Effect of Whole Multigrain Blends Addition on Quality Characteristics of Cookies

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ABSTRACT
Whole grain cereal products are important components of the daily diet worldwide. A high consumption of these products is associated with a decreased risk of diabetes, myocardial infarctions, and certain cancers. This study aimed to assess the effect of the whole multigrain flour (wheat, rye, barley and oats) incorporation at different levels (8%, 10%) on the quality characteristics of cookies. Moisture, ash, fat, protein, reducing carbohydrates, alkalinity, water absorption and impregnation index of blends and cookies were determined. The sensory profile was obtained by a 9 point hedonic test. Incorporation of multigrain flour in cookies could be a powerful tool to obtain food with enhanced nutritional characteristics.

Keywords: multigrain, cookies, quality characteristics.

INTRODUCTION
Cookies are popular food, consumed widely, characterized by long shelf-life and it can be used as vehicle for bioactive compounds fortification such as proteins and fibers (Jyotsna et al., 2012). Whole grain cereal products are important components of the daily diet worldwide. Health effects of diets rich in whole grain and cereal fibre are well known. A high consumption of these products is associated with a decreased risk of diabetes, myocardial infarctions, and certain cancers (Banu et al., 2010). The beneficial effects associated with whole grain consumption are in part due to the existence of the phytochemicals of whole grains such as: fibre, vitamins, minerals, phenolic compounds, carotenoids, vitamin E, lignans, β-glucan, inulin, resistant starch, sterols, and phytates (Rui, H.L., 2007).

AIMS AND OBJECTIVES
This study aimed to assess the effect of the whole multigrain flour (wheat, rye, barley and oats) incorporation on the quality characteristics of cookies.

MATERIALS AND METHODS
The ratios (% w/w) between wheat flour (WF): whole multigrain flour (WMGF) were 100:0, 100:8, 100:10. In the cookies formulation, the whole multigrain blend represents 22%, while other ingredients used and their amounts were: sugar (32%), shortening (22%), coconut (7%), egg powder (10%), ammonium bicarbonate (0.5%), sodium bicarbonate (0.5%), raisins (6%). All raw materials used in these experiments have been purchased from specialized stores. The technological steps and parameters are: kneading (10 min), resting time (4°C, 20 min), dividing and shaping, baking (180°C, 12 min). Moisture, ash, fat, protein, reducing carbohydrates, alkalinity, water absorption and impregnation index of blends and cookies were determined by AACC (2000) methods. While sensorial evaluation was carried out by 9 point hedonic test, in order to evaluate
the color, texture, odor, taste, flavor and overall acceptability.

RESULTS AND DISCUSSION
A slight decrease of blends humidity and absorption capacity was recorded as the level of WMGF increased from 0 to 10% in the blends (table 1) Substitution of WF with WMGF at level of 8% and 10% in cookies formulation lead to an enhanced content of protein and ash (table 2). Non-significant change (p>0.05) was recorded in reducing carbohydrates content with the increased content of WMGF, in cookies formulation. The impregnation index of the cookies with 10% WMGF was 1.03 points higher than the control sample due to the lower moisture content of WMGF. Sensory characteristics were not negatively affected by up to 10% WMGF in cookies formulation (fig.1).

CONCLUSION
Incorporation of multigrain flour in cookies could be a powerful tool to obtain food with enhanced nutritional characteristics.

REFERENCES

Tab. 1. Physicochemical characteristics of multigrain blends

<table>
<thead>
<tr>
<th>Blends</th>
<th>Humidity,%</th>
<th>Ash content,%</th>
<th>Protein content,%</th>
<th>Acidity, degree</th>
<th>Water absorption,%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A_0 (0% WMGF)</td>
<td>12,26</td>
<td>0,41</td>
<td>9,20</td>
<td>2,94</td>
<td>62,15</td>
</tr>
<tr>
<td>A_1 (8% WMGF)</td>
<td>11,55</td>
<td>0,90</td>
<td>10,25</td>
<td>3,27</td>
<td>53,21</td>
</tr>
<tr>
<td>A_2 (10% WMGF)</td>
<td>11,41</td>
<td>0,98</td>
<td>10,98</td>
<td>3,44</td>
<td>52,54</td>
</tr>
</tbody>
</table>

Tab. 2 Effect of multigrain flour substitution on cookies pysicochemical properties

<table>
<thead>
<tr>
<th>Sample</th>
<th>Humidity, %</th>
<th>Ash content, %</th>
<th>Fat content %</th>
<th>Protein content %</th>
<th>Alcalinity, degree/100g</th>
<th>Impregnation index %</th>
<th>Reducing carbohydrates content. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>C (0%)</td>
<td>3,51</td>
<td>1,55</td>
<td>39,78</td>
<td>5,98</td>
<td>1,28</td>
<td>39,92</td>
<td>8,38</td>
</tr>
<tr>
<td>P_1 (8%)</td>
<td>3,33</td>
<td>1,58</td>
<td>33,33</td>
<td>6,20</td>
<td>1,15</td>
<td>40,27</td>
<td>8,56</td>
</tr>
<tr>
<td>P_2 (10%)</td>
<td>3,22</td>
<td>1,62</td>
<td>31,81</td>
<td>6,39</td>
<td>1,09</td>
<td>41,18</td>
<td>8,77</td>
</tr>
</tbody>
</table>

Mean value of three independent determinations

Fig.1 Sensory characteristics scores for cookies with added multigrain flour