Analele Universităţii din Craiova, seria Agricultură – Montanologie – Cadastru (Annals of the University of Craiova - Agriculture, Montanology, Cadastre Series) Vol. XLVII 2017

THE EFFECT OF THE ADDITION OF DIETARY FIBER IN WHITE BEAN OVER THE TECHNOLOGICAL AND SENSORY QUALITIES OF WHITE BREAD

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Keywords: white bean, dietary fiber, bread.

ABSTRACT

The study aims to trace the influence of addition dietary fibres of white beans over technological and sensory properties of white bread.

White beans, in the form of flour has been added due to high dietary fiber content, thus aiming to achieve a functional product with superior properties for people with digestive problems, those who are prone to diabetes, healing colon and prevent constipation operation, reduces the risk of colon cancer, reduce the risk of breast cancer, reduce the risk of obesity, reduce installation cholesterol levels and hepatic cholesterol synthesis etc.

Bean flour is added to the dough stage (in percentage) of 3, 5, 7 and 10 percent of the mass of the flour used, obtaining four types of bread to which they are determined through a series of physical-chemical indices and sensory as well as volume, porosity, humidity, acidity, smell, yield, taste, color etc.

INTRODUCTION

Obtain bakery products is considered today one of the most important branches of the food industry, the branch is based on the long history of bread, but is also closely related to the evolution and development of new kinds of bread. The quality of products we developed is closely connected with the processes that take place during baking (Hadiyanto, a., Asselman, g., at. All, 2007) and with raw materials and auxiliaries which are manufactured.

The trend of the past few years the world is blaming white bread, which is regarded, rightly or not, responsible for the onset of many diseases of nutrition and not only.

According to a study conducted by AIB International, Romania in 2014 was the country with the highest consumption of bread in Europe, with 97 kg/year, followed by Cyprus 74 kilograms/year, Belgium 67 kilograms/year, Germany 57 kilograms/year, Denmark 43 kilos/yr and 14 United Kingdom pounds/year.

White bread is made from wheat flour extraction with a low content of sheathing, which determines the amount of protein, vitamins and mineral salts. Durum wheat is one of the three major grains that dominate world agriculture today. The importance of wheat for bread-making is evident from the content of the endosperm in gluten, gluten that gives uniqueness in rheological terms, giving it the dough visco-elastic properties (Codina, Bordei, Pâslaru, 2008).

From a nutritional standpoint, the bread best reflects the properties of raw materials and auxiliaries is produced. In this research domain specialists cotext always new combinations of raw materials and auxiliaries from which to get the bakery products with improved properties and which comply with the current concepts of functional food products. As a result of this and of the need to return to the consumption of healthy breads, the present study aims to be the basis of a new product development of functional breads enriched with dietary fibre derived from white beans.

Studies conducted by Hugh Trowell (British dietitian) show that in underdeveloped countries, where consumption of white bread is reduced, consuming mainly bread and vegetable materials with high content of fiber, the incidence of digestive problems, diabetes, mild forms of cancer is very small compared to that of developed countries.

Dietary fibres, long have been considered ballast substances, but research in recent years have demonstrated their importance in relieving and preventing diseases with high incidence in the modern world, such as stomach diseases, diabetes, obesity, cardiovascular disease. The current trend is to consume food products enriched with fibers.

From the point of view of the definition, the fibers can be explained as "*an Assembly of components, constituents of plant tissue, which are currently consumed by deep people and that cannot be degraded by digestive enzymes*" (Hugh Trowell, 1985). In this context, bakery products fall into two broad categories. Products made from flour, containing dietary fiber from wheat bran native and bakery products enriched with dietary fibre of different sourcing included. In the latter category fits the product obtained by the addition of white beans, a product that is the subject of the present study.

The use of food in the bakery in significant proportions (more than 5% of the prepared flour) it brings of a range of effects, both positive and negative on the dough and bread-making quality obtained from it. Thus, the negative effects are the reduction of volume of low machinability of the dough, it become more sticky and having a higher approach towards aderence of working bodies of the workpiece, and cars in the category of positive recall great moisturizing power, which prolongs the freshness lasting.

All the positive effects we can frame and the physiological effects of food fibres make operation of colon work and prevent constipation, reduce the risk of colon cancer, reduce the risk of breast cancer, reduce the risk of obesity, reduce installation cholesterol levels and hepatic cholesterol synthesis etc.

MATERIAL AND METHOD

Experimental research to study the influence of the content of dietary fiber in the white bean flour on the technological properties of white bread. During experimental studies have traced the humidity, acidity, porosity, the H/D ratio, volume, mass, respectively, yield losses at baking.

The provenance of food fibres has been chosen following bibliographic studies carried out, it was found that the beans are on the first places in the hierarchy of plant products with high content of dietary fiber.

The dough was prepared by one method, using the type 650 wheat flour and flour from white beans as a percentage of 3, 5, 7 and 10% compared to the mass of the flour. White bean flour was introduced into the batter, along with other raw materials.

For bakery products with the addition of dietary fibre have been used following raw materials and auxiliaries: white flour quality type 650, compressed yeast, salt, dietary fiber (white bean flour), drinking water.

Direct method of preparing dough is mixing, kneading and fermentation in one phase of all raw materials and auxiliaries.

Manufacture of bread with added white bean flour is similar to that of manufacturing of white bread made from wheat flour.

In order to achieve the desired bread assortment have been carried out several experimental samples with different percentages of auxilire material with a high content of dietary fiber. Thus, there has been a standard sample without added dietary fiber and 4 types of bread to which have been added to different percentages of dietary fiber white bean flour. These samples were symbolized as follows: PM bread of wheat flour quality type 650; P1: sample with added 3% flour white beans; -P2 sample with addition of 5% of

white bean flour; P3: tester with added 7% white bean flour; -P4 sample with addition of 10% white bean flour.

To obtain the PM used 500 g wheat flour, yeast, 3% 1.5% salt and 310 ml water.

In the preparation of other samples with different fiber additives, the quantity of flour with white bean flour, determination of the amount of flour required was accomplished by recalculating dry substances. The amount of yeast and salt remained the same, but the amount of water has varied, depending on the dough hydration needs.

For each of the 4 types of bread was determined moisture, acidity, porosity, the H/D ratio, volume, yield and baking losses.

To perform research used wheat flour type 650, whose characteristics are presented in table 1.

Table 1

The characteristics of the flour used

No. crt.	Flour type	Moisture content, %		Gluten content, %		Acidity, %		Ash, %	
1.	White wheat flour quality I	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1	Sample 2
		14,1	14,5	28	30	2,0	2,2	0,48	0,49
		14,3		29		2,1		0,485	

Experimental research of the working temperature of the flour was 24.9°C and 28°C water.

After measuring the temperature of the flour has been sifted, înglobânu, and a quantity of air necessary for fermentation and yeast activity of panification. Follow the dosing of raw materials, after which was done mixing-kneading dough with the mixer with vertical arms until the temperature has reached a temperature of 30°C.

The dough thus formed was divided and prepared, are to be left at the initial fermentation for 20 min. This time of fermentation has been applied to all samples. After short period of time, the dough has been shaped and made the final fermentation for 30 min.

After the rising time is over, the product was baked in an oven at a temperature of 240°C for 45 minutes. After baking, the period of time the product has been removed from the oven, it was sprayed with cold water and left to cool for 24 h.

Organoleptic analysis of white bread with white bean flour was done according to the standard SP-3,232-97 Bread, loaf product and bakery specialties. Annalysis methods. Thus, all products have been analyzed, the shape of the shell and core, volume, consistency, smell, taste and color core and shell.

For the determination of physico-chemical properties of bread have been used the methods of analysis provided for in SR-90-2007.

RESULTS AND DISCUSSIONS

4.1. Organoleptic analysis of white bread with added white bean flour

Organoleptic analysis was done according to the scoring scale, for each sample is given the appearance of color and form, core and shell, smell and taste.

Organoleptic analysis results have been summarized and are presented in table 2.

Table 2

Synthesis of organoleptic analysis results

Code number of the sample	The number of points awarded				Comments
	Layout and form	Colour	Odour	Taste	
PM	4	5	5	5	19p
P1 3% White bean flour	5	5	5	5	20p
P2 5% White bean flour	4	5	5	4	18p
P3 7% White bean flour	4	5	5	4	18p
P4 10% White bean flour	4	5	5	4	18p

As a result of sensory analysis, the addition of white bean flour proved to be a crucial influence on the quality of the products obtained. Following the addition of white beans in different percentage, has noticed an improvement in flavour and taste, products with a special aroma and taste.

Organoleptic point of view, the best results were obtained from the sample with added 3% flour white beans.

4.2. Estimation of physico-chemical

Physico-chemical quality assessment of products involved analyses for both blank and other samples with the addition of white bean flour.

Table 3

Quality indices estimation of blank sample

No. crt.	Features	PM
1.	Pound of bread, g	440
2.	The volume of bread, cm³	1650
3.	The elastisity of bread, %	113,6
4.	Porosity of bread, %	77,03
5.	Humidity of bread, %	40,0
6.	The acidity of the bread, degrees	2,0
7.	Baking losses, %	12,0

Table 4

Assessment of quality indices of the bread with addition of white bean flour

Features	*P1 3% White bean flour*	*P2 5% White bean flour*	*P3 7% White bean flour*	*P4 10% White bean flour*
Weight, g	*430*	*435*	*440*	*440*
Volume, cm³	*1390*	*1395*	*1380*	*1360*
Return of bread, %	*113,1*	*114,4*	*115,7*	*115,7*
Elasticity, %	*80,5*	*80,0*	*79,4*	*78,5*
Humidity, %	*38,9*	*38,0*	*36,5*	*34,0*
Acidity, ^{o}T	*2,3*	*2,6*	*2,9*	*3,1*
Losses, %	*12,5*	*12,9*	*13,1*	*13,9*

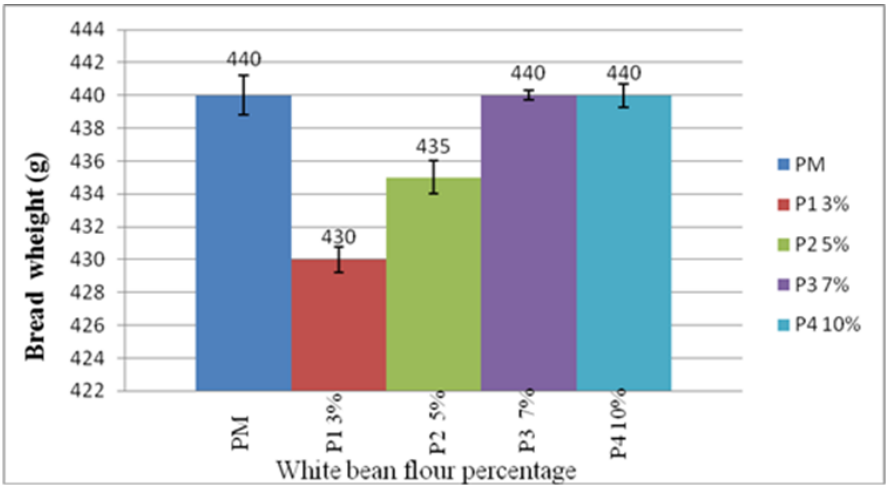

Fig. 1. The dependence of the mass amount of bread and white bean flour added

The addition of dietary fiber from bean white flour makes a number of changes of technological parameters, changes that directly affect the quality of the finished product. The addition of white bean flour does not influence critical mass of bread, and this apparent growth to the addition of 5 and 7% of white bean flour.

From the graph it is observed that at 3% bread flour for white bean, the table bread is less like that of blank and with the growth of the addition of white bean flour and bread rises, reaching out to have the same value as that of the blank.

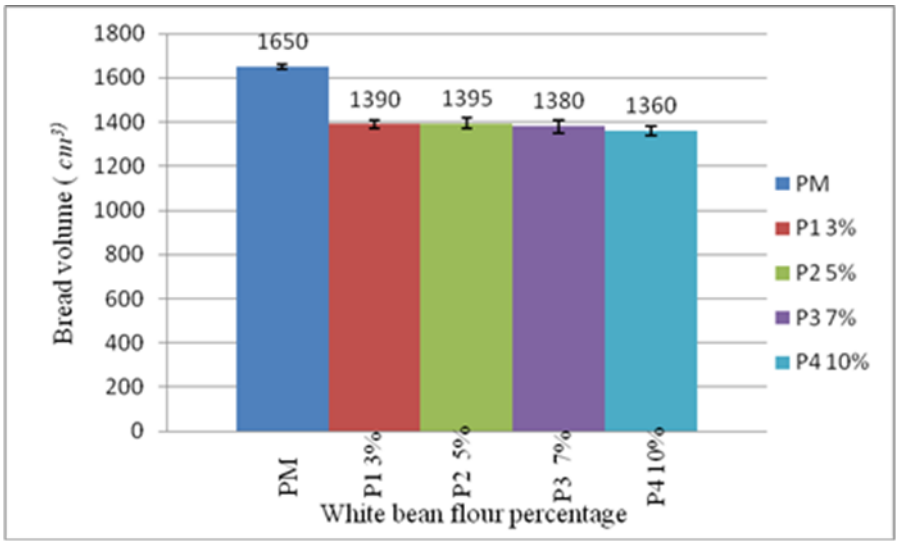

Fig. 2. The dependence of the volume of bread and the volume of added white bean flour

The main effect of the addition of white bean flour into bread reflects the volume of the products obtained. It is observed that the volume of bread is reduced in proportion to the percentage of white beans added flour, this is mainly due to the decrease of the content of gluten in the dough and thus reduce the capacity to keep the dough fermentation gases.

The study showed that the addition of up to 7% of white bean flour, bread volume decreases proportionally with reduced protein content glutenice. This phenomenon is explained by mechanical damage of glutenice films by white bean flour introduced. Another opinion is that in the presence of white beans, due to competition for water in the dough, glutenic proteins do not moisturize enough, so glutenică is insufficient network formed.

Aiming to change volume at baking, it was observed that the dough made of flour with white bean added, expand less volume than that simple, this fact being blamed on

more rapid fixing of the shape and volume of the bread, because of fast gelatine formation of starch due to the larger quantity of water in the dough with white bean flour.

From the diagram it can be seen that the largest volume it takes P2 with 5% white beans and flour along with the increase of the quantity of white beans meal it reduces the volume of bread.

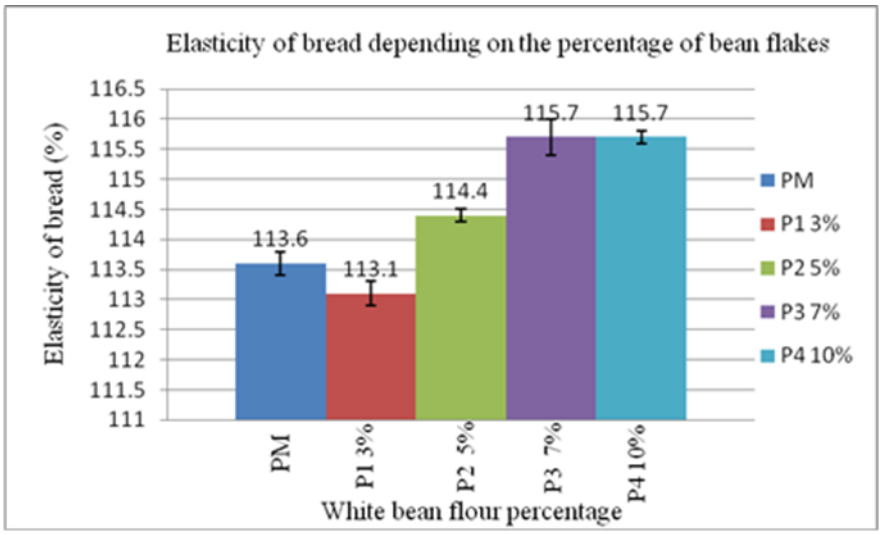

Fig. 3. The dependence of the elasticity of the bread and the amount of added white bean flour in varying percentages

The bread with white bean flour has a much smaller volume of bread as witness PM regardless of the amount of added white bean flour. The largest volume of bread should be recorded at the bread with 5% addition of white bean flour and decreases with increasing of added fiber, having the lowest value for bread with 10% addition of white bean flour.

In terms of efficiency we can notice that the samples with the addition of dietary fibre have an efficiency of bread. Increase in yield is due to the fibre properties: capacity of absorption and retention of water in addition.

We can see from the graph that the yield is lower at bread bread with 3% white bean flour than bread witness and increases with increasing fiber content.

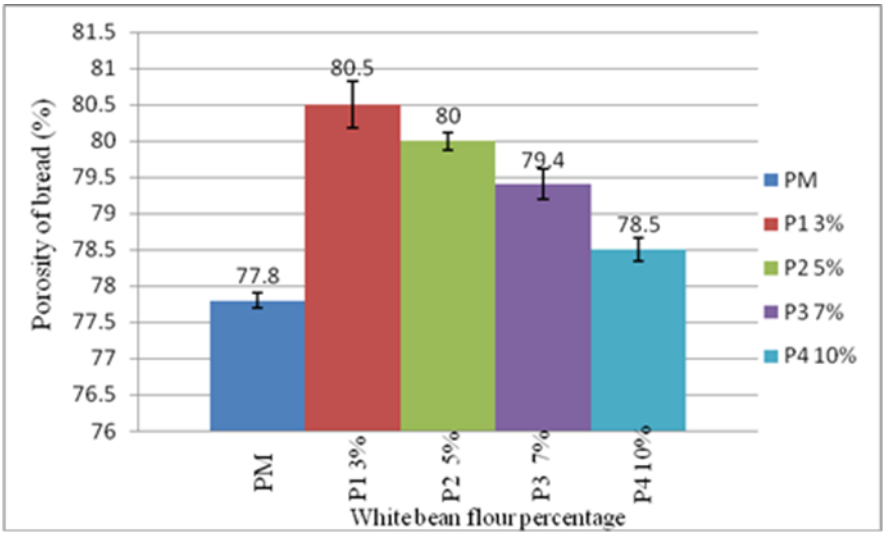

Fig. 4. The dependence of the porosity of bread and the amount of added white bean flour in varying percentages

In terms of core porosity it is observed that all samples of bread have porosity values in product standards recommendations. You may notice a slight decrease in the value of the porosity, the trend is closely related to the amount of added white bean flour.

Pursuing the values plotted in figure 4, note the porosity of the 4 samples is greater than that of the blank. The highest value was recorded in the case of the sample with 1% White bean flour and decreases as the amount of white bean flour added dough rise.

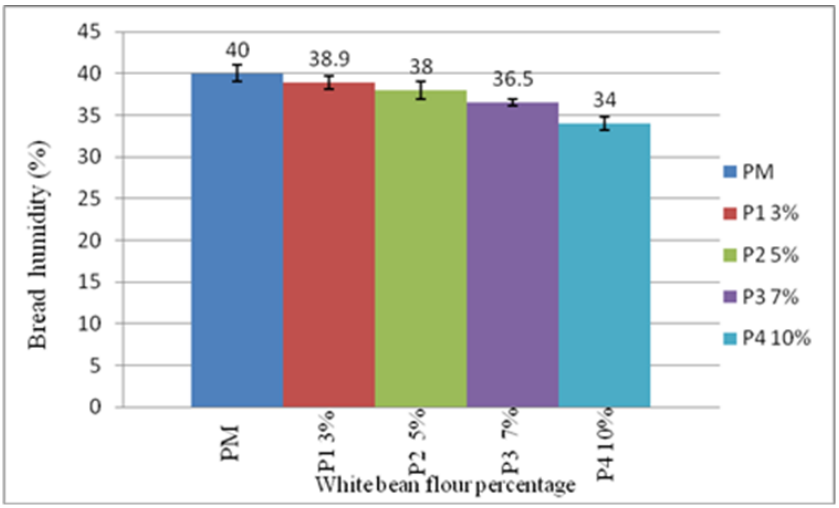

Fig. 5. ***Dependence of humidity quantity of bread and white bean flour***

According to the results presented graphically in figure 5, we can notice a decrease in humidity in the samples with the addition of white bean flour vs blank. This decrease is due to the increase in the capacity of absorption of water by the fiber in the product and its evaporation during baking.

From the graph it appears that moisture from the bread with the addition of white bean flour is lower than that of bread witness and also decreases with increasing the amount of the addition is the white bean flour. The smallest value of humidity shall be recorded at the 4 with 10% addition of white bean flour.

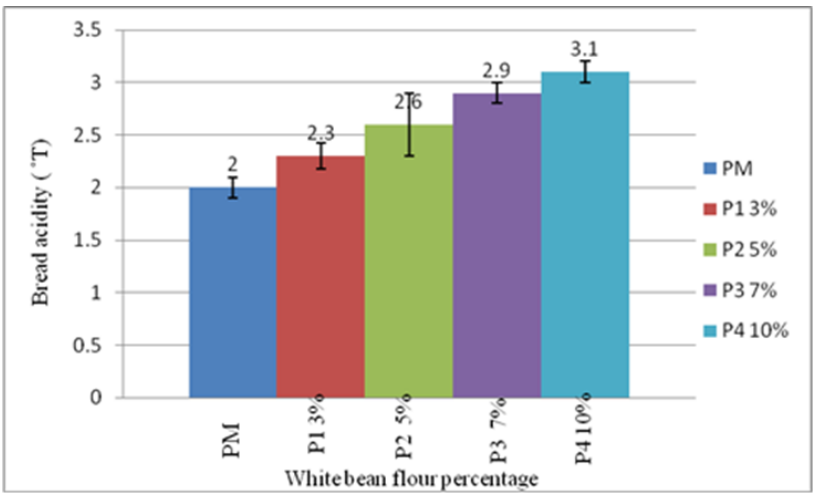

Fig. 6. The acidity dependence of the bread and the amount of added white bean flour in varying percentages

The measured acidity from the bread with the addition of white bean flour is higher than that of bread witness. Also can be seen from the graph that the acidity increases directly in proportion to the increase in the amount of added white bean flour.

Acidity index flour characterize the quality of the finished product. In the case of the addition of white bean flour, the acidity increases with the increase of the quantity of white

beans and flour in the dough of the accumulation of lactic acid that occurs as a result of lactic fermentation.

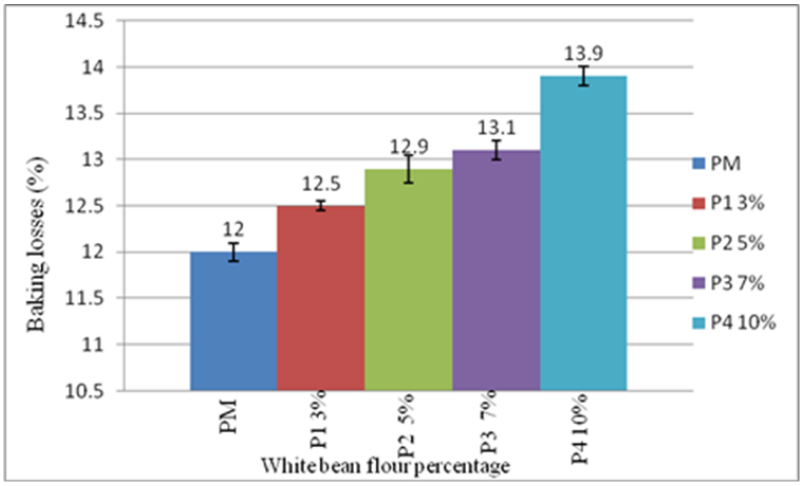

Fig. 7. The dependence of the baking of bread losses and the amount of added white bean flour

The losses are higher in baking bread with the addition of white bean flour than blank, due to the extra amount of water added to the dough hydration. The biggest value losses from baking bread to be recorded with the greatest amount of added white bean flour.

CONCLUSIONS

The use of food in the bakery in significant proportions (more than 5% of the prepared flour) brings a range of effects, both positive and negative on the dough and bread-making quality obtained from it. In this context, the results obtained in the present study, from the technological point of view the addition of dietary fiber from bean white flour does not distort organoleptic properties and physico-chemical properties of the product obtained.

As a result of sensory analysis, the addition of white bean flour proved to be a crucial influence on the quality of the products obtained. Following the addition of white bean has noticed an improvement in flavour and taste, products with a special aroma and taste.

All results obtained from the study conducted shows that, from the technological point of view, white bread flour with the addition of white bean meets the requirements of current standards and satisfy the tastes of consumers participating in tests.

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