Effect Of Sesame-Durum Wheat Flour Blends On Nutritional And Sensory Properties Of Couscous

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Abstract

The objective of this study was to investigate the effect of partial substitution (5, 10, 15 and 20%) of durum wheat flour by sesame flour on nutritional characteristics and quality parameters of couscous. Cooking properties, color values, chemical and sensory properties of couscous samples were determined. Sesame flour contained high percentage of protein, lipids, ash and crude fiber when compared to wheat flour. The results indicated that addition of sesame flour to durum wheat flour lead to increase protein, lipids, fiber and ash contents, as well as mineral contents (Ca, Mg, K, P, Fe and Zn). Cooking properties of couscous were affected negatively by the increasing sesame in formulation. Also the results revealed that crude protein, ash and cellulose and phytic acid contents of prepared couscous had gradually increased with increasing the replacement level with sesame flour in comparison to control. The replacement of durum wheat flour with sesame flour up to 15% successfully produced couscous without any unfavorable change in the sensory characteristics. Flavor, Firmness and Stickness Generally sesame
flour substitution decreased the cooking properties but increase nutritional and sensory properties.

**Introduction**

Wheat is one of the most popular grain crops in the world and has recently become one of the leading grain crops in the Kingdom of Saudi Arabia. Within the last ten years the production of wheat in the Kingdom has increase from 3000 to 4,700,000 tons per year. In Saudi Arabia, more than 95% of wheat distribution and production belongs to bread type wheat (*Triticum vulgare*). In recent years, the development of specialized durum wheat industry oriented toward the production of special products (couscous, semolina, pasta, etc.) has provided new impetus to durum wheat (*Triticum durum*) cultivation for internal consumption. Accurate estimation about the annual production of durum wheat production of durum wheat in Saudi Arabia is not available. However, the increase in durum wheat production is of great interest to overcome the increasing imported pasta products from 2500 tons during 1974-1976 to 23,500 tons during 1987-1989 (*Al-Mana and Mahmoud 1996*).

Couscous (pronounced "KOOS-koos") is a dish made from tiny granules of durum wheat. The couscous grains are then prepared by steaming them until they have a light, fluffy consistency. Couscous is closely related to pasta, as durum wheat, ground into semolina flour, is the same type of wheat that is most commonly used for making pasta (*Coskun, 2013*).
Couscous originated in North Africa, where it is traditionally prepared as part of a meat or vegetable stew seasoned with cumin. Today, couscous is found in many cuisines, including much of the Middle East and various Mediterranean cuisines, as well as the United States and western European countries such as France and the U.K. Its popularity is due to the great taste and good nutritional benefits. Couscous contains only 100–120 calories per half-cup serving, and includes complex carbohydrates, vitamin B and minerals (Demir, 2015).

Sesame (Sesamum indicum L.) is an important oilseed crop being cultivated in the tropics and the temperate zone of the world. Myanmar is a major producer of sesame followed by India, China, Ethiopia and Nigeria (FAOSTAT, 2011). Sesame seeds are rich in protein, oil, crude fibre and carbohydrates (Obiajunwa et al. 2005).

Dehulling of sesame seeds is necessary because the hull contains undesirable oxalic acid (2-3%), which could complex with calcium and reduces its availability (Maneemegalaial and Prasad, 2011). The hull also contains undigestible fiber, which impairs digestibility of the protein and imparts a dark color to the meal. Dehulling improves the nutritional and flavor characteristics of the meal and leads to the production of a glossy white product. It also leads to an increase in protein content, reduction in fiber content, and improvement in the functional characteristics of the protein.

The objectives of this research were to study the effects of the addition of sesame products to wheat flour on physical, sensory, chemical and nutritional properties of couscous samples.
Materials and Methods

Source and treatment of raw materials.

Durum wheat flour was obtained from Grain Soils and Flour Mills Organization at KSA. Sesame seeds (Sesamum indicum) were obtained from the local market, Jeddah, Kingdom of Saudi Arabia.

Sesame seed flour:

About 1 kg of seeds was blanched in 1 liter of 15% brine for 10 min at 60 C. The blanched seeds were dehulled by gentle abrasion in a wooden mortar with a pestle. The hulls were separated from the kernels by floatation using tap water. The kernels were dried in an air oven at 60 C for 5 h and milled into a smooth paste in an attrition mill. The paste was homogenized in 200 ml of diethyl ether and allowed to stand in a sealed class jar for 10 min. The homogenate was pressed through a double folded cheese cloth to obtain defatted sesame cake, which was dried in an air oven and milled using an attrition mill. The milled material was sieved into flour of 60 mesh as recommended by (Alobo, 2001). The flour was sealed in thick (0.5 mm) polyethylene bags and stored in a freezer (–4 C) until used.

Blend formulation and preparation of couscous:

Blends of durum flour and sesame flours containing 0, 5, 10, 15 and 20% sesame flour (SF) on a replacement basis were prepared.
Couscous samples were prepared according to a traditional method given by Çelik et al. (2004). For couscous preparation, flour was placed in a large bowl and wetted with milk. Then, the mixture was rolled by rubbing with the hand while flour was being added. Thus, the surfaces of the semolina granules were covered and coated by the dough. These wetting and rolling processes were continued until the size of couscous particles had reached a diameter of 3–5 mm. Then, the couscous was dried on a flat plate for 3–4 days at room temperature (25 ± 1°C) to decrease the moisture content below 10% (Çelik et al. 2004). Dried samples were kept in closed glass containers at room temperature until used.

Proximate analysis:
Moisture, protein, ether extract, ash, crude fiber, cellulose contents were determined according to AOAC (2000). Carbohydrate was calculated by difference. Mineral content was determined by inductively coupled plasma atomic emission spectroscopy (Bubert and Hagenah 1987). Phytic acid was measured by a colorimetric method according to Haugh and Lantzsch (1983).

Physical Properties:
Cooking properties and color values of the samples are technologic quality parameters of couscous. Evaluation of cooking properties, weight increase (WI), volume increase (VI) and cooking loss (CL) were determined according to AACC2002 method, calculated as shown in the following equation:

\[ WI(\%) = 100 \times \frac{\text{weight of cooked couscous} - \text{weight of raw couscous}}{\text{weight of raw couscous}} \]
VI(%) = 100×(volume of cooked couscous - volume of raw cousco )/ volume of raw couscous
CL(%) = 100×(weight of residue in cooking water)/ (weight of raw couscous)

Color of the dry couscous samples before cooking was evaluated by measuring the L (100 = white; 0 = black), a (+, red; -, green) and b (+, yellow; - , blue) values using a Hunter Lab Color method as described by AACC (2002).

Sensory Evaluation:
Couscous samples were evaluated by 15 panelists, who are familiar with the characteristics of couscous. The panelists were asked to score the couscous in terms of flavor, appearance, firmness, stickiness and overall acceptability using a 5-point scale where 1 represented “dislike extremely,” 3 represented “acceptable” and 5 represented “like extremely” in a particular attribute (Demir et al. 2010).

Statistical Analysis:
All obtained results were statistically analyzed by SPSS computer software (SPSS, 2000). The calculated occurred by analysis of variance ANOVA and significant differences among the various score were established using Duncan multiple test according to Waller and Duncan (1969).
Results And Discussion

Chemical composition of various flours:
Proximate chemical composition of durum wheat, sesame seed flour and their blends are presented in Table (1). The obtained data results revealed that durum wheat flour recorded the highest percent of moisture (13.25%). while sesame flours had lower moisture content 5%. sesame flour showed the highest values of protein (24.7 %), lipids (51.9%), ash (3%) and crude fiber (2.79%). On the other side, wheat flour contained the highest percent of carbohydrate, 77.17%. But durum wheat flour has the lowest levels of protein, lipids, ash and crude fiber being 15.4, 2.34, 2.0 and 2.30%, respectively. Also, the results in Table (1) show the chemical composition of the replacement of durum wheat flour with 5, 10, 15 and 20 % of sesame flour. The replacement of durum wheat flour with 5, 10, 15 and 20 % sesame flours caused gradually slightly decreased of moisture content as the level of replacement increased. Moreover, the replacement of durum wheat flour with 5, 10, 15 and 20 % of sesame flour caused gradually increased in crude protein, lipid, ash and crude fiber. These results in a agreement with Inyang and Ekanem (2006); Sabanis et al.,(2006); Manal (2013), Demir et al., (2010).

Physical Properties of Couscous Samples:
Cooking properties and color values of the couscous samples indicates the technological properties of couscous are given in Tables 2 and 3.
Weight increase is responsible for the texture of cooked pasta (Sabanis et al., 2006). Weight Increase values decreased significantly (P < 0.05) with increasing sesame flour substitution level. (Alobo, 2001) found that weights of biscuits were reduced with increasing level of replacement with sesame flour. Also, Sabanis et al. (2006) found that weight increase values of lasagne increased proportionally as the amount of chickpea flour in lasagna formulation increased as a source of protein.

In the present study, weight increase values of couscous samples containing 5, 10, 15 and 20% sesame flour decreased to 156, 150, 148 and 129% respectively, compared with the control sample 160% because of decrease in starch amount with the substitution and the possible decrease in water intake for the gelatinization.

As the sesame addition level increased in couscous formulation, volume increase values decreased significantly such as weight increase (P < 0.05). Decrement in volume increase of couscous containing sesame could be depend on the starch contents and the gelatinization properties of their starch (Sabanis et al. 2006). As the percentage of sesame flour increased, the starch content of the samples decreased and this low starch content contributed to low volume increase. This result was in agreement with (Ali and Halim, 2013) they reported that addition of white sesame flour to wheat flour with different incorporation levels (5, 10.15%) in bread blend led to significant decrease in bread volume.
Sesame addition into couscous formulation resulted to significant increase in cooking loss (Table 2) when compared with the control sample because of a decrease in gelatinizable starch in the formulation. Azeez et al., (2015) they mentioned that the cooking loss, which is defined as the solid leaching during cooking, the solid leaching during cooking may not have an effect on nutrient quality.

Color of couscous is an important quality parameter for consumer acceptability. A bright yellow creamy color is preferred commonly. Color values of dry couscous samples are presented in

**Table 3.** Sesames addition level were significant (P < 0.05) change the lightness (L), yellowness (b) and redness (a) values compared with the control sample. The lightness value of the couscous containing 15–20% Sesames decreased, but the yellowness of same samples increased. In the present study, increases in darkness and yellowness of end product were caused by the raw material (Sesame flour). The increasing Maillard reaction risk due to increasing nitrogenous compounds of sesames in formulation is the probable causes of the color changes. These results are in agreement with those of Azeez et al.,(2015) Increase in defatted sesame flour with Unripe Plantain inclusion increases the redness of the noodles and The lightness color of the noodles decreases as the defatted sesame flour increased, indicating darkness of the noodles. This could be due to Maillard reaction involving amino groups and carbonyl groups. Çelik et al. (2004) reported that usage of the soy flour as a source of protein in couscous preparation decreased lightness value.
- **Chemical composition of different couscous samples:**

  Chemical analysis of couscous prepared from different composite flour samples are presented in Table (4). From the obtained results, it could be shown that, the control sample containing 12.01% crude protein, 0.94% ash, 0.4% crude fiber and 150 mg/100g Phytic acid. From the same table, it could be observed that, all the measured chemical properties of couscous samples were increased as increasing the replacement level of wheat flour by sesames flour.

  These increases are expected due to the rich chemical composition of sesame (Table 1). *Makinde and Akinoso, (2014)* reported that the increased supplementation of wheat flour with sesame flour significantly affected the chemical quality of composite bread. Where as the values for protein, fat, fibre and ash increased with increasing levels of sesame supplementation except for carbohydrate and energy contents. There was an increase in the protein content of the composite bread samples with sesame-flour supplementation in the range of 10.3 to 14.8% compared to the control (9.2%). This is because the WF has lower protein content than the SF. The crude fibre and ash contents of the composite bread samples showed a percentage increase as the level of supplementation with sesame flour increased. This is direct effect of high content of cellulose, hemicelluloses and lignin in SF.

  The significant (P < 0.05) increase in crude fiber content of couscous leads to high dietary fiber content of the product, contributing to its functional properties. As expected, when the percentage of sesames increased in couscous formulation, phytic
acid (PA) content increased sharply. Some processes such as fermentation, germination, soaking and cooking are effective in the destruction of PA (Herken et al. 2007; Bilgiçli and Elgün 2004). These high phytic acid values in couscous samples are evidence that couscous making stages and drying processes could not reduce PA since it is a heat stable component (Sathe and Venkatachalam 2002). Here, the high PA content is not good for the mineral bioavailability such as Ca, P, Zn, Mg and Fe, but in contrast to this, it is a good antioxidant in functional nutrition (Burgess and Gao 2002).

- Mineral Content of different couscous samples:

Mineral contents of the couscous samples are given in Table 5. All of the investigated minerals in couscous samples increased with sesame flour addition. According to the control sample, Ca, Mg, K, P, Fe and Zn contents (mg/100 g) increased from 62.3, 26.5, 331, 250, 2.1 and 1.23 to 141.5, 93.6, 358.8, 338.4, 3.41 and 2.51 in couscous sample containing 20% sesame, respectively. Çelik et al. (2004) reported the K, Ca and Fe values of wheat flour couscous as 365.62 mg/100 g, 48.30 mg/100 g and 2.73 mg/100 g, respectively.

The similar result were obtained by (Manal, 2013) showed that, There were significant differences (P<0.05) in the mineral composition between the raw and the roasted. Sesame seeds Magnesium and Calcium were the most abundant minerals in defatted sesame seeds meal. The defatted sesame seeds meal contained significant amounts of important minerals. The Magnesium concentration (3.36, 1.56) was the highest, followed in by Calcium (2.00, 1.40), Potassium (0.51, 0.77), Sodium (0.29, 0.35), Phosphorus (0.15, 0.16) (g/100g dry weight).
**Conclusion**

Partial substitution of couscous formulation with sesame flour decreased the cooking quality and Color values were negatively affected at the higher substitution levels. Increasing the amount of sesame improved the nutritional value in terms of mineral and protein. Sensory evaluation of couscous with sesame up to 15% addition level was, acceptable sesame addition level was found as 10% in terms of technological, nutritional and sensory and also, functional properties of couscous.
Table (1): Chemical composition of durum wheat, sesame flours and their blends (% on dry weight basis)

<table>
<thead>
<tr>
<th>Flour sample</th>
<th>Chemical composition (%)</th>
<th>carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Moisture</td>
<td>Crude Protein</td>
</tr>
<tr>
<td>Durum wheat flour (DWF)</td>
<td>8.90a</td>
<td>±0.26</td>
</tr>
<tr>
<td>Sesame seed flour (SSE)</td>
<td>5.00c</td>
<td>±0.23</td>
</tr>
<tr>
<td>95% DWF + 5% SSF</td>
<td>8.66a</td>
<td>±0.45</td>
</tr>
<tr>
<td>90% DWF + 10% SSF</td>
<td>8.52a</td>
<td>±0.34</td>
</tr>
<tr>
<td>85% DWF + 15% SSF</td>
<td>8.29ab</td>
<td>±0.22</td>
</tr>
<tr>
<td>80% DWF + 20% SSF</td>
<td>8.03ab</td>
<td>±0.14</td>
</tr>
</tbody>
</table>

Means with same letter within column are not significantly different (P >0.05). Values are dry weight basis.
Table (2): Cooking properties of couscous samples.

<table>
<thead>
<tr>
<th>Samples</th>
<th>Weight increase (%)</th>
<th>Volume increase (%)</th>
<th>Cooking loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durum wheat flour</td>
<td>160±2.12</td>
<td>160±2.12</td>
<td>5.5±0.14</td>
</tr>
<tr>
<td>95% DWF + 5%SSF</td>
<td>156±2.12</td>
<td>160±2.12</td>
<td>5.4±0.12</td>
</tr>
<tr>
<td>90% DWF + 10%SSF</td>
<td>150±1.41</td>
<td>142±1.41</td>
<td>5.9±0.07</td>
</tr>
<tr>
<td>85% DWF + 15%SSF</td>
<td>148±1.41</td>
<td>139±1.41</td>
<td>6.1±0.07</td>
</tr>
<tr>
<td>80% DWF + 20%SSF</td>
<td>129±1.41</td>
<td>126±1.41</td>
<td>6.5±0.21</td>
</tr>
</tbody>
</table>

Means with same letter within column are not significantly different (P<0.05)

Table (3): Color Values of Couscous Samples.

<table>
<thead>
<tr>
<th>Flour sample</th>
<th>L</th>
<th>A</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>durum wheat flour</td>
<td>90.45±0.65</td>
<td>1.16±0.09</td>
<td>12.39±0.65</td>
</tr>
<tr>
<td>95% DWF + 5%SSF</td>
<td>89.20±1.11</td>
<td>0.50±0.09</td>
<td>12.30±0.83</td>
</tr>
<tr>
<td>90% DWF + 10%SSF</td>
<td>87.29±0.09</td>
<td>0.54±0.14</td>
<td>14.07±1.20</td>
</tr>
<tr>
<td>85% DWF + 15%SSF</td>
<td>86.67±0.75</td>
<td>0.60±0.13</td>
<td>20.00±0.48</td>
</tr>
<tr>
<td>80% DWF + 20%SSF</td>
<td>85.67±0.68</td>
<td>0.80±0.00</td>
<td>21.37±1.90</td>
</tr>
</tbody>
</table>

Means with same letter within column are not significantly different (P<0.05). L=Lightness, b=yellowness, a= redness
Table (4): Chemical Composition of Couscous Samples

<table>
<thead>
<tr>
<th>Flour sample</th>
<th>Ash (%)</th>
<th>Protein (%)</th>
<th>Crude fiber (%)</th>
<th>Phytic acid (mg/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durum wheat flour</td>
<td>0.94d ±0.07</td>
<td>12.01d ±0.53</td>
<td>0.4d ±0.04</td>
<td>150e ±1.34</td>
</tr>
<tr>
<td>95% DWF+ 5%SSF</td>
<td>1.10c ±0.15</td>
<td>14.50c ±0.52</td>
<td>1.00d ±0.04</td>
<td>220d ±4.56</td>
</tr>
<tr>
<td>90% DWF+ 10%SSF</td>
<td>1.35b ±0.05</td>
<td>15.60bc ±0.88</td>
<td>1.7c ±0.23</td>
<td>250c ±3.22</td>
</tr>
<tr>
<td>85% DWF+ 15%SSF</td>
<td>1.64ab ±0.02</td>
<td>16.1b ±0.63</td>
<td>2.04b ±0.07</td>
<td>304b ±5.33</td>
</tr>
<tr>
<td>80% DWF+ 20%SSF</td>
<td>1.99a ±0.08</td>
<td>18.7a ±0.22</td>
<td>2.6a ±0.03</td>
<td>370a ±2.78</td>
</tr>
</tbody>
</table>

Means with same letter within column are not significantly different (P<0.05)

Table (5): Mineral Contents of Couscous Samples (mg/100 g)*

<table>
<thead>
<tr>
<th>samples</th>
<th>P</th>
<th>Mg</th>
<th>K</th>
<th>Fe</th>
<th>Zn</th>
<th>Ca</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durum wheat flour</td>
<td>250d ±14.14</td>
<td>26.5e ±0.70</td>
<td>331e ±5.65</td>
<td>2.1c ±0.14</td>
<td>1.23d ±0.01</td>
<td>62.3d ±3.81</td>
</tr>
<tr>
<td>95% DWF+ 5%SSF</td>
<td>272.1cd ±7.07</td>
<td>43.28d ±1.84</td>
<td>337.85 ±4.24</td>
<td>2.36c ±0.09</td>
<td>1.52d ±0.07</td>
<td>81.4c ±5.09</td>
</tr>
<tr>
<td>90% DWF+ 10%SSF</td>
<td>294.2bc ±15.56</td>
<td>60.05c ±0.99</td>
<td>344.7c ±8.48</td>
<td>2.61b ±0.16</td>
<td>1.87bc ±0.04</td>
<td>98.7b ±4.66</td>
</tr>
<tr>
<td>85% DWF+ 15%SSF</td>
<td>316.3ab ±8.48</td>
<td>76.83b ±1.13</td>
<td>351.55b ±9.89</td>
<td>2.87b ±0.11</td>
<td>2.18b ±0.17</td>
<td>123.1a ±4.38</td>
</tr>
<tr>
<td>80% DWF+ 20%SSF</td>
<td>338.4a ±4.24</td>
<td>93.6a ±0.85</td>
<td>358.8a ±7.07</td>
<td>3.41a ±0.07</td>
<td>2.51a ±0.17</td>
<td>141.5a ±4.95</td>
</tr>
</tbody>
</table>

Means with same letter within column are not significantly different (P<0.05)
Table 6: Sensory properties of couscous samples

<table>
<thead>
<tr>
<th>Samples</th>
<th>Flavor</th>
<th>Appearance</th>
<th>Firmness</th>
<th>Stickiness</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durum wheat flour</td>
<td>3.00c</td>
<td>4.10a</td>
<td>4.60a</td>
<td>4.10a</td>
<td>3.80ab</td>
</tr>
<tr>
<td>±0.22</td>
<td>±0.74</td>
<td>±0.79</td>
<td>±0.22</td>
<td>±0.79</td>
<td>3.80ab</td>
</tr>
<tr>
<td>95% DWF + 5%SSF</td>
<td>3.60b</td>
<td>4.0a</td>
<td>4.10ab</td>
<td>4.00ab</td>
<td>3.80ab</td>
</tr>
<tr>
<td>±0.22</td>
<td>±0.79</td>
<td>±0.22</td>
<td>±0.79</td>
<td>±0.45</td>
<td>4.40a</td>
</tr>
<tr>
<td>90% DWF + 10%SSF</td>
<td>4.00a</td>
<td>4.10a</td>
<td>4.00ab</td>
<td>4.00ab</td>
<td>4.40a</td>
</tr>
<tr>
<td>±0.61</td>
<td>±0.76</td>
<td>±0.35</td>
<td>±0.45</td>
<td>±0.27</td>
<td>4.40a</td>
</tr>
<tr>
<td>85% DWF + 15%SSF</td>
<td>4.50a</td>
<td>4.30a</td>
<td>3.70bc</td>
<td>3.80ab</td>
<td>4.30a</td>
</tr>
<tr>
<td>±0.35</td>
<td>±0.45</td>
<td>±0.45</td>
<td>±0.27</td>
<td>±0.44</td>
<td>4.40a</td>
</tr>
<tr>
<td>80% DWF + 20%SSF</td>
<td>3.70b</td>
<td>4.30a</td>
<td>3.40c</td>
<td>3.30b</td>
<td>3.60b</td>
</tr>
<tr>
<td>±0.45</td>
<td>±0.57</td>
<td>±0.42</td>
<td>±0.27</td>
<td>±0.42</td>
<td>4.30a</td>
</tr>
</tbody>
</table>

Means with same letter within column are not significantly different ($P < 0.05$). 1, dislike extremely; 3, acceptable; 5, like extremely.
Sensory evaluation of couscous samples:
The effect of partial replacement with different ratio of sesame flour on the organoleptic quality characteristics of produced couscous is presented in Table (6). It could be noticed that, Flavor acceptance of the panelist increased with sesame flour addition, and couscous samples containing 10–15% sesame were found to be the best in terms of flavor. In the present study, couscous formulations with sesame flour contain also, milk. These ingredients could dilute the intense flavor of the sesame. In addition to the ingredients, the appearance of the samples that contain sesame flour did not change significantly with sesame addition. The firmness of the samples that contain 15 and 20% sesame were not liked by the panelists when compared to the control. As the sesame addition level increased in formulations, the stickiness score of the couscous increased descriptively. However, according to statistical results, 20% sesame addition into couscous samples were not preferred in terms of stickiness (P<0.05) compared with control. Overall acceptability scores showed that the couscous samples that contain sesames up to 15% were liked by the panelist.
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Garsa Ali Al Shehry

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Statistical package for Social Sciences. SPSS for Widows, Version 19, SPSS Inc., Chicago, IL, USA.

تأثير اضافة دقيق السمسم الي دقيق قمح الديورم علي الخصائص التكنولوجية والطبيعية والحسية للكسكسي

غرسة على الشهرى
قسم التغذية وعلوم الأطعمة - كلية التصميم والإقتصاد المنزلى - جامعة الطائف
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بذور السمسم (Sesamum indicum L) من أهم وأقدم المحاصيل الزراعية في العالم والتي تتميز بمحتواها العالي من العناصر الغذائية المفيدة ومضادات الأكسدة المعروفة والمفيدة لصحة الإنسان. لذلك تم دراسة تأثير استبدال دقيق السمسم بدقيق الديورم وذلك بمستويات استبدال 5، 10 و 15 و20% على الخواص الطبيعية وخصائص الجودة المختلفة للكسكسي. يتميز دقيق السمسم بمحتواه العالي من البروتين والدهون والربد والالياف الخام وذلك بالمقارنة بنصف الديورم والذي أدي اضافته زيادة مستوي تلك العناصر في المنتج النهائي (الكسكسي) وذلك مع زيادة نسبة الاستبدال من 5 الى 20%.

وقد وجد ان اضافة دقيق السمسم ادي الى زيادة جميع العناصر المعدنية المقدرة مثل الكالسيوم والماغنسيوم والكالسيوم والزنك والبوتاسيوم. تم أيضا اجراء تقييم حسي لعينات الكسكسي واتضح أن اضافة دقيق السمسم إلى دقيق الديورم أعطى كسكسي جيد من الناحية الحسية وبدون أي تأثيرات معنوية تذكر. عموما اتضح من اضافة دقيق السمسم إلى دقيق الديورم بمستويات المذكورة حدوث انخفاض في قيم خصائص الطبخ وتحسن ملحوظ في قيم الخصائص الطبيعية والحسية لمنتج الكسكسي.