



Effect of Temperature and pH on Antioxidant Effectiveness of *Capparis spinosa* Leaves

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Abstract: The *Capparis spinosa* leaves were collected for months (April, May, June, July, August and September) from the Eastern Radwaniya region in Baghdad. The aqueous and alcohol extracts were prepared and more than one method was used to estimate the stability of the extract as antioxidant toward heat and PH for the sample which exhibited highest antioxidant activity between all samples by methods used, the method of iron ion bonding , reducing power , the effectiveness of scavenging of hydrogen hydroxide and the effectiveness of free radical suppression, decreased antioxidant effectiveness when exposing the water and alcohol extract to different temperatures (5-55 ° C) for 4 hours. A decrease in the antioxidant effectiveness of the water and alcohol extract was observed in pH (3,4,5,6,7and8). A slight reduction in the antioxidant efficacy of PH7 was observed at temperature Refrigerator for 30 days and for all the tests mentioned above.

Keywords: *Capparis spinosa*, Antioxidant efficacy, reduction power, iron ion bonding, hydroxide hydroxide inhibiting, free radical suppression activity.

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Introduction:

Capparis spinosa An evergreen wild plant belonging to the Capparidaceae. This family includes 46 species, and *Capparis spinosa* is one of the main cultivars of this species. It is known in Iraq as Shafallah and kabar in Basra, kifri in the northern regions of Iraq (1-4). The plant was not used sufficiently, and all species of generosity It has been widely used in folk medicine by many cultures since antiquity, especially in the Mediterranean countries (Morocco, Spain, Tunisia, Italy and Turkey), and in the West as well as Central Asia (5). The economic and commercial aspect is therefore of the candidate plants for the cultivation of vegetables and spices in India (6,7). Plant adapts to soil diversity

and climatic conditions such as drought, high temperature and salinity (8). It grows in poor soils especially in dry areas, thus playing a role in the environment in reducing erosion (9). *C. spinosa* contains many active compounds, including alkaloids, glycosides, tannins, phenolics, flavonoids, sterols, terpenes, carbohydrates, soap, and a wide range of metals and trace elements (10). It has a number of biological agents such as antifungal, antifungal and liver toxicity(11). Various parts of *C. spinosa* including roots, floral shoots, fruits, leaves and seeds have been used in medicines, food and cosmetics (9).

Although oxidative reactions are necessary for life, they can be harmful because they result in the formation of free radicals that begin with chain

reactions that lead to cell damage (12). It is possible to reduce the risk of chronic diseases or prevent progression of disease either by strengthening the body with natural antioxidant defenses or by using it as a supplement in the diet(13). The most industrial antioxidants used in food products are Butyl Hydroxy Toluene (BHT) butylated hydroxytoluene and butylated hydroxyanisole (BHA) and they are very effective, but have side effects, similar to their work as promoters of carcinogenesis, so studies have been concerned with natural (non-toxic) natural antioxidants (14). Proved that the ethanolic extract of *C. spinosa* fruit has significant effectiveness in antioxidant protection and immunological efficacy in various laboratory tests (15,16). Natural antioxidants in the aloe vera extract can penetrate harmful free radicals in vivo and act to reduce the risk of chronic disease by strengthening the body's natural antioxidant defenses or as a supplement with dietary antioxidants(13).

Large amounts of antioxidant compounds, such as redflavonoids, help prevent the oxidation of vitamin C, and new research suggests that *C.spinosa* is used as a natural antioxidant against microorganisms(17). The new antioxidants in *C.spinosa* are (4-hydroxy-5-methylfuran-3-carboxylic acid, 1) and organic acids(18). The phenolic compounds in the leaves and flower buds of *C.spinosa* showed the routine, tocopherol, carotenoids, vitamin C, α and--tocopherol, the antioxidant activity(19). The experiment also demonstrated that the water extract and ethanolic leaves *C.spinosa* has antioxidant efficacy in both chemical

and biological tests conducted for them(20).

Materials and Methods of Work:

- Extraction:

Samples were collected from the eastern Radwaniya area in Baghdad for the monthly from May to September, and the aqueous and alcoholic extracts of the May and September samples were collected, according to P in-Der, and Gow-Chin, (1997) and Zhou *et al.*(21,22).

- Test the effect of heat and PH in the extract of the leaves of the plant the most effective as antioxidants:

I followed the method described in the Alshikhli (23) with some modifications from the current study researcher.

- Temperature:

Take 1 ml at a concentration of 10, 50 $\mu\text{g}/\text{ml}$ and 400 to 1250 microg / ml of the plant leaf extract for months showing the highest antioxidant activity in the four methods used in the present study. The tubes containing these extracts were placed at different temperatures The refrigerator was 55, 45, 35, 25 and 65 m for 2 and 4 hours, followed by the antioxidant method of each extract which showed the highest antioxidant activity.

- PH:

(0.1, 0.5, 0.04 and 0.125 g) respectively of powdered leaves of dried kabar and melted in 10, 10, 100 and 100 ml respectively of PH solution

of different pH (7,6,5,4,3) and 8) to a concentration of (10, 50) $\mu\text{g} / \text{ml}$ and (400, 1250) $\mu\text{g} / \text{ml}$ respectively of the water and alcohol extract of the leaves of the growing plant for the months that showed the highest antioxidant effectiveness of the four methods used. And for 30 days, followed by the method of estimating the antioxidant effectiveness, which per month of the months of the collection of the tested wells and both types of water extract and Which showed the highest anti-oxidant effect.

Results and discussion:

- Effect of thermal coefficients on antioxidant efficacy:

1. Ferrous Ion Chelating:

Citrus leaf extracts were treated with different temperatures (refrigerator temperature 45,35,25, 55 m) for a 2 and 4 hour chronological order, and extracts obtained from the test. It showed the highest correlation between iron ion

(oxidants) and included four extracts: water extract for May and August, and the extract of alcohol for the month of June and July, as the values of effectiveness obtained for that experiment as 98.1, 98, 95.5 and 96.9%, respectively.

Our Datain from (Table 1) show that there is a decrease in the binding ability of the four tested extracts starting from the tested 25 ° and in varying percentages. The water extract for the month of August is the most effective. The effectiveness decreased to 32.55% and the effectiveness of the extract for June and July was 62.79% and 63.95% Of which the sample of May was 48.83%. The activity continued to decrease with the increase in the temperature of the extracts for the period of time (2 hours) and reached 44.18% for the June extract of the highest efficiency of the three extracts tested at 55 ° C. The water abstract for the month of August reached the lowest effect of 18.6% at the same degree and the same length of time.

Table (1): The percentage of the of water and alcohol extracts of *C. spinosa* leaves the grown in for the tested months at different temperatures for 2 hours.

The month	Extract	Percentage of antioxidant efficacy of water and alcohol extracts at different temperatures%					
		Temperature (m ⁰)					
		Without thermal treatment	At refrigerator temperature	25	35	45	55
May	water	98.1	67.32	48.83	45.34	43.02	33.72
August	water	98	66.27	32.55	31.39	22.09	18.6
June	alcoholic	95.5	87.41	62.79	43.02	41.86	44.18
July	alcoholic	96.9	88.37	63.95	51.16	45.34	37.2

The results for the month of July were the most significant in the same temperature tested but for a longer period of 4 hours (Table 2). The efficacy of the extract was 8.13%, the lowest of the three tested extracts at

55 °C followed by the 10.46%. The efficiency ratios of the water extract for the month of August and the alcoholic extract for June were 17.44 and 16.27% in the same conditions.

Table (2): The percentage of the affinity of water and alcohol extracts of *C. spinosa* leaves the grown in the tested months and at different temperatures for 4 hours.

The month	Extract	Percentage of antioxidant efficacy of water and alcohol extracts at different temperatures%					
		Temperature (m ⁰)					
		Without thermal treatment	At refrigerator temperature	25	35	45	55
May	water	98.1	52.27	45.34	36.04	23.25	10.46
August	water	98	65.11	50	42.16	18.6	17.44
June	alcoholic	95.5	86.37	55.81	54.65	51.16	16.27
July	alcoholic	96.9	61.62	56.97	43.03	10.46	8.13

2. Reducing Power:

(Table 3 and 4) show the results of the test of the reduction of the water extracts of the leaves of the large plant of April and May and the alcoholic extracts of April and September at a concentration of 50 mg / ml. We note a decrease in efficiency when the water and alcohol extracts are exposed to temperature 55 m⁰ for 2 and 4 hours. The anti-oxidant effect of the water

extract for April at refrigerator temperature decreased from 93.48% to 91.91% after 2 hours and 90.91% after 4 hours. The water extract for May decreased from 96.74% to 94.22% after 2 hours and 90.96% after 4 hours, and the alcohol extract for April Decreased from 97.58% to 96.42% after 2 hours and to 91.7% after 4 hours, and to the alcohol extract for September decreased from 95.6% to 92.96% after 2 hours and to 93.48% after 4 hours.

Table (3): Percentage of the reduced strength of water and alcohol extracts of *C. spinosa* leaves the grown in the tested months at a concentration of (50 mg / ml) with different temperatures for 2 hours

The month	Extract	Percentage of antioxidant efficacy of water and alcohol extracts at different temperatures%					
		Temperature (m ⁰)					
		Without thermal treatment	At refrigerator temperature	25	35	45	55
April	water	93.48	91.91	91.49	91.07	88.13	86.44
May	water	96.74	94.22	90.44	86.76	86.44	84.87
April	alcoholic	97.58	96.42	89.49	87.86	85.71	85.6
September	alcoholic	95.6	92.96	92.75	88.23	87.39	87.24

The antioxidant activity continued to decrease slightly for April, May, April and September until its temperature was 55 ° C (86.44, 84.87, 85.6 and 87.24% respectively) after 2 hours and 84.13, 82.45 , 78.78 and

87.18%), respectively, after 4 hours, at the same thermal degree. Low antioxidant efficacy may be due to the reduction of the remaining active compounds in the above extracts.

Table (4): Percentage of the reduced strength of water and alcohol extracts of *C. spinosa* leaves the grown in the months tested at 50 mg / ml with different temperatures for 4 hours

The month	Extract	Percentage of antioxidant efficacy of water and alcohol extracts at different temperatures%					
		Temperature (m ⁰)					
		Without thermal treatment	At refrigerator temperature	25	35	45	55
April	water	93.48	90.91	88.13	85.81	85.71	84.13
May	water	96.74	90.96	90.44	89.6	85.29	82.45
April	alcoholic	97.58	91.7	89.28	86.18	83.81	78.78
September	alcoholic	95.6	93.48	93.17	92.43	87.92	87.18

3- Hydrogen peroxide inhibiting activity Hydrogen Peroxide Scavenging Activity:

(Table 5 and 6) show the results of the hydrogen peroxide extract for the water extracts of the leaves of the al-Kabir plant for April and July and for the alcoholic extracts of May and Tawaz at a concentration of 400 µg / ml for each of the water and alcohol

extracts. And alcohol to the temperature of (refrigerator - 55) m, the sample of the month of May (alcoholic extract) more than half of its effectiveness at the highest degree tested after 2 hours, with a rate of inhibition of 2.4%, followed by the sample of April (water extract) %, While the percentage of inhibition was close to the sample of the month of Tamo Aqueous extracts and alcohol rate of 1.6% and 1.2% respectively.

Table (5): The percentage of potability of water and alcohol extracts of al- Kabir Leaves the months tested at (400 µg / ml) with different temperatures for 2 hours.

The month	Extract	Percentage of antioxidant efficacy of water and alcohol extracts at different temperatures%					
		Temperature (m ⁰)					
		Without thermal treatment	At refrigerator temperature	25	35	45	55
April	water	4.3	4	3.9	3.6	2.5	2.1
July	water	4.3	3.3	2.9	2.4	1.9	1.6
May	alcoholic	4.3	3.9	3.8	3.5	2.9	2.4
July	alcoholic	4.3	3.2	3.1	2.9	2.4	1.2

In addition, the sample of the month of May (alcohol extract) maintained the antioxidant effectiveness at the highest level after 4 hours. The inhibition rate was 1.4%, followed by the July sample (alcoholic extract) with

1% inhibition. And extract of water extract by 0.7%. Low antioxidant efficacy may be due to the reduction of the remaining active compounds in the above extracts.

Table (6): The percentage of potability of water and alcohol extracts of the leaves of the big plant for the months tested at (400 µg / ml) at different temperatures for 4 hours.

The month	Extract	Percentage of antioxidant efficacy of water and alcohol extracts at different temperatures%					
		Temperature (m ⁰)					
		Without thermal treatment	At refrigerator temperature	25	35	45	55
April	water	4.3	2.6	2.2	2.1	2.1	0.7
July	water	4.3	3.2	2.5	1.7	1.5	0.7
May	alcoholic	4.3	3.8	3.6	3.4	1.9	1.4
July	alcoholic	4.3	2.6	2.4	1.8	1.4	1

4- Free Radical Scavenging Activity:

(Table 7 and 8) shows the results obtained by testing the efficacy of anti-oxidation using DPPH. After exposing the water and alcohol extracts to the leaves of the big plant for different temperatures for 2 and 4 hours, the best mechanic of the extracts as oxidants

was DPPH, The effectiveness of the antioxidants for the sample of April and June (alcohol extract) decreased from 85.74 to 84.65% to 70.03% and 71.94% respectively. The extracts retained half of their effectiveness or slightly less for the month of August and September (water extract) And 85.01% to 49.08% and 43.6% at 55 ° C Rour 2 hours.

Table (7): Percentage of anti-oxidation efficacy using DPPH for aquatic and alcoholic extracts of the leaves of the grown plant for the tested months (1250 µg / ml) with different temperatures for 2 hours.

The month	Extract	Percentage of antioxidant efficacy of water and alcohol extracts at different temperatures%					
		Temperature (m ⁰)					
		Without thermal treatment	At refrigerator temperature	25	35	45	55
August	water	87.33	83.37	79.63	78.03	76.6	49.08
September	water	85.01	82.75	66.74	60.9	47.86	43.6
April	alcoholic	85.74	84.77	82.94	77.58	73.56	70.03
June	alcoholic	84.65	83.33	78.68	78.44	77.83	71.94

After the exposure of the extracts for 4 hours at the temperature used 55 m o, the extracts retained the most effective antioxidant for the sample of the month of April and June (alcoholic extract) also, and decreased effectiveness of 85.74 and 84.65% to 66.5% and 68.61%, respectively, while

The antioxidant activity of the August and September samples (water extract) decreased from 87.33%, 85.01% to 21.29% and 22.89% at the same temperature and time. The reason for the low antioxidant effectiveness may be due to the low effective compounds remaining in the mentioned extracts.

Table (8): Percentage of DPPH antioxidant efficacy for water and alcohol extracts of alfalfa leaves for tested months (1250 µg / ml) at different temperatures for 4 h.

The month	Extract	Percentage of antioxidant efficacy of water and alcohol extracts at different temperatures%					
		Temperature (m ⁰)					
		Without thermal treatment	At refrigerator temperature	25	35	45	55
August	water	87.33	83.08	75.29	70.31	67.61	21.29
September	water	85.01	76.97	65.52	51.64	33.73	22.89
April	alcoholic	85.74	84.75	85.62	78.56	68.94	66.5
June	alcoholic	84.65	82.11	80.63	80.14	77.71	68.61

We found in the experiment the total phenols, flavonoids and tannins in *C.spinosa* leaves. The main reason for the low antioxidant effectiveness is due to the decrease in the total content of phenolic compounds due to the effect of

the heating temperature. This decrease in efficiency may be due to the transformation of the dissolved tannin into an insoluble state (24). Exposure to heat (25).

- Effect of PH on antioxidant efficacy:

1. Ferrous Ion Chelating:

The detection of a combination of water and vitamins and vitamins and essential oils in the form of vitamin A and in vitro fertilizers in table (9) have been shown to increase the concentration of vitamin D in the presence of aqueous humor (5,4,3 and 6). The following is a 30-day follow-up visit to the United States (19.76, 22.9, 25.58 and 48.83), followed by an additional 98.1% of the total volume of alcohol (38.37, 39.02, 54.65 and 61.62).) After all, Kant has 98% left without trading, but the key is Kant's

Lashkar (47.67, 58.13, 59.3 and 66.27)% Ali al-Tual % 95.5%, and% 39.53, 46.51% and 67.44% respectively). % 96.9% of the time, I did not trade at the same time, but the PH(7) is not the same. Lack of evidence for the use of echocardiograms for the active labor market (55.81, 66.27, 82.55 and 77.9)% of the blood alcohol, but in the blood of the aldosterone pH8, the absence of fasting enzymes in the immediate aftermath of the next 30 days, after the heat treatment of the lymphatic drainage of the lymphatic drainage tract 10.46% of the water body of the valley 31.39% of the city of Hezar al-khawali 43.02 % However, the city of Tamoza was 33.55%.

Tablets (9): Polyurethane and cappuccino for the analysis of agrochemicals and inorganic chemistry Polyacrylonitrile butadiene starch

The month	Extract	Antioxidants for allergic rheumatoid arthritis Hydromorphic rats PH variable%						
		Without treatment	3	4	5	6	7	8
May	water	98.1	19.76	22.9	25.58	48.83	55.81	10.46
August	water	98	38.37	39.02	54.65	61.62	66.27	31.39
June	alcoholic	95.5	47.67	58.13	59.3	66.27	82.55	43.02
July	alcoholic	96.9	36.04	39.53	46.51	67.44	77.9	32.55

2- Reducing Power:

(Table 10) the results of the study on the use of vitamins and minerals for the production of April and Lactobacillus cysts of April and Lactobacillus cerebrosinalas and Nasal and Euclidean liquids. 50 Alcohols / lactobacillus in vitamins and phytochemicals. After the 30th anniversary of the end of the year, I received the invitation from the Central Committee of the Ministry of Foreign Affairs of the United Arab Emirates to 85.18%. After that, 93.48% of the votes were taken, and I received a payment of 83.19%. After that, I did not pay for

96.74%, but I did not pay any taxes. 85.29% later, Kant 97.58% I do not trade, and I am selling the Kutch 83.4% later. T-95.6% I do not trade, but the PH-7 is a lack of enzymes for diarrhea in vitro and in vitro and in vitro and in vitro (86.44, 86.23, 87.71 and 84.66%). However, in the first phase of the PHD, the death of the Alhadugin al-Qaeda PH8, the death of the high-risk group, is the most effective after the 30th anniversary of the death penalty in the case of the April Alma mater, 42.85% and 40.54% respectively, and April Lashkar 26.78%, while the city of Ihlul Mahan is 68.48.

Tablets (10): Antibacterial wiping creams Vermiculite lacquer and raspberries (50 solvent / melon) and various hydrodynamic varieties.

The month	Extract	Antioxidants for allergic rheumatoid arthritis Hydromorphic rats PH variable%						
		Without treatment	3	4	5	6	7	8
April	water	93.48	69.74	72.16	80.25	85.18	86.44	42.85
May	water	96.74	60.08	71	81.4	83.19	86.23	40.54
April	alcoholic	97.58	42.75	73.21	84.24	85.29	87.71	26.78
Ilu	alcoholic	95.6	71.95	74.05	80.25	83.4	84.66	68.48

3- Hydrogen Peroxide Scavenging Activity:

(Table 11) the results of hydroxylation of hydroxybenzoate in vitro and in humans. After the 30th anniversary of the end of the year, the following activities were carried out at the end of the year: 4.3% of the workforce was attended by more than 3% of the respondents and 3% of the respondents and 3.2% of the respondents and 2.5% of the respondents and 1.6% of the

respondents. Almtadlh terminal PH7 lack Lvhz Ankhfaz Tfyf per Alfalyh Almzadh Llaksdh Kant (3.1, 3.9, 3.1 and 2.5)% Llmstkhlsat Lshhry-dispersive IR and April , July , May and July.

But the PH8 was the result of anxiety disorder in the immediate aftermath of the hypoglycemic event after 30 days. After 30 months, the blood pressure of the nasal spray was 1.7%, and the water content of the liver was 2.3%, and the water level was 1.4%.

Table (11): Watercolors for water purification Water and sewage water purification equipment (400 micrograms / ml) Water-soluble varnishes Hydroelectric variety.

The month	Extract	Antioxidants for allergic rheumatoid arthritis Hydromorphic rats PH variable%						
		Without treatment	3	4	5	6	7	8
April	water	4.3	2	2.6	2.8	3	3.1	1.7
July	water	4.3	2.4	3	3.1	3.2	3.9	2.3
May	alcoholic	4.3	1.5	1.6	2.2	2.4	3.1	1.4
July	alcoholic	4.3	1.3	1.5	1.8	1.9	2.5	0.9

4- Free radical scavenging activity:

I am glad that I am the source of the Almighty (12), April Almhahd al-Qa'ul, the daughter of my daughters, who are among those who have been drinking alcohol (water and Iolum

lactose and lactic acid), as well as the prevention of diabetes, DPPH, and rhizomidosis. I am 4 to 8 Alqaedi , And in the first quarter of the year, 7,4% of the total number of activities in the country was 84.4%.

Table (12): Antibacterial Antioxidant Antibiotics DPPH Antibacterial Antibacterial Antibacterial Antibacterial Antibacterial Antibacterial (1250 µg / ml).

The month	Extract	Antioxidants for allergic rheumatoid arthritis Hydromorphic rats PH variable%						
		Without treatment	3	4	5	6	7	8
August	water	87.33	69.42	73.81	77.95	79.17	80.14	50.66
Ilu	water	85.01	56.15	61.99	65.89	76.97	77.46	31.05
April	alcoholic	85.74	75.03	79.29	81.6	81.97	84.4	72.59
June	alcoholic	84.65	75.63	75.88	79.9	78.19	81.48	68.33

This is the first step in the field of alcohol and alcohol in the form of hydrocarbons. Waltz Hundredth in the heat of the day of the birth of the 30th Yuma and the Lkhlh al-Nahr al-Qa'at, (26), but in the context of the study of the use of anxiety in the context of the work of the interlocutors in the context of the implementation of the modalities of the work of the Mediator, it is possible to use the ideal method for the collection of letters of interest (27). About the Author Latex viewing and impeller laboreactors, vitamins, minerals and feeding for domestic animals, Antibiotic Drugs, Antibiotic

Excerpt from:

Show results fate Sbatyh activities vehicles almzadh llaksdh tjah heat and PH Llmstkhlsat facing show highest activity kmzadat aksdh btrayq testing of used per aldrash alhalyh, making Ankhfaz per Alfalyh Almzadh Llaksdh bed widening Almstkhlsat Ldrjat Heat Different Mma Eddie until Alankhfaz with high degree of heat vzyadh time altrz for many , Protecting vitamins, vitamins, minerals and feeding for domestic animals, Antioxidants, Antibiotic Drugs, Antibacterial wipes, Antibacterial wipes. Therefore, the *Capparis spinosa* is compatible with the conservation of Alcoholic Beverages.

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