Evaluation of physico-chemical properties of toast breads fortified with pumpkin (Cucurbita moschata) flour

By
Mervat Ebrahim El-Demery
Home Economics Department, Faculty of Specific Education
Kafr-Elsheikh University

The 6th Arab and 3rd International Annual Scientific Conference on:

Development of Higher Specific Education Programs in Egypt and the Arab World in the Light of Knowledge Era Requirements

Faculty of Specific Education
Mansoura University - Egypt
April, 13-14, 2011

كلية التربية النوعية بالمنصورة
المؤتمر السنوي (العربي السادس– الدولي الثالث)
تطوير برامج التعليم العالي النوعي في مصر والوطن العربي
في ضوء متطلبات عصر المعرفة
في الفترة من 13 – 14 أبريل 2011

2011
م / 1432 هـ
Evaluation of physico-chemical properties of toast breads fortified with pumpkin
Evaluation of physico-chemical properties of toast breads fortified with pumpkin (Cucurbita moschata) flour

By
Mervat Ebrahim El-Demery
Home Economics Department, Faculty of Specific Education
Kafr-Elsheikh University

Abstract

The purpose of this study was to evaluate the physico-chemical and sensory properties of toast bread fortified with pumpkin flour. Four different substituted levels of pumpkin in flour (5%, 10%, 15%, 20% and control) were used compared with control. The chemical composition (moisture, protein, fat, ash, fiber, carbohydrates and minerals) was determined. Physical properties (Loaf height, loaf volume, loaf weight and specific volume), in addition to color and water holding capacity were evaluated. Results showed that no significant (P>0.05) different between 10% and 15% pumpkin flour toast bread in protein, fat and ash contents. However, loaf weight was reaching a maximum at substitution levels of pumpkin flour between 15% and 20%. Similar results was observed with water holding capacity. Sensory evaluation results showed that toast bread with 5% and 10% pumpkin flour and control were not significantly (P>0.05) different in terms of order, texture and over all acceptability. Color of the toast bread treatments was significantly affected (P<0.05) by addition different levels of pumpkin flour.

Keywords: Pumpkin flour, toast, bread, minerals, color, physical, sensory.
Evaluation of physico-chemical properties of toast breads fortified with pumpkin (Cucurbita moschata) flour

By
Mervat Ebrahim El-Demery
Home Economics Department, Faculty of Specific Education
Kafr-Elsheikh University

Introduction

Pumpkin is cultivated throughout the world for use as vegetable as well as medicine. It has been used traditionally as medicine in many countries such as China, Yugoslavia, Argentina, India, Mexico, Brazil and America (Popovic,1971), (Jia et al., 2003) and (Adolfo and Michael, 2005). Some of its common uses in most countries are for diabetes and treating internally as well as externally for management of worms and parasites. However, it is commonly consumed as vegetable.

Pumpkin can be processed into flour which has a longer shelf-life. Pumpkin flour is used because of its highly-desirable flavour, sweetness and deep yellow-orange color. It has been reported to be used to supplement cereal flours in bakery products, for soups, sauces, instant noodle and spice as well as a natural coloring agent in pasta and flour mixes. Pumpkin is rich in carotene, vitamins, minerals, pectin and dietary fiber (Djutin, 1991). Hence, supplementation of PF would improve the nutritional quality of bread (Ptitchkina et al., 1998).

According to a study by (Ptitchkina et al., 1998), protein content of pumpkin powder was reported to be 9%, while (See et al., 2007) reported that it to be 9.65%. These figures fall within the reported range of protein content in wheat flour of 7% to 15% (Atwell, 2001), reflected the potential application of pumpkin flour to be used as substitution for wheat flour or as wheat–pumpkin composite flour blend. (Cauvain and Young, 2000) reported that fibrous material from sources other than wheat could be supplemented into bakery products to confer particular nutritional or sensory properties. According to (Ptitchkina et al., 1998), pumpkin powder contains 40% cellulose, 4.3% hemi cellulose, and 4.3% lignin, which are the main components of insoluble dietary fiber. Consumption of high-fiber diet has been reported to be protective against
various health disorders such as diabetes mellitus, cardiovascular diseases, constipation, appendicitis, hemorrhoids, and colon cancer (Mendeloff, 1987); (Anderson et al., 1994). Fiber is capable of buffering the pH of stomach by binding to the excess acids produced by the digestive system, aid in fecal bulking, and also intestinal emptying (Vergara-Valencia et al., 2006). Besides that, (Dreher 1987) and (Sharma, 1981) reported that fiber components can give texture, gelling, thickening, stabilizing, and emulsifying effects on certain foods. Ability of flour to retain water and oil improves the mouthfeel of a food product and helps to reduce fat and moisture losses. Syneresis in food products is controlled by adding food ingredients with high water holding capacity (WHC) (Grigelmo-Miguel et al., 1999). Thus, pumpkin could be processed into flour to be incorporated in baked products as wheat–pumpkin composite flour blend for fiber enrichment and other functional purposes

Sudha et al. (2007) reported that bakery products are varied by addition of value added ingredients. Among the added ingredients, dietary fibre has gained tremendous attention. De Escalada Pla et al. (2007) reported that, fruits and vegetables are important sources of dietary fibre, although the content is not as high as in cereals. Fruits and vegetables have been shown to have high content of soluble dietary fibre. Soluble dietary fibre plays an important role in lowering serum cholesterol and glucose level, while insoluble dietary fibre is essential in maintaining intestinal health. Jun et al. (2006) reported that pumpkin is a good source of carotene, pectin, mineral salts, vitamins and other substances that are beneficial to health. These facts lead to the processing of pumpkin into various food products.

Pumpkin is high in β-carotene, which gives it yellow or orange color. It is also high in carbohydrates and minerals. Beta-carotene in plants that have a pleasant yellow-orange color is a major source of vitamin A Lee, (1983). Consumption of foods containing carotene helps prevent skin diseases, eye disorders and cancer Bendich, (1989). Incorporation of β-carotene rich materials in the human diet is therefore considered a cost-effective approach to vitamin-A related health problems Berteram and Bortkiewicz, (1995). This investigation was done to evaluate the physico-chemical attributes of pulp pumpkin and pumpkin flour as well as to evaluate the physico-chemical, nutritional and sensory properties of toast bread prepared with different levels of pumpkin flour.

MATERIALS AND METHODS

Preparation of Pumpkin Flour

Pumpkin fruits (Cucurbita moschata) were obtained from a local market. The rind, fibrous matter and seeds were removed and the flesh cut into small
pieces followed by soaking for 45 minutes in 0.2% (w/v) sodium metabisulphite and rinsing under running tap water. The pumpkin pieces were then cut into slices of 2-3 mm thickness using a slicer and dried in hot air oven to a moisture content of 10 -12% at 60°C for 24 hours. The dried pumpkin slices were grounded then flour was passed through a mesh sieve of size 0.25 µm at 14000 rpm. The resulting flour was then kept in an airtight container and stored in a chiller prior to use See et al., (2007)

Preparation of Toast Bread

All ingredients were obtained from local market. Flour blends were baked using the straight–dough method according to Chauhan et al., (1992) with little modification wheat flour were substituted by Four levels of pumpkin flour (5, 10, 15, and 20%)

The baking formula was 500 g of flour blend, 9 g of compressed baker’s yeast, 5 g of NaCl, 13 g of cane sugar, 10 g of vegetable shortening and approximately 280 ml of water. All the ingredients were mixed in a Kenwood mixer (Model A907D) for 3.5 min. The dough were fermented for 90 min at 28±1°C, then punched, scaled to 250 g dough pieces, proofed for 90 min at 30°C, 85% relative humidity and baked at 250°C, for 30 min. Baked toast breads were ground, screened through a 0.25 mm sieve and used for chemical analyses.

Proximate Chemical Analysis

All analyses were carried out in triplicate. Moisture, ash, protein, fat and fiber content were determined according to AOAC (1995). Moisture (g water/100 g sample) was determined by drying 3 g sample at 100°C to constant weight. Ashing was performed at 500°C for 5hrs (g ash/100 g sample). Protein (g protein/100 g sample) was analyzed using kjeldahl method; factor of 6.25 was used for conversion of nitrogen to crude protein. Fat (g fat/100 g sample) was calculated by weight loss after 6-cycle extractions with petroleum ether in soxhlet apparatus. Crude fiber as (g crude fiber/100 g sample) was determined, carbohydrate contents were estimated by difference.

Total caloric content was determined by calculation. According to Lawrence (1965). Using the following equation: total caloric (Kcal/100g) = (protein content x4) + (fat content x9) + (carbohydrate content x4)

Mineral analysis

Mineral analysis was done by dry ashing according to procedure of the AOAC (1995). Calcium, iron, potassium and sodium were determined using an
atomic absorption spectrophotometer (AAS). Phosphorus was determined by the molybdenum-vanadate method using procedure of the AOAC (1995).

**Bread characteristics**

Bread characteristics or baking qualities were evaluated by measuring loaf height, loaf weight, loaf volume and specific volume, 30 min after removal from the oven. Loaf volume was measured by rapeseed displacement; specific volume was obtained by dividing the loaf volume on its corresponding loaf weight.

**Determination of water holding capacity**

Water holding capacity was determined according to a method of Gould et al., (1989). An amount of 3 g of the flour sample (dried) was weighed into a centrifugal tube, added with 30 mL distilled water and mixed using the vortex mixer (Vortex V1 Plus, Boeco, Germany) for 30 sec. The sample was allowed to hydrate for 2 h at room temperature.

This was followed by centrifugation using a bench top centrifuge (Kubota 5100 Bench Top Centrifuge, Fujioka, Japan) at 2800 rpm for 10 min. The supernatant was discarded and the hydrated sample was weighed. Results were expressed as

\[
\text{Water holding} = \frac{\text{Weight of hydrated sample (g)} - \text{Weight of dry sample (g)}}{\text{weight of dry sample (g)}}
\]

**Color Measurement**

Pumpkin flour and toast color were measured using The Minolta Spectrophotometer CM-3500d (Osaka, Japan). The color attributes Hunter L, a, and b. L* defines lightness, a* denotes the red/green value and b* the yellow/blue value. The L* axis has the following boundaries: L=100 (white or total reflection) and L=0 (black or total absorption). According to See et al.,(2007)

**Sensory property**

Loaves were cooled for 1-2 h at room temperature (25°C) in a sealed plastic bag. The toast bread was then cut into 2 x 3 x 5 cm slices using a bread knife. Sensory property was evaluated by 10 trained panelists for appearance, color, odor, taste and overall acceptance on a 9-point hedonic scale (from like extremely = 9 to dislike extremely = 1) Watts et al., (1989).
Evaluation of physico-chemical properties of toast breads fortified with pumpkin

Statistical analysis:

Data of sensory quality, chemical analysis and physico-chemical properties were subjected to analysis of variance followed by Duncan's multiple range tests according to Steel and Torrie (1980).

Results

Chemical composition of pumpkin pulp and pumpkin flour

The chemical analysis and mineral assay of pumpkin pulp and pumpkin flour are shown in Table 1. Results indicated that pumpkin flour was lower in moisture (10.64%) and higher in protein, fat, ash, fiber and carbohydrate content than pumpkin pulp. This result was similar to Pongjantat et al., (2006) and Bothat et al., (1981). On the other hand, the mineral analysis showed that pumpkin flour is high in all minerals, sodium, potassium, calcium, iron and phosphorus when compared to pumpkin pulp.

This results imply that fluted pumpkin can supply a mix of essential minerals required for various body function, Egbekun et al., (1998)

Table (1): Proximate chemical composition and some mineral content (mg/100g) of pumpkin pulp and pumpkin flour

<table>
<thead>
<tr>
<th>Composition (%)</th>
<th>Pumpkin pulp</th>
<th>Pumpkin flour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture (%)</td>
<td>89.65</td>
<td>10.64</td>
</tr>
<tr>
<td>Protein (%)</td>
<td>1.21</td>
<td>9.69</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>0.56</td>
<td>1.25</td>
</tr>
<tr>
<td>Ash (%)</td>
<td>1.50</td>
<td>6.13</td>
</tr>
<tr>
<td>Fiber (%)</td>
<td>1.80</td>
<td>3.26</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>6.98</td>
<td>71.03</td>
</tr>
</tbody>
</table>

Mineral content (mg.100 g)

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Pumpkin pulp</th>
<th>Pumpkin flour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium (Na)</td>
<td>0.949</td>
<td>21.50</td>
</tr>
<tr>
<td>Potassium (K)</td>
<td>355.22</td>
<td>5185.11</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>46.35</td>
<td>616.73</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>0.835</td>
<td>14.07</td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>44.05</td>
<td>817.88</td>
</tr>
</tbody>
</table>

Chemical composition of different prepared toast breads. Table 2, shows the chemical composition of toast bread with different levels of substitution of wheat flour with pumpkin flour. There were no significant (P>0.05) differences in moisture and fat content between the control which contained 100% wheat flour and 5% pumpkin flour toast bread, also no significant (P>0.05) differences in protein, fat and ash between 10% and 15% pumpkin flour toast bread.
bread. Reduced fat content as compared to the control may be attributed to the lower fat content in pumpkin flour See et al., (2007). Therefore, when the level of pumpkin flour increased, moisture content increased (21.35 to 26.05%). This result in agreement with that of Ptitchkina et al., (1998) who found that addition of pumpkin powder at concentration up to ~10 g/kg flour also caused an increases in moisture content of the bread.

See et al., (2007) and Sundy and Dickson (1992) attributed that results to the higher water absorption capacity in the composite flour compared to wheat flour.

The protein content in the control (16.02%) was significantly (P<0.05) higher than all other pumpkin flour toast bread, this results could be due to higher content of protein in wheat flour compared to pumpKin flour. Moreover, addition of pumpkin flour to toast bread led to reduction of protein content, this result agrees with that of Ensminger et al., (1994). In the same table, ash and fiber content in pumpkin toast bread were significantly difference (P<0.05) higher when compared with control (1.78, 1.61%). This results were same trained with the results of Ptitchkina et al., (1998).

Carbohydrates and energy kcal/100 g were decreasing by (9.91%, 11.56%) respectively with increment of pumpkin flour percent. Substitution of pumpkin flour to wheat flour also showed reduction in total carbohydrate content of the toast bread. These results in agreement with those of See et al., (2007).

Table (2) : Chemical composition of toast bread with different levels of pumpkin flour

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Composition (%)</th>
<th>Moistures</th>
<th>Protein</th>
<th>Fat</th>
<th>Ash</th>
<th>Fiber</th>
<th>Carbohydrate</th>
<th>Energy Kcal/100 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control 100% W.F</td>
<td>20.81bc</td>
<td>16.02a</td>
<td>2.75a</td>
<td>1.78d</td>
<td>1.61d</td>
<td>57.03</td>
<td>316.95</td>
<td></td>
</tr>
<tr>
<td>5% PF + 95% W.F</td>
<td>21.35c</td>
<td>15.63b</td>
<td>2.60a</td>
<td>2.65c</td>
<td>2.57c</td>
<td>55.20</td>
<td>306.72</td>
<td></td>
</tr>
<tr>
<td>10% PF + 90% W.F</td>
<td>23.75b</td>
<td>14.95c</td>
<td>2.46b</td>
<td>2.98b</td>
<td>2.86b</td>
<td>53.00</td>
<td>293.94</td>
<td></td>
</tr>
<tr>
<td>15% PF + 85% W.F</td>
<td>25.15a</td>
<td>14.37c</td>
<td>2.41b</td>
<td>3.14b</td>
<td>3.12a</td>
<td>51.81</td>
<td>286.71</td>
<td></td>
</tr>
<tr>
<td>20% PF + 80% W.F</td>
<td>26.05a</td>
<td>13.75d</td>
<td>2.20c</td>
<td>3.39a</td>
<td>3.23a</td>
<td>51.38</td>
<td>280.32</td>
<td></td>
</tr>
</tbody>
</table>

Different letters on same column represent statistically significant (P<0.05) difference between means.

Where : WF : Wheat flour
PF : Pumpkin flour
Some minerals content of different toast bread treatments

Minerals content in toast bread at different levels of wheat flour substitution with pumpkin flour (mg/100g) are shown in Table 3. More significantly was observed in the mineral contents between control treatment and all treatments which contained pumpkin flour. But no significant differences was found between 5% and 10% pumpkin flour boast breads in their content of sodium, iron and phosphorus. The minerals were increased with increasing in the level of pumpkin flour in all treatments. The values obtained for K, Ca, Fe and P are reasonably high in different breads with different levels of pumpkin flour that may satisfy the nutritional needs of the consumers.

Gomaa, (2000) investigated that using of pumpkin pulp flour with infants food formula at level 5% led to improvement its minerals content and it had a very good effect on sensory characteristics and protein efficiency ratio of prepared formula

Table (3) : Some minerals content in toast bread at different levels of wheat flour substitution with pumpkin flour (mg/100g)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Minerals content mg/100g</th>
<th>Na</th>
<th>K</th>
<th>Ca</th>
<th>Fe</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control 100% W.F</td>
<td></td>
<td>333.20c</td>
<td>100.82f</td>
<td>59.60f</td>
<td>1.42d</td>
<td>113.80c</td>
</tr>
<tr>
<td>5% PF + 95% W.F</td>
<td></td>
<td>382.40b</td>
<td>5204d</td>
<td>682.30d</td>
<td>14.70c</td>
<td>840.22ab</td>
</tr>
<tr>
<td>10% PF + 90% W.F</td>
<td></td>
<td>398.50b</td>
<td>5226c</td>
<td>701.20c</td>
<td>14.95c</td>
<td>851.08ab</td>
</tr>
<tr>
<td>15% PF + 85% W.F</td>
<td></td>
<td>407.20a</td>
<td>5251b</td>
<td>722.60b</td>
<td>15.18b</td>
<td>863.13a</td>
</tr>
<tr>
<td>20% PF + 80% W.F</td>
<td></td>
<td>415.60a</td>
<td>5280a</td>
<td>747.40a</td>
<td>15.46a</td>
<td>877.05a</td>
</tr>
</tbody>
</table>

Different letters on same column represent statistically significant (P<0.05) difference between means.
Where: WF : Wheat flour
PF : Pumpkin flour

Baking properties of the prepared toast breads.

Baking properties for the prepared toast bread prepared with different substitution levels of wheat flour with pumpkin flour were presented in Table 4.

The results illustrated that there were no significant results (P>0.05) were observed in loaf hights, loaf volumes, loaf weights and specific volumes of toast bread made from 100% wheat flour and toast bread containing 5%pumpkin flour. A similar observation was reported by Ptitchkina et al., (1998), pumpkin powder, introduced initially as a nutritional supplement, has been found to give very large, unexpected, increases in the loaf volume and
organoleptic acceptability of wheat bread produced using our samples with comparatively poor bread making properties.

Increasing water level in the formula by 10-20% increased the loaf volumes in bread Gallagher et al., (2003) but Misra et al., (1991) observed that, bread volume decreased when soy flour incorporated in wheat flour exceeded 2%.

On the other hand, addition of pumpkin flour at concentration up to 5% caused a reduction in these toast bread properties (except for loaf weight that reaching a maximum at concentration of pumpkin flour between 15 and 20%). This result is in agreements with the results of Giami, (2003).

Finally, more significantly differences were noticed between control treatment and treatments which contained up to 10% pumpkin flour in all properties. The same table results recorded highest significantly (P<0.05) differences of water holding capacity (WHC) between control treatment and pumpkin flour treatments, but no significant (P>0.05) difference was observed between 15% and 20% pumpkin flour levels Chen et al., (1984) reported that high WHC of fruit fibers is linked to the high pectin content of the fruit. According to Hodge and Osman (1976), flours with high WHC contain more hydrophilic constituents, such as polysaccharides

**Table (4)**: Baking properties and WHC of toast bread prepared with different substitution levels of pumpkin flour with wheat flour.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Properties</th>
<th>Loaf height (cm)</th>
<th>Loaf volume (cm$^3$)</th>
<th>Loaf weight (g)</th>
<th>Specific volume (cm$^3$)</th>
<th>WHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control 100% W.F</td>
<td></td>
<td>10.65a</td>
<td>1320.50a</td>
<td>230.60c</td>
<td>5.73a</td>
<td>1.61f</td>
</tr>
<tr>
<td>5% PF + 95% W.F</td>
<td></td>
<td>10.40a</td>
<td>1230.80a</td>
<td>235.50c</td>
<td>5.23a</td>
<td>2.04c</td>
</tr>
<tr>
<td>10% PF + 90% W.F</td>
<td></td>
<td>8.75b</td>
<td>1199.80b</td>
<td>240.00b</td>
<td>5.00b</td>
<td>2.23b</td>
</tr>
<tr>
<td>15% PF + 85% W.F</td>
<td></td>
<td>7.90b</td>
<td>1125.60b</td>
<td>243.40b</td>
<td>4.62c</td>
<td>2.42a</td>
</tr>
<tr>
<td>20% PF + 80% W.F</td>
<td></td>
<td>5.85c</td>
<td>1035.90c</td>
<td>247.60a</td>
<td>4.18c</td>
<td>2.66a</td>
</tr>
<tr>
<td>Pumpkin pulp</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.57f</td>
</tr>
<tr>
<td>Pumpkin flour</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.95d</td>
</tr>
</tbody>
</table>

Different letters on same column represent statistically significant (P<0.05) difference between means.
Where: WF : Wheat flour
PF : Pumpkin flour
WHC: Water holding capacity
Color Evaluation of different toast breads samples compared to pumpkin pulp and flour

Evaluation of color values for pulp and pumpkin flour and toast breads prepared with different levels of substitution of wheat flour with pumpkin flour are shown in Table 5. Color values of L*, a* and b* were significantly higher (P<0.05) in pumpkin flour than that of pulp pumpkin since, pumpkin flour has a lighter color L* value (58.02), a* value was higher (9.08) than that of pulp pumpkin (5.12), indicated more redness pumpkin flour, also increased yellowness (higher b* value 34.88) than pulp pumpkin. This result agreement with the result obtained by Pongianta et al., (2006), while see et al., (2007) found that pumpkin flour has higher L* value, low a* value and higher b* value than fresh pumpkin. The yellow color of the pumpkin could have been caused by the carotenoids Wu and Jin, (1995) as pumpkin is a rich source of β-carotene.

In the same table 5, the average a* and average b* values of all pumpkin flour-substituted treatments were higher than of the control. The higher redness (a*values) and yellowness (b* values) indicated that the pumpkin flour had more attractive color as compared to wheat flour. Therefore, adding pumpkin flour would enhance the color of food products, and ultimately would improve consumers, acceptance on the products of Aziah and Komathi (2009).

Table (5) : Evaluation of color values for toast breads prepared with different levels of substitution of wheat flour with pumpkin flour

<table>
<thead>
<tr>
<th>Color values</th>
<th>Pumpkin pulp</th>
<th>Pumpkin flour</th>
<th>Control 100% WF</th>
<th>% Pumpkin flour levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>L*</td>
<td>32.18b</td>
<td>58.02a</td>
<td>28.25a</td>
<td>27.88b 27.62b 26.89c 26.57c</td>
</tr>
<tr>
<td>a*</td>
<td>5.12b</td>
<td>9.08a</td>
<td>0.77c</td>
<td>0.82c 0.97b 1.65a 1.92a</td>
</tr>
<tr>
<td>b*</td>
<td>24.05b</td>
<td>34.88a</td>
<td>2.83c</td>
<td>10.37b 10.58b 10.99a 11.25a</td>
</tr>
</tbody>
</table>

Different letters on same column represent statistically significant (P<0.05) difference between means.
Where : WF : Wheat flour
       PF : Pumpkin flour

On the other hand, control treatment was found to be significantly different (P<0.05) in L* value (28.25) as compared to all pumpkin treatments. It has the highest L*value (28.25), indicated that wheat flour has the lightest color
Aziah (2009). While Maeda et al., (2004) reported that wheat flour is generally considered white due to the removal of the bran or endosperm during milling.

**Sensory evaluation of different toast breads treatments compared with control**

Sensory evaluation of toast bread at different levels of wheat flour substitution with pumpkin flour are presented in Table 6. The odor, texture and over all acceptability scores of control treatment and 5%, 10% pumpkin flour treatments were not significantly different (P>0.05), they ranged from "Like slightly" to "Like moderately". Incorporation of pumpkin flour recorded highest scores for all quality attributes of substitution 5% and 10% higher than that control treatment. Moreover, color appeared to be a very important criterion for initial acceptability of the baked product by the consumer. The color of the toast bread was significantly affected (P<0.05) by the addition of pumpkin flour, but the color of 15%, 20% substitution of the pumpkin flour, toast bread showed a significant decrease (P<0.05).

Bloukas et al., (1999) reported that development of food products with attractive colors has been a major goal in the food industry. The attractive color imported by pumpkin could improve the appearance of food. According to Lee et al., (2002), incorporation higher levels of pumpkin powder produced noodles with improved color and sensory characteristics.

**Table (6)**: Sensory evaluation of toast bread at different levels of wheat flour substitution with pumpkin flour.

<table>
<thead>
<tr>
<th>% pumpkin flour levels</th>
<th>Appearance</th>
<th>Paste</th>
<th>Color</th>
<th>Oder</th>
<th>Texture</th>
<th>Over all acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control 100% W.F</td>
<td>6.88b</td>
<td>7.38a</td>
<td>6.92b</td>
<td>6.82a</td>
<td>7.30a</td>
<td>7.32a</td>
</tr>
<tr>
<td>5% PF + 95% W.F</td>
<td>7.36a</td>
<td>7.72a</td>
<td>7.52a</td>
<td>6.85a</td>
<td>7.60a</td>
<td>7.56a</td>
</tr>
<tr>
<td>10% PF + 90% W.F</td>
<td>7.15a</td>
<td>7.13b</td>
<td>7.15b</td>
<td>6.80a</td>
<td>7.42a</td>
<td>7.13ab</td>
</tr>
<tr>
<td>15% PF + 85% W.F</td>
<td>6.41c</td>
<td>6.765c</td>
<td>6.28c</td>
<td>6.18b</td>
<td>6.71b</td>
<td>6.37b</td>
</tr>
<tr>
<td>20% PF + 80% W.F</td>
<td>5.63d</td>
<td>5.22d</td>
<td>5.78d</td>
<td>5.66c</td>
<td>5.35c</td>
<td>5.25c</td>
</tr>
</tbody>
</table>

Different letters on same column represent statistically significant (P<0.05) difference between means.
Where: WF : Wheat flour
PF : Pumpkin flour
References


---

The 6th Arab and 3rd International Annual Scientific Conference 2158


Evaluation of physico-chemical properties of toast breads fortified with pumpkin


المحلية العربية

هناك زيادة في الطلب على المنتجات الصحية الغنية بالألياف منخفضة الطاقة والتي لها قيمة غذائية عالية. ويعتبر الفرع العصبي من المصدرين الجيدة في الكاروتيدين والبيتين والأملاح المعدنية والفيتامينات مثالاً آخر منتشرًا صحياً. وهذا أدى إلى استخدامها في العديد من المنتجات الغذائية. لذلك كان هدف هذه الدراسة استخدام الفرع العصبي المجفف في صورة دقيق تدعم بعض المخزونات كخليج التوست والذي تم دراسة خواصه الطبيعية والكيميائية مع مقارنتها بالتوست المحمض من دقيق القمح ك및اً كنترول، حيث تم استخدام دقيق القمح مع الدقيق الأبيض استخلاص 72% بنسب استبدال 5، 10، 15 و 20% زيادة إضافة دقيق القمح ومن خلال النتائج المتحصل عليها وجد أن:

- حدوث زيادة المحتوى الرطلي والحمض والألياف بينما احتفظ محتوى البروتين والدهن والكربوهيدرات وأيضاً الطاقة في العينات المدعمة بدقين الفرع العصبي بالمقارنة بالعينة الكنترول بينما كان هناك زيادة في محتوى الأملاح المعدنية لكل العينات المدعمة.

- لوحظ نقص في كل من ارتفاع وحجم الهيدر وكمية الحجم النوعي ونسبة زيادة في الوزن في العينات المدعمة بدقين الفرع العصبي بالمقارنة بالعينة الكنترول.

- حددت تحسن في الخواص الطبيعية خاصة اللون عند مستوى إضافة 5%، 10% من دقيق الفرع. وجود فروق عالية معنوية بين العينات الكنترول والعينات المدعمة بدقين الفرع بالنسبة لخصائي المقدرة على الاحتفاظ بالماء.

- كما أوضح النتائج أن الخواص البيولوجية الحمضية أن خليج التوست المدعم بنسب 5، 10% كان أكثر قوة للسمك ويوفر فروق معنوية بين العينات الكنترول وبذلك العينات من حيث النكهة والقوام والقبول العام.

وعلى ما تقدم، توصي الدراسة باستخدام دقيق القمح في تعزيز منتجات الخبز بنسب تتراوح بين 5-15% والتي لاقت قبول لدى معظم المستهلكين.