# NONTRADITIONAL ADDITION IN BAKERY EXCERPT FROM PLANT MATERIAL

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**Abstract**. The work at issue is actual as an important link in broadening the range of products with functional character on the local market. Purpose of this paper is to develop and implement bakery products for people with dietary needs, but who will be able to be consumed and by healthy people for prophylactic uses. Research conducted in this study aimed at achieving the following objectives: study of the influence of fiber addition on the blank and finished products, to establish an optimal dose of dietary fiber (inulin), develop production recipe.
**Keywords:** inulin, fiber, bakery products.

## Introduction

In recent decades, our doctors note that immunity is weakened due to unfavorable environment and breach of the principle of nutrition. To strengthen immunity, nutrition experts recommend a balanced diet with high content of protein, vitamins, minerals and dietary fiber, including vegetables. Traditionally, bread is the foundation of the food basket of the population.

Nontraditional materials and additions may lead to a suitable product rational norm food. Replacing a portion of bread's carbohydrates with additions of plant materials, improves nutritional value and functional properties of the product. A special interest presents opportunities research of application of additives, derived from vegetable products and, in particular vegetable fibers. A new achievement in this field is the use of long fibers additions [7]. Inulin is part of their group.

Inulin - ideal food combining dietary fiber with other fibers. A reserve polysaccharide that belongs to the class of carbohydrates, known as fructan. It can be extracted from approximately 36,000 plants, for example: artichoke, chicory, dandelion, burdock, sea grass. In normal conditions inulin is a white powder, neutral taste, hygroscopic and amorphous, slightly soluble in water [3, 11].

Its advantages allow producers to obtain a new product - a probiotic bread with pleasant taste rich with fiber additives [7]. It is appreciated that this foodstuff for health is a field in full effervescence [5, 6].

## 1. Materials and methods

To obtain bakery products with added inulin were used following raw and auxiliary materials: high quality flour, salt, active yeast, plant materials (laboratory inulin), drinking water. Laboratory inulin used in the study was obtained by extraction from root (burdock and dandelion) and consists in obtaining a inulino-cellulosic blend, which presents a biologically active components that can be successfully used in food industry. Appreciation of the quality of raw and auxiliary materials was performed according to current standards working in Moldova.

For baking samples were determined organoleptic and physico-chemical indices of the semi and finished products.

## 2. Results and Discussion

Experiments performed were aimed to obtain dietary products.

At obtaining bread with added inulin were followed objectives: developing the recipe for producing bread with functional properties and production technology, establishing an optimal dose of inulin. Laboratory inulin was obtained by extraction using the method of obtaining inulino-cellulose mixture [8].

To achieve given assortment of bread were performed several experiments with different sample rate of inulin:

- PM – wheat flour (high quality) bread;
- P1 – sample with 3 % inulin addition;
- P2 – sample with 5 % inulin addition;
- P3 - sample with 7 % inulin addition.

Doses of addition were chosen taking into account the bibliographic study [9, 10].

The dough was prepared using the phase method, using the quantity of flour (high quality) and the percentage of inulin 3, 5 and 7% of flour weight. The obtained blank was divided into equal pieces weighing 515 g and subsequently undergoing to the fermentation process. Baking was done in forms at 220 ° C for 30 minutes.

### 2.1 Physico-chemical quality assessment of the blank

During the study was followed the influence of inulin addition, in different doses, to the quality of of the blank. The results are presented in Table 1.

Analyzing the results presented in Table 1, we can mention that added inulin to the dough increased humidity due to dilution of gluten grid, the dough becomes sticky for the same consistency, but the fermentation process helps regulate this parameter. Final moisture of dough sample P1, with addition of 3% increased by 1.02 times the control sample (PM), and sample P3 - by 1.09 times compared to the control sample. On acidity, we can say that before fermentation and after fermentation of the dough, its values vary insignificantly.

The addition of fibers reduces the volume of bread. According to Pomerany etc. [4] replacing a part of the flour with insoluble fiber causes a decrease in bread volume greater than that due to dilution of gluten. This decrease relates to gas retention in dough. For P1dough sample with addition of 3 % laboratory inulin, there was a greater volume of 1,03 times than the control sample (PM), and P3 indicates a smaller volume of 1,17 times than the control PM. So we noticed a reduction, and what we say ist hat the obtained blank with the amount of 7 % inulin has a low capacity to retain and emit gas at cooking and fermentation stages. Dough density increases with increasing amount of addition to the dough.

***Table 1.*** Caracteristics of blank

| Indices | Samples | | | |
|---|---|---|---|---|
| | **PM** | **P1 + 3 % inulin** | **P2 + 5 % inulin** | **P3 + 7 % inulin** |
| Moisture, %<br>before fermentation<br>after fermentation | 37,4<br>39,7 | 38,4<br>40,1 | 40,4<br>40,3 | 40,8<br>39,9 |
| Acidity, degree<br>before fermentation<br>after fermentation | 1,5<br>1,9 | 1,6<br>2,0 | 1,6<br>2,0 | 1,5<br>2,0 |
| Density, $10^{-3}$ kg/m$^3$ | 0,30 | 0,29 | 0,32 | 0,36 |

### 2.2. Physico-chemical quality assessment of the blank

Performing baking in laboratory conditions, with added inulin appreciated organoleptic quality of bread after scoring scheme. The results of this assessment are presented in table 2.

***Table 2.*** Synthesis of organoleptic analysis

| Products indices | Score | | | |
|---|---|---|---|---|
| | **Maximum** | **Granted** | | |
| | | **P1 + 3 % inulin** | **P2 + 5 % inulin** | **P3 + 7 % inulin** |
| The shape and volume of the product | 4 | 3 | 4 | 4 |
| The color and appearance of the shell | 4 | 1 | 3 | 2 |
| Degree of baking, condition and appearance of the kernel | 6 | 6 | 6 | 6 |
| Kernels porosity and the pore structure | 6 | 5 | 5 | 3 |
| Flavour | 4 | 4 | 4 | 4 |
| Taste and acidity | 6 | 4 | 5 | 4 |
| **Total score** | **30** | **23** | **27** | **23** |

Best score of 27 points was obtained from sample P1, compared with control sample (PM). It is noteworthy that the points obtained indicate a product complies with all relevant.

### 2.3 Physico-chemical assessment of finished products

The obtained results on the assessment of quality indices of finished products are shown in table 3.

***Table 3.*** The influence of inulin addition on physico-chemical indices of bakery products

| Indices | Bakery samples | | | |
|---|---|---|---|---|
| | **PM** | **P1 + 3 % inulin** | **P2 + 5 % inulin** | **P3 + 7 % inulin** |
| Specific volume of bread, $cm^3$ | 1920 | 1920 | 1850 | 1800 |
| Volumetric efficiency, $cm^3$ | 480,00 | 480,00 | 462,50 | 450,00 |
| Bread humidity, % | 41,8 | 42,1 | 42,4 | 41,8 |
| Bread acidity, degrees | 1,8 | 1,8 | 1,9 | 1,9 |
| Bread porosity, % | **76,30** | **77,32** | 73,67 | 72,12 |
| Cooking losses, % | 9,49 | 9,46 | 9,31 | 9,49 |

In terms of volume variation at baking, it was found that the addition of laboratory inulin dough expands less volume than that with the addition of 5 and 7% fiber, this think being attributed to faster form fixation and bread volume due to faster gelatinisation of starch, as a result of higher amount of water in the dough with fibers. From the table we can see, the most developed volume plays P1 sample with 3% added laboratory inulin and with increasing amount of inulin is reduced bread volume. Experiences have shown that the addition of inulin does not change essentially the acidity of the finished product. In all cases there was a slight increase of this parameter compared with the control sample. In general, the acidity determined values in all baking samples were within normal limits - 1.8 to 3.0 degrees for white bread [1, 2].

Addition of 3% laboratory inulin at sample P1 demonstrated a positive effect on porosity of the finished product, its value being with 1.34% higher than in control sample. However, in sample P1 was observed an uneven porosity, and pore walls were very thick compared to other samples. Addition of 3% laboratory inulin in sample P1 has a beneficial influence on the final product, we obtained higher values than the other samples.

Performing baking with added laboratory inulin, we obtained products presented in Figure 1.

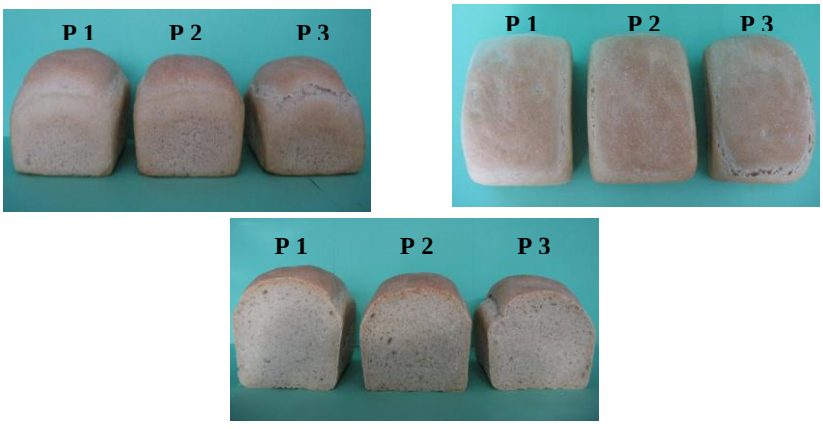


***Fig. 1.*** Samples P1, P2, P3 with the addition of 3, 5, and 7 % laboratory inulin to the weight of flour

**Conclusions:**

Performing baking bread samples, we found that the best sensory and physico-chemical indices were obtained from the addition of 3% laboratory inulin by the control sample. But notice that all samples with added inulin showed excellent sensory index: intense skin coloration, uniform porosity core structure, taste and pleasant flavor compared to the control sample.

Therefore, inulin must be widely used in functional products worldwide due to health effects and special technological properties. Also, inulin is not only a low-calorie food ingredientbut also a prophylactic medical product, with the role of dietary fiber. Inulin is the ingredient of the future who encounters food industry needs today and is the prime position among the updates that appear on the market of functional products.

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