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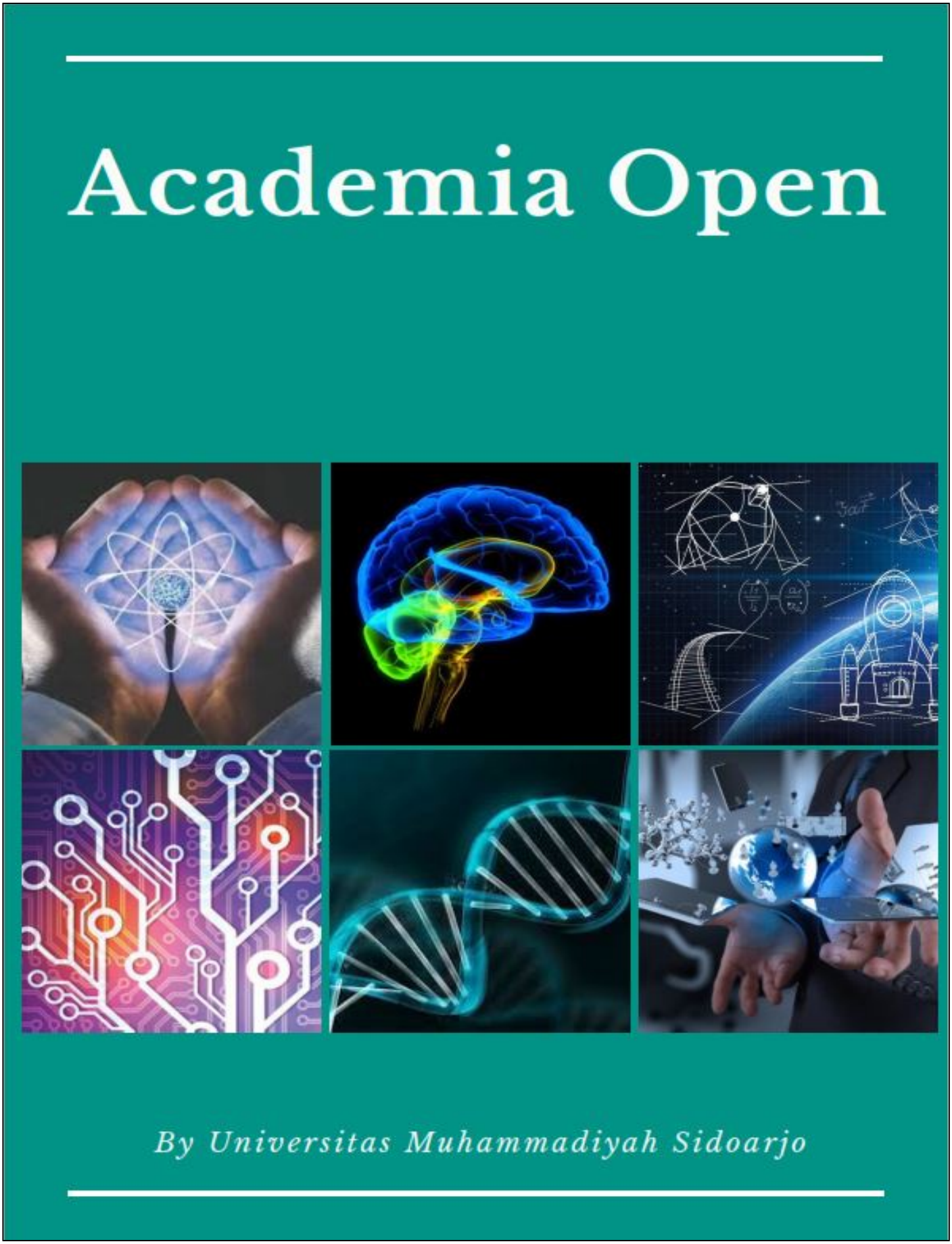

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Comparative Analysis of Lutein Content in Leaves and Fruit of Lycium barbarum: Implications for Medicinal Applications

Analisis Perbandingan Kandungan Lutein pada Daun dan Buah Lycium barbarum: Implikasi untuk Aplikasi Obat

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Abstract

Herbal medicine stands as a pivotal realm of contemporary research, offering substantial benefits with minimal side effects. Lycium barbarum, recognized for its abundant bioactive compounds, holds promise in treating various ailments, particularly in antiaging and antioxidative capacities. Carotenoids, notably lutein and zeaxanthin, constitute key bioactive compounds with diverse functions in both plant physiology and human health, including photo protection against intense light and detoxification of reactive oxygen species. This study meticulously examines the lutein content within leaves and fruit of L. barbarum, employing a uniform extraction method and solvent. The investigation illuminates significant variations in lutein content between the leaves and fruit, shedding light on potential applications in herbal medicine and nutraceuticals.

Highlight:

- Herbal Medicine Advancements: This study underscores the pivotal role of herbal medicine in contemporary research, emphasizing its potential for providing substantial benefits with minimal side effects.
- Lycium barbarum's Therapeutic Potential: The research highlights Lycium barbarum's significance due to its rich array of bioactive compounds, particularly in addressing antiaging and antioxidative requirements.
- Bioactive Carotenoids in Focus: The study delves into the functions of essential

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bioactive compounds, lutein and zeaxanthin, elucidating their roles in plant physiology and human health, including their photoprotective and detoxifying properties.

Keyword: Herbal Medicine, Lycium Barbarum, Bioactive Compounds, Carotenoids, Lutein Content

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Introduction

Folk herbal medicine has been highly used over many decades all over the world alike, and this because its natural origin and its minimum side effects when compared with other synthetic drugs. plants characterized by it contain of therapeutically important constituents. Theis compounds are extracted from herbs and purified for its therapeutic benefit [1].

Lycium barbarum, also referred to as LB, Gouqi, wolfberry, or Fructus lycii, is a widely recognized traditional herbal plant that exhibits a broad geographical range. The significance of this substance in China and other Asian nations is of great importance, as it serves not only as a dietary supplement for daily use, but also possesses medicinal properties. *L. barbarum*, has garnered significant attention from both Chinese and international medical researchers and dietetic health professionals in recent years. This heightened interest can be attributed to the comprehensive examination of LB, which has revealed its noteworthy antioxidant properties and potential anti-aging benefits. [2]

L. barbarum is regarded as a botanical species with therapeutic properties that have been utilized in traditional and folk herbal medicine practices. The herbal raw material of Lycium, scientifically known as fructus Lycii and cortex Lycii radicis, encompasses its fruit and bark. However, it is worth noting that the therapeutic chemicals can also be found in the seeds and leaves of Lycium. The fruits of L. barbarum exhibit various therapeutic properties, including antiaging, protective, immunostimulant, energizing, adapt genic, anticancer, and antioxidant activity. These fruits are also abundant in biologically active compounds such as specific polysaccharides, carotenoids, flavonoids, terpenoids, vitamins B and C, and the element germanium.[3]

Carotenoids, which include oxygen-containing xanthophylls and oxygen-free carotenes, are present throughout the tree of life .a tiny set of carotenoids that are necessary for human nutrition and must be received from diet, such as lutein, zeaxanthin, and β-carotene (provitamin A)[4]

Lutein is a fat-soluble carotenoid pigment composed of 40 carbon atoms, including a sequence of prominent conjugated double bonds.

The conspicuous red color and propensity to supply free radicals in these substances are attributed to the presence of double bonds in their structure.[5]

Lutein (, -Carotene- 3, 3' diol) is an oxygenated derivative of hydrocarbon carotenoids that occurs naturally.It is found in different plants. It plays a physiological role in increasing eyesight and protecting the eyes from damaging UV rays. [6]

This study focus on lutein in the *L.barbarum* extract of leaves and fruit and compare between them when the extraction method and the solvent is the same

Material and Methods:

1. Plant Material:

The plant was collected from different cities (Baghdad, Basrah, Maysan). then the specimen was diagnosed by Dr Ula Almosawi in the Pharmacognosy Laboratory, Faculty of Pharmacy at Basrah University.

It was first cleaned, washed and air dried at room temperature for 5 days. Then, the plant parts were crushed using blender until it become powder and prepared it to extraction process.

2. Extraction methods

To make the extracts, 5 grams of each plant part from each area were weighed out one by one, and 100 milliliters of 85% methanol were added to a 250-milliliter conical jar as a solvent. Our ultrasonic bath (DS-2510 DT) was set to 60 kHz and left on for 30 minutes at room temperature. All of the extracts were filtered and put in the fridge until they were analyzed [7]

3. High Performance Liquid Chromatography (HPLC) Analysis of lutein in Crude Extracts :

An HPLC analysis was performed for the detection and estimation of lutein in twelve extracts of plant. Analysis was carried out by HPLC system (Shimadzu) and the analysis was done in ministry of since and technology /Baghdad

HPLC Conditions:

Mobile phase :

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1. A- Acetonitrile 76%
2. B- Methanol 21.5%
3. C- n- hexane 2.5%

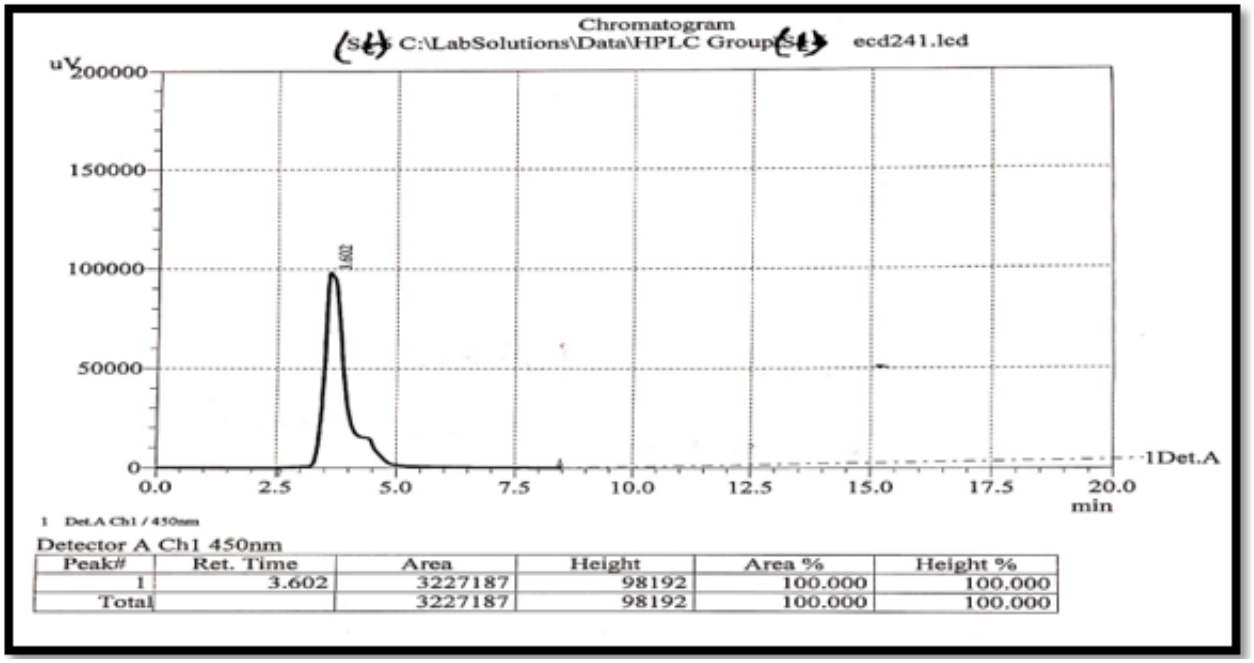
Column type: ODS c18 (250 * 4.6 Id)mm, 5um particle size

Flow rate: 1ml/min

Temperature: at room temp.

Volume injection: 20ml

Results and Discussion



Peak#	Ret. Time	Area	Height	Area %	Height %
1	3.602	3227187	98192	100.000	100.000
Total		3227187	98192	100.000	100.000

Figure 1. *Stander*

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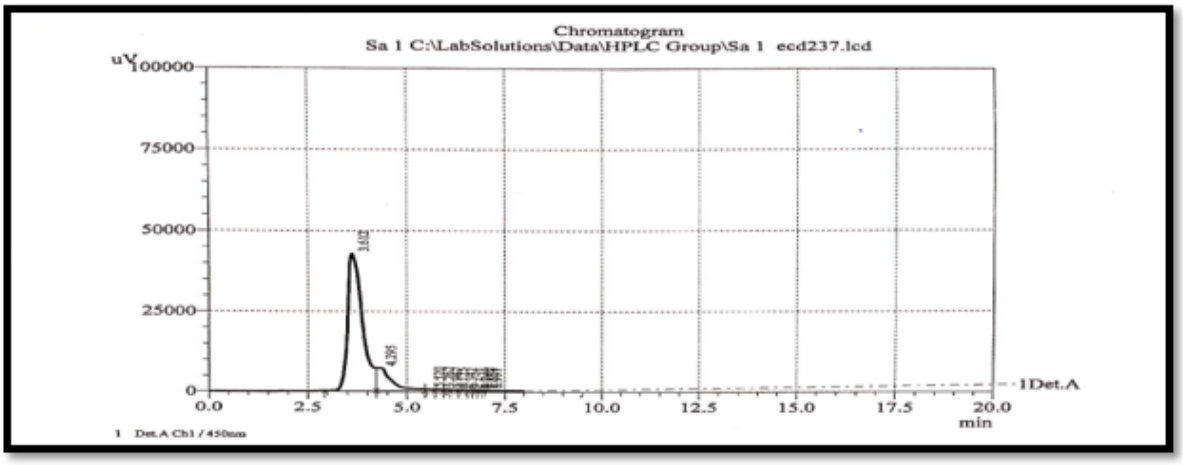

Detector A Ch1 450nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	3.612	1122629	42831	83.233	80.682
2	4.295	195609	7289	14.503	13.730
3	5.520	8203	592	0.608	1.115
4	5.767	5711	488	0.423	0.919
5	5.967	4256	408	0.316	0.769
6	6.125	4080	364	0.302	0.687
7	6.342	2736	302	0.203	0.569
8	6.623	1672	234	0.124	0.440
9	6.740	1406	218	0.104	0.410
10	6.867	1460	181	0.108	0.340
11	6.997	1024	180	0.076	0.339
Total		1348785	53087	100.000	100.000

Figure 2. *Figure and table HPLC of the lutein in the leaves extract of Baghdad*

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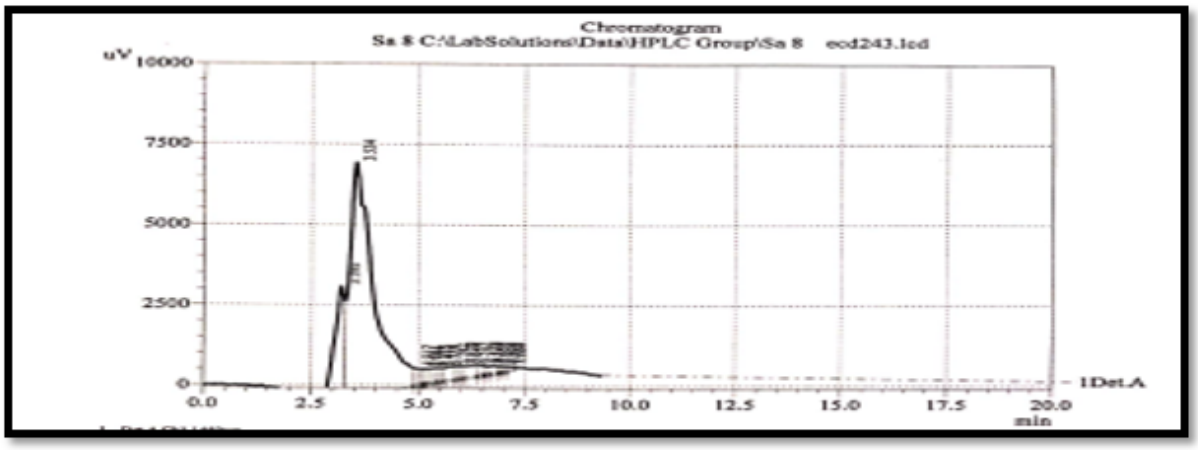

Detector A Ch1 450nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	3.193	55304	3477	14.189	19.954
2	3.534	280799	7239	72.045	41.547
3	4.917	5195	579	1.333	3.324
4	5.081	2292	521	0.588	2.993
5	5.166	3010	517	0.772	2.966
6	5.275	4579	493	1.175	2.832
7	5.412	2605	490	0.668	2.812
8	5.528	3379	462	0.867	2.654
9	5.742	6935	463	1.779	2.655
10	5.930	2855	459	0.732	2.635
11	6.044	2898	426	0.744	2.445
12	6.242	6884	394	1.766	2.260
13	6.478	2823	358	0.724	2.055
14	6.542	1266	338	0.325	1.942
15	6.668	1981	298	0.508	1.708
16	6.798	2632	278	0.675	1.594
17	6.906	1254	242	0.322	1.390
18	7.033	1287	199	0.330	1.143
19	7.109	1776	190	0.456	1.092
Total		389757	17423	100.000	100.000

Figure 3. *Figure and table HPLC of the lutein in the fruit extract of Baghdad*

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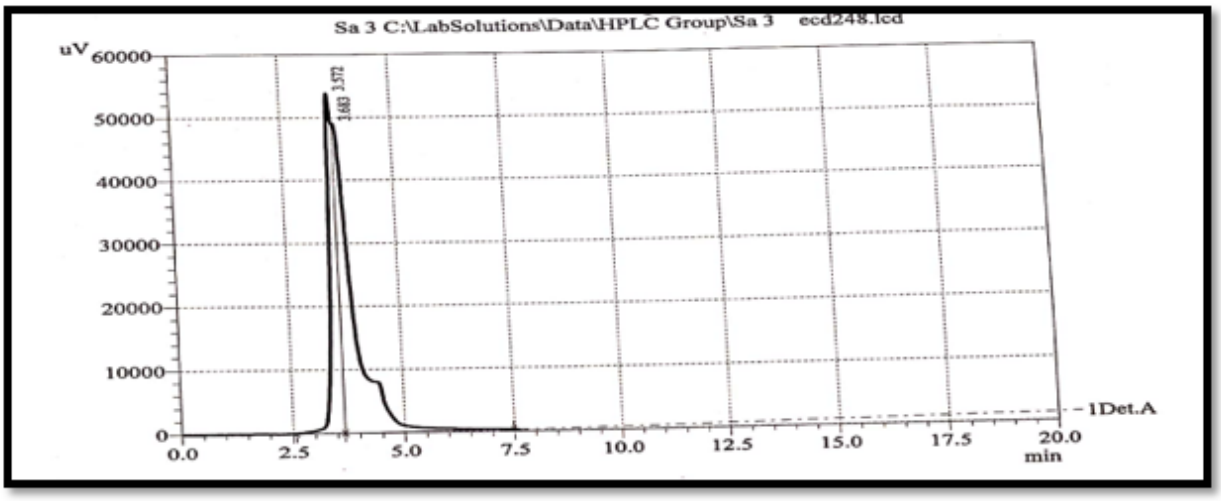
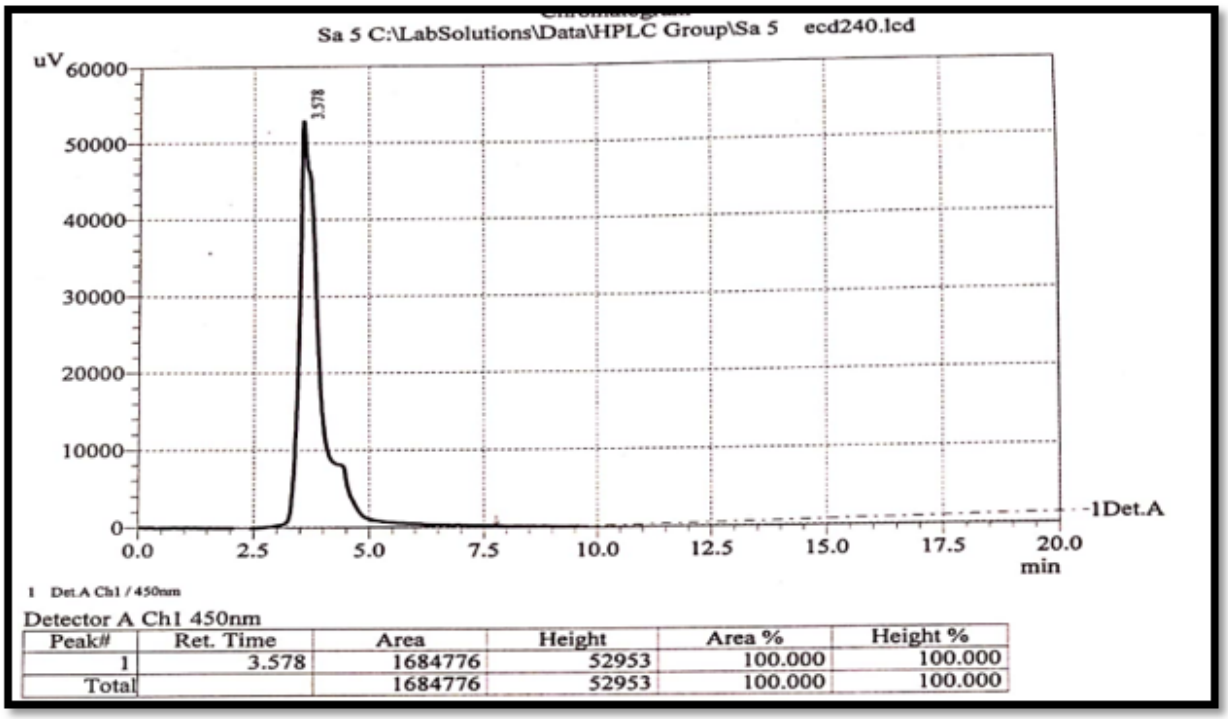


Detector A Ch1 450nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	3.572	677613	53866	38.572	52.331
2	3.683	1079116	49066	61.428	47.669
Total		1756729	102932	100.000	100.000

Figure 4. *Figure and table HPLC of the lutein in the leaves extract of Basrah*



Detector A Ch1 450nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	3.578	1684776	52953	100.000	100.000
Total		1684776	52953	100.000	100.000

Figure 5. *Figure and table HPLC of the lutein in the fruit extract of Basrah*

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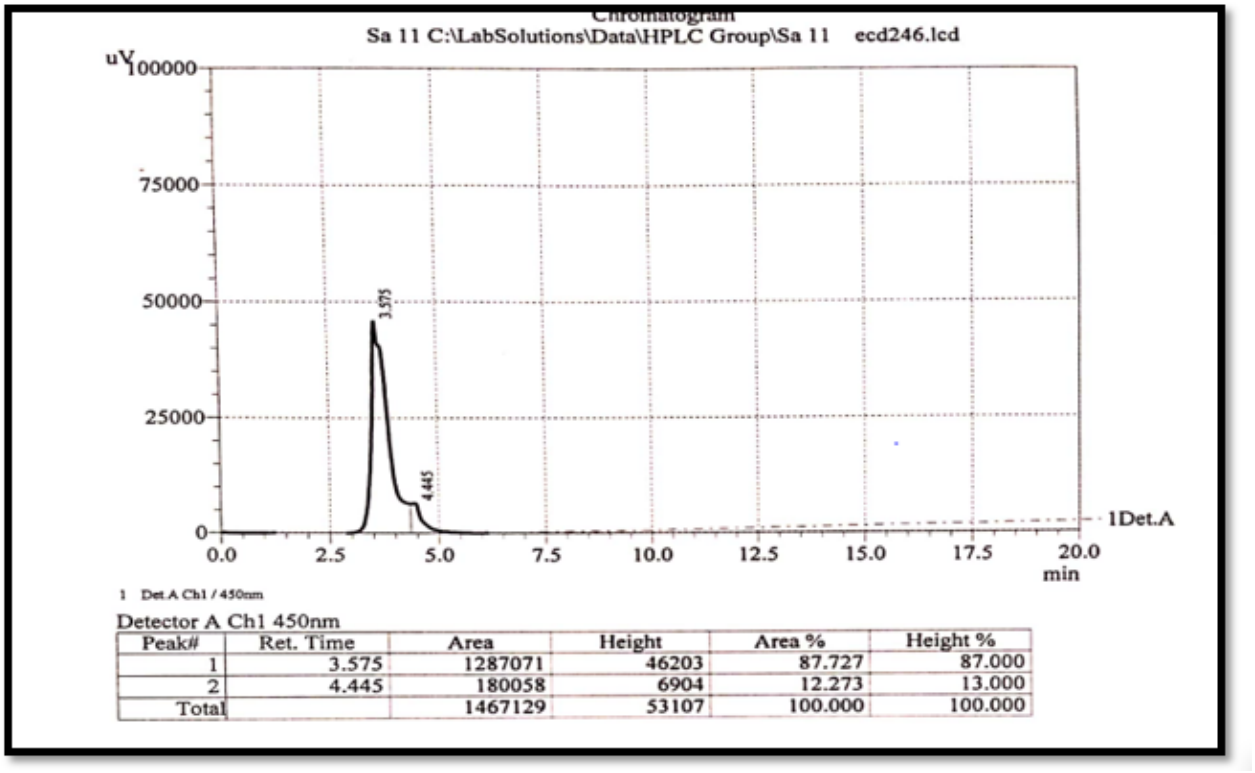
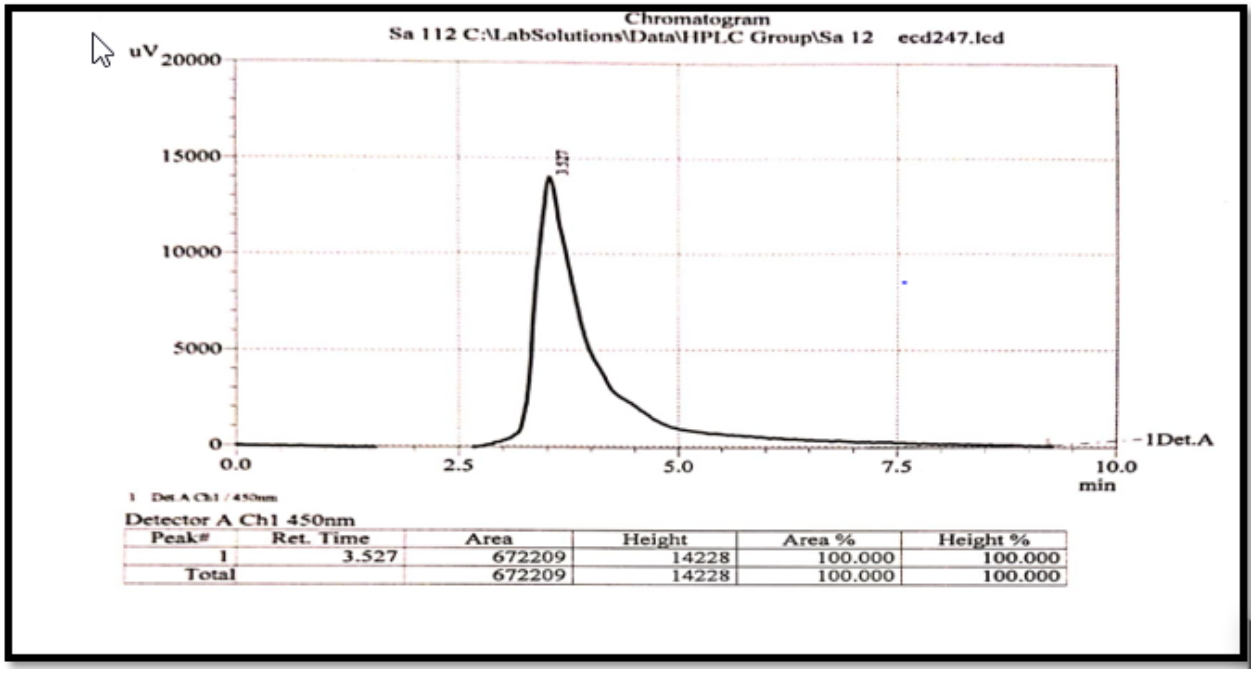


Detector A Ch1 450nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	3.575	1287071	46203	87.727	87.000
2	4.445	180058	6904	12.273	13.000
Total		1467129	53107	100.000	100.000

Figure 6. *Figure and table HPLC of the lutein in the leaves extract of Maysan*



Detector A Ch1 450nm

Peak#	Ret. Time	Area	Height	Area %	Height %
1	3.527	672209	14228	100.000	100.000
Total		672209	14228	100.000	100.000

Figure 7. *Figure and table HPLC of the lutein in the fruit extract of Maysan*

Conc. of the Sample = Area of Sample / Area of Stander X Conc. Stander X Dilution Factor

Were the dilution factor is 20

Area of the sample is the highest beak

Area of the stander= 3227187

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City	Conc. Of Lutein in leaves	Lutein in fruit
Baghdad	6.95mg/ml	1.7mg/ml
Basrah	10.88mg/ml	10.44mg/ml
Maysan	7.9mg/ml	4.1mg/ml

Table 1. *The concentration of lutein*

Conclusion

The experiment was done to measure the concentration of lutein in both leaves and fruit of *L. barbarum* and compare between concentration of lutein in leaves and fruit.

The result illustrate that both leaves and fruits extract contain lutein but in each region the leaves extract have lutein in higher concentration than fruit extract.

Our study shown that the lutein found in highly present in green leaves than fruit and this is match with Alisa Perry

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