

COMPARATIVE STUDY ON THE ACTIVE CHEMICAL CONSTITUENTS OF SOME CHENOPODIACEAE PLANTS

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ABSTRACT

This study aimed to investigate and compare between the chemical constituents of some Chenopodiaceae plants (*Beta vulgaris* (Linn.), *Bassia muricata* (L.), *Trigonum nudatum* (Del.), *Salvia lanigera* (Poir.) and *Salsola kali* (L.) growing widely at Matruh habitat (North Western Coast Egypt) collected at the spring season of 2007-2008. Phytochemical screening of the aerial parts of the studied plants revealed some differences in the chemical constituents. Determination of water content, total soluble and insoluble carbohydrates, total nitrogen and protein contents, total lipids, total ash and the crude fibre content also revealed the presence of some differences in the values of these constituents between the five studied plants. On the other hand, the percentages of total flavonoids reached its maximum value in *Trigonum nudatum* (Del.) and its minimum value in *Salvia lanigera* (Poir.). The highest value of alkaloids was detected in *Beta vulgaris* (Linn.), while the lowest value was detected in *Salvia lanigera* (Poir.). Saponins were most abundant in *Trigonum nudatum* (Del.). While, *Salvia lanigera* (Poir.) possessed the higher content of tannins than the other species. Moreover, all the studied plants contained high contents of Na, Ca and K and very small amounts of Ni and Cr. Phenolic and flavonoid compounds in the studied plants were determined by using paper chromatography and HPLC techniques. *Trigonum nudatum* (Del.) had the lowest water content, total carbohydrates and elements and high concentration of total proteins, flavonoids and phenolic compounds. The presence of alkaloids and flavonoids in all the plants, suggests their antioxidant potentials and justifies their therapeutic actions, which could be used in drug formulation. The presence of tannin in all the investigated plants indicated that they could be used in the treatment of burns and wounds.

Key words: *alkaloids, carbohydrates, chenopodiaceae, phenolic and flavonoid compounds, phytochemical screening, saponins.*

1. INTRODUCTION

The active chemical constituents are compounds that occur naturally in plants. They contribute to the color, flavor and smell of plants. In addition, they form part of a plant's natural defense mechanism against diseases. Their therapeutic values to human health and disease prevention have been reported (Okwu, 2004).

Family chenopodiaceae is characterized by the presence of 102 genera and about 1400 species (Pandy, 1982). It contains numerous species which vary greatly in their chemical constituents and uses such as alkaloids, flavonoids, saponins and tannins.

Approximately 1300 species of chenopods (family: Chenopodiaceae) worldwide range from annual herbs to trees. Many species of chenopods

are allocated among C4 photosynthesis plants. The flowers are tiny and inconspicuous, but some species bear showy masses of fruits. Chenopods are common in deserts and especially in saline or alkaline soils (Houerou *et al.*, 1995).

Many plants of this family are used in folk medicine as antimicrobial remedies, where crude preparation of such plants are used in different forms for oral and external local applications to throat microbial infections. *Beta vulgaris* (Linn.) is a native of south Europe, extensively cultivated as an article of food and especially for the production of sugar, it pacifies vitiated vata, pitta, urinary retention, anemia, inflammation, liver and spleen diseases, amenorrhea, dysmenorrhea and general debility.

Two acylated flavonoid glycosides (Caffeoyl

and Feruloyl) have been isolated from the aerial parts of *Bassia muricata* (Mohamed *et al.*, 2001).

A new natural methyl ester of carnosic acid isolated from the arial parts of *Salvia lanigera* (Hassan,1985), was shown to contain oleanolic and ursolic acids (Abedl-moneim *et al.*, 1967). Chloroform extract of the roots of the Egyptian *Salvia lanigera* Poir. afforded two new orthoquinones, Lanigerone and Salvigerone together with two known diterpenoids ,aurcadiol and pisiferal (Lee *et al.*, 1998)

According to Hartwell (1967-1971), the plants of *Salsola kali* L. are used in folk remedies and to be cathartic, diuretic, emmenagogue, poisonous, stimulant, and vermifuge. Russian thistle is a folk remedy for dropsy and excrescence (Duke and Wain, 1981). Navaho used a decoction of the ashes, both internally and externally for influenza and smallpox (Duke, 1983).

Salsola kali L. contains oxalic acid and excess of KNO₃, so it may be toxic to grazing animals. We selected five plants of the family chenopodiaceae to compare their constituents of active materials.

2. MATERIALS AND METHODS

2.1. Source of Materials

Beta vulgaris (Linn.), *Bassia muricata* (L.), *Tragonum nudatum* (Del.), *Salvia lanigera* (Poir.) and *Salsola kali* (L.) growing widely at Matruh habitat (North Western Coast, Egypt). The aerial parts of the studied plants were collected during the spring season of 2007-2008.

The plants obtained from this region were identified and separately prepared for chemical analysis.

2.2. Methods

2.2.1. Determination of constants and other constituents

Water content, the total ash content, acid and water insoluble ash and the crude fibre contents were determined according to Alabi *et al.* (2005). The total soluble and insoluble carbohydrates were determined according to Chaplin and Kennedy (1994). The total nitrogen and protein contents were determined according to James(1995) and the total lipids were determined according to Christie (1982).

2.2.2. Active constituents

2.2.2.1. Preliminary photochemical screening

The qualitative determination of tannins, sterols, carbohydrates and/or glycosides, flavonoids, phenolics, alkaloids, saponins and

resins in ethanolic extracts of the studied plants were performed according to the method of Woo *et al.* (1977), Sofowara. (1993), Mojab *et al.* (2003), Edeoga *et al.* (2005) and Edeoga *et al.* (2006).

2.3. Determination of the active constituents

2.3.1. Determination of total flavonoids

The total flavonoids were determined by spectrophotometrically method described by Karawya and Aboutable (1982).

2.3.2. Determination of total alkaloids

The total alkaloids were estimated using two methods the acid- base titration and the gravimetric methods as described by Balbaa (1986) and Woo *et al.*, (1977)

2.3.3. Determination of total saponin

Saponin content of the studied plants were determined according to Balbaa (1986).

2.3.4. Determination of total tannins

The total tannins were estimated according to Makkar and Googchild method (1996).

2.4. Phytochemical screening by using successive extraction

Five grams from each of the air dried powdered samples of the five studied plants were successively extracted in a Soxhlet with petroleum ether (b.p.40 to 60°), ether, chloroform, benzene, acetone, alcohol 80% and water. Phytochemical screening was carried out for each extract of the five plants as mentioned before .

2.5. Element measurements

Sodium and potassium were determined in the digested samples of the studied plants using a flame photometer according to Allen (1989). Phosphorus content in the digested samples was determined colorimetrically by the molybdc acid method as described by Humphries (1956). The contents of Ca⁺⁺ were determined using Unicam 929 atomic absorption spectrophotometer.

2.6. Isolation of phenolic and flavonoid compounds using paper chromatography

Each methanolic extract of the plant species was separately chromatographed on Whatman No.1 paper chromatography along side with the available authentic samples using the solvent system n-butanol: acetic acid: water (4:1:5, v/v/v) for the first way and the solvent system acetic acid water (15 : 85 v/v) for the second way. The developed chromatograms were air dried, and examined under ultraviolet (UV) light. The concentrated ethanolic extracts of the plant species were applied separately on the top of a cellulose column. Elution was started with water

followed by a mixture of water /methanol and finally pure methanol was used. The received fractions were evaporated and similar fractions were collected together, evaporated and subjected to paper chromatography (Liu *et al.*, 1989). Preparative paper chromatography was applied on Whatman No.3 paper chromatography using the solvent system BAW. The separated flavonoid and phenolic compounds were purified on a sephadex LH-20 column using methanol / water system. Carboxylic acids, hydroxy flavonoids and sugars were detected by spraying the air dried chromatograms with different reagents

2.7. Phenolic and flavonoid compounds using HPLC

Phenolic and flavonoid compounds of the five selected plants were detected by using high performance liquid chromatography (HPLC) according to Ben-Hammouda *et al.* (1995).

3. RESULTS AND DISCUSSION

3.1. Determination of constants and other constituents

It is clear from Table (1) that, the mean values of water content were 26.82,15.21, 11.23,18.62 and 14.18 % for the studied species (*Beta vulgaris*, *Bassi muricata*, *Tragonum nudatum*, *Salvia lanigera* and *Salsola kali*, respectively).

Mohamed and Alain (1995) suggested the accumulation of carbohydrates under salinity stress is due to a reduction in their utilization , either as a source of energy or for the formation of new cells and tissues. The present data indicated that the percentages of water content, total, soluble and insoluble carbohydrates of *B . vulgaris* were higher than the other species. The total nitrogen and crude protein content of *T. nudatum* were 1.69 and 10.56 % and they were higher than the other species. The total lipid content of *B.muricata* reached its maximum value of 3.46 % and its minimum value of 1.50% in *S. kali*. Total ash content of *T..nudatum* was higher than the other species, while the acid – insoluble ash was the lowest in the same plant. Water – insoluble ash content of the studied species reached its maximum value of 12.50 % in *S.lanigera*. Al- Owaimer *et al.* (2008). reported that ash contents were 16.61 and 16.42% for *Atriplex halimus* and *A. leucoclada*, respectively. Meanwhile Rizk (1986) reported that *Schanginia aegyptiaca* of family Chenopodiaceae contained a very high ash content (39.82%). This reflects the particular

origin of the plant which grows on salinized soil. Table (1) showed that, *B. muricata* had the maximum value of crude fibre content (14.82 %).

The results presented in Table (1) showed that, there is an inverse relationship between water content and the crude fibre contents.

3.2. Active constituents

3.2.1. preliminary phytochemical screening

Table (2) showed that, tannins, sterols, carbohydrates and / or glycosides, flavonoids, phenolics and alkaloids were detected in all the studied species, (saponins were detected only in *B.muricata*, *T.nudatum* and *S.kali*) .While the resins were present in *T.nudatum* as traces and *S.lanigere* and absent in the other species. The presence of these active constituents in the studied plants account for its usefulness as medicinal plants.

3.2.2. Determination of the active onstituents

Flavonoids are potent water soluble antioxidants and free radical scavengers which prevent oxidative cell damage. They have strong anticancer activity and protect against the different levels of carcinogenesis (Okwu, 2004). Flavonoids in the intestine lower the risk of heart diseases. The antioxidant potentials of the plants have been linked with their flavonoid contents. In addition, the therapeutic potentials of plants have been linked with their antioxidant potentials (Akinmalodun *et al.*, 2007; Eleazu *et al.*, 2011). As antioxidants, the flavonoids from these plants may provide anti-inflammatory activity. Thus the high alkaloid and flavonoid contents of these plants explain their therapeutic use in herbal medicine especially in the treatment of wounds, burns and ulcers.

Data presented in Table (3) indicated that , less concentrations of total flavonoids were detected only in *S. lanigera* (1.10%), while the high concentration was observed in *Tragonum nudatum* (2.83%).

Alkaloids are basic natural products occurring primarily in plants. They occur as one or more heterocyclic nitrogen atoms and are generally found in the form of salts with organic acids. Alkaloids are the most efficient therapeutically significant plant substances. Pure isolated alkaloids and their synthetic derivatives are used as basic medicinal agents because of their analgesic, antispasmodic and anti-bacterial properties (Stray, 1998). Table (3) showed that, alkaloids high concentration was detected in *B.vulgaris* (3.65%) and the lowest concentration in *S.lanigera* (0.63%).

Table (1): Mean values of different constants and constituents of the studied species.

Constants and constituents	1	2	3	4	5
Water content	26.82	15.21	11.23	18.62	14.18
Total carbohydrates	3.48	1.16	1.07	2.96	1.86
Soluble carbohydrates	2.32	0.85	0.79	2.02	1.14
Insoluble carbohydrates	1.16	0.31	0.28	0.94	0.72
Total nitrogen content	0.94	0.76	1.69	1.51	0.80
Crude protein content	5.83	4.73	10.56	9.44	4.98
Total lipid content	2.58	3.46	2.06	2.90	1.50
Total ash content	17.16	14.06	22.60	12.97	15.79
Acid –insoluble ash	2.92	3.52	1.96	3.91	3.30
Water –insoluble ash	11.06	9.07	7.86	12.50	7.48
Crude fibre content	9.82	14.82	11.56	8.90	11.26

1- *Beta vulgaris* 2- *Bassia muricata* 3-*Traganum nudatum*
 4- *Salvia lanigera* 5- *Salsola kali*

Table (2): Preliminary phytochemical screening.

Tests	1	2	3	4	5
Tannins	+++	++	++	+++	++
Sterols	++	++	++	+++	+
Carbohydrates and/or glycosides	++	++	++	++	++
Flavonids , phenolics	++	+++	+++	++	+++
Alkaloids	+++	+	++	+	+
Saponins	-	+	+	-	+
Resins	-	-	+	+	-

1- *Beta vulgaris* 2- *Bassia muricata* 3-*Traganum nudatum*
 4- *Salvia lanigera* 5- *Salsola kali*
 - traces + positive ++ moderately positive +++ strongly positive

Table (3): Percentage of the active constituents of the five selected plants.

Item	1	2	3	4	5
Total flavonids	1.45	1.78	2.83	1.10	2.34
Total alkaloids					
a. Graviometric method	3.24	0.92	2.14	0.63	0.85
b. Acid-base titration	3.65	1.13	2.32	10.65	0.79
Total saponins	-	11.2	14.9	-	12.5
Total tannins	1.87	0.96	1.05	2.03	0.85

1- *Beta vulgaris* 2- *Bassia muricata* 3-*Traganum nudatum*
 4- *Salvia lanigera* 5- *Salsola kali*

Saponin has the property of precipitating and coagulating red blood cells. Some of the characteristics of saponins include formation of foams in aqueous solutions, hemolytic activity, cholesterol binding properties (Eleazu *et al.*, 2010) and bitterness (Sodipo *et al.*, 2000). Saponins were present only in *B.muricata*, *T.nudatum* and *S.kali*, (11.2, 14.9 and 12.5% respectively).

Tannins are dietary anti-nutrients that are responsible for the astringent taste of foods and drinks (Chikezie *et al.*, 2008). The tannin content of *Salvia lanigera* was significantly higher than the other plants studied while that of *Salsola kali* was the least.

The presence of flavonoids and tannins in the plants is likely to be responsible for the free radical scavenging effects observed. Flavonoids and tannins are phenolic compounds and plant phenolics are a major group of compounds that act as primary antioxidants or free radical scavengers (Poltrait, 1997).

3.2.3. Phytochemical screening by using successive extraction

It is clear from Table (4) that, flavonoids, alkaloids, saponins and tannins were absent by using petroleum ether extract, while alkaloids were present as traces in *S. kali* only by using ether extract. With chloroform extract, alkaloids only were present in the five studied plants. Ethyl acetate extract revealed that the presence of flavonoids in all the studied plants, while alkaloids were present only in *S.lanigera*, saponins and tannins were present as traces in *B. muricata*, *T.nudatum* and *S.kali* and absence in *B. vulgaris* and *S.lanigera*.

Ethyl alcohol 96 % and ethyl alcohol 70 % extracts showed the absence of saponins in *B. vulgaris* and *S. lanigera* and present in the other plants, while flavonoids, alkaloids and tannins were present in the five species. Saponins and tannins were absent in *B. vulgaris* and *S. lanigera* and present in *B.muricata*, *T.nudatum* and *S.kali*, while flavonoids and alkaloids were present in all the studied plants by using the water extract as shown in Table (4).

3.3. Elements measurements

Table (5) presented the elements composition of the five studied plants. The data showed that, the maximum contents of Na, Ca, Zn were present in *Salvia lanigera*. Also, the maximum contents of K, Mn were recorded in *Beta vulgaris*. *Bassia muricata* contained higher contents of P, Fe, Al and Cu than the other species. All the studied plants contained very

small amounts of Ni and Cr.

Saltbushes, in general, are characterized by moderate crude protein and high mineral contents, particularly Na, K, Cl and Ca concentrations. Potassium is an important contributor to the osmotic potential of the cells while calcium is an important mineral for the constructions of cell walls (Pessaraki, 1995). The reduction of phosphate concentration in stressed plants is due to its unavailability in the soil. Several studies have been conducted regarding the utilization of saltbushes in animal feeding (El Shaer *et al.*, 1987).

3.4. Phenolic and flavonoid compounds using paper chromatography

Table (6) revealed the presence of rutin, myricetin, quercetin, kaempferol and Kaempferol-3-O- α -L-rhamnoside with different concentrations in the all studied species, isorhamnetin and isorhamnetin 3- o-rutinoside were present only in two plants (*T. nudatum* and *S. kali*), while isorhamnetin 3- o -glucoside was present only in *S.kali*. Also chlorogenic acid was present only in *T. nudatum* and *S. lanigera*, gallic acid was absent in *S. lanigera* and present in the other species, ferulic acid was absent in *T. nudatum* and *S. kali* and present in the others. Kaempferol -3-o-B-D-glucoside was present with different concentrations in *B. vulgaris*, *T.nudatum* and *S.kali* and absent in the two other plants, Quercetin 3-O- α -L - rhamnoside was absent in *T.nudatum* and present in the other species, while Quercetin -3-O-B-D- glucoside was present in *B.muricata*, *T.nudatum*, *S.lanigera* and *S.kali* and absent in *B.vulgaris* as shown in Table (6).

3.5. Phenolic and flavonoid compounds using HPLC

Flavonoids are important dietary compounds, having a capacity to inhibit DNA damage and lipid peroxidation and quench free radicals. They also have anti-carcinogenic and antiproliferative effect (Romanova and Vachalkova, 1999). Some flavonoids act as growth regulators, phytoalexins, natural toxins and sweating agents while others have estrogenic action, reduce capillary fragility and employed as genetic markers. Phenolic compounds were found to be highly toxic to certain protozoa (Watt and Breyer Brandwijk, 1962). Quercetin had the maximum value of phenolic and flavonoid compounds in *B.muricata* while *P-catechiuc* acid had the minimum value in *S.lanigera* as shown in Table (7).

Table (4): Phytochemical screening for the five selective plants by using successive extraction.

Solvent	Active materials																			
	Flavonoids					Alkaloids					Saponins					Tannins				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
P . ether	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ether	-	-	-	-	-	-	-	-	-	±	-	-	-	-	-	-	-	-	-	-
Cholroform	-	-	-	-	-	+++	+	++	+	+	-	-	-	-	-	-	-	-	-	-
Ethyl acetate	+	±	++	+	+	-	-	-	+-	-	-	±	+	-	+	-	±	±	-	±
Ethyl alcohol 96%	+	++	++	+	++	++	++	++	+	++	-	+	++	-	++	+++	++	++	+++	++
Ethyl alcohol 70%	++	+++	+++	++	++	+++	++	+++	+	++	-	++	++	-	++	++	+	+	++	++
Water	+	++	+	+	++	+	+	++	+	++	-	++	+	-	++	-	++	++	-	+

+- positive or negative

- negative

+ weakly positive

++ moderately positive

+++ strongly positive

1- *Beta vulgaris*2- *Bassia muricata*3- *Traganum nudatum*4- *Salvia lanigera*5- *Salsola kali***Table (5): Elements composition of the studied plants.**

Element (ppm)	1	2	3	4	5
Na	483.62	357.20	312.36	562.04	498.42
Ca	121.05	110.25	108.32	151.42	134.12
K	282.52	271.30	218.61	268.38	198.60
P	18.08	20.28	16.92	12.90	12.28
Zn	3.31	4.83	4.02	5.60	3.98
Fe	8.62	9.96	5.82	7.06	9.20
Mn	0.60	0.52	0.41	0.18	0.26
Al	3.53	4.38	2.98	2.90	4.08
Cu	1.20	1.96	1.12	0.98	1.05
Ni	0.05	0.06	0.02	0.06	0.04
Cr	0.02	0.03	0.02	0.01	0.03

1- *Beta vulgaris*2- *Bassia muricata*3- *Traganum nudatum*4- *Salvia lanigera*5- *Salsola kali*

Table (6): Phenolic and flavonoid compounds of the five selected plants using paper chromatography.

Chemical compounds	1	2	3	4	5
Rutin	+	++	+++	+	+
Myricetin	++	+	++	+++	+
Qurcetin	++	+++	+	++	++
Kaempferol	+++	++	+++	++	++
Isorhamnetin	-	-	++	-	+++
Isorhamnetin -3-O-glucoside	-	-	-	-	+++
Isorhamnetin -3-O-rutinoside	-	-	++	-	+++
Chlorogenic acid	-	-	+	++	-
Gallic acid	+	+++	++	-	+
Ferulic acid	++	+	-	++	-
Kaempferol -3- O - α -L-rhamnoside	+++	+	++	++	+
Kaempferol-3- O - β -D-glucoside	++	-	+	-	+
Qurcetin -3- O - α -L-rhamnoside	+	+++	-	++	+
Qurcetin -3-O- β -D-glucoside	-	+	++	+	++

1- Beta vulgaris 2- Bassia muricata 3-Traganum nudatum
 4- Salvia lanigera 5- Salsola kali
 - negative + positive ++ moderately positive +++ strongly positive

Table (7): Phenolic and flavonoid compounds of the five selected plants using HPLC.

Compounds	Phenolic and flavonoids μ /g				
	1	2	3	4	5
<i>P</i> - catechuic acid	-	3.59	0.96	0.13	4.03
Chlorogenic acid	-	-	1.85	4.27	-
Catechum	0.46	1.27	7.31	0.68	5.52
Salicylic acid	1.49	0.16	-	0.07	-
<i>P</i> - coumaric acid	0.38	2.19	5.95	-	7.36
Rutin	2.62	8.52	13.73	2.09	3.84
Ferulic acid	5.09	0.67	-	3.26	-
Coumarin	1.06	4.28	6.57	-	8.02
Myricetin	10.74	1.89	9.10	27.63	1.56
Querctin	15.32	38.62	8.15	19.07	11.53
Kaempferol	28.07	10.26	17.63	15.08	9.83
Isorhamnetin	-	-	22.35	-	35.64

1- Beta vulgaris 2- Bassia muricata 3-Traganum nudatum
 4- Salvia lanigera 5- Salsola kali

The flavonoid compounds and phenolic acids, which were separated from these five selected plants are important in medicine such as:

- 1- Rutin can use as antioxidant , inhibitory for the adenosine deaminase, inhibitory for lens aldose reductase, antilipoperoxidant, antihepato toxic and for expansion of the artery (Sigma, 1992 and Balbaa *et al*, 1981)
- 2- Myrecetin can be used as antioxidant, while phenolic myrecetin and gallic acid support healthy functions of the cardiovascular system, beside supporting health cells and other components of the human organism.
- 3- Kaempferol can be used as antioxidant .
- 4- Quercetin can be used as antioxidant and as an inhibitor of protein tyrosine kinases (Sigma, 1992).
- 5- Chlorogenic acid has high antioxidant capacity, significantly higher than any other natural antioxidant and about five times higher than vitamin C in the juice of apple.

Conclusion

The obtained results showed that, all the studied plants contained high quantities of alkaloids and flavonoids suggesting their antioxidant potentials and justifying their therapeutic uses which could be utilized in drug formulation. Finally, the low quantities of tannin in all the plants studied suggest that usage of these plants in herbal medicine can neither interfere with dietary iron absorption nor inhibit digestive enzymes.

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دراسة مقارنة علي المكونات الكيميائية الفعالة لبعض نباتات العائلة الرمرامية

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ملخص

يهدف هذا البحث الي دراسة ومقارنة التركيب الكيميائي للأجزاء الخضرية لبعض نباتات العائلة الرمرامية النامية في منطقة مطروح خلال فصل الربيع (٢٠٠٧- ٢٠٠٨) وذلك للتعرف علي المركبات الفعالة الموجودة في هذه النباتات والتي تلعب دورا في علاج بعض الأمراض. تم تقدير المحتوي المائي والكربوهيدرات الذائبة وغير الذائبة والنيتروجين الكلي وكذلك البروتين والدهون بالإضافة الي محتوى الرماد الذائب وغير الذائب وتقدير الألياف. أوضحت الدراسة اختلافات واضحا في نسب هذه المكونات في النباتات الخمسة. تم الفصل الكيميائي لبعض المكونات الاخرى كالتانينات والاستيرويدات والمركبات الفينولية والفلافونيدية والقلويدات والصابونينات. أوضحت الدراسة ان النباتات الخمسة تحتوي علي نسبة عالية من الصوديوم والكالسيوم والبوتاسيوم وكميات صغيرة جدا من النيكل والكروم. كما تم تقدير المركبات الفينولية باستخدام كروماتوجرافيا الورق وكذلك باستخدام جهاز HPLC ووجد أن النباتات الخمسة تحتوي علي مجموعة من هذه المركبات ولكن بنسب مختلفة. وجد ايضا ان نبات زمران (*Traganum nudatum*) يحتوي على اقل نسبة من المحتوي المائي، الكربوهيدرات الكلية و الاملاح واعلي نسبة من المحتوي البروتيني والمركبات الفينولية والفلافونيدية. وقد أظهرت النتائج وجود نسبة عالية من القلويدات والفلافونيدات يمكن استخدامها كمضادات اكسدة و في علاج بعض الامراض كما اكدت علي وجود التانينات في جميع النباتات مما يدل علي إمكانية استخدامها في علاج الحروق والجروح.

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