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PHYTOCHEMICAL STUDIES ON *Verbascum sinaticum* BENTH

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ABSTRACT

The preliminary phytochemical screening of *Verbascum sinaticum* which collected from Catherin and Wadi Fieran showed that it contained sterols, flavonoids, chlorides, tannins, resine, saponines, alkaloids, and carbohydrates and/or glycosides.

The paper chromatography of free sugars showed that *Verbascum sinaticum* contained glucose, fructose, rhamnose and arabinose in leave at the two studied habitats, while it was obvious that rhamnose was absent in stem at Catherin and rhamnose and fructose were absent in stem at Wadi Fieran.Concerning the combined sugars glucose, rhamnose, sucrose and arabinose were detected in the leaves, while the stem contained the same components except rhamnose at Catherin habitat. On the other hand at Wadi Fieran habitat the results revealed the presence of glucose, fructose, rhamnose, sucrose and arabinose in leave, while the stem contained the same components except fructose and rhamnose.

Investigation of free amino acid showed the present of proline, alanine and lysine in leave and stem at the two studied habitats, while aspartic acid, serine, glycine, valine, isoleucine and leucine present only in the stem at the two habitats but varied in leave at the two habitats . Concerning the protein-amino acids, *Verbascum sinaticum* contained seventeen amino acid with different concentrations. Proline was the highest one of the bound amino acids 25.1 and 18.3% in leave at Catherin and Wadi Fieran sample respectively. Meanwhile, leucine was the highest one 18.6 and 15.1% in the stem at the same habitats, respectively.

The values of the fundamental chemical properties of the extracted lipid of *Verbascum sinaticum* were lower in leaves than that found in stems, while acid, iodine, ester and saponification values were higher at Wadi Fieran habitat than that sample at Catherin habitat.

The unsaponifiables content of *Verbascum sinaticum* was determined and the relative percentages of each component were calculated. There was no significant difference between the two habitats except the presence of tetracosanoic at Catherin only and the presence of cholesterol in leave and stem at catherin and Wadi Fieran respectively.

The Gas-liqued chromatographical analysis of *Verbascum sinaticum* lipids revealed the presence of long chain fatty acid, where stearic acid was the major fatty acid in leaves at two habitats, while linoleic acid was the major component in stem at two habitats.

Concerning the metabolic products studies, it was found that the percentage of total nitrogen, total protein, total lipid and total, soluble and insoluble carbohydrates were higher in the leaves than those in the stems at both studied habitats , while they were higher at Catherin than those at Wadi Fieran habitats.

Concerning the active constituents it was found that the percentages of total flavonoids, total alkaloids, total saponins and total tannins were higher at the leaves than those in the stem, while they were higher at Catherin than those at Wadi Fieran habitats.

Keywords: Phytochemical-Verbascum-aminoacid-fatty acid-carbohydrate

INTRODUCTION

Scrophulariaceae is a world wide distribution family, occurring mostly in temperate and sub-tropical regions comprises about 220 genera and 300 species (Trease and Evans, 1989). So it is reputed to be one of the families containing a vast number of both medicinal and poisonous plants.

Verbascum species are biennial or prennial herbs, coverned with branched hairs, there is wide use of *verbascum* species for medicinal purpose and many pharmacological studies was carried out on this species which used in folk medicine as diuretic, antirheumatic wound healing ophthalmic diseases, cold and chest diseases (Wichtl, 1989).

The genus verbascum comprises about 360 species spread in the northern temperate region of Eurasia, but chiefly in the Mediterranean region (Saleem and Rafiquddin 1982).

Drandarof (1995) stated that *Verbascum pseudonobile* contained 17-membered lactam alkaloids, verbacine (1,E-isomer) and verballocine (1,z-isomer) containing spermine,and phenylpropionyl precursoyl units.

Klimek (1995) isolated apigenen, luteolin, quercetin and their derivatives from the inflorescence of *Verbascum lychnitis* whereas only the glucuronides of apigenen, luteolin and diosmetin were isolated from *Verbascum nigrum* where the phenolic acid components were identified.

Samia (2000) reported that *Verbascum sinaticum* Benth contained two flavonoids luteolin and chrysoeriol. These two compounds are isolated, purified by chromatographic methods and identified by spectroscopic method.

Osvath, *et al.*, (1982) isolated *B*-sitosterol, stigmasterol from the flowers of *Verbascum phlomoides.*

Zhang, *et al.* (1996) isolated ergosterol peroxide, oleanolic acid and B-sitosterol from the flowers of *Verbascum thapsus.*

Primary and secondary metabolites have an essential role in growth and development but the majority of them are involved in chemical defence systems, which protect plants from herbivores microbial infection and the sequences of environmental stress (Michael, 1997). We aimed to investigate the main chemical constituents. i.e. carbohydrates, proteins and lipids of *Verbascum simaticum* to clarify the effect of environmental on its bicohemical constituents.

MATERIALS AND METHODS

Verbascum simaticum was collected from two natural habitats, Wadi fieran and catherin. The fresh plant were cleaned, dried in an oven at 60°C for 48 hours and ground to fine powder, then kept in tight containers for the following investigations:

2.1. Preliminary phytochemical screening.

About 50 g of air dried powdered plant material were extracted with about 250 ml of 80% ethyl alcohol for 6 hours, then filtered. The residue was then washed several times with warm alcohol. The combined alcohol filtrates

were concentrated under reduced pressure at 50°C, then used for the following tests:

Test for sterols and terpens according to Fieser and Fieser (1959), test for flavonoids according to Wall *et al.*, (1954), test for carbohydrates and/or glycosides using Molish's and Fehling reagents according to Harper, (1975), test for saponins according to Wall *et al.*, (1954), test for resins according to Balbaa (1986), and alkaloids according to Jenkins *et al.* (1957).

2.2. Invstigation of carbohydrates:

2.2.1. Identification of free sugars:

Twenty g of the defatted plant powder were extracted with 80% ethyl alcohol and filtered. The filtrate was clarified by carries reagent, filtered and the filtrate was evaporated. The residue was dissolved in 3 ml of 10% aqueous isopropanol for paper chromatographic investigation (Chaplin and Kennedy, 1994).

2.2.2. Identification of combined sugars:

The combined sugars were extracted from the defatted powder of 5 g plant after removing the free sugars. The extraction was carried out by cold method followed by hot method according to Laidlow and Percival (1949) and (1950) and Hirst and Jones (1955). Then few mg of the dried sugar hydrolyzate were dissolved in 10% aqueous isopropanol for paper chromatography.

2.3. Investigation of free and protein –amino acids:

The free amino acids and the hydrolyzed protein-amino acids were determined according to the method described by Pellet and Young (1980). Twenty micro liters of the amino acids were loaded in instrument capsule for investigation. LKB alpha plus high performance Amino Acid Analyzer LKB Biochrom. LTD England was used for this purpose.

Retention time and area were determined using Hewlett Packard 3390 recording integrator. The concentration of each amino acid (g/16 g nitrogen) was calculated by a special designed program.

2.4. Investigation of lipids

The lipids were extracted and estimated according to the A.O.A.C.(1970).

Acid value (A.V.), ester value (E.V.) and saponification value (S.V.) were determined according to Guenther (1972). Iodine value (I.V.) was estimated according to Mohamed and Amer (1965).

Fractionation of the unsaponifiable matter and fatty acids, as well as identification of their constituents were carried out using GLC technique as followed by Eaton (1989). The extracted fatty acids and the standard ones were converted to the corresponding methyl esters using ethereal solution of diazomethane (Farag *et al.*, 1986).

The results of Itoh *et al.* (1973) and Farag *et al.* (1986) were used as a guide to characterize some of the unknown compounds. The relative proportion of each individual compound was estimated as the ratio of the

partial areas to the total area as mentioned by Fryer *et al.*, (1960) and Nelson *et al.* (1969).

2.5. Metabolic products:

2.5.1. Carbohydrates:

The total, soluble and insoluble carbohydrates in the plant were determined according to Chaplin and Kennedy (1994).

2.5.2. Nitrogen compounds:

The total nitrogen and protein were determined according to British pharmacopoeia, (1980).

2.5.3. Total lipids.

The total lipids were determined according to A.O.A.C. (1970).

2.6. Active constituents:

2.6.1. Estimation of flavonoid content:

The total flavonoid (as luteolin) of *Verbascum sinaticum* at the two studied habitats were determined spectrophotometrically according to Karawya and Aboutable (1982).

2.6.2. Estimation of alkaloid content:

The total alkaloid of *Verbascum sinaticum* at the two localities were estimated according to Balbaa (1986) and Woo *et al.* (1977).

2.6.3. Estimation of saponin content:

Saponin content of *Verbascum sinaticum* at the two studied habitats were estimated according to Balbaa (1986).

2.6.4. Estimation of tannins content:

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

RESULTS AND DISCUSSION

3.1. Prelminary phytochemical screening:

The preliminary phytochemical screening on *Verbascum sinaticum* collected from the two habitats revealed the presence of sterols, flavonoids, saponins, alkaloids, chlorides, sulphates, carbohydrate and/or glycosides and resin (Table 1).

Table (1): Preliminary phytochemical screening of *Verbascum sinaticum*.

Test	Results
Flavonoids	+
Chlorides	+
Resine	+
Saponine	+
Alkaloids	+
Sterols	+
Carbohydrate and/ orglycosides	+

3.2. Investigation of carbohydrates:

The obtained results of the free sugar extract of *Verbascum sinaticum* using comparative paper chromatograms revealed the presence of glucose, fructose and arabinose in both leave and stem, while rhamnose was present only in the leave at Catherin habitat. On the other hand, at Wadi Fieran habitat it revealed the presence of glucose, fructose, rhamnose and arabinose in leave, while the stem contained two free sugar only which are glucose and arabinose. (Table 2).

Table (2) : The separaton of free and combined sugars of *Verbascum sinaticum* by using paper chromatographic.

Sugars	Catherin				Wadi-Fieran			
	leave		stem		Leave		stem	
	Free	combined	Free	Combined	Free	Combined	Free	Combined
Glucose	+	+	+	+	+	+	+	+
Fructose	+	-	+	-	+	+	-	-
Rhamnose	+	+	-	-	+	+	-	-
Sucrose	-	+	-	+	-	+	-	+
Arabinose	+	+	+	+	+	+	+	+

The obtained results of the hydrolyzed combined sugar extract of *Verbascum sinaticum* using comparative paper chromatography revealed the presence of glucose, rhamnose, sucrose and arabinose in leave, while the stem contained the same components as in leave except rhamnose at catherin habitat. On the other hand at Wadi Fieran habitat it revealed the presence of glucose, fructose, rhamnose, sucrose and arabinose in leave. While the stem contained the same components as in leave except fructose and rhamnose (Table 2).

3.3. Investigation of amino acids:

The obtained paper chromatograms of free amino acid of *Verbascum sinaticum* at Chatherin habitat revealed the presence of glutamic acid, proline, alanine and lysine in leave. Meanwhile the stem contained aspartic acid serine, proline, glycine, alanine, valine, isoleucine, leucine and lysine. On the other hand at Wadi Fieran habitat it revealed the presence of aspartic acid, serine, glutamic acid, proline, glycine, alanine, valine, isoleucine and lysine in leave. Meanwhile the stem contained aspartic, serine, proline, glycine, alanine, valine, isoleucine, lucine and lysine (Table 3). The separted protein-amino acids of *Verbascum sinaticum* by using amino acid analyzer at the two studied habitats are given in (Table 4) it were clear that the maximum value was proline (25.1 and 18.3 ug/100g) in leave at Catherin and Wadi Fieran habitats, respectively, while the highest one was lueicne in the stem (18.6and 15.1 ug/100g) at Catherin and Wadi Fieran habitats, respectively.

The presence of proline may be due to the increase of soil salinity at the two habitats. Ali and Sawaf (1992) reported that salinity could inhibit the transmission reactions and hence the glutamic acid is accumulated and transformed to other nitrogenous compounds such as proline.

Table (3): The separation of free amino acids of *Verbascum sinaticum* by using paper chromatographic.

Free amino acids	Catherin		Wadi Fieran	
	Leave	Stem	Leave	Stem
Aspartic acid	-	+	+	+
Thereonine	-	-	-	-
Serine	-	+	+	+
Glutamic acid	+	-	+	-
Proline	+	+	+	+
Glycine	-	+	+	+
Alanine	+	+	+	+
Cysteine	-	-	-	-
Valine	-	+	+	+
Methionine	-	-	-	-
Isoleucine	-	+	+	+
Leucine	-	+	-	+
Tyrosine	-	-	-	-
Phenylalanine	-	-	-	-
Histidine	-	-	-	-
Lysine	+	+	+	+
Arginine	-	-	-	-

Table (4): Protein-amino acids of *Verbascum sinaticum* at the two studied habitats.

Protein amino acids	Catherin		Wadi Fieran	
	Leave	Stem	Leave	Stem
Alanine	5.2	3.9	9.4	8.3
Valine	8.7	4.1	4.1	6.2
Threonine	8.3	4.2	2.0	4.0
Glycine	8.0	3.9	4.3	2.3
Isoleucine	5.9	2.5	1.5	9.8
Leucine	9.9	18.6	6.9	15.1
Serine	2.2	2.0	1.8	1.6
Proline	25.1	5.5	18.3	5.2
Cysteine	4.0	1.5	3.2	2.8
γ-amino buteric	2.8	1.1	4.1	1.7
Methuonine	4.0	1.7	2.1	5.1
Aspartic acid	3.8	7.0	10.2	8.3
Phenylalanine	4.6	9.5	8.8	11.2
Histidine	1.4	5.6	2.7	8.7
Glutamic acid	2.2	18.1	16.2	3.0
Tyrosine	1.3	5.3	1.7	3.5
Lysine	1.7	4.5	2.5	2.4

3.4. Investigation of lipids:

3.4.1. The fundamental chemical properties:

It was clear from (Table 5) that the iodine, ester and saponification values were higher at Wadi Fieran habitat than at Catherin. Also, it was obvious that all of these values were higher in stem than in leaves at both habitats.

Table (5): Acid, Ester, Saponification and Iodine values of lipid of *Verbascum sinaticum* in two studied habitats.

Item	Catherin		Wadi Fieran	
	Leave	Stem	Leave	Stem
Acid value	22.8	25.2	33.0	42.0
Iodine value	34.9	87.6	39.2	98.3
Ester value	84.1	156.2	164.4	210.4
Saponification value	117.1	198.2	187.2	235.6

The saponification values of *Verbascum sinaticum* were higher in leaves and stem of Wadi Fieran, than at Catherin.

3.4.2. Investigation of saponifiable fraction of lipids:

The gas liquid chromatographical analysis of *Verbascum sinaticum* lipid revealed the presence of long chain fatty acid C_{16}, C_{18} and C_{20} at both habitats. Where stearic acid was the major fatty acid in the leaves, while linoleic acid was the major fatty acid in the stems at both habitats (Table 6).

3.4.3. Investigation of unsaponifiable mater:

The unsaponifiables matter content of *Verbascum sinaticum* was determined using GLC technique, the relative percentages of each components were calculated and tabulated in (Table 7). It was obvious from the obtained results that there were elven hydrocarbon and sterol in the stem at both habitats except cholesterol, which was only present in the stem at Wadi Fieran habitat, while there were ten and nine hydrocarbons and sterols in the leaves of Catherin and Wadi Fieran habitats, respectively except cholesterol,which was present only in the leave of catherin habitat.

3.5. Metabolic products:

3.5.1. Determination of total, soluble and insoluble carbohydrates:

It was clear from (Table 8) that the percentage of total, soluble and insoluble carbohydrates of *Verbascum sinaticum* were higher in the leaves than that of stem at both habitats. Data also indicate that the total, soluble and insoluble carbohydrates were slightly higher at Catherin that Wadi Fieran habitat.

The increase in soil moisture stress decreased the photosynthesis, which was associated with an increase in respiration rate and led to the reduction in the total carbohydrates concentration in plant. These results were inagreement with those obtained by Stocker (1960) and El-Monayeri *et al.* (1981).

3.5.2. Determinaiton of total nitrogen and protein contents.

Data presented in (Table 8) indicated that the percentages of total nitrogen and protein were slightly higher in the leaves than that in the stems at both habitats. Also it was obivous that the total nitrogen and protein were higher at Catherin than that of Wadi Fieran habitat.

The increase in the soil moisture stress may decreased the assimilation and accumulation of nitrogenous compounds in *Verbascum sinaticum*, a behaviour similar to the response of carbohydrates to soil drought conditions. These results are inagreement with those obtained by Abd El-Rahman *et al.* (1971) and El-Monayeri *et al* (1981).

3.5.3. Determination of total lipid contents:

(Table 8) indicated that the total lipid was also higher in the leaves than that of the stem at both habitats and higher at Catherin than at Wadi Fieran habitat.

It was obvious that the highest percentage of total lipid content may be due to the increase concentration which convert to lipid by oxidation reaction, which agreed with Meayer and Andrson (1952).

3.6. Active constituents preliminary phytochemical screening:

The preliminary phytochemical screening of *Verbascum sinaticum* at the two habitats in both leaves and stems indicated that the plant contained flavonoid, alkaloids, saponins and tannins as active constituents.

3.6.1. Estimation of total flavonoids:

The total flavonoid present in *Verbascum sinaticum* at the two studied habitats were determiend spectrophotometrically and calculated as luteolin. Data presented in (Table 9) indicated that the percentages of total flavonoids of the plants was higher in the leaves than those at the stems. And it was higher at Catherin than those at Wadi Fieran habitats.

The natural plants produce different kinds of natural secondary metabolate during their metabolism, where the nature and amounts of these compounds vary according to the environmental condition. Some of these compounds have an essential role in growth and development but the majority of them are involved in chemical defence systems, which protect plants from herbivores and microbial infection (Michael, 1997).

A number of phenolic compounds have been identified in the surface waxes of leaves or fruits to prevent germinaiton of hostile fungal spores. Plant phenolics are liable to interact with animals that eat plants throughout the whole process of food selection, eating and digestion.

Isoflavones have long-term effects on grazing animals because of their oestrogenic properties.

3.6.2. Estimation of total alkaloids:

Data presented in (Table 9) indicated that the percentages of total alkaloids of *Verbascum sinaticum* was higher in leaves than those of stems. And it was higher at catherin than those at wadi fieran habitats.

Alkaloids are poisonous agents protecting the plant against insects and herbivores, so during growth and development of plants alkaloids are used as defensive agents and concentrated near the surface regulatory growth factors, where they are capable of supplying nitrogen on other elements to the plants.

3.6.3. Estimation of total saponins:

The total saponins of *Verbascum sinaticum* at the two localities were illustrated in (Table 9). Data presented indicated that the percentages of total saponins was higher in the leaves and stem at Catherine than those of Wadi Fieran habitats.

Saponins have a bitter acrid taste and they are sternutatory and irritating to the mucous membranes of eyes and nose. Saponins are toxic to animals, so accumulation of them in plants are defensive against herbivores especially on the surface.

3.6.4. Estimation of tannins:

The total tannins of *Verbascum sinaticum* at the two habitats were illustrated in (Table 9). Data presented indicated that the percentages of total tannins of the plants was higher in the leaves than those in the stem. And it was higher at Catherin than those of Wadi Fieran habitats.

Tannins inhibit the growth of many fungi. Tannins play a role in protecting the plants against grazing animals as they cause increase of the excretion of saliva and thus decrease the palatability and rate of digestion in animals.

Table (6): GLC of fatty acid of *Verbascum sinaticum*.

Item	Catherin		Wadi Fieran	
	Leave	Stem	Leave	Stem
Caproic acid	-	1.3	1.1	1.5
Caprylic acid	0.8	0.2	0.1	1.1
Capric acid	2.7	1.1	3.9	1.8
Lauric acid	1.9	1.1	2.9	0.6
Myristic acid	23.6	0.1	21.1	0.9
Pentadecylic acid	-	-	0.1	0.2
Palmitic acid	3.1	14.1	5.1	16.1
Palmitoleic acid	-	24.4	-	14.8
Stearic acid	41.6	7.7	32.2	5.1
Oleic acid	16.7	19.2	18.1	23.5
Linoleic acid	9.3	26.8	11.8	30.9
Linolenic acid	0.5	2.4	1.7	3.3
Brassidic acid	0.3	0.1	-	-
Un known	0.3	0.3	0.1	-
Un known	-	-	1.2	-

Table (7): GLC of – hydrocarbon and sterol of *Verbascum sinaticum* at two studied habitats

Hydrocarbon and sterol	Catherin		Wadi Fieran	
	Leave	Stem	Leave	Stem
Tetradecanoic	-	9.2	-	11.6
Hexadecanoic	10.6	2.0	0.7	0.9
Octadecanoic	1.2	1.0	0.7	2.9
Eicosanoic	6.3	0.5	1.4	3.6
Docosanoic	7.2	0.7	3.0	0.06
Tetracosanoic	11.0	1.5	-	-
Hexacosanoic	8.9	4.0	2.0	6.8
Octacosanoic	22.3	33.2	2.3	26.03
Triaontamoic	3.9	11.1	10.4	5.9
Cholesterol	26.1	-	-	11.2
B-Sitosterol	1.6	16.2	19.4	28.7
Un known	-	20.7	60.0	2.4

Table (8): Metabolic products in *Verbascum sinaticum* at two studied habitats.

Metabolic product	Catherin		Wadi Fieran	
	Leave	Stem	Leave	Stem
Total carbohydrates	2.3	1.2	1.8	1.4
Soluble carbohydrates	0.9	0.5	0.7	0.3
Insoluble carbohydrates	1.4	0.7	1.1	1.1
Total lipids	3.22	1.82	2.89	1.06
Total nitrogen	1.00	0.65	0.80	0.32
Total protein	6.25	4.06	5.00	3.98

Table (9): Percentage of the active constituents of *Verbascum sinaticum* during the period of investigation at Catherin and Wadi Fieran habitats

Item	Catherin		Wadi Fieran	
	Leave	Stem	Leave	Stem
Total flavnoids	1.8	1.3	0.63	0.31
Total alkaloids	2.4	1.5	1.9	0.87
Total saponins	0.29	0.21	0.18	0.14
Total tannins	3.9	2.8	3.1	2.2

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دراسات كيميائية نباتية على نبات فيرباسكم سيناتيكم(عورور)

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تضم فصيلة حنك السبع عدداً من النباتات ذات الأهمية الاقتصادية والطبية وذلك لاحتوائها على مركبات فعالة مختلفة ولذلك فقد تم اختيار نبات فيرباسكم سينتيكم أحد أنواع هذه الفصيلة المنتشر فى منطقتى وادى فيران وكاترين لدراسة مكونات النبات الكيميائية من سكريات وبروتينات ودهنيات وتحليلها لموادها الأوليه واستخلاصها والتعرف عليها نوعياً وتقديرها كمياً وقد اشتمل البحث على مسح كيميائى اولى للنبات اتضح منه ان النبات يحتوى على استيرولات وفلافونيدات وكلوريدات وتانينات وصابونين وقلويدات وكربوهيدرات و/ اوجليكوسيدات .

وقد تم خلال هذه الدراسة ما يلى :-

* التعرف على السكريات الحرة فى النبات فى الورقة والساق فى المنطقتين وذلك باستعمال طرق التفريد الورقى فتبين وجود السكريات الحرة فى الورقة فى كلتا المنطقتين حيث يوجد جلوكوز – فركتوز – رامينوز وارابينوز بينما لا يوجد رامينوز فى الساق فى منطقة كاترين ولا يوجد رامينوزوفركتوز فى الساق فى منطقة وادى فيران .

كما تبين وجود السكريات المرتبطة فى الجلوكوز ورامينوز وسكروز وارابينوز فى الورقة منطقة كاترين ونفس المركبات توجد فى الساق ما عدا الرامينوز على الجانب الأخر يوجد فى منطقة وادى فيران جلوكوز وفركتوز ورامينوز وسكروز وارابينوز فى الورقة ويحتوى الساق على نفس المركبات ماعدا الفركتوز والرامينوز .

التعرف على الاحماض من الامينية المرة التى يحتويها النبات بواسطة التفريد الورقى فتبين وجود الاحماض الامينية الحرة بروالين – الانين – ليسين فى الورقة والساق فى كلا المنطقتين بينما حمض الاسبارتك – سيرمين – جليسلين – فالين – ايسوليوسلين – ليوسين توجد فقط فى الساق فى كلتا المنطقتين وفى الورقة فى وادى فيران بينما لا توجد فى الورقة فى كلترين اما بالنسبة للاحماض الامينيه الداخلة فى تركيب البروتين والتى تم تقديرها كنسبة مئوية فى المنطقتين باستخدام جهاز تحليل الاحماض الامينيه فكان البرولين أعلى نسبه فى الورقة فى كاترين ٥٢٥,١% وفى وادى فيران ١٨,٣% بينما فى الساق كان ليوسين ١٨,٦% ، ١٥,١% فى كلتا المنطقتين .

اتضح من دراسة محتوى النبات من الدهون ودراسة خواصها الطبيعية والكيميائية ان نسب الدهون اقل فى الورقة عنها فى الساق بينما رقم الحمض –رقم الأيودين–رقم الاستر – رقم التصبن – يزيد فى وادى فيران عنه فى كاترين.

أما الاسيترولات والمركبات الهيدروكربونية فلا يوجد فروق بين المنطقتين الا انه يوجد تتراكوسانويك فى كاترين فقط ويوجد كوليسترول فى الورقة والساق فى كلتا المنطقتين.

أوضح التحليل الكروماتوجرا فى للاحماض الدهنية ان حامض استياريك هو الحامض السائد فى الاوراق فى كلاتا المنطقتين بينما حامض لينوليك هو السائد فى الساق فى كل من المنطقتين .

وبدراسة محتوى النبات من النيتروجين – البروتين – اللبيدات ،والكربوهيدرات الكلية والذائبة والغير ذائبة اتضح انها.

كانت اعلى فى الأوراق عنها فى الساق فى كل من المنطقتين واعلى فى كاترين عن وادى فيران .

وبدراسة كميات المواد الفعالة فى النبات وجد ان الفلافونيدات والقلويدات والصابونين والتانينات اعلى فى الأوراق عنها فى الساق وأعلى فى كاترين عنها فى وادى فيران .