نسب الاستبدال من ٣إلى ٩% مطحون العدس فقد أدى إلى زيادة فى نسبة الامتصاص والمطاطية حيث كانت نفس القيمة عند نسب استبدال ٣%،٦%ثم زادت عند نسبة استبدال ٩%كما حدث انخفاض فى زمن العجن ودرجة الضعف ٠

كما أظهرت نتائج الفارينوجراف والاكستنسوجراف أن إضافة مطحون الحلبة بنسبة ٣% أدى إلى زيادة فى نسبة الامتصاص ودرجة الضعف والمرونة والرقم النسبى وطاقة العجن ،كما حدث نقص فى الثبات ووقت العحن والمطاطية وذلك بالمقارنة بالعينة الكنترول، وعند زيادة نسبة الاستبدال من ٣إلى ٩% مطحون الحلبة فقد أدى ذلك إلى زيادة فى نسبة الامتصاص والثبات و المرونة والرقم النسبى وطاقة العجن كما أدى إلى نقص فى معدل الصمود ودرجة الضعف٠

أيضا أظهرت نتائج الفارينوجراف والاكستنسوجراف أن إضافة مطحون الريحان بنسبة ٣% أدى إلى زيادة فى نسبة الامتصاص ومعدل الصمود ودرجة الضعف والمرونة والرقم النسبى وطاقة العجن كما أدى إلى نقص فى المطاطية وزمن العجن وذلك بالمقارنة بالعينة الكنترول وعند زيادة نسبة الاستبدال من ٣إلى ٩% مطحون الريحان أدى ذلك إلى زيادة فى الثبات والمرونة وطاقة العجن ٠ أما إضافة خليط الثلاثة معا بنسبة استبدال ٦% فقد أدى إلى زيادة فى نسبة الامتصاص ووقت العجن و الثبات ومعدل الصمودودرجة الضعف والمرونة والرقم النسبى وطاقة العجن كما أدى إلى نقص فى المطاطية وذلك بالمقارنة بالعينة الكنترول٠

وبالنسبة للخواص الحسية فقد أظهرت درجة تقبل عام مرتفعة للخبز المضاف إليه مطحون العدس بنسب ٣% ،٦% وعدم تقبل للخبز المضاف إليه مطحون الحلبة والريحان بنسبة ٩%٠كما أظهرت النتائج تقبل للخبز المضاف إليه مطحون العدس بنسبة ٩%، كذلك مطحون الحلبة والريحان بنسبة ٣% وأيضا تقبل للخبز المصنوع من خليط الثلاثة معا بنسبة ٦%. ومن خلال النتائج السابقة توصى الدراسة الحالية بإضافة مطحون العدس والحلبة والريحان إلي وجبات الأطفال والبالغين بهدف تحسين الصحة وحل مشكلة الأنيميا،كما توصى الدراسة الحالية بتدعيم الخبز بتلك الأغذية الغنية بالحديد٠

الكلمات المفتاحية

الأنيميا، العدس، الحلبة، الريحان، الخبز، الخواص الريولوجية ، الخواص الحسية

energy. In this respect ,the blend of lentil, fenugreek and basil at 6% substitution has led to increase water absorption ,stability ,dough time, d-tolreance index , dough weaking, resistance to extension, proportional number and dough energy whereas extensibility value was decreased. Sensory evaluation tests showed that high acceptance for lentil bread at the ratio 3% ,6% ,on the other hand, results showed good acceptance for lentil bread at 9% ,fenugreek powder bread and basil powder bread at the ratios3%.It was noticed that the blend sample bread showed good acceptance whereas bread containing 9%fenugreek or 9%basil were unacceptable to the judges. The study recommended that addition of lentil ,fenugreek and basil to diet for overcoming the problem of iron deficient anemia beside improving the health of infants and adults also fortification bread with these foods which rich in iron.

Key words: anemia**,** lentil, fenugreek, basil, bread, sensory properties, rheological properties.

الملخص

تحسين القيمة الغذائية للخبز باستخدام اغذية غنية بالحديد

تهدف الدراسة الحالية إلي تحسين القيمة الغذائية للخبز باستخدام أغذية غنية بالحديد وكذلك دراسة تأثيراضافة تلك الأغذية على الخواص الكيميائية والريولوجية والحسية لخبز دقيق القمح ٠

ولهذا الغرض تم اضافة مطحون العدس والحلبة والريحان٣و٦و٩% استبدال على الترتيب كما تمت اضافة خليط من الثلاثة معا بنسبة استبدال ٦% إلى دقيق القمح المستخدم فى صناعة الخبز ٠ثم مقارنة تلك الخلطات بخبز دقيق القمح (١٠٠% دقيق قمح) وذلك لمعرفة مدي تأثر كل من تركيب الخبز وخواصه الحسية والريولوجية بتلك الإضافات٠

ولقد أظهرت النتائج أن تلك الإضافات قد أدت إلي زيادة في محتوي الخبز من البروتين والألياف ، أما بالنسبة للحديد فقد أظهرت النتائج زيادة محتوى الخبز من الحديد عند تدعيمه بتلك الإضافات وقد لوحظ ارتفاع الحديد بشكل كبير عند تدعيم الخبز بمطحون الريحان٠

كما أظهرت نتائج الفارينوجراف والاكستنسوجراف أن إضافة مطحون العدس بنسبة ٣% أدى إلى زيادة فى نسبة الامتصاص، معدل الصمود ، درجة الضعف ، المرونة والرقم النسبى وطاقة العجن، كما أدى إلى نقص فى المطاطية وزمن العجن والثبات وذلك بالمقارنة بالعينة الكنترول٠ وعند زيادة

ABSTRACT

IMPROVE THE NUTRITIONAL VALUE OF BREAD BY USING IRON- RICH FOOD

The present study aims to study the effect of partial replacement of wheat flour with lentil ,fenugreek and basil flours at different levels 3, 6 and 9% and their mixture at 6% substitution on the chemical composition of produced bread, on the rheological and sensory properties of produced bread as compared with the bread produced by using wheat flour (72% extract). The results indicated an increase in protein and fiber according to supplementation with lentil, fenugreek and basil powder whereas the blend of them led toan increase in protein, fiber, ash and carbohydrate .It was found that an increase in iron due to supplementation with lentil, fenugreek and basil powder, iron increasing was high at supplementation bread with basil powder.

The results of farinograph and extinsograph showed that when lentil was added at level 3% it led to an increase in water absorption, d-tolreance index, dough weakening, resistance to extension, proportional numberand dough energy whereas it led to a decrease in dough time, stability and extensibility compared to control sample but by increasing the substitution levels in the blends from 3 to 9 % lentil this led to an increase in water absorption ,stability while it led to a decrease in dough weakening, d-tolreance index, resistance to extension, proportional no. and dough energy. concerning extensibility it was the same at levels 3,6% lentil but it increased at 9%

Concerning fenugreek the results declared that when fenugreek was added at level 3%it led to an increase in water absorption, dough weakening, d-tolreance index, resistance to extension, proportional number and dough energy, while it led to decrease stability compared to control sample. Whereas, by increasing the substitution levels in the blends from 3 to 9 % fenugreek it led to an increase in water absorption , stability(min), extensibility, resistance to extension, proportional number and dough energy whereas it led to decrease dough weakening and d-tolreance index. Concerning extensibility it was the same at levels 3,6% fenugreek but it increased at 9%

The results also showed that adding basil at 3%level led to an increase in water absorption, dough weakening, d-tolreance index, resistance to extension and proportional number while it led to decrease dough time ,extensibility and dough energy compared to control sample .However, by increasing the substitution levels in the blends from 3 to 9 % basil it led to an increase in water absorption, stability, resistance to extension and dough

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Effect of lentil, fenugreek and basil supplementation on sensory evaluation of produced bread

The effect of partial replacement with different ratios of both lentil, fenugreek and basil on the organoleptic characteristics of produced bread was found in Table (4) .Results in Table (4) show the mean values for aroma, taste , color, tenderness and overall acceptability for bread samples. It could be noticed that replacement of flour with 3% or 6% lentil , which nearly observed the same scores of control sample these results agree with **Naeem*et al.*,(2002)** who revealed that wheat flour could be replaced up to 10% using raw and germinated legumes flour without drastically affecting bread quality. In this respect, it could be seen that with the increase of the level of fenugreek flour the results of sensory degrees for aroma, taste ,colour ,tenderness and overall acceptability score of bread decreased obviously.

It was found that the control sample had the highest score, while bread containing 9%fenugreek or 9%basil were unacceptable to the judges. Results showed good acceptance for lentil bread at 9% ratio ,fenugreek powder bread and basil powder bread at the ratios3%.The mixed sample (6% mixture of lentil ,fenugreek and basil powder) were acceptable to the judjes.

These results are in the line with **Indrani *et al.*, (2010)**Who stated that the effect of fenugreek seed powder on characteristics of wheat flour in relation to parotta(flat bread) will be useful in the production of speciality parotta with perceptible fenugreek flavor. Such parottas will have medicinal value also. This study will throw light on the use of functional ingredients in flat bread.

Table (4) :Effect of lentil , fenugreek and basil on sensory evaluation of produced bread

Properties / Treatments	Aroma means of 10 scores	Taste means of 40 scores	Color means of 10 Scores	Tenderness means of 20 scores	Overall Acceptability means of 20 scores	Sensory scores
C	10	40	10	20	20	100
L1B	9.5	38	10	19	19	95.5
L2B	9	37	9	17	17	89
L3B	7.5	35	8	15	14	79.5
F1B	7	28	7	16	15	73
F2B	6	24	6	14	12	62
F3B	4	16	5	12	10	47
B1B	9	32	7	16	15	79
B2B	7	23	5	13	12	60
B3B	5	12	4	10	8	39
LFB	7.5	30	7	15	14	73.5

C:control "wheat flour bread 72%extraction",L1B:lentil bread(3%lentil powder) L2B:lentil bread(6%lentil powder),L3B:lentil bread(9%lentil powder),F1B:fenugreek bread(3% fenugreek powder), F2B:fenugreek bread(6% fenugreek powder), F3B:fenugreek bread(9% fenugreek powder), B1B:basil bread (3% basil powder),B2B:basil bread (6% basil powder),B3B:basil bread (9% basil powder),LFBB (6% mixture of lentil ,fenugreek and basil powder).

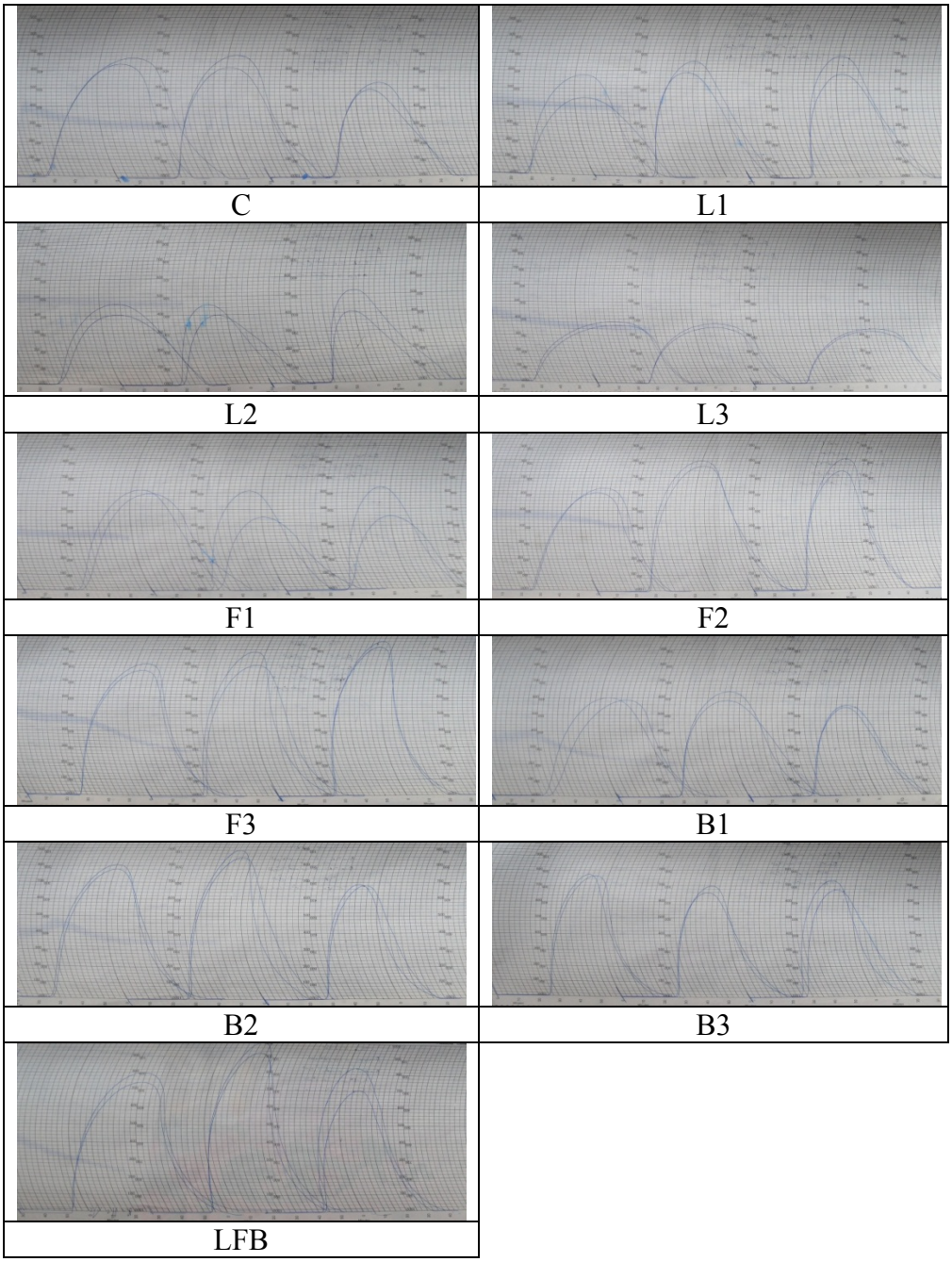

Fig. 2: Extensograph for the dough prepared from wheat flour and its blends.

The results also showed that adding basil at 3%level led to increase resistance to extension and proportional no while it led to decrease extensibility and dough energy compared to control sample However, by increasing the substitution levels in the blends from 3 to 9 % basil it led to increase resistance to extension and dough energy.

Concerning basil flour the extensibility values were decreased at 6% ratio (10cm)but it increased at the ratio 9%(11.5 cm). , On the other hand, the resistance to extension was the same at the ratios 6 %, 9% for basil flour 680 (BU). Also it could be noticed that proportional number increased at the ratio 6% (6.8)but it decreased at 9% ratio (5.91). In this respect it could be observed that by increasing the substitution levels of basil dough energy was increased (67,70,85 cm2 respectively).

In this respect ,the mixture of lentil, fenugreek and basil at 6% substitution has led to increase resistance to extension, proportional no. and dough energy whereas extensibility value was decreased.

Table(3).Extensograph parameters of wheat flour 72% and wheat flour-Lentil, Fenugreek and basil flour blends

Blends	Extensibility (cm)	Resistance to extension after 5 mim. (BU)	Maximum Resistance to extension (BU)	Proportional No.	Dough Energy (cm2)
C	12	480	530	4	70
L1	11.5	640	680	5.56	81.75
L2	11.5	460	520	4	55.5
L3	15	280	340	1.86	58
F1	11.5	540	630	5.47	74
F2	11.5	780	820	6.78	100
F3	12	920	960	7.66	122
B1	11	550	550	5	67
B2	10	680	680	6.8	70
B3	11.5	680	740	5.91	85
LFB	11.5	770	840	6.69	105

C:control "wheat flour 72%extraction",L1:lentil flour (3%lentil powder)
L2:lentil flour (6%lentil powder),L3:lentil flour (9%lentil powder),F1:fenugreek flour (3% fenugreek powder), F2:fenugreek flour (6% fenugreek powder), F3:fenugreek flour (9% fenugreek powder), B1:basil flour (3% basil powder),B2:basil (6% basil powder),B3:basil (9% basil powder).LFB (6% mixture of lentil ,fenugreek and basil powder).

Extensograph parameters of wheat flour 72% and wheat flour- Lentil, Fenugreek and basil flour blends

Extensograph properties of wheat flour dough by substitution at different levels of either lentil, fenugreek and basil are presented in table (3)and fig.(2)

The results of extensograph showed that when lentil was added at level 3% it led to increase resistance to extension, proportional no. and dough energy whereas it led to decrease extensibility compared to control sample whereas, by increasing the substitution levels in the blends from 3 to 9 % lentil it led to decrease resistance to extension, proportional no. and dough energy.

Concerning lentil the extensibility values were the same (11.5 cm) at the ratio 3,6% lentil but it increased until (15 cm) at 9%.When the substitution levels of lentil increased from 3 to 9%the resistance to extension gradually decreased (640,460,280 B.U) .It could be noticed that proportional number decreased by increasing lentil levels from 3% to 9% (5.56,4,1.86).With regards lentil the dough energy values were (81.75 ,55.5 and 58 cm^2 respectively).

For fenugreek the results declared that when fenugreek was added at level 3%it led to increase resistance to extension, proportional no. and dough energy, while it led to decrease extensibility compared to control sample Whereas by increasing the substitution levels in the blends from 3 to 9 % fenugreek it led to an increase in resistance to extension proportional no. and dough energy.

Data in Table(3) and fig.(2) showed that the extensibility values were the same at the ratios 3,6% for fenugreek flour (11.5cm) but it increased at the ratio 9% to be (12 cm). The resistance to extension values gradually increased for fenugreek flours addition with increasing levels of fenugreek(540,780,920B.U respectively). Concerning the proportional number of the dough, as shown in table(4), it could be noticed that the increasing in the substitution levels of the fenugreek the proportional no. values for produced dough were obvious increased which were found to be 5.47, 6.78, and 7.66 . For dough energy (cm2) as shown in table (3) and fig.(2) by increasing level of fenugreek in wheat flour blends from 3 to 9% it led to an increasing in the dough energy (74,100,122 cm^2respectivelly)these results are in the same line with **Indrani *et al.*,(2010**).

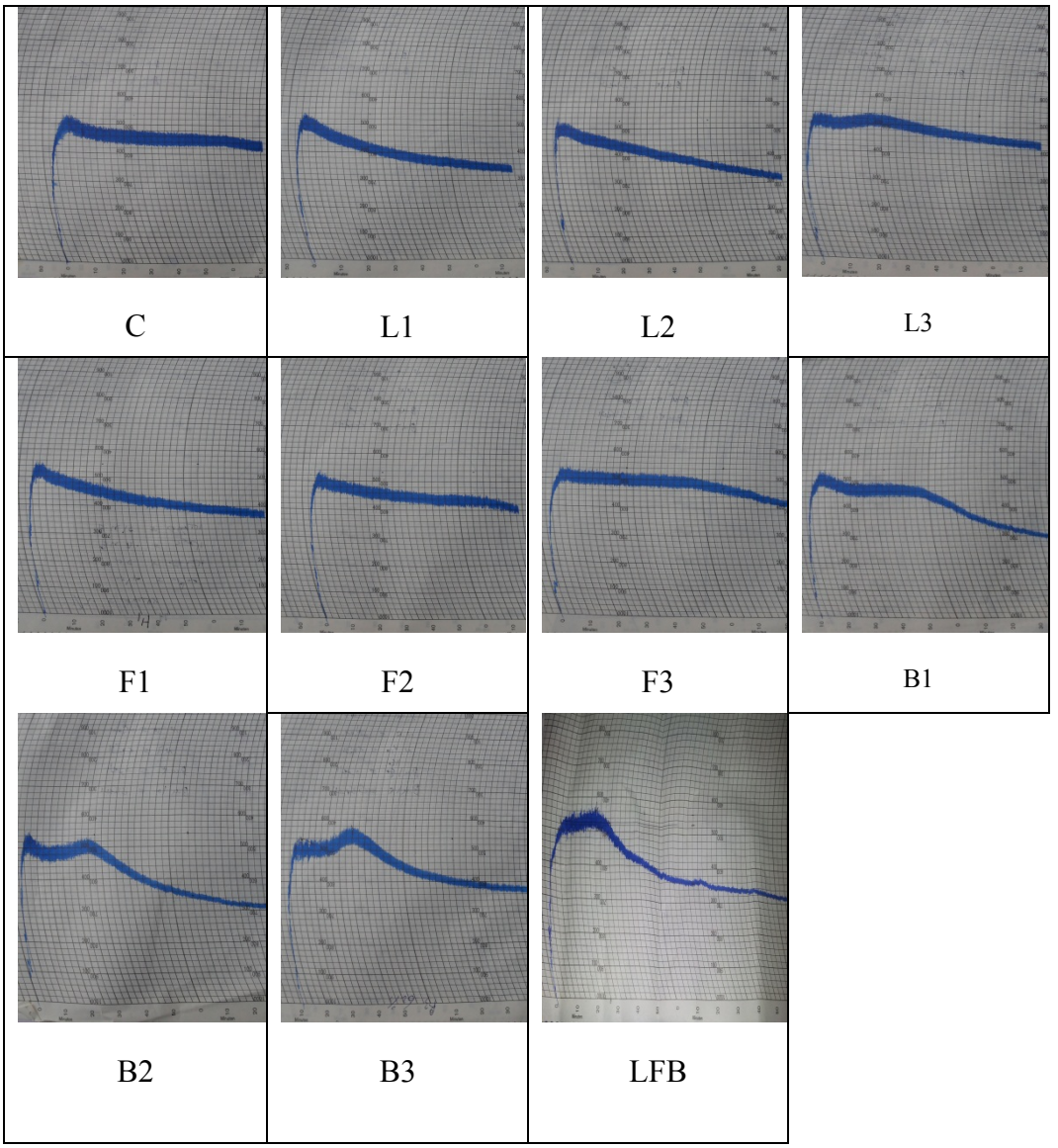

Fig. 1: Farinograph for the dough prepared from wheat flour and its blends.

table (2) and fig.(1) it could be noticed that, when the substitution levels of lentil increased from 3 to 9%, the dough development time decreased from (1.5 to 1.0) min these results are in the same line with **Kohajdová *et al.*,(2012)**. while, the dough development time was the same time in all blends of the fenugreek(1.5) min..concerning basil dough time was the same at the level 3,6% (1.5 min) whereas at level 9% basil dough development time increased to (5 min) .These results were in harmonization with **Zaidul *et al.*, (2004)**.The data presented in Table (2) and fig. (1)also observed that by increasing the substitution levels in the blends from 3 to 9 %lentil ,fenugreek and basil reduced the dough weakening. This result may be due to the presence of fibrous materials that weakened the dough. These results are in the line with those found by **Fenn *et al.*, (2010).**It was found that with the increasing proportion of the lentil ,fenugreek and basil in wheat flour blends from 3 to 9% led to an increase in the dough stability (min) .It could be observed that the increasing in the dough stability could be attributed to the increase in protein content, which could make the dough more stable. These results are in harmonization with those found by **Hegazy and Faheid (2006) and Mashayekh *et al.*, (2008).**

Table (2).Farinograph parameters of wheat flour 72% and wheat flour-Lentil, Fenugreek and basil flour blends

Blends	Water absorption (%)	Dough Time (min)	Stability(min)	D-Tolreance Index (B.U)	Dough weakening (B.U)
C	55.8	2	2.5	50	60
L1	58.2	1.5	2	100	140
L2	59	1	2	60	130
L3	59	1	9	0	40
F1	60	1.5	2	80	120
F2	60.2	1.5	3	50	60
F3	60.3	1.5	11	20	30
B1	60.5	1.5	2.5	60	140
B2	61	1.5	6	30	140
B3	62	5	7.5	140	120
LFB	64	4.5	5	140	170

C:control "wheat flour 72%extraction",L1:lentil flour (3%lentil powder)
L2:lentil flour (6%lentil powder),L3:lentil flour (9%lentil powder),F1:fenugreek flour (3% fenugreek powder), F2:fenugreek flour (6% fenugreek powder), F3:fenugreek flour (9% fenugreek powder), B1:basil flour (3% basil powder),B2:basil (6% basil powder),B3:basil (9% basil powder).LFB (6% mixture of lentil ,fenugreek and basil powder).

Rheological properties of flour dough samples used

Farinograph parameters of wheat flour 72% and wheat flour- Lentil, Fenugreek and basil flour blends

Farinograph properties of wheat flour dough by substitution at different levels of either lenteil, fenugreek and basil flour or the blend of the three are presented in Table (2) and fig.(1).

The results of farinograph showed that when lentil was added at level 3% it led to an increase in water absorption, d-tolreance index, dough weakening, whereas it led to a decrease in dough time, stability compared to control sample but by increasing the substitution levels in the blends from 3 to 9 % lentil this led to increase water absorption which was the same at 6%,9% ratio (58.2,59,59%) ,stability which was the same at 3%,6% ratio (2,2,9 min) while it led to decrease dough weakening (140,130,40 BU) and d-tolreance index(100,60,0 B.U).

Concerning fenugreek the results declared that when fenugreek was added at level 3%it led to an increase in water absorption, dough weakening, d-tolreance index, while it led to decrease stability compared to control sample Whereas by increasing the substitution levels in the blends from 3 to 9 % fenugreek it led to an increase in water absorption(60,60.2,60.3%)and stability(2,3,11 min)whereas it led to decrease dough weakening(120,60,30 B.U) and d-tolreance index(80,50,20 B.U).

The results also showed that adding basil at 3%level led to increase dough weakening, d-tolreance index while it led to decrease dough time compared to control sample .However, by increasing the substitution levels in the blends from 3 to 9 % basil it led to increase water absorption(60.5,61 and 62%)and stability (2.5,6,7.5 mim). In this respect ,the blend of lentil, fenugreek and basil at 6%substitution has led to increase water absorption ,stability, dough time, d-tolreance index and dough weaking.

From the obtained results, it could be noticed that by increasing the substitution levels in the blends from 3 to 9 % lentil ,fenugreek and basil water absorption gradually increased. This increase in absorption due to increasing fiber addition which may have caused an increase in the quantity of hydroxyl groups in the dough, which allows more water to be added, due to hydrogen interactions **Anil (2007) and Roberts *et al.*,(2011)**On the other hand, the stability time increased by increasing the substitution percentage to 9% lentil ,fenugreek and basil. Concerning the dough development time, as shown in

RESULTS AND DISCUSSION

Chemical composition of bread samples on dry weight

The chemical composition of bread made from wheat flour(C) and its blends with 3, 6 and 9 % of both lentil flour bread (LB) , fenugreek flour bread (FB) ,basil flour bread (BB) and the blend of them at substitution 6% (LFBB) are found in Table (1). Data declared that an increase in protein andfiber according to supplementation with lentil, fenugreek and basil powder from 3 to9% which were higher than those of wheat flour(C).

For fat data in Table (1) revealed that the highest value was observed for the control sample (wheat flour bread) (3.33),by increasing substitution levels of lentil fenugreek and basil from 3to9% fat increased to be (1.95,2.2 and 2.60) ,(0.54, 0.693and 1.910) and(0.315,0.677and 1.16).Concerning ash data in Table (1) showed decrease due to supplementation with lentil from 3% to 9% (3.22,3.16and3.05) these values were higher than wheat flour bread (2.62).In this respect by increasing level substitution of fenugreek and basil from 3 to9% ash increased to be (1.15,2.30and3.76) and (1.94,3.12and 4.44)Whereas , total carbohydrate in wheat flour bread was lower than that in samples (62.737) except for lentil bread which contain 9% lentil powder(62.294) and basil bread which contain 9% basil powder(59.91). Concerning the produced bread LFBB(mixture of lentil fenugreek and basil at 6% data showed that an increase in protein, fiber ,ash and carbohydrate .On the other hand, data revealed that an increase in iron due to supplementation with lentil, fenugreek and basil powder, iron increasing was high at supplementation bread with basil powder. These results are nearly with **Di Cesare *et al.,(*2003) and Shakuntala *et al.,(*2011)**

Table (1) Chemical composition of bread samples on dry weight

Samples	Total moisture %	Protein %	Fat%	Fiber %	Ash %	Carbohydrate %	Iron (ppm)
C	18.5	12.58	3.33	0.233	2.62	62.737	4.38
L1B	15.3	12.96	1.95	0.255	3.22	66.315	5.24
L2B	16.3	13.41	2.2	0.448	3.16	64.482	5.34
L3B	17.2	14.21	2.60	0.646	3.05	62.294	5.44
F1B	17.5	12.85	0.54	0.78	1.15	67.18	5.78
F2B	17	13.053	0.693	0.89	2.30	66.064	5.95
F3B	15	13.21	1.910	0.96	3.76	65.160	6.12
B1B	13.8	12.92	0.315	0.29	1.94	70.735	5.45
B2B	16.4	13.43	0.677	0.616	3.12	65.757	6.41
B3B	19.4	13.93	1.16	1.160	4.44	59.91	7.35
LFBB	16.2	13.32	1.2	0.642	2.85	65.788	5.85

C:control "wheat flour bread 72%extraction",L1B:lentil bread(3%lentil powder) L2B:lentil bread(6%lentil powder),L3B:lentil bread(9%lentil powder),F1B:fenugreek bread(3% fenugreek powder), F2B:fenugreek bread(6% fenugreek powder), F3B:fenugreek bread(9% fenugreek powder), B1B:basil bread (3% basil powder),B2B:basil bread (6% basil powder),B3B:basil bread (9% basil powder).LFBB lentil fenugreek basil bread (6% mixture of lentil ,fenugreek and basil powder).

MATERIALS AND METHODS

Materials:

Ingredients:

Wheat flour (72%) , the tested fenugreek powder , lentil and basil leaves were obtained from local market.

Methods

Preparing of lentil and basil flour:

lentil and basil leaves were cleaned by hand to remove foreign materials, then were crushed in household mill.

Chemical analysis:

Moisture, protein, ash, crude fiber and fat were determined according to the methods described in **AOAC (2000).** Total carbohydrates were calculated by difference. in Grain Research Labs.(G.R.L.), Training Center, El-haram

Iron analysis:

Iron was determined using a Pye Unicom SP 19000 atomic absorption spectroscopy in National Research Center , El Doki, Cairo, Egypt as described by **AOAC (2000).**

Rheological properties of dough:

Farinograph test was carried out to determine the water absorption, dough development time, dough stability and degree of weakening according to the method described in **AACC (1995).** Extensograph test was carried out to determine resistance to extension (BU), extensibility (mm), proportional number and energy (cm2) according to the method described in **AACC (1995)** in Grain Research Labs.(G.R.L.), Training Center El-haram.

Preparing of bread

Bread was prepared from 86 g wheat flour extraction 72%, 8g dry yeast, 5 g sugar, 1g salt with the addition of water for kneading.The used wheat flour was partially substituted by 3, 6 and 9 % of lentil ,fenugreek and basil flours and their mixture at 6% substitution.

Sensory evaluation of bread

Sensory properties of the organoleptic quality attributes; aroma, taste, color, Tenderness and overall acceptability for produced bread was carried out by ten experience judges from Home Economics Dept., Fac. Specific Education, Damietta Univ., Egypt. Bread was organoloptically evaluated according to **Watts *et al.*, (1989).**

Anemic conditions can result from a myriad of causes that can be isolated, but more often than not co-exist. These causes include hemolysis with malaria and other infectious diseases, enzyme deficiencies, a variety of hemoglobinopathies, and other icronutrient deficiencies **(McLean *et al.*, 2008).**

Vitamin C (ascorbic acid) significantly enhances iron absorption from non-haem foods the size of this effect increasing with the quantity of vitamin C in the meal. Germination and fermentation of cereals and legumes improve the bioavailability of non-haem iron by reducing the content of phytate, a food substance that inhibits iron absorption **(Lynch, 1997).**

Prevention and control is typically achieved through iron fortification of food staples like flour, rice, and pasta, and/or through administration of iron supplements most often in iron pill or, more recently sprinkle form **(Faqih et al., 2006 and Mumtaz*et al.*, 2000).**

World Health Organization guidelines suggest that iron supplementation should include administration of 60 mg of iron daily with a dose of 400 µg of folic acid for women of reproductive age, 30 mg of iron and 250 µg of folic acid for schoolaged children, and approximately 2 mg/kg body weight per day for preschool-aged children **(McLean *et al.*, 2008)**.

Lentils can be eaten along with rice or as a soup; their nutritional properties can be attributed to the carbohydrates, dietary fiber, protein, thiamine, calcium, folate, iron, magnesium, phosphorus, potassium, and zinc in them However, lentils also contain phytates, which reduce the availability of minerals, making them less desirable. Soaking lentils overnight can reduce their phylates content **(Thavarajah *et al.*, 2007).**

Fenugreek is one of the oldest medicinal plants, originating in India and Northern Africa. An annual plant, fenugreek grows to an average height of two feet **(Ethan *et al.*, 2003)**.

Fenugreek use for blood lipids and sugar decreasing in diabetic and non diabetic peoples and have antioxidant and antibacterial activity.This plant decrease body fats and effective on obesity. This plant use in therapy atherosclerosis**(Nandini *et al.*, 2007).**

Basil produces a range of polyphenolic compounds including rosmarinic acid, a characteristic it shares with herbs in the genus Lamiaceae. Rosmarinic acid is a cinnamic acid derivative with potent antioxidant activity **(Chen and HO ,1997)** and known antiviral, antibacterial, and anti-inflammatory properties **(Petersen and Simmonds , 2003).**

The present study was designed to evaluate the effect of substitution of wheat flour with different levels of lentil, fenugreek and basilat different levels 3, 6 and 9% and their mixture at 6% level substitution on the chemical composition of produced bread, on sensory and rheological properties of wheat flour bread.

IMPROVE THE NUTRITIONAL VALUE OF BREAD BY USING IRON- RICH FOOD

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INTRODUCTION

Iron, a component of every living cell, is intrinsically involved in numerous biochemical reactions in the body and is associated with oxygen transport and storage, energy production, DNA synthesis, and electron transport **(Crichton *et al.,* 2002 and Theil, 2004).**

Iron deficiency(ID) is the most common deficiency state in the world, affecting more than 2 billion people globally. Although it is particularly prevalent in less-developed countries, it remains a significant problem in the developed world, even where other forms of malnutrition have already been almost eliminated. Effective management is needed to prevent adverse maternal and pregnancy outcomes, including the need for red cell transfusion(**Pavord*et al.,* 2011).**

Iron plays an essential role in oxidative energy production. Iron deficient anemia (IDA) that is low levels of hemoglobin (Hb) in combination with abnormal levels of other iron indicators is associ -ated with, inter alia, greater susceptibility to disease, fatigue and reduced child development. In severe cases, it is associated with elevated infant and maternal mortality. Iron deficiency affects physical activity through primarily two pathways. First, ashemogl -obin levels decline, the maximum amount of oxygen that the body can use (aerobic capacity) declines. Second, as iron stores are depleted, the amount6 of oxygen available to muscles declines, reducing endurance, and the heart works harder to produce the same amount of activity**(Haas and Brownlie,2001).**Anemia is defined as aHb concentration of less than 11.0 g/dL for bothmale and female children aged 12 through 35 months **(Cusick*et al.,* 2008).**

IDA remains a common cause of anemia in young children. However, even more important than anemia itself is the indication that the more common ID without anemia may also adversely affect long-term neurodevelopment and behavior and that some of these effects may be irreversible. Because of the implications for pediatric health care providers and their patients, this report reviews and summarizes this information**(Lozoff*et al.,*2006).**