Characteristics of Fatty acids content in *Gundelia L.* oil extract

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Abstract

The fatty acid composition of the seed oil of Gundelia L. which is grown in Kurdistan Region-Iraq was determind. The percentage of seed oil was found to be 31.5%.

It has been found that the seed oil contain myristic, palmitic, palmitolic, heptadecanoic, stearic, oleic, linoleic, and linolenic. Seed's oil contain high level of oleic and linoleic acids, about 20-40%.

Key words: Fatty acid, GLC , ***Gundelia L.,***Oil

الخلاصة

أن الاحماض الدهنية المحتواة في زيت بذور الكوندليا امنطقة كوردستان العراق تم تقديرها بحيـث كانت نسبتها 31.5% . لقد وجد ان زيت البذور المستخاص يحتوي على الاحمـاض التاليـة : ميريـستك، بالمتيك، بالميتوليك، هيبتاديكانويك، ستيارسك، اوليك، لينوليك، و لينولينيك . كما اوضح التجريـب علـى ان زيت البذور هذا يحتوي على نسبة عالية من احماض الاوليك و اللينوليك تقدر ما بين 20 – 40 %.

Introduction

The Gundelia is a spiny, thistle-like flowering plant of the genus Gundelia L.,
in the sunflower family (***Asteraceae***) [1]. They occur in the semi-desert areas of Armenia, Asia Minor, Iraq and Iran [2]. A member of this genus, tumbleweed G., has capacities and inhibition on glutathione-S-transferase activity [3]. Researches were found significant differences regarding the fatty acid content and new evidence for systematic position of ***Gundelia L***.with notes on delimitation ***Asteraceae*** [4].

The characteristics of fatty oils recovered from seeds of plant species of Turkish origin have been investigated [5] and hypolipidimic effect of Kuub (***gundelia tournefotii A)*** oil and tournefortii came under the spotlights in 1998, when its pollen grain were found in abundance on the shroud of Turin. It has been suggested

that this spin plant may be the (crown of thorns), symbol of humiliation of Jesus [1].

Gundelia tourenfortii (L), is used as an occasional food, and its extracts have been used for prevention and treatment of liver diseases in Iran [2]. Extracts of it has antioxidant clofibrate on liprofile of atherosclerotic rats [4].

The aim of this present work is the determination of the percentage of seed oil, of ***Gundelia L***. in the Iraqi Kurdistan region and the qualitatively analysis of the oil fatty acids content using GLC (gas liquid chromatography).

Experimental procedure

Preparation of the sample for determination of total oil content:

The seed powder of ***gundelia L.*** was dried for 2 days in an air oven at 60 ^{o}C. The oil contents were determined in continuous soxhlet apparatus using petroleum ether (40- 60^{o}C), [6]. The oil was recovered by petroleum ether distillation in a rotary evaporator at a 60^{o}C. The oil was then dried in a desiccator for 1 hour, and finally weighted to obtain the gram of oil extracted. The percentage of oil was 31.5%. The characteristic properties of the oil were determined by conventional methods, the result is presented in table (1, 2).

Preparation of the sample for determination of fatty acids:

The fat composition in fatty acids was determined using methyl esters before GLC analysis, all samples were subjected to a purification process consisting of:

1-Purification of the triglycerides fraction.

2-Esterification with alcoholic KOH.

The triglycerides fraction were carried out by carefully evaporating the sample until dried and using a nitrogen current, they were redissolved in diethyl ether : hexane (90:10) and loaded on a silica column of 20x 0.9 cm dimensions. The sample was deposited after elution at 1ml/min with 50ml of diethyl ether: hexane 90:10 [7].

Trans Esterfication:

The methyl esters of the fatty acids which were prepared by trans esterfication of 1gm of oils was put in 20 ml stopped test tube then 10 ml of heptane was added, followed by 0.5ml of 2M methanolic KOH. The mixture was shaked for 20 sec. and the solution become clear, after awhile turbidity forms due to the separation of glycerol, the upper heptanes layer containing the methyl esters was decanted into a small vial[8].

GLC analysis:-

A sample for GLC was prepared by using 0.2M of methyl ester and subjected to the methyl ester and subjected to vapor phase gas chromatography column. The mobile phase was nitrogen gas and a glass column which is 6 feet in length and 4 mm in diameter was used. The stationary phase was 15% of DEGS (dimethylene glycol succinate) on a solid material of chrombosorb WAW DMCS which is the 80-100 mesh diameters. The oven temperature was programmed from 140- 190^{o}C in 80^{o}C/min. The temperature of both injection and the detector were 200^{O}C. The nitrogen gas flow was 24ml/min Identification of the peaks were achieved by comparison of the retention times of the fatty acids and their methyl ethers of the oils with the retention times of pure fatty acids and their methyl esters analyzed under identical conditions aided in the direct identification of the peak on the chromatographic record. The data calculated as weight percent fatty acids is given in table (1).

Results and Discussion

Gas liquid chromatography is the most versatile and widely used type of elution chromatography. The technique is used by chemists to separate and

determined variety organic, inorganic, and biological materials [1]. Applying GLC analysis for the standard fatty acids (authentic) (fig-1), the data obtained reflects the fact that the mixture of saturated fatty acids used (myristic, palmitic, heptodecanoic, and stearic) were have the specific retention time of each (table-1). It was obviously seen that fatty acids contained in ***Gundelia L.*** oil extracted were have the same Rt values when applied to GLC analysis (fig-2), [1]. The little variations in the fractions of the readings of Rt values can be explained to be due to the differences in the type of GLC model used, length of column, types of mobile phase used and its flow rates, the instrument sensitivity and type of packed column material already used by other authors. Data obtained from the analysis and identification of the fatty acids provides strong evidence for the similarity between the standard and the extracted one. Investigation the chemical properties of the seed oil resulted in the percentage of the factors that are characterized it (table-2). Results showed that the oil content to be of 31.5%. The oil was yellow in color, the its iodine value is often the most useful figure for identifying oil or least into a particular group which give a reasonably quantitative measure of unsaturation of oil [8]. The saponification number representthe amount of the saponifible material which is inversely proportional to the mean of the molecular weight of the fatty acids in the glycerides present [8]. The peroxide value is an indicator of the product of primary oxidation, it measure rancidity or degree of oxidation but not stability of the fat [10]. Rancidity test often begin to be noticeable when the peroxide value is between 10 and 20 [8]. All these prescribes digits were of valuable for health and thus ***Gundelia L.*** can be used as a source of nutrients.

Table (1): percentage of fatty acids obtained from GLC analysis of *Gundelia L.* seed.

No.	No,of carbon	Common name of acid	Sat / unsat	Rt time standard	Rt time seed	Area under peak A%
1	C14	Myristic	Sat.	3.21	3.35	1.496
2	C16	Palmitic	Sat.	5.48	5.12	29.42
3	C16	Palmitoleic	Unsat.	5.62	5.61	0.958
4	C17	Heptadecanoic	Sat.	6.42	6.42	0.06601
5	C 18	Stearic	Sat.	7.12	7.17	9.78
6	$C18^{-}$	Oleic	Unsat.	7.97	7.88	40.13
7	$C18^{=}$	Linoleic	Unsat.	9.04	9.03	20.33
8	$C18^{=-}$	Linolenic	Unsat.	10.91	10.92	0.430

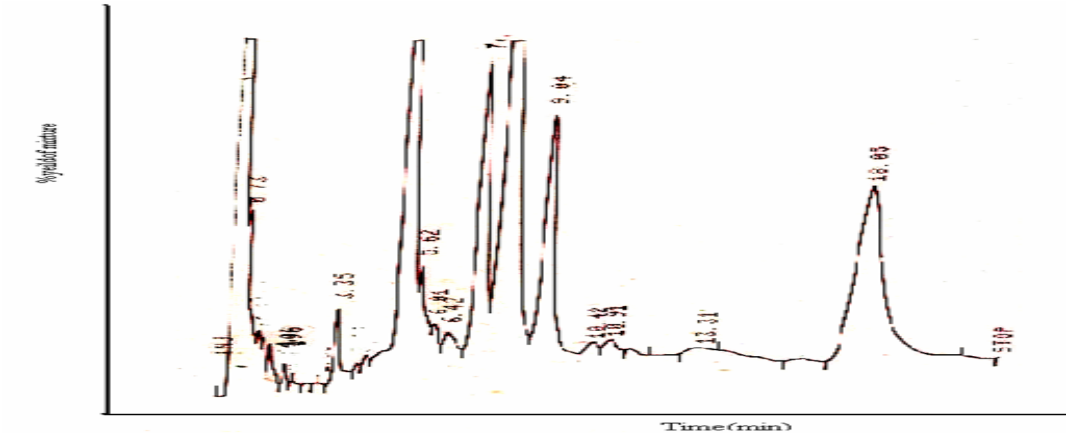

Fig (1) GLC Chromatograms of a Mixture of Authentic Methyl Esters of Myristic, Palmitic, Palmitolic, Heptadecanoic, Sttearic, Oleic, Linoleic, Linolenic acid.

Table (2) chemical analysis of the seed oil of *Gundelia L.*

No.	properties	Seed
1	oil	31.5%
2	Saponification value	196
3	Iodine value	99.06
4	Acid value	1.22
5	Peroxide value	1.2

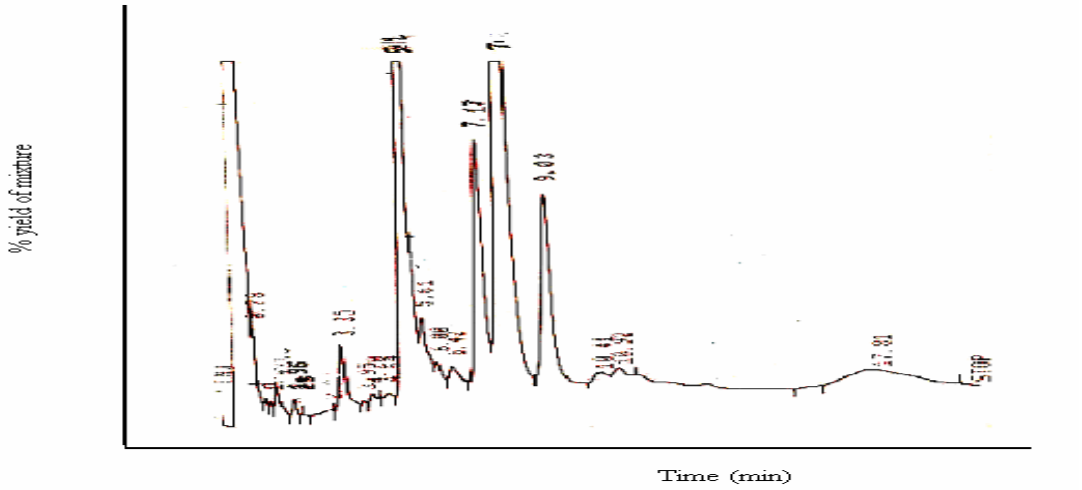

Fig (2) GLC Chromatograms of a Mixture of Fatty Acids Present in seed of *Gundelia L.*

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