How to Cite:
Issa, R. Q. M., Ahmed, B. A. R., Rahim, A., & Rahim, A. (2022). Identification of the active compounds in alcoholic extracts of chard and watercress and their use in improving the physical properties of freeze-stored beef birch. *International Journal of Health Sciences*, *6*(S10), 241-253. https://doi.org/10.53730/ijhs.v6nS10.13427

Identification of the active compounds in alcoholic extracts of chard and watercress and their use in improving the physical properties of freeze-stored beef birch

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Abstract---In this study, alcoholic extracts of swiss chard and watercress were prepared and the percentage of yield was calculated, then quantitative and qualitative detection of its active compounds using Chromatography Mass Spectrometry-GC/MS technology, and the extracts were introduced into the preparation of bovine birch, and the study of its effect on the physical properties represented in water carrying capacity, which amounted to (18.47, 18.33)%and the loss during defrost, which amounted to (2.33, 2.21)%, and the loss during cooking, which amounted to (22.63,22.49)% and the cooking yield, which amounted to (82.70, 82.50)%, as the addition of these extracts improved the physical properties compared to the control sample and for all storage periods up to 30 day.

Keywords---identification, alcoholic extracts, physical properties, freeze-stored.

Introduction

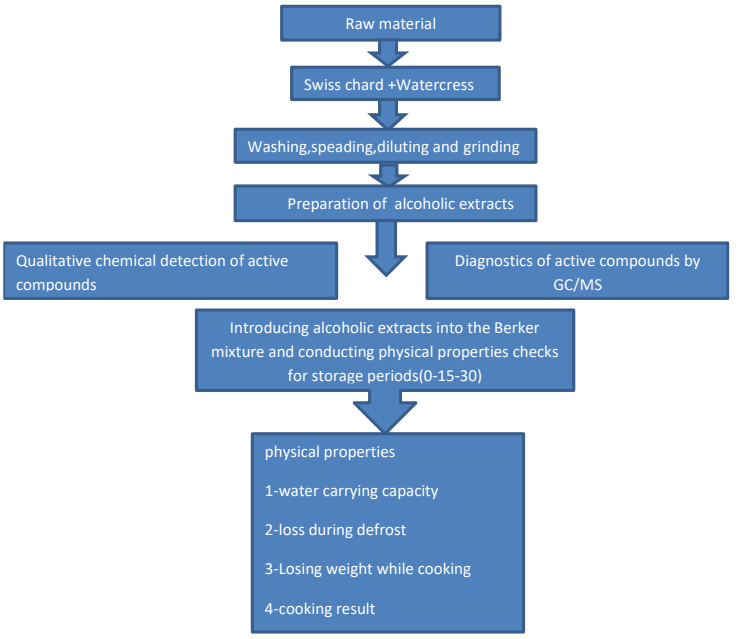
Medicinal plants and herbs, vegetables and spices possess a lot of biologically active compounds that have the ability to scavenge free radicals and act as natural antioxidants such as phenolic compounds. Infection with many diseases

such as cancers, diabetes, heart and nervous system diseases (Zhongkai *et al.*, 2004), and natural plants and herbs contain antioxidants, as both chard and watercress are widely used as food additives because they have protective effects on the body, and this antioxidant activity comes Since it contains a large amount of phenolic compounds, flavonoids and organic acids (Lenge *et al.,* 1999), it was found that treating beef samples with chard works to raise the moisture content due to the chard containing a high percentage of minerals that have an important effect on the amount of water associated with meat. Like potassium, sodium and phosphorous (Al-Qabbani, 1969) and (Mousa, 2008), the watercress plant is distinguished by its taste. The sharp stinging caused by the leaves of the watercress plant on the tongue. The part used for food and medicine is the green leaves. It belongs to the Angios perms division. It has a high nutritional value because it contains amino and fatty acids, sugars, vitamins and a wide range of nutrients.

The cruciferous family, especially watercress, was distinguished by its high content. From a group of active substances of medical benefit and sulfur glycosides (thioglycoside) that lower blood sugar levels (EL-Genjaihi et al. , 2009, ALThamir et al. (2004) and to reduce hyperlipidemia in the blood serum (Badee *et al.,* 2003) and is characterized by containing a group of flavonoids that act as natural antioxidants, especially their effect on free radicals (Free Radicals) that damage DNA and cell membranes and lead to Consequently, for cancer diseases (23) (Meh boob *et al.*, 2000) and the watercress seed leaves contain a group of phenolic compounds with anti-inflammatory action (Hila *et al.,* 2009) and foot fungi (Bhandar, 1996). The use of watercress as an extract (Alcoholic) leads to an improvement in the qualitative, chemical and sensory evaluation characteristics of Berker's tablets treated with frozen-stored arugula extract (Abboud, 2015). The aim of the research is to prepare alcoholic extracts of chard and watercress and identify the active compounds in them after calculating the percentage of yield and then introducing these extracts into Berker mixtures and studying their effect on physical properties throughout the storage period and up to (30) days.

Materials and working methods

Two models of plants were selected, which are swiss chard and watercress. They were washed well and dried. The leaves were used only for the chard. As for the watercress, the whole plant was used. The vegetable leaves were ground using the electric grinder and sifted. Fat-free beef was used from the thigh area, as the meat was cut into cubes. Small to facilitate the mincing process and minced using the meat disc twice to homogenize the meat and use the fat deposited around the bones of the pelvis and kidney, as it was obtained from the same carcass, then cut the fat into small cubes and mince in a meat mincer machine. Use garlic powder and black pepper powder as well as table salt and basmati as a filler.



Working method diagram

Prohibition of alcoholic extracts of chard and watercress

100 gm of powder was weighed for each sample and 500 ml of ethyl alcohol (98%) was added to it and mixed well in the magnetic stirrer and left for 24 hours at a laboratory temperature of 25 °C, then the extract was filtered using filter paper (What man, No.1). The filtrate was then concentrated in a Rotary Vacuum Evaporated at 40°C to get rid of the solvent. Then the filter was left at room temperature until a sticky substance was obtained (Harbone, 1973) and it was placed in sealed opaque bottles and kept in the refrigerator until use.

Identification of the active compounds in the alcoholic extract of chard and watercress using GC/MS technology and a chemical and qualitative detection of the active compounds in them

The active compounds of each of (chard and watercress) were diagnosed separately and this was done using a gas chromatograph connected to a mass spectrometer type Gc-msQP2010ultra Shlmlozu, gapan, and after obtaining the mass spectrum of each compound, the results were processed with the Gc-ms solutions program and the definition of the effective Peaks curves On the basis of the Nstao8 machine database, then chemical and qualitative detection of the active compounds in the alcoholic extract of the chard and watercress samples under study in the laboratories of the Ministry of Science and Technology / Ibn Al-Bitar Research Center. The method described in (Harbone, 1984) was used for the detection of phenols and the method described in AL-(Khzaragi, 1991) for the detection of flavonoids and the method described in(Shitata, 1951) for the

detection of resins and the method described in (gawad،1997) for the detection of tannins and the method described in(Al-khazraji،1991) for the detection of glycosides and the method described in(Haddad, 1965) for the detection of saponins. Described in(Shriner, 1980) for the detection of aldehydes and ketones and the method described in(Harborne, 1984) for the detection of triterpenoids, triterpenes and sterols.

Preparing the birker mixture

Al-Berker tablets were manufactured and prepared according to what was mentioned (Abdul Rahim, 2010) using 80% pure beef meat, 10% abdominal fat, 5% filler, 1% table salt, 0.7% black pepper, and garlic powder by 0.7%. 0.8% and 1% oil extract was added to it.

Examinations of the physical indicators of bovine pyrecra, frozen for periods (30-15-0)

- **Water holding capacity of meat (WHC)** I followed the method of(Dolatowski and Stasiak, 1998) in measuring the water holding capacity of meat in beef samples**.**
- **Loss during cooking:** the percentage of loss during cooking was estimated according to the method of (Dolatowsk and Stasiak, 1998)
- **Calculating the percentage of weight loss after thawing Loss Thawing** The percentage of weight loss after thawing was estimated according to the method (Lyon and Young, 1997), used by Salman and Saleh (2012).
- **Cooking quotient,** as the ratio of cooking quotient was calculated according to the equation mentioned in (AKwetey and Yamoah، 2013).

Results and Discussion

The percentage of the extraction yield of alcoholic extracts of chard and watercress, as it is noted from Table No. (1) the percentage of the extraction yield using methanol alcohol, as it is noted that the extraction rate decreased significantly, recording significant differences in each of the alcoholic extract of chard, reaching 15.7312, which does not differ significantly from the percentage of the yield In the alcoholic extract of watercress, it reached 14.3164, and these results were in agreement with (Al-Qatefi, 2019) and (Najah, 2019).

Extracts	Yield
Alcoholic chard	15.7312 C
Alcoholic watercress	14.3164 C

Table No.(1)

Identification of the active compounds in the alcoholic extract of chard and watercress using GC/MS. Technique

The active compounds in the alcoholic extract of chard, as it is noted from the table that (20) peaks appear with their names and percentages for each compound, as the highest peak was No. (4) represented by the compound (Methenamine) with a rate of 27.81% of the amount of active compounds, in

addition to a number of other active compounds Methenamine is also known as hexamethylene tetraamine, a heterocyclic organic compound, also known as hexamine, as it increases water consumption in poultry and is rapidly absorbed and reaches the urinary system without changes and then decomposes to form aldehyde, which acts as a strong antiseptic against bacteria and as a diuretic.

Table 2

NP	DT	Active compounds	%
1-	4.477	2,4-Cyclohexadien-1-one, 3,5-bis(1,1-dimethylethyl)-4-hydroxy- 1,1,1,3,5,5,5-Heptamethyltrisiloxa 1,4-Bis(trimethylsilyl)benzene	
2-	5.254	Benzaldehyde, 3-pentafluorophenox methyl-4--methoxy Benzaldehyde, 3-[(2-bromophenoxy)methyl]-4-methoxy- 3H-Indazol-3-one, 1,2-dihydro-5-nitro-	3.11
3-	6.201	1,4,7-Trimethyl-2-azafluorenone Methanimidamide, N,N-dimethyl-N'-(3-nitrophenyl)- 6-(Methylamino)phenanthren-3-ol	1.51
4-	13.874	Methenamine	27.81
5-	13.912	Methenamine 1H-Azepin-1-amine, N-ethylidenehex ah	1.39
6-	14.211	Methenamine	26.37
7-	14.618	Methenamine 1H-Azepin-1-amine, N-ethylidenehex ahydro	1.64
8-	16.972	2-Butanone, methyl-2-propenylhydrazone Ethanamine, N-ethyl-N-[(1-methylethoxy)methyl]- Azetidine, 1,3-dimethyl-	1.32
9-	20.510	-1,3-Propanediamine, N,N,N',N'-tetr amethyl Oxirane, 2,3-diethyl-2-Pentanone, 5-hydroxy	2.97
10-	22.965	Ni(ii)-2,7-bis[2-hydroxy-5,5-dimethyl-4,5-dihydro-1H-pyrrol-4-on-3-yl]-3,6-diazaocta-2,6-dien 5-Aminomethyl-5-oxo-1,3,5-diazaphosphorinane 3-Piperidinol, 1,4-dimethyl-, cis	2.87
11-	23.652	4-Oxopentyl formate Aziridine, 2,2,3,3-tetramethyl- 3-Piperidinol, 1,4-dimethyl-, cis-	8.36
12-	23.684	2-Hexene, (E)-	3.16
13-	23.722	Aziridine, 2,2,3,3-tetramethyl- 3-Piperidinol, 1,4-dimethyl-, trans- Butanoic acid, 3-oxo-, propyl este	3.86

14-	23.780	7-n-Pentadecylaminomethyl-6-hydrox y-5,8-quinolinedione Aziridine, 2,2,3,3-tetramethyl- 3-Hexene, (Z)-	3.49
15-	23.888	(3-Piperidinol, 1,4-dimethyl-, tran s3-Hexene, (Z	1.75
16-	25.167	-(Thiophene, 2,5-bis(1,1-dimethyleth oxy N-Acetylethylenediamine Alanine, N-acetyl-2-mercapto-, (.+	1.53
17-	27.177	-3-Piperidinol, 1,4-dimethyl-, tran s N,N',N''-Trimethyldiitrimethylenet 40820 000123-7	2.45
18-	30.708	Octasiloxane, 11,11,13,13,15,15-hexadecamethyl Hexasiloxane, 1,1,3,3,5,5,7,7,9,9, 11,11- -dodecamethyl Monolinoleoylglycerol trimethyls ilyl ether	1.69
19-	32.292	1-Monolinoleoylglycerol trimethyls ilyl ether ,Octasiloxane Hexasiloxane, 1,1,3,3,5,5,7,7,9,9 11,11-dodecamethyl-	1.40
20-	33.787	Octasiloxane, , Hexasiloxane 1,1,3,3,5,5,7,7,9 11,11-dodecamethyl-	1.71

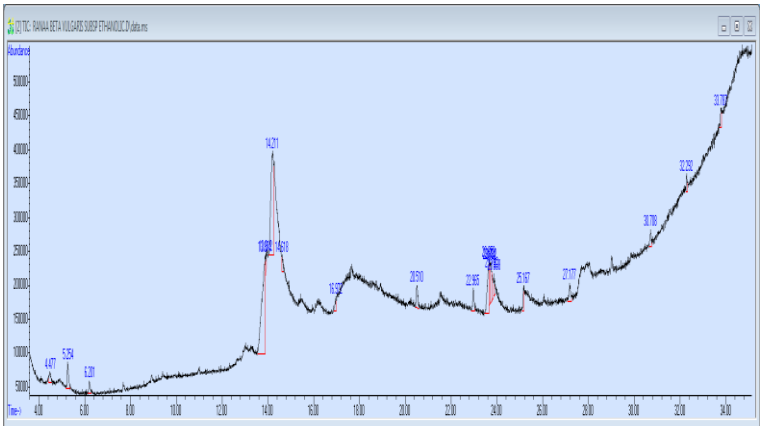


Figure 1

The active compounds in the alcoholic extract of watercress

As it is noted from Table No. (3) that (15) peaks appeared with their names and percentages for each compound, as the highest peak was No. (6), which is represented by a number of active compounds in varying proportions at the same peak as shown in the table and the most important of these Compounds 1,3-benzothiazol.

Table 3

NP	DT	ACTIVE COMPOUND	%
1-	4.497	1,2,4-Benzenetricarboxylic acid, 1 ,2-dimethyl ester Cyclotrisiloxane, hexamethyl-	2.67
2-	5.285	Benzene, 1-isocyanato-3-methox Benzaldehyde, 3-pentafluorophenoxy methyl-4-methoxy-	8.54
3-	6.214	1,4,7-Trimethyl-2-azafluorenone 1,4,6-Trimethyl-2-azafluorenone 1H-Benzoimidazole, 5-amino-1-m-tol yl-	4.34
4-	7.684	Ethanone, 1-[4-[4-(2-hydroxyethyl) -1-piperazinylsulfonyl]phenyl]- Acetic acid, 2-(1-methyl-2-oxohydr azino)-, N'-[(E)-(2-hydroxyphenyl) methylidene]hydrazide, N-oxide Cyclotetrasiloxane, octamethyl-	2.22
5-	20.153	Acetamide, N-(2,5-dimethoxyphenyl) -2-(2-thienyl)- 1H-Indole, 1-(trimethylsilyl)-5 trimethylsilyl)oxy]- 2-Nitrophenoxathiin-10,10-dioxide	24.83
6-	25.224	N-(3-Allyl-2-oxo-2,3-dihydro-1,3-b enzothiazol-6-yl)acetamide tbdms 1-Diphenyl(tert-butyl)silyloxy-4-m ethoxybenzene Pyrido[2,3-d]pyrimidine-2,4(1H,3H) -dione, 6-amino-5-hydroxy-1,3-dime thyl-7-(2-oxo-1-pyrrolidinyl)-	33.46
7-	26.611	Butanedioic acid, monoamide, N-(3- fluorophenyl)-, allyl ester Cedran-diol, (8S,14)- Isolongifolan-8-ol	3.11
8-	27.622	Oleic Acid E-11-Hexadecenoic acid, ethyl este cis-10-Heptadecenoic acid, methyl ester	2.18
9-	30.701	9,12,15-Octadecatrienoic acid, 2- (trimethylsilyl)oxy]-1-[[(trimethy lsilyl)oxy]methyl]ethyl ester, (Z, Benz[e]azulene-3,8-dione, 5-[(acet yloxy)methyl]-3a,4,6a,7,9,10,10a,1	3.17

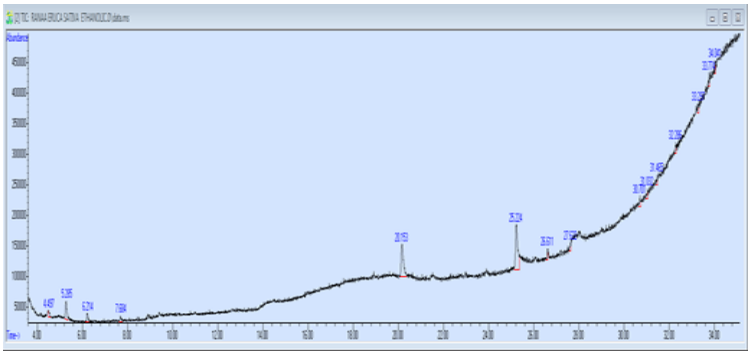


Figure 2

Qualitative chemical detection of the active compounds in the alcoholic extracts of the plants under study

It is noted from the table that the alcoholic extract of boiling water contains tannins, carbohydrates, phenols, flavonoids, saponins and coumarins, and does not contain glycosides, resins, alkaloids, terpenes and steroids. These results are in agreement with (Ljubica, 2019). Ivanovi et al., 2018) As for the alcoholic extract of arugula, it was found to contain tannins, carbohydrates, phenols, saponins and troponins, and not to contain glycosides, resins, alkaloids, coumarins and steroids, and these results were in agreement with (Martinz-Sancheze et al., 2008).

Table 4

Extracts	Tannins	carbohydrate	Glycosides	Phenols	Resins	Flavonoids	Saponins	Alkaloids	Coumarins	Turbines	steroids
alcoholic chard	+	+	-	+	-	+	+	-	+	-	-
alcoholic watercress	+	+	-	+	-	+	+	-	-	+	-

Physical indicators of beef burger to which alcoholic extracts of Swiss chard and watercress have been added, stored in freeze for periods (0-15-30) days

Water holding capacity WHC, as it is noted from Table No. (5) the effect of alcoholic extracts on the holding capacity of water in the frozen Berker tablets. It was noted that the water holding capacity was at the highest in the Berker tablets to which the alcoholic extract was added alcoholic chard as it amounted to (18.47)%, which does not differ Significant differences from the WHC value of Berker tablets to which the alcoholic extract of alcoholic watercress was added amounted to (18.33)%. These results were for the period of 0 days. As for the results of the period of 15 days, the WHC decreased, as it amounted to a (17.51)%

in the tablets treated with alcoholic chard extract, which does not differ significantly from its value. In the tablets treated with alcoholic extract of watercress, it amounted to (17.28%), as for the results of the period (30), where the WHC recorded a non-significant decrease, as its value in the tablets treated with the alcoholic extract of chard reached (16.41)%, which does not differ significantly from the WHC value of the treated beef burger tablets In the alcoholic extract of watercress, it amounted to (16.28)%. The reason is due to the low percentage of WHC in the tablets treated with plant extracts, due to the fact that these extracts contain a high percentage of phenolic compounds as natural antioxidants that contribute to the protection and stability of fat in curbing The free radicals resulting from oxidation and reducing the rupture of the cell membranes surrounding the muscle fibers and preserving them, which increases the flexibility of the meat to retain water, agreed with (Al-Adhari, 2017). As for the effect of the storage period, it had a non-significant effect on the water carrying capacity, as the WHC decreased continuously during the storage periods. 30-15-0) day For all plant alcoholic extracts, the reason for the decrease is related to pH and muscle proteins. These results agreed with (Ibrahim et al., 2018).

Loss after thawing

As it is noted from Table No. (5) the effect of alcoholic extracts on the percentage of loss after thawing for Berker tablets stored in freezing, as it was noted that the percentage of loss after thawing in Berker tablets treated with alcoholic chard extract amounted to (2.33)%, which does not differ significantly from Its percentage in the tablets treated with alcoholic extract of watercress reached (2.21)%. This was the results of the period 0 days. As for the results of the period of 15 days, the percentage of loss during dissolution increased, as it reached in the tablets treated with alcoholic extract chard, reaching (2.50%)%, which does not differ significantly from the percentage of loss During dissolving for tablets treated with alcoholic extract of watercress, it reached (2.39)%. As for the results of the period (30) days, the percentage of loss during dissolving continued to rise slightly to reach its highest rate at the end of the storage period 30, as it reached (2.67)% for Berker tablets treated with alcoholic chard extract Which does not differ significantly from the percentage of loss during dissolving for tablets treated with alcoholic extract of watercress, which amounted to (2.58%). These results are in agreement with what was reached (Al-Adhari, 2017). As for the storage period, it had an effect on the percentage of loss during defrosting, as the percentage increased continuously during the storage period for the alcoholic extracts of all plants, chard and watercress, to reach the highest rate. It is at the end of the storage period, and the reason is that during freezing, the formation of ice crystals and the large size of these crystals during freezing and their loss during thawing in the form of water drops, and the amount of the associated liquid increases (Al-Mousawi, 1995). These results agree with (Al-Qatif, 2019).

Loss during cooking

As it is noted from Table No. (5) the effect of alcoholic extracts on the percentage of weight loss during cooking, as it was noted that the percentage of weight loss during cooking in the tablets treated with alcoholic extracts reached (22.63)% in the tablets treated with alcoholic watercress extract. While the percentage of

weight loss during cooking recorded a non-significant decrease, reaching (22.49)% for the tablets treated with chard alcoholic extract. These were the results of the period 0 days. As for the results of the period of 15 days, the percentage of weight loss was recorded during a slight increase with non-significant differences, which amounted to (22.79)% In the tablets treated with alcoholic extract of watercress, which did not differ with significant differences from its value in tablets treated with alcoholic extract of chard, it amounted to (22.62)%. As for the results of the 30-day period, the percentage of weight loss during cooking continued to rise continuously during the storage period, as its percentage in the tablets treated with alcoholic extract of watercress. It amounted to (22.93)%, which does not differ significantly in the tablets treated with alcoholic extract of chard as it reached (22.81)%. We note that the percentage of weight loss during cooking decreased in the tablets Treatment with extracts The presence of these extracts improved the binding strength of meat tissue and worked to increase the bound water, which reduced the percentage of loss during cooking. These results agreed with (Al-Ta'i, 1987). As for the storage periods, it had a non-significant effect, as the percentage of weight loss increased during cooking. Cooking continuously for the storage period and for all alcoholic extracts of all plants (chard and watercress). These results were in agreement with (Al-Doukhi, 2014) and (Abboud, 2015).

Cooking yield

As it is noted from Table No. (5) the effect of plant alcoholic extracts on frozen beef tablets, as it was noted that the highest percentage yield was for tablets treated with chard alcoholic extract, reaching (82.70)%, which does not differ significantly from tablets treated with alcoholic extract of watercress. It reached (82.5)%. These were the results of the period 0 days. As for the results of the period of 15 days, it was noticed that the percentage of the cooking yield decreased slightly, as it reached (82.57)% in the tablets treated with chard alcoholic extract, which does not differ with significant differences from the percentage of the cooking yield in The tablets treated with alcoholic extract of watercress amounted to (82.37)%, while the percentage of cooking yield recorded a decrease in the tablets treated with alcoholic extract of chard, reaching (82.43)%, which does not differ significantly from its value in the tablets treated with alcoholic extract of watercress which amounted to (82.20)%. The ratio of the cooking yield of the tablets treated with extracts is due to the fact that the addition of alcoholic extracts improved the ratio of the cooking yield due to the enhancement of the ability to retain water and fat in the meat tissue, given that the plant extracts are materials containing natural antioxidants These results were obtained with (Kenawi and Mohmed, 2017). As for the effect of the storage period, it had an insignificant effect on all alcoholic extracts of the plants under study, as the percentage of cooking yield decreased continuously during the storage period and for all storage tide (30-15-0), as it was found that The proportion of the cooking yield continued to decline until the end of the storage period. These results agreed with (Al-Qutaifi, 2019).

Table 5

physical properties	Extracts	Storage period		
		0	15	30
Water holding capacity	Standard	17.43	16.04	15.84
	alcoholicchard	18.47	17.51	16.41
	alcoholicwatercress	18.33	17.28	16.28
Loss after thawing	Standard	3.76 a	3.48 ab	4.20 a
	alcoholicchard	2.33 b	2.50 b	2.67 b
	alcoholicwatercress	2.21 b	2.39 b	2.58 b
Loss during cooking	Standard	26.81 a	26.95 a	27.16 a
	alcoholicchard	22.49 b	22.70 b	22.81 b
	alcoholicwatercress	22.63 b	22.79 b	22.93 b
Cooking yield	Standard	76.02	75.55	75.37
	alcoholicchard	82.70	82.57	82.43
	alcoholicwatercress	82.50	82.37	82.20

Conclusion

In this study, alcoholic extracts of swiss chard and watercress were prepared and the percentage of yield was calculated, then quantitative and qualitative detection of its active compounds using Chromatography Mass Spectrometry-GC/MS technology, and the extracts were introduced into the preparation of bovine birch, and the study of its effect on the physical properties represented in water carrying capacity, which amounted to (18.47, 18.33)%and the loss during defrost, which amounted to (2.33, 2.21)%, and the loss during cooking, which amounted to (22.63,22.49)% and the cooking yield, which amounted to (82.70, 82.50)%, as the addition of these extracts improved the physical properties compared to the control sample and for all storage periods up to 30 day.

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