

## POTATOES – THE SOURCE OF IMPROVEMENT THE QUALITY OF BREAD

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**Abstract:** This study was elaborated to investigate the influence of potato and the food fibres from its composition on the bakery products, and the authors intending the development of a new technology for making bread with potato flour, to increase the duration of freshness and the efficiency of that product.

**Keywords:** bread, quality, yeld, rheology, celiac

### Introduction

Potato is a highly nutritious vegetable. In the form of dehydrated (flour, granules or flakes) it has numerous applications in bakery products. The potato production can not only replace a part of flour in the recipe, but modifies the bread texture in which they are introduced, it is considered to be fresher, and that is obtained the increasing of duration of freshness. The main source of potato flour used in bakery is the potato flour, but can be used occasionally and other products. Flour and potato flakes have a rich content of malt dextrin. Maltodextrins obtained from potato were used to replace partially or sometimes even completely fats used in the production of bakery products, thus reducing significantly the energy value of concerned products.

Because potatoes are rich in complex carbohydrates and dietary fibre, but have a low fat content, it is intended to be placed on a large scale in dietary bakery products. To produce the new ranges of products with potato flakes or granules, they are subjected to drying process. Very low content of protein and fat of potato starch leads to formation of a taste far less "starchy" and the tendency to foam is reduced. In contrast to the relatively low degree of polymerization of amylose in cereal starches, which tend to demote quickly (become insoluble and lead to ageing bakers), starch potato contains an amylose with molecular weight greater than starch obtained from cereal products (wheat), interfering with the process of relegation [5].

A diet rich in fiber can reduce the risk of certain conditions such as hemorrhoids, irritable bowel syndrome and diverticulosis of colon. Fibers, especially soluble, can also reduce blood cholesterol levels and reduce carbohydrate absorption thereby optimizing the level of blood glucose in diabetics.

Since the potato flour does not contain gluten it follows that the amount of gluten in bread is reduced, these products can be used successfully in feeding people who suffer from intolerance to gluten or coeliac, also known by the name of enteropatie. The evolution of this disease is characterised by alternate periods of exaggeration and lull.

No treatment can cure celiacs disease. However, the disease can be kept under control by changing the diet – removing outright or partially from eating gluten. It is usually excluded from the diet of bread products, but certain nutrients are excluded from the diet and certain needed nutrients contained in bread. Potato flour, however, comes to the aid of those who suffer from this disease. And since this flour does not contain gluten,

lately is often used in bakery products, which can be consumed in certain quantities and those who suffer from coeliac disease [7].

### Materials and methods

For bakery products for diabetes patients have been used the following raw and auxiliaries materials: high quality flour, salt, yeast tablets, potato flour, drinking water.

For organoleptic analysis of raw materials, especially for the flour to bakers flour with the addition of potatoes were used the following methods: method for determining the color of the flour according to GOST 27558-87, STAS, paragraphs 90-95. 3 according to GOST 27558, the smell-87, 90-95 PTS STAS. 3. flour taste, according to GOST 27558-87, 90-95, STAS point. 3. flour infestation with pests of the barn under STAS, paragraphs 90-95. 3.

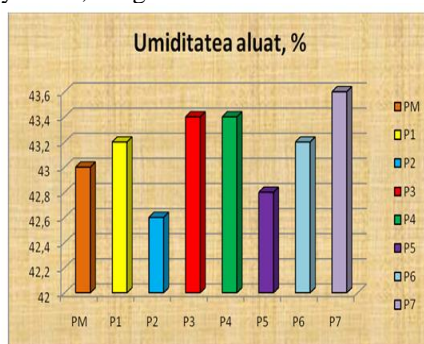
In accordance with this technological process, the following experimental variants were made: PM – blank - the bread of wheat flour high quality; P1 - sample with addition of c 1% of flour; P2 - sample with addition of 3% potato flour; P3 - sample with addition of 5% potato flour; P4 - sample with addition of 8% potato flour; P5 - sample with addition of 10% potato flour; P6 - sample with addition of 12% potato flour; P7 – test with the addition of 15% of potato flour.

The quality of baked bread was determined after it has passed at least 4 hours and up to 24 hours from the time of baking. It has also determined the mass, specific volume, porosity of bread , humidity and acidity and organoleptic indexes of he product.

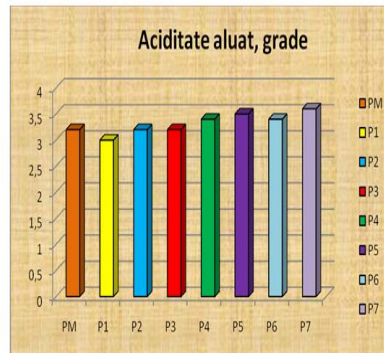
### Results and discussions

In the case of kneading the dough with the addition of potato flour, it was found that the dough was a little too tough, dry, requiring the addition of a quantity of water and respectively, increasing the amount originally calculated, which is explained by the fact that the potato flour is hygroscopic. The amount of added water raised with the addition of flour quantity.

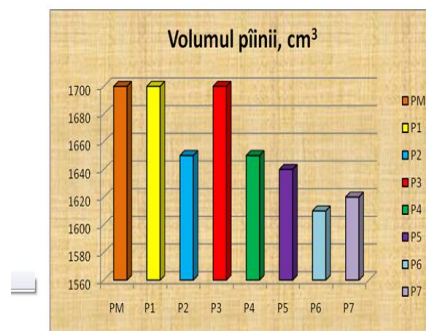
Because potato flour is rich in carbohydrates, the dough has a higher power of growth in fermentation, thus the volume of dough and its pores enhancing properly. From the point of view of acidity of semi-finished products with the addition of potato flour in various reports, there is no change, i.e. the addition of potato flour does not influence the acidity of the semi-finished products, they are within the rules established in view of the quality of wheat flour used in experiments, which constitutes comparable values with the wheat flour of high quality 3 to 3,5 degrees.



*Fig. 1.* The dependence between the amount of added potato flour in different doses and the humidity of dough

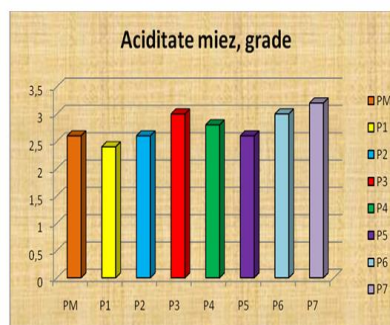


**Fig. 2.** The dependence between the amount of added potato flour in different doses and the acidity of dough



**Fig. 3.** The dependence between the amount of added potato flour in different ratios and bread volume

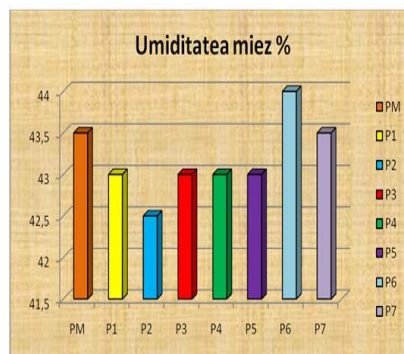
The first figure reproduced above, we find that an optimal volume is obtained in the sample blank and the sample with the addition of 5% of the potato flour, which has also a volume of 1700 cm<sup>3</sup>. With the increase of the addition of potato flour diminishes the amount of bread sample, because the potato flour does not contain gluten and therefore in the production of added potato flour is used wheat flour with the rich content of gluten.



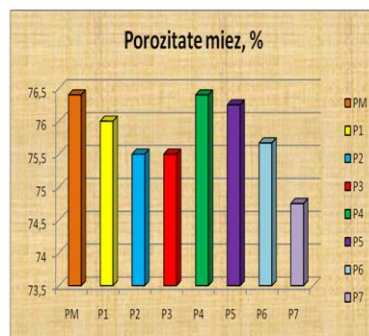
**Fig. 4.** The dependence between the amount of added potato flour in different ratios and the acidity of dough

From figure 4 we see that the addition of potato flour does not influence on the acidity of the finished product, which constitutes not more than 3,2 degrees, which falls within the rules indicated in the standard regarding the products of high quality wheat flour.

In the process of kneading bread with potato flour, it is necessary to add additional water, as potatoes flour is hygroscopic and, in addition of more potato flour, the core becomes sticky, hence, the humidity of core is higher.



*Fig. 5.* The dependence between the amount of added potato flour in different ratios and humidity of bread



*Fig. 6.* The dependence between the amount of added potato flour in different ratios and the bread crumb porosity

The porosity of bread has higher values to blank and samples at 4 and 5. In samples with the addition of more potato flour is a crumb with a lower porosity and, as a result, with a smaller volume.

### Conclusions

The bibliographic study has demonstrated that the addition of potatoes in bakery products, change the aspect of their organoleptic and enriches their nutritional value. Also, both potato and bread with the addition of potatoes can be eaten by patients with coeliac disease.

The experimental studies carried out in the framework of this work aimed to investigate the influence of the addition of potato in the bakery products. The majority of

fiber sources improve the hydration capacity of the mixture. Fibers retain water better in the finished products, which prolongs their freshness.

The potato influence begins to manifest still in the dough. In the process of kneading, the dough becomes drier, which causes the increase of the quantity of water calculated according to the recipe. During fermentation, the dough is higher as usual. It also shows a slight acidity dough rising, along with the increasing of the ratio which characterizes the addition of flour.

Due to the addition of potatoes, it was obtained bread a finished product with special organoleptic indices: the crust of the bread is more intensely colored crisper, the core being well developed, with a uniform pore structure. It was found that the best results offer the addition of 8%, 10% and 12%, and the addition of potato flour is more than 15% the volume of bread lowers considerably. The porosity reaches the maximum value of 8% and 10% addition of potato flour, the crumb is also moister and becomes more sticky, therefore, with the increase of the addition of potato flour and the humidity enhances the final product. It was also demonstrated that the bread with the addition of potato the efficiency is higher compared to the blank.

The obtained results from the research are applied in production. For this purpose it was developed a technological line for the production of two sorts of bread (baked in try and fireplace) with the addition of potato flour.

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