Utilization of Swiss chard as functional food

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Abstract: Swiss chard(*Beta Vulgaris* L. Var. cicla)is one of the healthy vegetables. This food is very low in saturated fat and cholesterol. It is a good source of many vitamins, minerals, dietary fiber and phenolic compounds. In recent years, Swiss chard has been claimed to be useful for the therapy of diabetic hyperglycemia and have been widely investigated . Using Swiss chard in diet was decreased blood cholesterol and body weight. The aim of this work is to investigate the effects of Swiss chard leaves on tammia (Egyptian food), pan bread and pizza characteristics . Swiss chard leaves (*Beta Vulgaris*), and coriander leaves used fresh to prepared tammia, coriander leaves, replaced with Swiss chard leaves with different levels replacements (25,50,75 and 100%) . Dried Swiss chard leaves was used to make pitzza and pan bread. Dried Swiss chard leaves(DSCL) was used in ratio at 1%,3% and 5% for making pizza and Pan bread. Experiments were planned so that the quantity of the applied Swiss chard in the blends with different levels controlling characteristics of the product were: proximate composition ,minerals content, phenolic compounds content, Ratio of vit. A, sensory evaluation and specific volume of pan bread. The results indicated that the replacement of Swiss chard until 50% in tammia was good of sensory properties, while the replacement of Swiss chard until 100% in, tammia was acceptable sensory properties, but adding dried Swiss chard until 3% in producing pitzza and pan bread with acceptable sensory properties. Also it was found that the most effective replacement and adding percent of Swiss chard in all products improved proximate composition, minerals content, phenolic compounds content and Ratio of vit. A.
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1. Introduction

Swiss chard is considered to be one of the healthiest vegetables available, and is a valuable addition to a healthy diet (like other green leafy vegetables(**Jump up, 2011**) Fresh young chard can be used raw in salads. Mature chard leaves and stalks are typically cooked (like in pizzoccheri) or sauteed; their bitterness fades with cooking, leaving a refined flavor which is more delicate than that of cooked spinach Chard has a slightly bitter taste and is used in a variety of cultures around the world, including Arab cuisine. Turkish cuisine, Dolma of Swiss chard ie stuffed Swiss chard is better for stomach to digest than wine leaves. Wikipedia, the free encyclopedia Swiss chard (*Beta vulgaris* L. var. cycla L.) is a leafy vegetable highly valued because it is available year round and for the nutritional properties of its leaves which contain considerable amounts of vitamin C, potassium, calcium and magnesium (**Macias *et al.*,2003 and. USDA, 2005).**

Swiss chard is high in vitamins A, K and C, with a 175 g serving containing 214%, 716%, and 53%, respectively, of the recommended daily value (Jump up,2012) It is also rich in minerals, dietary fiber and protein(**Jump up,2013**).

Nutritionally Swiss chard deserves to be highly valued, as it is an excellent source of many core nutrients as well as phytochemical, it contains high levels of lutein and zeaxanthin. Multi-coloured stalks also contain betalains, which have strong antioxidant activity. Other phenolics in Swiss chard, such the flavonoid kaempferol, are also important antioxidants . Its slightly bitter taste is perhaps to blame for its lack of popularity, but if served mixed with other sweeter vegetables, it can provide an interesting contrast in flavour. Swiss chard ,Its nutritional profile is very similar to that of its close relative, spinach. Besides its many nutrients, it too contains anti-nutritive oxalates Swiss chard is particularly rich in vitamin E. In addition, it provides useful amounts of a wide range of minerals(**Hedges & Lister, 2007**).

Phytochemical screening of Swiss chard has revealed the presence of some fatty acids (palmitic, stearic, oleic, linoleic and linolenic acids) (**Secchi, 1963**), phospholipids, glycolipids (**Zeller *et al.*,1977**), polysaccharides), folic acid, ascorbic acid (Platenius and Schudel) and pectin (**Elwell and Dehn, 1939**). In addition, saponins (**Masayuki and Shoichi, 1997**) and flavonoids (**Dijioux *et al.*,1995**). Swiss Chard (Chenopodiaceae; *Beta vulgaris* subsp. cycla) has been indicated in folk medicine as a hypoglycemic **(Bolkent *et al.*,2000; Sener *et al.*,2002; Yanardag *et al.*,2002)**, anti-inflammatory and hemostatic herb **(Kim *et al.*,2003)**. It has been proposed that another cultivar of

Beta vulgaris, the beet root (Beta vulgaris rapacea) has anticancer activity **(Pa´ tkai *et al.*,1997)**.

Chard may decrease blood sugar by increasing insulin secretion from B cells of the pancreas. We can say that the chard extract acts like an insulinogenic agent in induced diabetic rats. As a result, it can be assumed that plant therapy can provide blood glucose homeostasis and can cause regeneration of B cells of endocrine pancreas**.(Bolkent *et al.*,2000).**

2. Material and Methods

The raw materials used in this study were Swiss chard leaves, khodra (Parsley leaves and coriander leaves). In addition we used flour and beans. All these materials were obtained from local market in Cairo, Egypt.

The preparation of the raw materials:-

The fresh vegetables were thoroughly washed with tap water. Swiss chard leaves cut in small pieces and dried in sun. Then, milled using laboratory mill.

Tammia(Tm):- The vegetables of Ingredients of tammia were shown in Table (1).

Table (1)

Samples	Khodra	Fresh Swiss chard leaves (FSCL)
control	100%	-
Supplemented with (FSCL) 1	75%	25%
Supplemented with (FSC L) 2	50	50%
Supplemented with (FSC L) 3	25	75%
Supplemented with (FSC L) 4	-	100%

- pitzza (pz):| for making (pz)we used Swiss chard leaves in ratio at 1%,3% and 5%
- Pan bread we made pan bread supplemented (Pb) with dried Swiss chard leaves (DSCL) at the same ratio of pizza

I- Methods.

-Chemical analysis:-

Moisture, crude protein, of ash were determined according to **A.O.A.C. (2000),** In addition the carbohydrate were calculated by differences, mineral content were determined after ashing by using Atomic Absorption spectrophotometers as described in **(A.O.A.C. 2000**). *Determination of phenolic compounds:- phenolic compounds were determined by HPLC according to the method of **Goupy *et al.* (1999).**

***Determination of V.A;-**

were determined by HPLC according to the method of **Pyka- and Sliwiok (2001).**

***Sensory** evaluation -

The sensory evaluation were evaluated by ten pane lists for these products. Colour, flavor, taste, odour, texture, Appearance and crust colour were measured as described by **Kulp, and Ponte (1981).**

***Statistical analysis-**

Statistical analysis were carried out by(Spss, Chicago, lll) program for windows. The level of statistical significance was set at $p<0.05$ as reported by **(Eidi *et al.*,2007).**

***Determination of specific volume;-**

The weight and volume of the pan bread were measured after the baking **(Randez-Gil *et al.*,1995).**The ratio of volume to weight was also calculated to obtain the specific volume.

3. Results and Discussion

In multiple epidemiological studies eating vegetables has been found to protect against several chronic diseases associated with aging such as cardiovascular diseases and some types of cancer **(Steinmetz and Potter ,1996)**. Swiss chard (*Beta vul0 garis* L. var. *cycla* L.) is a leafy vegetable highly valued because it is available year round and for the nutritional properties of its leaves which contain considerable amounts of vitamin C, potassium, calcium and magnesium **[Moreira *et al.* (2003), USDA (2005)]**

1- Fresh Swiss chard and Coriander leaves: Results of the proximate composition of Swiss chard, coriander and parsley in Table (2) indicate that content of moisture in Coriander leaves was high(94.1 %) compared to content of moisture in Swiss chard leaves(91%) while contents of Carbohydrates, Protein, Ash, crude Fiber and ether extract in Swiss chard leaves were high (3.7, 2.3, 1.7, 0.9 and 0.4% respectively) compared to content of Carbohydrates, Protein, Ash, crued Fiber and ether extract in Coriander leaves(3.3, 0.9, 1.0, 0.6, 0.1% respectively) .As seen in Table (2), moisture represented the major component followed by Carbohydrates, Protein, Ash, crude Fiber and ether extract, (respectively).

Results of minerals content of Swiss chard, coriander and parsley in Table (3) indicate that content of Macro elements Na, K, P and Ca(mg/100g) were high in Swiss chard leaves(164, 505, 32 and 85 mg/100g respectively,) compared to that minerals content of Coriander leaves(126 , 341 , 28 and 39 mg/100g respectively). As seen in Table (3)content Swiss chard leaves of Microelements, Fe and Zn were high (3.05 and2.00 mg/100g respectively) compared to that minerals content of Coriander leaves(0.3 and 1.60

mg/100g respectively) **SHANNON *et al.* (2000)** Swiss chard accumulates higher levels of sodium in its tissues compared with other leafy vegetables.

Table (2) proximate composition of Swiss chard, coriander and parsley.

Composition %	Swiss chard leaves	Coriander leaves	Parsely leaves
Moisture	91	94.1	85.1
Protein	2.3		3.6
Ether extract	0.4	0.1	0.6
Crude Fiber	0.9	0.6	1.5
Carbohydrates	3.7	3.3	7.0
Ash	1.7	1.0	2.2

Table (3) minerals content of Swiss chard, coriander and parslely

Ingredients	Macro elements (mg/100g)				Microelements (mg/100g)	
	Na	K	P	Ca	Fe	Zn
Swiss chard leaves	164	505	32	85	3.05	2.00
Coriander leaves	126	341	28	39	0.3	1.60
Parslely leaves	45	72	63	203	5.2	1.89

Unusually for stalky/leafy material, vitamin E. in addition , it provides useful amounts of a wide range of minerals (**Hedges & Lister,2007)**

2- Products

2-1-chemical composition of Tammia

Results of the proximate composition of of dough and fried Tammia TM samples in Table (4) indicate that content of moisture in dough and fried Tammia TM decrease with increase levels of swiss chard. As seen in Table (4) content of Protein, ash, fiber, fat and Carbohydrates in dough and fried Tammia TM increase with increase levels of Swiss chard, the highest increase of Protein, ash, fiber, fat and Carbohydrates in dough Tammia TM(8.50 , 1.85 , 1.3 , 6.30 and 45.05% respectively) with levels 100% of swiss chard. Also the highest increase of Protein, ash, fiber, fat and Carbohydrates in fried Tammia TM(11.62, 2.61, 1.90, 19.35and 34.71 % respectively) with levels 100% of Swiss chard.

Table (4)proximate composition of dough and Fried Tammia TM samples.

proximate / Sample no	Dough						Fried					
	Moisture	Protein	Ash	Fiber	Fat	Carbohydrates	Moisture	Protein	Ash	Fiber	Fat	Carbohydrates
Control	40.20	8.20	1.5	1.01	5.00	44.09	33.70	10.90	2.29	1.50	18.5	33.11
(FSC L) 1	40.00	8.21	1.60	1.04	5.90	43.25	32.00	11.20	2.30	1.62	18.60	34.28
(FSC L) 2	39.00	8.30	1.62	1.11	6.00	43.97	31.20	11.30	2.42	1.71	18.80	34.57
(FSC L)3	38.25	8.40	1.77	1.22	6.20	44.16	30.40	11.50	2.55	1.82	19.10	34.63
(FSCL) 4	37.00	8.50	1.85	1.3	6.30	45.05	29.81	11.62	2.61	1.90	19.35	34.71

As shown in Table (5) minerals content of dough and Fried Tammia (TM) samples per 100g, content of Macro elements (mg) and microelements in dough and Fried Tammia increase with increase Swiss chard leaves levels , the highest increase of Macro elements Na, K, P and Ca(mg/100g) was in Fried Tammia (TM) prepared with 100% Swiss chard leaves as substitute of Coriander leaves(540, 260, 115 and 21 mg/100g respectively),the same samples has the highest content of microelements Fe and Zn(2.52 and 1.40 mg/100g respectively).

This results were similar to that recorded by(**Anthony et al., 1992; Donald & George, 1997),** the leaves and the stalks of chard contain nutritionally significant concentrations of calcium, iron, and phosphorus

Table (5) minerals content of dough and Fried Tammia (TM) samples per 100g.

Elements / Samples	Dough						Fried					
	Macro elements (mg)				Micro elements (mg)		Macro elements				Micro. Elements (mg)	
	Na	K	P	Ca	Fe	Zn	Na	K	P	Ca	Fe	Zn
Control	390	210	103	12	1.85	0.87	522	258	118	20	2.50	1.23
(FSC L)1	398	211	104	14	1.89	0.90	523	259	119	22	2.60	1.29
(FSC L)2	400	214	105	15	1.90	0.97	524	262	113	23	2.66	1.35
(FSC L)3	401	215	109	17	1.99	0.98	529	265	114	24	2.70	1.38
(FSC L)4	403	217	101	13	1.80	0.75	540	260	115	21	2.52	1.40

Table (6) phenolic compounds content of dough and Fried Tammia (TM) samples (P.P.M).

Phenolic compounds	**Dough**					**Fried**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	4	5
P-Benzoic	101.45	297.32	340.14	459.54	601.32	75.54	227.45	290.22	301.45	510.15
Chlorogenic	421.14	610	705.11	855.65	963.84	320.12	501.12	602.45	690.52	710.12
ferulic	422.40	1690.89	1904.15	2150.21	2551.21	310.14	1500.12	1720.54	1950.12	2210.10
Catechol	103.21	579	690.24	775.54	852.64	65.45	420.19	501.12	620.54	690.14
Syringic acid	212.10	7041.89	8124.24	9861.14	10540.54	155.10	5021.10	6123.14	7124.41	8620.10
Coffiec acid	302.12	1220.59	1404.14	1720.10	1950.65	210.10	955.10	111.14	1520.10	1752.17
gallic	85.25	579	695.85	787.14	881.47	55.54	401.14	490.47	552.87	658.58
Vanillic	77.14	500.75	620.12	821.12	978.01	51.10	380.10	485.14	530.41	702.47
protocatechuic	144.16	704.18	850.41	986.24	1123.54	98.14	510.14	630.58	750.14	920.14
p-Coumaric	221.01	1251.89	1452.57	1720.14	1980.34	147.47	820.14	1103.47	1501.41	1710.14
Catechin	55.40	234.73	355.46	460.24	520.10	20.10	190.00	260.10	310.17	401.10
myricetin	60.10	485.10	590.14	661.34	721.01	30.10	350.10	420.14	502.15	610.45
queretin	48.14	344.00	470.12	530.42	654.14	21.41	284.41	401.45	490.48	520.41
kaempferol	203.21	907.92	1200.12	1402.21	1710.12	170.14	705.47	1001.74	1212.54	1520.98

Results in Table (6) indicated that the highest content of phenolic acid in dough and Fried Tammia (TM) samples (P.P.M) was syringic acid. In the same line the highest content of flavonoid of dough and Fried Tammia (TM) samples (P.P.M) was kaempferol ,the same observation was noticed with **Pyo *et al.* (2004)** he found that the major phenolic acid in silver beet was syringic acid and the major flavonoid was kaempferol. Phenolic composition as well as content differed between leaves and stems, with leaves containing more than. As shown in Table (6) dried process caused reduction in phenolic compounds content.

Table (7) Ratio of vit. A of Tammia ™ (dough and Fried).(p.p.m)

Sampes of (TM)	**Vit A**	**Vit.A**
	Dough	**Fried**
Control	3.12	2.12
(FSC L) 1	4.57	3.14
(FSC L) 2	5.04	4.04
(FSC L)3	7.62	5.24
(FSC L)4	9.32	6.92

Table (7) shows the influence of use Swiss chard leaves on Ratio of vit. A of Tammia ™ (dough and fried).(p.p.m), the results in the table (7) indicated that with increase levels of Swiss chard leaves in Tammia ™ (dough and fried) the Ratio of vit. A of Tammia ™ (dough and fried).(p.p.m) increase, the highest content of vit. A 9.32 (p.p.m) in the sample Supplemented with (FSC L) 4 . On the other hand, fried decrease Tammia containing of vit. A, **(Anthony *et al.*, 1992; Donald & George, 1997)** noticed that The leaves and the stalks of Swiss chard contain nutritionally significant concentrations of vitamins A, C and B .

2-2-chemical composition of Pan bread and pizza samples

Results of the proximate composition of pan bread and pizza samples per (100g) in Table (8) indicate that content of moisture in pan bread and pizza samples increase with increase levels of dried Swiss chard leaves This is probably due to the fiber in dried Swiss chard leaves ,which absorb high levels of water . As seen in Table (8) contents of Protein, ash and fiber of pan bread samples increase with increase levels of dried Swiss chard leaves, the highest increase of Protein, ash, and fiber in pan bread (14.59, 1.5 and 0.4, respectively) with levels 5% of dried Swiss chard leaves. In contrast contents of fat and Carbohydrates decrease with increase levels of dried Swiss chard leaves of pan bread samples, Also the highest decrease of fat and Carbohydrates with levels 5% of

dried Swiss chard leaves(5.0 and 47.01% respectively). Also Data in this Table revealed that:-

contents of, ash, fiber, fat and Carbohydrates of Pizza samples increase with increase levels of dried wiss chard leaves, the highest increase of ash, fiber, fat and Carbohydrates in Pizza (3.2, 1.3, 8.20 and 38.4 %respectively) with levels 5% of dried swiss chard leaves. In contrast contents of Protein decrease with increase levels of dried Swiss chard leaves of Pizza samples, Also the highest decrease of Protein with levels 5% of dried Swiss chard leaves(36.00%)

Table (8) Chemical composition of pan bread and pizza samples per (100g).

Sample no.	pan bread						Pizza					
	Moisture	Protein	Ash	Fiber	Fat	Carbohydrates	Moisture	Protein	Ash	Fiber	Fat	Carbohydrates
Control	30.10	11.25	1.1	.15	5.6	51.80	11.89	39.33	2.7	1.05	8.00	37.03
1- supplemented with 1% (DSCL)	30.20	12.19	1.2	0.2	5.5	50.71	12.0	38.56	2.9	1.1	7.8	37.64
2- supplemented with 3% (DSCL)	30.39	13.24	1.4	0.3	5.2	49.47	12.5	37.50	3.0	1.2	7.6	38.2
3- supplemented with 5% (DSCL)	31.41	14.59	1.5	0.4	5.0	47.01	12.9	36.00	3.2	1.3	8.20	**38.4**

Table (9) minerals content of pan bread and pizza samples per (100g).

Samples	Pan bread				Micro elements (mg)		Pizza					
	Macro elements (mg)						Macro				Micro. Elements (mg)	
	Na	K	P	Ca	Fe	Zn	Na	K	P	Ca	Fe	Zn
Control	10.01	22.1	5.21	4.32	1.10	0.755	25.5	10.1	.990	0.12	1.301	.500
1-Supplemented with 1% (DSCL)	11.17	24.60	6.15	4.923	1.352	0.8752	25.9	11.36	11.20	1.51	1.670	0.52
2-Supplemented with 3% (DSCL)	15.31	25.31	7.12	5.121	1.712	0.9121	35.3	25.12	13.10	3.21	1.943	0.544
3-Supplemented with 5% (DSCL)	20.27	35.3	7.81	5.779	1.995	0.9260	35.6	26.85	15.70	5.52	2.041	0.553

As shown in Table (9) minerals content of Pan bread and pizza samples per (100g), content of Macro elements (mg) and microelements in Pan bread and pizza samples per (100g) increase with increase dried Swiss chard leaves levels , the highest increase of Macro elements Na, K, P and Ca(mg/100g) was in Pan bread prepared with 5% dried Swiss chard leaves (20.27, 35.3, 7.81 and 5.779 mg/100g respectively),the same samples has the highest content of microelements Fe and Zn(1.995and 0.9260mg/100g respectively).

Table (10) Ratio of vit. A of Pan bread and (Pizza samples (P.P.M.)

Samples	(Vit. A)	(Vit .A)
	Pan bread	Pizza
Control	666.58	534.25
Supplemented with (1%) (DSCL)	865.82	633.82
Supplemented With (3%) (DSCL)	928.53	640
Supplemented with (5%) (DSC L)	976.85	660

Table (10) shows the influence of use dried Swiss chard leaves on Ratio of vit. A of pan bread and Pizza samples (P.P.M.)

Table (10) indicated that with increase levels of dried Swiss chard leaves in pan bread and Pizza samples the Ratio of vit. A of Pan bread and (Pizza samples (P.P.M.) increase, the highest content of vit. A in Pan bread and Pizza samples (976.85 and 660 p.p.m, respectively) with addition 5% of dried Swiss chard leaves .

Swiss chard is particularly rich in vitamins A (through B-carotene), C as with spinach , cooking degrades vitamin C, but makes the carotenoids more bioavailable. 80% loss of vitamin C was observed after boiling for 10 minutes. **(Gil *et al.*,1998).**

Table (11) shows phenolic compounds content of pan bread and pizza (P.P.M). Results in Table (11) indicated that the highest content of phenolic acid of pan bread and pizza samples was syringic acid with added 5% of dried Swiss chard leaves (5324.03 and

1008.12 p.p.m, respectively) .In the sam line the highest content of flavonoid of pan bread and pizza samples was kaempferol with added 5% of dried Swiss chard leaves(670.14and 150.41p.p.m, respectively). (**Hedges, and Lister,2007)** they found that Sliver beet Similar in composition to spinach , silver beet (or Swiss chard) is rich in core nutrients. Less is known about phytochemical content, probably because it is less popular. However,. Other pheonolics in silver beet, such the flavonoid kaempferol, are also important antioxidants.Also**(Gil *et al.*,1998)** indicated that Around 50% of the flavonoids from a green cultivar leached into cooking water during boiling , although less leaching was observed with a yellow cultivar

Table (11) phenolic compounds content of pan bread and pizza (P.P.M).

Phenolic compound	Samples of pan bread				Samples of Pizza			
	Control	Supplemented with (1%) (DSCI)	Supplemented with (3%) (DSCI)	Supplemented with (5%) (DSCI)	Control	Supplemented with (1%) (DSCI)	Supplemented with (3%) (DSCI)	Supplemented with (5%) (DSCI)
P-Benzoic	2.01	154.56	260.14	370.54	.041	31.83	60.14	99.65
Chlorogenic	101.14	317.27	420.47	580.15	.012	65.35	85.54	130.48
ferulic	422.40	884.43	1020.10	1200.14	2.01	62.14	87.87	140.65
Catechol	23.21	301.12	430.01	490.12	1.24	180.97	225.48	298.14
Syringic acid	21.26	3660.81	4250.24	5324.03	.056	754.12	856.47	1008.12
Coffiec acid	85.12	634.54	825.45	1023.41	2.04	130.24	180.45	230.41
gallic	35.25	301.14	502.45	680.12	1.24	62.45	102.41	150.15
Vanillic	21.14	360.01	520.12	690.14	0.01	53.62	91.45	252.58
protocatechuic	44.16	366.08	480.12	580.12	0.03	75.21	105.10	140.45
p-Coumaric	22.01	650.01	801.45	960.12	11.14	143.85	180.15	253.54
Catechin	55.40	122.02	223.52	332.47	.085	25.35	56.48	94.45
myricetin	32.10	252.18	350.14	480.45	1.01	51.94	96.98	256.65
queretin	22.14	178.97	260.17	370.45	,042	36.86	62.54	96.54
kaempferol	45.21	471.83	580.15	670.14	.08	97.18	104.45	150.41

Table (12) specific volume of pan bread (volume and weight of bread).

Samples	Volume (Cm3)	Weight (g) the bread	Specific volume (cm3)
Control	390	128.543	3.034
Supplemented with (1%) (DSC L)	395	129.20	3.0573
Supplemented with (3%) (DSC L)	430	130.13	3.3043
Supplemented with (5%) (DSC L)	476	140.0	3.400

Data in table (12)shows that ,Weight (g) of bread, bread Volume (Cm3)specific volume of pan bread were increased with the increasing of dried swiss chard leaves quantity, while at same time the quality of pan bread decreased with the increasing dried Swiss chard leaves quantity about 3%

Table (13) sensory evaluation of Tammia .

Sample No.	Appearance	Texture	Odour	Taste	Color
Control	9.2±.3 ab	8.7±.3 b	8.7±.2 bc	7.8 ±.1b	7.9±.1 c
1- supplemented with (FSC L)1	9.9 ±.1a	9.8±. 1a	9.8±.1 a	9.7 ±.1a	9.8±.1 a
2- supplemented with (FSC L)2	9.3±.4 ab	9.1 ±.4b	9.3±.3 ab	8.1±.1 b	9.1±. 4b
3- supplemented with (FSC L)3	8.8±.2 b	8.5± .2b	81± .4cd	9.2±.3 a	7.9±.1 c
4- supplemented with (FSC L)4	7.9±..1 c	7.8±. 1c	8.0±.1 d	8.3±. 2b	7.9±.1 c
L.S.D.	0.7311	0.6443	0.938	0.61166	0.6784

Means within the same column with the same letters are not significantly

From the obtained data of table (13) cleare that sensory evaluation of Tammia improved with replacement coriander with swiss chard up to(50%) ,while at same time the sensory evaluation of Tammia decreased with the increasing swiss chard about (50%).

Table(14) sensory evaluation of pizza.

Sample No.	Color	Taste	Odour	Texture	Appearance
Control	8.8 ±.4ab	8.9±. 2a	8.9±.2 a	9.1±.1 a	9.4±.1 a
1-Supplemented with 1% (DSCL)	8.8±.3 ab	8.9±.3 a	8.9±.2 a	9.1± .1a	9.4±.1 a
1-Supplemented with 3% (DSCL)	9.2±.1 a	9.1±.1 a	9.0±.1 a	8.9±. 3a	9.00±.2 ab
1-Supplemented with 5% (DSCL)	8.5±.1 a	8.8 ±.2a	8.7± .1a	8.4 ±.1a	8.6±.1 b
L.S.D	0.8492	0.7003	0.5833	0.8025	0.7497

Means within the same column with the same letters are not significantly different (P<0.05).

Table (14) shows the sensory attributes of pizza containing dried Swiss chard leaves improved with supplemented with 1 and3% (DSCL), while at same time the sensory attributes of pizza containing dried Swiss chard leaves decreased with supplemented with 5 % (DSCL)

Table(15) sensory evaluation of pan bread.

Sample No.	Porosity	Crust color	Appearance	Flavour	Odour	Color	Taste
Control	9.2±.1 a	9.0±.3 a	9.2±.1 a	9.3±.2 a	9.4±.[1] a	9.3±2 a	9.2±.3 a
Supplemented with 1% (DSCL)	9.2±.1 a	9.2 ±.1a	9.2±.1 a	9.4 ±.1a	9.4±.1 a	9.4± 1a	9.3±.1 a
Supplemented with 3% (DSCL)	8.3 ±.2ab	8.3±. 2a	8.6 ±.3ab	8.4±.3 b	8.1±. 4b	8.6 ±3ab	8.6±. 2ab
Supplemented with 5% (DSCL)	8.2±.1 b	8.2± .1a	7.7± .1b	8.0±. 1b	7.7 ±.1b	7.7±1 b	7.9±. 1 b
L.S.D	0.9142	1.0989	1.1458	0.9518	1.0846	1.0225	1.0629

Means within the same column with the same letters are not significantly different (P<0.05).

From the obtained data of table (15) cleare that sensory evaluation of pan bread improved with supplemented with 1 % (DSCL) ,while at same time the sensory evaluation of pan bread containing dried swiss chard leaves decreased with supplemented with 3 and 5 % (DSCL).

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