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Comparative Study on some Plants as Sources of Natural Antioxidants

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ABSTRACT

Nowadays, plants and natural products have a great probable interest due to their pharmaceutical, cosmetic and nutritional applications. So, the biologically active compounds of moringa and fig leaves as well as red pepper fruits and seeds were assessed as antioxidants agents as well as their antioxidant activities were evaluated using different assays and the obtained results revealed that, moringa and fig leaves had the highest content of chlorophylls A and B, but their contents in moringa leaves (625.37 and 229.94 mg/100g, respectively) were more than four folds greater than fig leaves (142.14 and 83.57 mg/100g, respectively). Red pepper fruits and moringa leaves had the highest contents of total carotenoids. The ABTS and DPPH procedures gave the highest antioxidant capacity values of all selected raw materials. Furthermore, moringa and fig leaves recorded the highest contents of antioxidant activity comparing with red pepper fruits and seeds correlated with the highly contents of total phenols and flavonoids. Moringa leaves had higher contents of phenolic acids (309.4mg/100g) than other selected plants and E- vanillic and pyrogallol were the most common phenolic compounds found in moringa leaves. On the other hand, there are little differences between fig leaves and red pepper fruits but, the lowest phenolic acids content (136.58 mg/100g) was detected in red pepper seeds. There was variation in flavonoids individuals between all selected raw materials. Moringa and fig leaves had approximately the same highest contents of flavonoids (283.71 and 266.73 mg/100g, respectively) than red pepper fruits and seeds which recorded lowest ones (112.84 mg/100g). Cobalamin (B_{12}) was the major B complex vitamins found in fig leaves, red pepper fruits, moringa leaves and red pepper seeds which recorded 994.01, 217.46, 164.81 and 125.5 mg/100g, respectively. Moringa leaves and red pepper fruits are considered as excellent sources for vitamins C and K that play an important roles as antioxidant agents to protect biological systems via inhibition or prevention of oxidation stress induced by reactive oxygen substances generated from normal metabolic activity or environmental factors followed by red pepper seeds and fig leaves.

Keywords: Moringa leaves, Fig leaves, Red pepper fruits and seeds, antioxidants activity assays

INTRODUCTION

Medicinal plants and natural products have been recognized as a source for medicines since ancient times across the world for treating and preventing human diseases. Many antioxidant compounds from plants such as carotenoids, ascorbic acid, flavonoid and phenolic compounds are the effective nutrients to prevent oxidative stress related disease including diabetes, Alzheimer's, Parkinson's, cardiovascular diseases, cancers and aging process (Volko *et al*., 2007). Among the diversity of antioxidant constituents from plants, phenolic and flavonoid compounds have received a great deal of attention as antioxidant to prevent diseases caused as a result of oxidative stress (Karimi *et al*., 2011).

Moringa (*Moringa oleifera* Lam), is a high source for in nutrients and phytochemical compounds as vitamins, proteins, β-carotene, amino acids and various phenolics such as caffeoylquinic acid, kaempferol, quercetin and zeatin with potential for nutritional and therapeutic applications (Siddhuraju and Becker, 2003). Different parts of this plant such as roots, leaves, bark, flowers, fruit of immature pods and seeds have a number of therapeutic properties such as, antioxidant, anti-inflammatory (Mahajan *et al*., 2009), antihypertensive, antitumor, antibacterial (Rahman and Sheikh, 2009), cholesterol lowering, hepatoprotective (Mehta *et al*., 2003) and are being operational in various traditional medicine system for curing different health problems (Stohs and Hartman, 2015).

Fig (*Ficus carica*) is a rich fruit containing vitamins, minerals, fats and having the highest plant sources for calcium, potassium (that help control blood pressure) and fibers. They are good sources of flavonoids, polyphenols and some bioactive compounds (Gilani *et al*., 2008). The leaves of this plant have anti diabetics properties and reduce the amount of insulin needed by diabetics (Perez *et al*., 2003), inhibit the growth of cancer cells and prevent colon cancer (Herre *et al*., 2008).

Peppers *(Capsicum annuum*) are a good source for several health-promoting compounds such as flavonoids, carotenoids, vitamin C and capsaicinoids, responsible for their characteristic hot taste, (Kim *et al*., 2010). In peppers, there are phytochemical properties that have many biochemical and pharmacological properties which includes antioxidants, anti-inflammatory and anti-carcinogenic activities (Nishino *et al*., 2009), antimicrobial activity (Wahba *et al*., 2010) that can also boost immune system. Accordingly, this investigation was planned to evaluate the phytochemicals and bioactive compounds of selected raw materials as antioxidants agents as well as-evaluate their antioxidant activities using different assays.

MATERIALS AND METHODS

Materials

Raw Materials

- Moringa seeds (*Moringa oleifera* Lam) were sown in experimental station of Agriculture of Faculty, Mansoura University during seasons of 2015 and 2016, then moringa terminal buds were used. Fig buds (*ficus carica*) were obtained from El Minia city and red hot pepper fruits (*Capsicum annuum* L.) were obtained from a culture near Giza governorate, Egypt.
- Most chemicals (analytical grade) were purchased from Elgomhouria pharmaceuticals Co., Cairo, Egypt.
- -2.2-diphenyl-1-1picryl-hydrazyl (DPPH), Folin-Ciocalteu reagent, 2.2-azino-bis(3- ethylbenzthiazoline- 6-sulfonic acid (ABTS), gallic acid, quercitin and butelated hydroxy toluene (BHT) were obtained from Sigma-Aldrich Chime, Steinheim, Germany.

Methods

Collection and preparation of plant materials

The fresh leaves of moringa and fig buds were collected washed in running tap water to remove impurities, drained from excess water and shade dried for 4 days. The dried leaves were grounded to fine powder (Anjorin *et al*., 2010). The red pepper fruits were washed several times with tap water, the seeds and peduncle were removed, cut into small pieces, steamed for 5 min. and

blotted with tissue paper to remove excess water, dried in oven at 50±1°C for two days and ground to fine powder (Tunde-Akintunde, 2010). Whereas, the seeds and peduncles were removed, then dried alone in oven at 50 ±1°C for two days and ground to fine powder.

Analytical methods

- Total anthocyanins were determined according to the method described by Ranganna (1977). Both chlorophylls (A and B) and total carotenoids of samples were determined according to the methods described by Holm (1954) and Wetsttein (1957).
- Total phenolic compounds content was determined using Folin-Ciocalteau reagent according to the method described by Maurya and Singh (2010) and phenolic compounds were fractionated and identified by HPLC according to the method described by Goupy *et al.* (1999).
- Total flavonoids content was determined according to the method described by Jia *et al*. (1999) and flavonoid compounds were fractionated and identified by HPLC according to the method of Loon *et al*. (2005).

Determination of antioxidant activity using different procedures

- The 2, 2'-azino-bis (3-ethylbenzothiazoline-6-sulphonic acid (ABTS) assay was carried out according to Re *et al.* (1999).
- The antioxidant activity of samples was determined by the 2, 2'-Diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity according to the colorimetric method of Brand-Williams *et al*. (1995), as well as it was also determined by measuring the inhibition of hydroperoxides formed from linoleic acid oxidation (Dapkevicius *et al*., 1998). The ferric reducing property of sample extracts was determined according to the method described by Lim and Murtijaya (2007).
- B- Complex vitamins were fractionated according to the method described by Batifoulier *et al.* (2005).
- Vitamin C was determined using 2, 6 Dichlorophenol - Indophenol according to the method described by Ranganna (1977).
- Vitamins A, D, E and K were determined according to the methods of Pyka and Sliwiok (2001).

The statistical analysis

The statistical analysis was carried out using one way analysis of variance (ANOVA) under significant level of 0.05 for the whole results using the statistical program CoStat (Ver. 6.400) and data were treated as complete randomization design according to Steel *et al*. (1997). To ascertain the significant among means of different samples, LSD test was applied.

RESULTS AND DISCUSSION

Bioactive compounds content of selected raw materials

The biologically active compounds of moringa and fig leaves as well as red pepper fruits and seeds were evaluated and the results are presented in Table (1). Moringa and fig leaves had the highest content of chlorophylls A and B but their content in moringa leaves (625.37 and 229.94 mg/100g, respectively) were more than four folds greater than fig leaves (142.14 and 83.57 mg/100g, respectively). Red pepper fruits and moringa leaves had the highest contents of total carotenoids (138.88 and 102.20 mg/100g, respectively) followed by fig leaves which were 78.83 mg/100g. These results are in agreement with those reported by Campos *et al*. (2013), Younis *et al.* (2013) and Abdalla (2015). Total anthocyanin in red pepper fruits was 25.43 mg/100g, whereas, noticeable amount was found in red pepper seeds. These results are in accordance with those reported by Loizzo *et al*. (2017).

Table 1. Bioactive compounds content of selected raw materials

*Samples Constituents	Moringa leaves	Fig leaves	Red pepper fruits	Red pepper seeds	LSD at 5%
Anthocyanin (mg/100g)	ND	ND	25.43±0.14^{a}	1.51±1.53^{b}	0.22
Chlorophyll A (mg/100g)	625.37± 0.33^{a}	142.14± 0.39^{b}	40.77± 0.34^{c}	0.04±1.0^{d}	0.58
Chlorophyll B (mg/100g)	229.94± 1.66^{a}	83.57± 0.67^{b}	80.63±0.57^{c}	0.09±1.53^{d}	1.32
Total carotenoids (mg/100g)	102.20± 0.19^{b}	78.83± 0.48^{c}	138.88 ± 0.49^{a}	1.06±1.00^{d}	0.67
Total phenols (as gallic acid) (mg/g)	14.01± 6.42^{a}	12.12± 0.39^{b}	8.61± 0.13^{c}	4.76± 0.80^{d}	0.40
Total flavonoids (mg/g)	12.17 ± 1.26^{a}	8.02 ± 0.71^{b}	7.37± 0.36^{b}	3.82± 9.7^{c}	1.41

***(dry weight)**

Moringa and fig leaves had the highest contents of total phenols and flavonoids (14.01 , 12.17 and 12.12 , 8.02 mg/g, respectively) followed by red pepper fruits which had 8.61 and 7.37 mg/g, respectively for total phenols and flavonoids. Meanwhile, the red pepper seeds recorded the lowest contents (4.76 and 3.82 mg/g, respectively). These results are in agreement with those reported by Shi *et al*. (2011), El Sohaimy *et al*. (2015) and Loizzo *et al*. (2017), they found that, the level of total phenolic and flavonoid contents in moringa leaves ranged from 13.4 to 115.68 and 14.32 to 113.95 mg/g, respectively, but in fig leaves ranged from 3.9 to 17.44 and 1.05 to 3.87 mg/g, respectively whereas, the total phenolic and flavonoid contents of hot red pepper varied from 1.17 to 36.87 and 0.69 to 8.39 mg/g, respectively.

Evaluation of antioxidant activity procedures of selected raw materials

Four procedures namely ABTS, DPPH, β – carotene and Frap were used to evaluate the antioxidant activity content of moringa and fig leaves and red pepper fruits and seeds and the result are presented in Table (2). The ABTS procedure recorded the highest contents of antioxidant activity in moringa and fig leaves and red pepper fruits (93.81, 92.11 and 90.09 %, respectively) whereas; the red pepper seeds were 84.93%. Little differences of the antioxidant data between ABTS and DPPH procedures were recorded. Using DPPH procedure, the antioxidant activity of moringa, fig leaves and red pepper fruits were 89.47, 88.81 and 87.56%, respectively, while in red pepper seeds was 64.79%. These results are in accordance with those reported by Ouchemoukh *et al*. (2012), Gamal *et al*. (2016) and López *et al*. (2017).

The data of β – carotene procedure showed moderate results (68.66, 66.11, 64.40 and 61.30 %, respectively) for moringa, fig leaves, red pepper fruits and seeds comparing with the data of ABTS and DPPH procedures. Whereas, the lowest values of antioxidant activities were recorded when the Frap procedure was

used. The FRAP procedure is a method for measuring total reducing power of electron donating substances, while ABTS and DPPH assays are procedures for measuring the ability of antioxidant molecules to quench ABTS and DPPH free radicals, respectively (Wangcharoen and Gomolmanee, 2011).

Generally, from the aforementioned data it could be concluded that, the different values of each antioxidant capacity assay resulted from the different mechanism of each procedures. The ABTS and DPPH procedures gave the highest antioxidant capacity values of all selected raw materials. Furthermore, moringa and fig leaves recorded the highest contents of antioxidant activity comparing with red pepper fruits and seeds correlated with the highly contents of total phenols and flavonoids.

Table 2. Evaluation of antioxidant activity assays of selected plants

*Samples Antioxidant activity %	Moringa leaves	Fig leaves	Red pepper fruits	Red pepper seeds	LSD at 5%
ABTS	93.81± 0.32^{a}	92.11± 0.77^{ab}	90.09± 2.16^{b}	84.93±1.09^{c}	2.41
DPPH	89.47±0.28^{a}	88.81±0.37^{a}	87.56±0.42^{a}	64.79±2.82^{b}	2.82
β - carotene	68.66±1.18^{a}	66.11± 0.83^{b}	64.40± 0.53^{b}	61.30±1.04^{c}	1.74
Frap	6.11± 1.17^{a}	6.00±1.53^{b}	5.79± 1.99^{c}	2.68±9.50^{d}	9.32

***(dry weight)**
ABTS (+(2,2-azino-bis(3-ethylbenzthiazoline- 6-sulfonic acid)).
DPPH (2, 2'-Diphenyl-1-picrylhydrazyl).
β-Carotene bleaching assay
Frap (Ferric reducing-antioxidant power).

Fractionation of phenolic compounds of selected raw materials

The phenolic compounds of selected raw materials were separated and identified by HPLC and the results are presented in Table (3).Twenty four phenolic compounds were identified and pyrogallol was the major phenolic compound detected in red pepper fruits and seeds that represented 74.19 and 54.94 mg/100g, respectively comparing with its contents in moringa and fig leaves which were 47.06 and 15.65 mg/100g, respectively. E-vanillic and vanillic acids were the most common phenolic compounds found in moringa and fig leaves (78.14 and 26.15 mg/100g, respectively),whereas, E- vanillic was the second phenolic acid that detected in fig leaves (24.25 mg/100g), red pepper fruits (26.03 mg/100g) and red pepper seeds (18.36 mg/100g). As well as, ellagic, catechol, epicatechein and P-OH-benzoic were also detected in moderate amounts of all selected materials. These results are in agreement with those reported by Babiker *et al*. (2016) and Gamal *et al*. (2016), they stated that, the major phenolic acids was protocatechuic acid (97.92 to 109.15 mg/100g) followed by gallic acid (3.64 to 4.13 mg/100g) in moringa leaves and the most common phenolic compounds found in red pepper fruits E- vanillic acid (.15 mg/100g) followed by chlorogenic acid (15.74 mg/100g).

Table 3. Fractionation of phenolic compounds of selected plants

*Samples Phenolic compounds (mg/100g)	Moringa leaves	Fig leaves	Red pepper fruits	Red pepper seeds
Gallic acid	1.30	0.90	1.57	0.29
Pyrogallol	47.06	15.65	74.19	54.94
4-Amino-benzoic acid	0.88	0.65	1.24	2.35
Protocatchuic	4.19	2.19	4.88	4.98
Catechein	14.82	15.72	2.07	5.60
Chlorogenic acid	8.99	7.67	12.52	0.85
Catechol	11.10	8.04	27.08	3.17
Epicatechein	22.67	6.11	2.68	1.09
Caffeine	1.38	2.80	2.00	3.02
P-OH-benzoic acid	22.49	3.64	4.80	3.24
Caffeic acid	1.75	6.63	0.82	0.21
Vanillic acid	8.00	26.15	3.38	3.79
P-Coumaric acid	1.32	4.48	4.20	1.62
Ferulic acid	2.52	6.03	2.59	1.07
Iso-Ferulic acid	19.61	9.36	2.30	0.32
Reversetrol	0.42	0.79	0.42	0.32
Ellagic acid	22.00	21.95	13.37	11.29
E- vanillic acid	78.14	24.25	26.03	18.36
Alpha-Coumaric acid	7.42	3.39	2.78	0.95
Benzoic acid	17.80	19.05	4.78	8.66
3,4,5-methoxy-cinnamic acid	1.68	1.54	0.57	1.10
Coumarin	1.82	1.17	0.84	1.86
Salycilic acid	10.39	5.63	4.19	7.24
Cinnamic acid	1.65	0.69	0.27	0.26
Total	309.4	194.48	199.55	136.58

***(dry weight)**

From the aforementioned data, it could be clearly concluded that moringa leaves had higher contents of phenolic acids (309.4mg/100g) than other selected plants. On the other hand, there are little differences between fig leaves and red pepper fruits but, the lowest phenolic acids content (136.58 mg/100g) was detected in red pepper seeds. These results are confirmed with the data of total phenols content which illustrated previously in Table (1). The concentration of total polyphenols determined by Folin–Ciocalteu method was higher than the concentration obtained by HPLC method. The HPLC method presented only 50–60% of the level analyzed by the Folin–Ciocalteu method (Ferreira *et al.*, 2002).

Fractionation of flavonoid compounds of selected raw materials

Data in Table (4) reveal that, seventeen flavonoid compounds were identified from selected raw materials and hesperidin was the predominant flavonoid compound, which amounted to 55.69 mg/100g for moringa leaves, 42.64 mg/100g for red pepper fruits and 30.52 mg/100g for seeds. Rutin was the major compound (75.21 mg/100g) found in fig leaves, but it was the second major flavonoid compound (48.75 mg/100g) detected in moringa leaves. Furthermore, hesperidin (47.53 mg/100g) in fig leaves and narengin (20.76 mg/100g and 20.09 mg/100g) in red pepper fruits and seeds were the second major flavonoids compounds detected. These results are in accordance with those reported by Gamal *et al*. (2016) who found that fig leaves were rich sources for many flavones as Kampherol and rutin. Moreover, apigenin -7 –glucose, acacetin neo. rutinodie and luteolin found also in high amounts in all selected raw materials.

Generally, it could be clearly concluded that there were variation in flavonoids individuals between all selected raw materials. Moringa and fig leaves had approximately the same highest contents of flavonoids (283.71 and 266.73 mg/100g, respectively) than red pepper seeds which recorded lowest ones (112.84 mg/100g).

Table 4. Identification of flavonoid compounds of selected plants

*Samples Flavonoid compounds (mg/100g)	Moringa leaves	Fig leaves	Red pepper fruits	Red pepper seeds
Luteolin	17.44	20.32	6.18	15.32
Narengin	44.60	32.22	20.76	20.09
Rutin	48.75	75.21	9.162	3.07
Hesperidin	55.69	47.53	42.64	30.52
Rosmarinic	4.49	2.00	0.92	1.27
Quercetrin	4.85	6.67	7.28	2.19
Quercetin	3.31	1.37	1.49	1.82
Naringenin	8.05	1.46	2.54	0.32
Hespertin	11.31	2.20	4.43	0.92
Kaempferol	2.77	0.42	2.06	1.41
Apigenin	1.14	0.55	1.12	1.63
Apigenin 6- rhamose 8- glucose	9.51	17.76	6.82	14.80
Quercetin-3-o-glucose	0.69	2.90	1.08	0.097
Apigenin -7 -glucose	32.47	33.64	15.91	2.55
Apigenin -7-0 -neoheos	4.76	7.19	10.08	5.65
Kaempferol 3-7-diramoside	9.63	4.31	3.96	2.74
Acacetin neo. rutinodie	24.25	10.62	17.68	8.24
Total	283.71	266.37	151.11	112.84

***(dry weight)**

B complex vitamins content of selected raw materials

Data in Table (5) reveal that, cobalamin (B_{12}) was the major B complex vitamins found in fig leaves, red pepper fruits, moringa leaves and red pepper seeds which recorded 994.01, 217.46, 164.81 and 125.5 mg/100g, respectively. Whereas, nicotinic acid was the second detected vitamins in red pepper fruits, fig leaves and red pepper seeds (70.22, 38.84 and 30.81 mg/100g, respectively) as well as, pyoxidin (B_6) was 70.09 mg/100g in moringa leaves. Thiamin (B_1), riboflavin (B_{12}) and folic acid detected also with small amounts in all tested plants. The aforementioned data of B complex vitamins are in accordance with those reported by Mensah *et al*. (2012) and El Sohaimy *et al*. (2015), they reported that, the vitamin B complex content of moringa leaves ranged from 0.05 to 2.64 (B_1) and 0.8 to 20.5(B_2).

Vitamins A, C, D, E and K contents of selected raw materials

From the data in Table (6), it could be clearly noticed that moringa leaves and red pepper fruits had the highest content of vitamins K (725.25 and 530.90 mg/100g, respectively) and vitamin C (317.72 and 118.53 mg /100g), followed by fig leaves and red pepper seeds which contains moderate amounts. These results are in agreement with those reported by Keleş *et al*. (2016) and Nobosse *et al*.(2017) they found that, moringa leaves and red pepper fruits are rich sources of vitamin C which ranged from 218.13 to 691.0 and 10.10 to 100.5 mg/100g, respectively, as well as, peppers had ascorbic acid content four times higher than orange that are considered the most important source for this healthy compound. The vitamin C content of fresh and dried hot red pepper ranged from 87.13 to 280.0 and 58.5 to 173.7 mg/100g, respectively (Ozgur *et al*., 2011). On the other hand, small amounts of vitamin D and noticeable amounts of vitamins A and E were detected in all tested raw materials.

Generally, it could be concluded that moringa leaves and red pepper fruits are considered as excellent sources for vitamins C and K that play an important roles as antioxidant agents to protect biological systems via inhibition or prevention of oxidation stress induced by reactive oxygen substances generated from normal metabolic activity or environmental factors followed by red pepper seeds and fig leaves.

Table 5. Fractionation of B complex vitamins of selected plants

*Samples Vitamin B Complex fractions (mg/100g)	Moringa leaves	Fig leaves	Red pepper Fruits	Red pepper seeds
Nicotenic acid (Niacin)	39.25	38.84	70.22	30.81
Thiamin (B1)	19.81	8.93	19.36	6.25
Pyroxidin (B6)	70.09	10.47	22.79	7.95
Folic acid	8.65	6.06	12.35	5.63
Cobalamin (B12)	164.81	994.01	217.46	125.5
Riboflavin (B2)	16.25	13.12	11.55	4.32

***(dry weight)**

Table 6. Vitamins A, C, D, E and K contents of selected plants

*Samples Vitamins (mg/100g)	Moringa leaves	Fig leaves	Red pepper fruits	Red pepper seeds
Vit. A	0.37	1.01	0.79	0.31
Vit. C	317.72	41.95	118.53	23.08
Vit. D	3.21	6.38	5.81	2.85
Vit. E	0.42	0.28	0.16	0.1
Vit. K	725.25	86.45	530.90	211.45

***(dry weight)**

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دراسة مقارنة على بعض النباتات كمصادر لمضادات الأكسدة الطبيعية

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فى الأونة الأخيرة ظهر اهتمام عالمي كبير بالنباتات والمنتجات الطبيعية نتيجة لدخولها فى العديد من التطبيقات الغذائية والدوائية ومستحضرات التجميل . لذلك تم تقييم المركبات الحيوية النشطة لكل من أوراق نبات المورينجا والتين وثمار وبذور الفلفل الأحمر كمضادات طبيعيه للأكسده بالإضافه إلى تقييم النشاط المضاد لإكسده لهذه النباتات بإستخدام طرق مختلفة والمفاضله بينها. وتوصلت النتائج إلى أن أوراق نبات المورينجا والتين سجلت أعلى محتوى من كلورفيل A& B حيث كان محتواهما فى أوراق المورينجا (٦٢٥.٣٧ و ٢٢٩.٩٤ ملجرام/١٠٠ جرام على التوالى) أعلى أربع أضعاف من محتواهما فى أوراق التين والتى كانت ١٤٢.١٤ و ٨٣.٥٧ ملجرام /١٠٠ جرام على التوالى. وأحتوت ثمار الفلفل الاحمر وأوراق المورينجا على أعلى نسبة من الكاروتينات الكلية. كما سجلت كلا من طريقه ABTS و DPPH أعلى قيم فى النشاط المضاد للأكسده فى جميع العينات مقارنه بالطرق الاخرى. وسجلت أوراق المورينجا والتين أعلى محتوى من النشاط المضاد للأكسده مقارنة بثمار وبذور الفلفل وذلك نتيجه لإرتفاع محتواهما من الفينولات والفلافونيدات الكلية. سجلت أوراق المورينجا أعلى محتوى من الأحماض الفينوليه (٣٠٩.٤ ملجرام/١٠٠جرام) مقارنه بباقى العينات وكان E-vanillic و Pyrogallol أكثر المركبات الفينوليه شيوعا فى أوراق نبات المورينجا كما وجد إختلافات طفيفه بين أوراق التين وثمار الفلفل الأحمر بينما سجلت بذور الفلفل الأحمر أقل محتوى من المركبات الفينوليه (١٣٦.٥٨ ملجرام /١٠٠جرام). كما وجد إختلافات فى محتوى الفلافونيدات المفرده بين كل المواد محل الدراسة حيث سجلت أوراق المورينجا والتين تقريبا نفس المحتوى المرتفع فى الفلافونيدات (٢٨٣.٧١ و٢٦٦.٧٣ ملجرام /١٠٠جرام) مقارنه بثمار الفلفل الأحمر وبذوره والتى كانتا أقلهما فى محتوى الفلافونيدات (١١٢.٨٤ ملجرام/١٠٠جرام). كان الكوبلامين (B_{12}) من أكثر مجموعة فيتامين B المركبة التى وجدت فى أوراق التين وثمار الفلفل الأحمر وأوراق المورينجا وبذور الفلفل الأحمر والتى سجل ٩٩٤.٠١ و ٢١٧.٤٦ و ١٦٤.٨١و ١٢٥.٥ ملجرام/١٠٠ جرام على التوالى. وتعتبر أوراق نبات المورينجا وثمار الفلفل الأحمر من المصادر الممتازة لفيتامين C و K والتى تلعب دور مهم كمضادات أكسده لحماية النظام الحيوى وتثبيط ومنع الجهد التأكسدى الناتج عن جزئيات الأكسجين النشطه الناتجه من نشاط الميتابولزم الطبيعى للجسم أو العوامل البيئه الخارجية ويليها بذور الفلفل الأحمر وأوراق التين.