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Utilization of jew's mallow stems as a natural source of dietary fiber in pan bread product

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Abstract

The present work aims to study the potential effect of substituted Jew's mallow stems powder with wheat flour (82% extract) for making pan bread by 5, 7.5, 10, 20 and 30% was used to partially replace wheat flour in pan bread formulation, concentrations to give more protection against obesity and pan bread thus made were evaluated for rheological properties and sensory quality by a small semi-trained panel. Proximate analysis of jew's mallow stems showed a composition of 14.22% crude protein, 57.84% dietary fiber and 19.02% ash contents. On a 9-point hedonic scale, the highest overall acceptability score of (8.19) was obtained with 5% fortification, which was similar to control sample (8.23). All other treatments, though significantly different than the control, had an overall acceptability score of >5. The obtained diet showed that pan bread made with up of 20% jew's mallow stems exhibited sensory scores within an acceptable range. It was minerals content of pan bread higher values of Mg and K (819.26 and 491.9 ppm, respectively). It has been conducting analyzes of fat soluble vitamins and water soluble vitamins in pan bread, the record higher values of vitamin D (1.4 mg/100 g) and higher of vitamins C, B1, B3 and B9(1.60, 1.01, 0.09 and 3.03 mg/100 g dry mater respectively). Also, identification and determination of the phenolic and flavonoids in pan bread using HPLC, flavonoid compounds were exist in pan bread substituted with jew's mallow stems higher than phenolic compounds.

Key words: Jew's mallow- Dietary fiber - Rheological properties- Sensory quality- Minerals Vitamins- HPLC.

Introduction

There are many food processing wastes emanating large quantities of solid wastes. These wastes are either uneconomically utilized or disposed of as they are, there by causing serious of pollution problems, in vegetable processing **(Ehsan *et al.*, 2000)** jew's mallow Corchorus olitorius Linn. (Tiliaceae) is an annual herb with slender stems. Jew's mallow is an important green leafy vegetable in many tropical areas including Egypt, Sudan, India and Bangladesh, in tropical Asia in such countries as the Philippines and Malaysia, as well as in tropical Japan, South America, the Caribbean and Cyprus. In West African countries particularly Ghana, Nigeria and Sierra Leone, where staple diets consist of starchy food-stuffs such as rice, cassava, maize and yams, leafy vegetables are used to complement such staple foods **(Tulio *et al.*, 2002).** It is cultivated to provide bark for the production of fibers (Jute) and its mucilaginous leaves are used in food as a vegetable **(Meikle, 1977 and Abou Zeid, 2002)**. Jew's mallow is an essential green, leafy edible vegetable, consumed in many countries. The origin of jew's mallow is unknown. Leaves of Jew's mallow are used for human consumption. The leaves are highly nutritious rich in proteins, vitamins A, C and E, betacarotene, iron, calcium, thiamin, riboflavin, niacin, folate, dietary fiber, and most essential amino acids, **(Matsufuji *et al.*, 2001)** form its beneficial properties for skin, hair and health. This is actually a herb that has many nutritional values. It is considered to be best for health. It is not only known for its health benefits but also it is beneficial for skin and hair **(Ogunrinde and Fasinmirin, 2011)**. It has more vitamins, calcium and carotene contents than that of the spinach. It contains iron, potassium, vitamins and fiber than any other vegetable and hence it is called as the king of vegetables. It contains properties that help to boost the immune system and prevents cancer, high blood pressure, osteoporosis, premature aging, fatigue, and so on **(Ahmed and Nizam, 2008).** *C. olitorius* is used for the fibers obtainable from its stem. The crop is cut and then retted in running water to remove the softer tissues, the fibers are then separated from unwanted woody material, cured and dried. The jute fiber prepared in this way is of lesser quality than the white jute obtainable from the closely related **(Grubben, 2004).**

Materials and Methods

Materials:

Commercial wheat *(Triticum aestivum)* flour (82% ext.) was obtained from southern Giza Mill Company, Giza, Egypt.

Jew's mallow stems.

Fresh jew's mallow plants were obtained from the local market. Giza, Egypt. The fresh were washed and the leaves and roots were removed. The stems were dried using solar energy in National Research Center, Dokky, Giza.

Methods:

Preparation of pan bread:

Replacement of flour (82% ext.), by dietary fiber sources such as jew's mallow stems, powder, 5g table salt, 9g dry yeast, 20g skimmed milk powder and 200 ml water used to prepare pan bread samples **(Table, a)** according to straight dough method **A.A.C.C. (2000),** mixing time was 8.0 min first 4.0 min slowly and the last 4.0 min was quickly, at room temperature .Fermentation for 10 min and baked for 35 min at 180˚C in oven. After baking allowed cool for 30 min at room temperature.at a level 20% and packed in poly ethylene bag and frozen stored till analysis

Table a. Ingredients of pan bread with jew's mallow stems powder.

Ingredients	Fiber level (20%)	
	Control sample	Jew's mallow stems powder
Weight Flour (82%ext.)	**500**	**400**
Source of fiber	**-**	**100**
Skimmed milk powder	**30**	**30**
Table salt	**5**	**5**
Dry yeast	**9**	**9**
Sugar	**10**	**10**
Water	**250**	**225**

Chemical analysis of raw materials and pan bread:

Chemical components of raw materials and pan bread (moisture, crude fibers, crude protein, ash and fat contents) were determined according to the method described by **A.O.A.C. (2003).** Total carbohydrates were determined by difference as mentioned by **Odhav *et al.* (2007).** Mineral contents including (Na, K, Ca, Fe, Zn, Cu, Mg and P) were determined according to the method described by **A.O.A.C (2003)** using a Pye Unicom SP1900 Atomic Absorption Spectrometry (Perkin Elmer model 4100ZL. Vitamins including (B1, B2, C, E, A and β -carotene) Analysis of the fat-soluble vitamins and water-soluble vitamin with HPLC according to the methods described by **Plozza *et al.* (2012)** and **Romeu-Nadal *et al.* (2006).** Types and concentrations of polyphenolic compounds, flavonoids and isflavonoids were estimated with HPLC as recommended by **and Kaufman *et al.* (1997), Goupy *et al.* (1999) and Mattiala *et al.* (2000)**

Determination of chlorophyll a, b and β-carotene:

Chlorophyll a, b and β-carotene were determined in raw materials according to the method described by **Ranganna (1990).** The determination was conducting using acetone (85%v/v) as a blank at wavelengths 662,664 and 440 nm, respectively elicitation.

Chl. A= (9.784 X E 662) - (0.99 X E 644) =X1

Chl. B = (21.426 X E 644) – (4.65 X E 662) =X2

β-Carotene = (4.695 X E 440) – (0.268) X (X1 + X2)

$$\textbf{The content (ml/mg)} = \frac{\textbf{(x) X volume of acetone}}{\textbf{Weight of sample}}$$

Determination of total dietary fiber (TDF):

Total dietary fibers were estimated by the non-enzymatic-gravimetric method by **Li and Cardozo (1994).** The soluble and insoluble dietary fibers were determined according to the method described by **Asp *et al.* (1983)**

Rheological properties:

Farinograph test was carried out to determine the water absorption, dough development, dough stability and dough weakening of wheat flour of (82% ext.) and also, blends with jew's mallow stems powder. The extensograph test was carried out on wheat flour (82% ext.) and its blends with jew's mallow stems powder to determine the maximum resistance to extension, extensibility and energy according to the method described in the **A.A.C.C. (2000)**.

Sensory evaluation of pan bread:

Sensory characteristics of pan beard samples were evaluation according of the method described by **De Conto *et al.* (2012)**. The organoleptic properties of pan bread were evaluated by ten trained Judges. Ten panelist's from the staffs of Food Tech. Res. Ins. were chosen to evaluate the Judges were asked to give scores from 0 to 9 for taste, odor, color, color texture, latex texture and general appearance**.**

Statistical analysis:

Statistical analysis was carried out using ANOVA with two factors under significance level of 0.05 for the whole results using **SPSS (ver. 22).** Data were treated as complete randomization design according to **Steel *et al.* (1997).** Multiple comparisons were carried out applying LSD.

Results and Discussion

Chemical constituents of raw materials such as wheat flour (82% extr.) and jew's mallow stems powder was determined.

Data in **Tables (1)** showed that the wheat flour (82% ext.) contain the highest moisture and carbohydrate contents, while the jew's mallow stems contain the lowest contents (11.30, 83.05 % and 2.08, 63.9 %), respectively. Jew's mallow stems had the highest content of protein, ash, fiber fat, and β-Carotene. These results are in agreement with those obtained by **Ezz El-Arab (2009) and Islam (2017).**

Table 1. Chemical composition of wheat flour (82%ext.) Jew's mallow stems, powder (g/100 g).

Components	Wheat flour (82% ext.)	Jew's mallow stems
Ash %*	1.29±0.02	19.02±0.04
Fat %*	1.74±0.02	2.86±0.40
Crude protein%*	13.92±0.05	14.22±0.3
Moisture%	11.30±0.03	2.08±0.4**0**
Total carbohydrates%*	83.05±0.5	63.9±0.40
Total dietary fibers% *	2.14±0.06	57.84±0.5
Soluble dietary fibers%*	0.74±0.05	2.00±0.30
Insoluble dietary fibers%*	1.40±0.08	55.84±0.7
Chlorophyll a (mg/100g) *	-	20.59±0.02
Chlorophyll b (mg/100g)*	-	22.48±0.3
β- Carotene (mg/100g)*	-	9.31±0.30

*On dry weight bases.

Data in **Table (2)** observed that the jew's mallow stems contained the highest values of Mg, K and Ca (3568.37, 1940.0 and 310.33 ppm, respectively) compared with wheat flour which had the lowest content in this minerals. The results accordance with those reported by **Hareedy *et al.* (2006).** Data in **Table (3)** it could be observed that fat soluble vitamins, highest value of vitamin D (2.05 mg/100 g dry mater).As for water soluble vitamins jew's mallow stems showed the highest of vitamins C, B1, B3 and B9 (3.01, 3.009, 2.3 and 4.01 mg/100g respectively) **Tulio, *et al*. (2002) and Ogunrinde and Fasinmirin (2011).** It was also noted that the wheat flour (82% ext.) had low in water soluble vitamins and fat soluble vitamins compared with jew's mallow stems powder. Vitamin B is the most important vitamins responsible for the composition of the body's cells, including red blood cells, Enhance immune and nervous system function is the most obvious function of calcium in the building and growth of bones and teeth, so potassium, while magnesium helps in the body's ability to the body's absorption of calcium and potassium. So jew's mallow it considered beneficial to health for its richness in minerals and vitamins

Table 2. Minerals content of wheat flour (82% ext.) and jew's mallow stems (ppm).

Minerals / Raw materials	Mg	K	Na	Zn	Mn	Fe	Ca
Wheat flour (82% ext.)	126.03	125.70	30.17	1.06	0.88	1.42	19.11
Jew's mallow stems	3568.3	1940.3	101.56	2.017	2.88	16.5	310.33

Table 3. Vitamins content of wheat flour (82% ext.) and jew's mallow stems (mg/100 g)

Vitamins / Raw materials	Fat soluble vitamins				Water soluble vitamins						
Components	**A**	**D**	**E**	**K**	**C**	**B1**	**B2**	**B3**	**B6**	**B9**	**B12**
Wheat flour (82% ext.)	.00012	.00015	0.01	.00013	.0004	0.09	0.48	6.1	1.6	0.002	0.001
Jew's mallow stems	0.5	2.05	0.003	2.01	3.01	3.009	0.007	2.3	1.01	4.01	1.001

Data in **Table (4)** indicated that jew's mallow stems contained contain high percentage of syringic, 4-amino- benzoic**,** coumarin acid and ellagic (1.80, 1.02, 1.80 and 0.80 mg/g, respectively), the phenolic compounds were exist in jew's mallow stems, with deferent levels showed by **Kuskoski *et al.* (2006)** and **Ali *et al.* (2014)**.

Data in **Table (5)** showed that jew's mallow stems contain high percentage of flavonoid compounds recorded of diadzein, iso- formentin, rutin, cinnamic acid, kaempferol and hesperitin (6.5, 1.50, 0.33, 2.07, 8.2 and 1.4 mg/g), it was observed the flavonoid compounds were exist in jew's mallow stems at deferent levels, so jew's mallow stems contain higher percentage of flavonoid compounds than phenolic compounds. The usefulness of phenolic and flavonoid (antioxidants) preventing free-radical damage that can initiate many illnesses **Li *et al.* (2006)** and **Singh and Immanuel (2014).**

Table 4. Identification of the phenolic components in jew's mallow stems powder by HPLC (mg/g).

Peak No.	Components	R.T.	Jew's mallow stems
1-	**Syringic**	3.04	1.80
42-	**Pyrogall**	5.95	0.07
3-	**Gallic Acid**	6.42	0.3
4-	**Protocatchoic**	7.61	0. 70
5-	**4-amino-bebzioc**	7.93	1.02
6-	**P-OH-Benzoic**	8.84	0.06
7-	**Epicatechin**	9.10	0.10
8-	**Vanillic acid**	9.50	0.30
9-	**Ellagic**	10.83	0.80
10-	**Ferulic**	11.17	0.20
11-	**Benzoic**	12.48	0.80
12-	**Coumarin acid**	13.03	1.80

Table 5. Identification and determination of the flavonoids in jew's mallow stems powder by HPLC (mg /g).

Peak No.	Components	R.T.	Jew's mallow stems
1-	**Diadzein**	4.75	6.50
2-	**Genestien**	6.05	1.20
3-	**Catechein**	7.88	0.08
4-	**Chlorogenic acid**	8.68	0.07
5-	**Caffeic acid**	9.42	2.15
6-	**Iso- formentin**	9.80	1.50
7-	**Caffeine**	10.78	8.40
8-	**Narengin**	11.53	1.20
9-	**Hesperidin**	11.92	0.09
10-	**Rutin**	12.18	0.33
11-	**Nargenginin**	14.13	1.70
12-	**Cinnamic acid**	14.17	8.20
13-	**Quercetrin**	14.46	1.80
14-	**Hesperitin**	14.69	1.40
15-	**Kaempferol**	15.05	2.07
16-	**Biochanine**	16.97	0.06

From the results in **Table (6)** it could be noticed that the replacement of wheat flour (82% ext.) by (5, 7.5, 10, 20 and 30%) of jew's mallow stems powder in pan bread samples, the substituted jaw's mallow stems powder, at levels of (5, 7.5 and 10%) are not significant different from the control sample for all the characteristics while the general appearance in pan bread substituted with jaw's mallow at levels (5, 7.5 and 10%) had higher scores (8.12 ,7.89 and 7.73). For 20%, general appearance, has recorded score (6.92). But at 30%, the score was (4.87), this ratio was not acceptable. **Babiker *et al.*, (2013) and Adediran *et al.*, (2017)**

Table 6. Effect of replacing with different levels of jaw's mallow steams powder on the sensory evaluation of the produced pan bread.

jaw's mallow steams powder %	Crust color	Taste	Odor	Color	Texture	General appearance
Control sample	**8.50±0.06^{a}**	**8.53±0.01^{a}**	**8.65±0.03^{a}**	**8.56±0.02^{a}**	**8.50±0.03^{a}**	**8.72±0.02^{a}**
5	**7.98±0.02^{b}**	**8.12±0.02^{b}**	**8.14±0.02^{b}**	**8.18±0.01^{b}**	**8.16±0.02^{a}**	**8.12±0.01^{b}**
7.5	**7.46±0.03^{c}**	**7.63±0.01^{c}**	**7.63±0.01^{c}**	**7.85±0.03^{c}**	**7.75±0.03^{a}**	**7.89±0.01^{c}**
10	**7.11±0.01^{d}**	**7.36±0.02^{d}**	**7.36±0.01^{d}**	**7.68±0.01^{d}**	**7.55±0.03^{a}**	**7.73±0.02^{d}**
20	**6.72±0.01^{e}**	**6.86±0.02^{e}**	**6.67±0.01^{e}**	**6.15±0.03^{e}**	**7.95±1.00^{a}**	**6.95±0.08^{e}**
30	**5.13±0.09^{f}**	**5.20±0.03^{f}**	**5.09±0.05^{f}**	**5.80±0.06^{f}**	**5.33±0.01^{b}**	**4.87±0.12^{f}**

Means within the same column by followed the same letter (s) are not significantly different at $p< 0.05$ level

Nutrients of pan bread made from wheat flour (82% ext.) control sample compared with the other types of pan bread after substituted at (5, 7.5, 10, 20 and 30 %) jaw's mallow steams powder are

shown in **Table (7).** In this concept, pan bread made using 20% Jaw's mallow steams powder had13.98 % protein, 1.46% fat, 2.30 % ash, 11.10 % crude fiber and 82.26% carbohydrates, compared with the control sample, the values recorded were 13.50 ,1.00, 1. 25 % 0.93 and 84.25%, respectively. In fact, the control sample of pan bread had the lowest percentage of nutrients than that of pan bread made using 20% jaw's mallow steams powder except carbohydrate content.

Table 7. Chemical composition of pan beard substituted with different levels of jew's mallow stems (g/100gm) on dry wheat basis.

Components	Control	Pan bread substitute with jew's mallow stems				
		5%	7.5%	10%	20%	30%
Crude protein %	13.50	13.90	13.92	13.94	13.98	14.00
Crude Fiber %	0.93	3.76	5.27	6. 59	11.10	18.40
Fat %	1.00	1.14	1.21	1.28	1.46	1.63
Ash %	1.25	1.90	1.92	1.98	2.30	2.50
Total carbohydrates %	84.25	83.06	82.95	82.80	82.26	81.87

The obtained results in **Table (8)** showed that pan bread substituted jew's mallow stems compared with control sample. It could be noticed that the addition of jew's mallow stems powder improved the contents of minerals such as Mg and K (819.26 and 491.90 ppm, respectively) compared with the control sample. These results are in harmony, with those obtained by **Mehder (2013).**

Table 8. Minerals content of produced pan bread substituted with jew's mallow stems at 20% level (ppm).

Products	Mg	K	Na	Zn	Mn	Fe	Ca
Control (wheat flour 82% ext.)	121.72	110.5	31.80	0.50	0.80	0.32	15.1
Pan bread substituted with jew's mallow stems	819.26	491.90	46.60	1.20	2.07	4.54	79.11

Data in **Table (9)** showed that, the phenolic compounds in pan bread substituted with jew's mallow steams showed that contain high percentage of syringic, 4-amino- benzoic and coumarin acid components (0.90, 0.50 and 1.40 mg/g respectively) phenolic components were exist in pan bread substituted with jew's mallow stems at deferent levels. These results are in agreement with those obtained by **(Kuskosk *et al.*, 2006**, **Ribeiro *et al.*, 2007, Bondia-Pons *et al.*, 2009, Fischer *et al.*, 2011, Ali *et al.*, 2014 and Zaki *et al.*, 2015).**

Table 9. Identification of the phenolic components in produced pan bread substituted with and jew's mallow stems at 20% level by HPLC (mg /g).

Peak No.	Components	R.T.	Pan bread substituted with Jew's mallow Stems 20%
1-	**Syringic**	3.52	0.90
3-	**Pyrogall**	7.03	0.04
2-	**Gallic Acid**	6.94	0.05
5-	**Protocatchoic**	8.38	0.30
4-	**4-amino- benzoic**	8.25	0.50
7-	**P-OH-Benzoic**	9.91	0.03
6-	**Epicatechin**	9.71	0.01
9-	**Vanillic acid**	12.65	0.20
10-	**Ellagic**	13.22	0.50
8-	**Ferulic**	12.04	0.01
11-	**Benzoic**	13.76	0.50
12-	**Coumarin acid**	14.43	1.40

Data in **Table (10)** showed that, the pan bread substituted with jew's mallow stems contain diadzein, iso- formentin, rutin, cinnamic acid, kaempferol and hesperitin components (5.50, 1.00, 0.23, 7.30, 1.50 and 1.20 mg/g, respectively). From the results it observed that a decrease in the ratio of flavonoids and phenolic compounds in pan bread and due to the effect of heat temperature, time baking and

different amounts of phenolic components in raw materials These results are in agreement with those obtained by **(Li *et al.*, 2006; El-Falleh *et al.*, 2009; Farag *et al*., 2014 and Singh and Immanuel, 2014).**

Table 10. Identification of the flavonoids components produced in pan bread substituted with different sources of dietary fiber at 20% level by HPLC (mg /g).

Peak No.	Components	R.T.	Pan bread substituted with Jew's mallow stems at 20%
1-	**Diadzein**	4.75	5.50
2-	**Genestien**	6.07	0.50
3-	**Catechein**	8.57	0.04
4-	**Chlorogenic acid**	9.13	0.04
7-	**Caffeic acid**	10.26	1.90
6-	**Iso- formentin**	9.88	1.00
5-	**Caffeine**	9.80	6.20
8-	**Narengin**	12.49	1.00
10-	**Hesperdin**	12.71	0.07
9-	**Rutin**	12.58	0.23
12-	**Nargenginin**	15.53	0.90
14-	**Cinnamic acid**	15.75	7.30
11-	**Quercetrin**	13.60	1.10
15-	**Hesperitin**	15.85	1.20
13-	**Kaempferol**	15.72	1.50
16-	**Biochanine**	17.32	0.05

Data in **Table (11)** and **Fig. (1 and 2)** showed the effect of addition jew's mallow stems, to wheat flour (82% ext.) at substitution level of 20% on farinograph parameters (water absorption %, arrival time (min), dough stability (min) and dough development time (min). The obtained data it could be indicated that the addition of such rich-fiber sources to wheat flour (82% ext.) led to an increase in the water absorption values by (60.7%) with jew's mallow stems. Dough stability was increased and the highest value (>12min) was observed with jew's mallow stems powder according to **(Ammar *et al.* 2009 and Raj and Masih, 2014).**

Table 11. Effect of 20% replacement of wheat flour (82%ext.) by jew's mallow stems powder on farinograph parameters.

Parameters	Control	Pan bread substituted with 20% jew's mallow stems
Water absorption (%)	**50.5**	**60.7**
Arrival time (min)	**1.5**	**1.0**
Dough development (min)	**2.5**	**1.5**
Dough stability (min)	**5.0**	**>12**
Degree of softening (B.U)	**80**	**-**

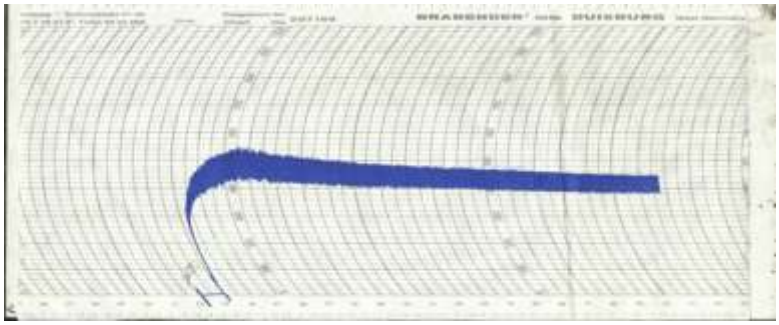

Fig. (1): Farinogram of 100% wheat flour (82% ext.).

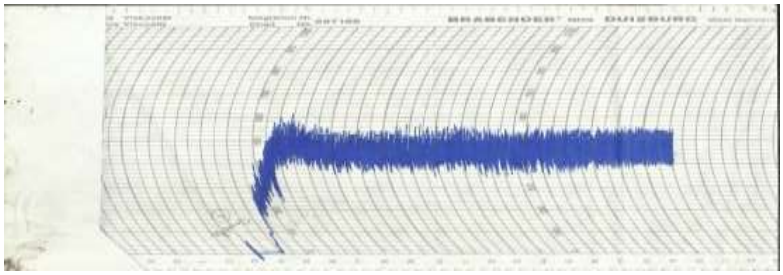

Fig. (2): Farinogram of 80% wheat flour (82% ext.) +20% jew's mallow stems.

Data in **Table (12)** and **Fig. (3 and 4)** showed the effect of addition of jew's mallow stems to wheat flour (82% ext.) at substitution level of 20% on extensorgraph parameters, (elasticity. (B.u), extensibility (mm), proportional No. and energy (cm^2). The same trend was observed that the produced pan bread with jew's mallow stems powder was less than in all the tests. These results are agreement with those obtained by **(Yaseen *et al.* 2010)** and **Ahmed 2013).**

Table 12. Effect of 20% replacement of wheat flour (82%ext.) by jew's mallow stems powder on extensograph parameters

Parameters	Control	Pan bread substituted with 20% jew's mallow stems
Elasticity (B.U)	**720**	**550**
Extensibility(mm)	**95**	**75**
Proportional No.	**7.58**	**7.33**
Energy (cm^2)	**45**	**35**

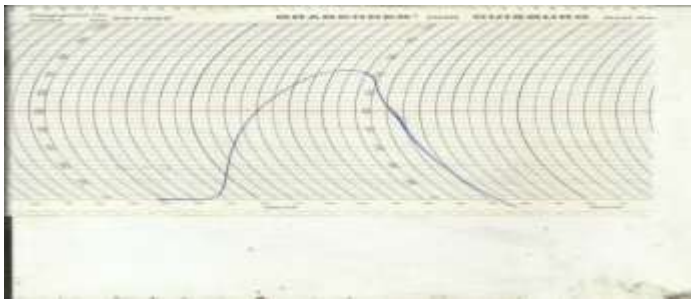

Fig. (3): Extensogram of 100% wheat flour (82% ext.).

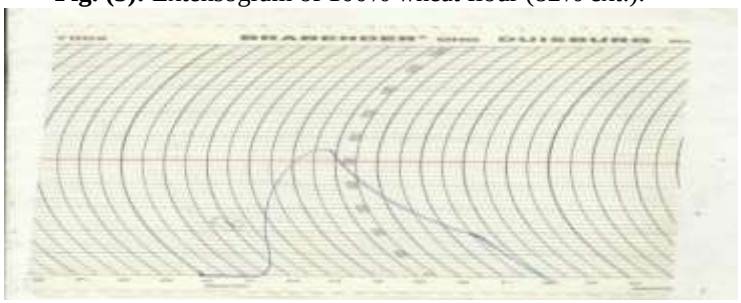

Fig. (4): Extensogram of 80% wheat flour (82% ext.) +20% jew's mallow stems.

Conclusions

This study showed the effect of Jew's mallow stems in pan bread by replacing wheat flour (82% ext.) with different percentage (5, 7.5,10, 20 and 30%). Its effect on the characteristics (crust color, taste, odor, color, texture and general appearance) pan bread with a good acceptance was substituted with 20% Jew's mallow steams powder than 30% level. The analyzes were performed on pan bread was fortified 20% jew's mallow stems powder ,which Identification and determination of the phenolic and flavonoids in Jew's mallow stems powder using HPLC, minerals content of pan bread, vitamins content of pan bread, the effect of 20% replacement of wheat flour (82%extraction) and jew's mallow stems powder on farinograph and extensograph parameters.

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إستخدام سيقان الملوخية كمصدر طبيعى للألياف الغذائية فى عمل خبز القوالب

نيفين على ماهر عرفة [1]؛ أحمد إبراهيم الدسوقى عبد الحميد حسن[2]؛ همام الطوخى محمد بهلول [2]؛ سليمان عباس سليمان[2]

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أجريت هذه الدراسة بهدف دراسة تأثير إستبدال دقيق القمح (استخراج 82٪) أستخدام الألياف الغذائية مثل سيقان الملوخية بنسب 5 ، 7,5، 10،20و 30٪ فى أنتاج خبز القوالب ثم تم تقييم المنتج حسيا وكميائيا.

أظهرت النتائج المتحصل عليها أن مسحوق سيقان الملوخية عالى في محتواه من الرماد حيث كانت النسبة (1,29٪) بالمقارنة مع الدقيق القمح (استخراج82٪). وأظهرت النتائج أيضا أن إضافة هذه الألياف لدقيق القمح (إستخراج 82٪) أدي إلي زيادة كبيرة في مستوي الألياف في عينات خبز القوالب حيث كانت عينات المنتج المضاف لها مسحوق سيقان الملوخية بنسبة 10٪ متقاربة مع عينة الكنترول في كل خصائصها بينما العينات المضاف لها مسحوق سيقان بنسبة 20٪ كانت متقاربة مع عينة الكنترول من حيث اللون، الطعم ،القوام والمرونة العامة ما عدا الملمس.كما أظهرت النتائج أن إضافة الألياف أدي إلي نقصان في الحجم مع زيادة في الوزن بالمقارنة بعينة الكنترول .أما بالنسبة للخصائص الريولوجية فقد أدت إضافة هذه الألياف إلي زيادة كل من نسبة إمتصاص الماء ثبات العجينة والمرونة بينما انخفضت قيمة الطاقة.