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QUALITY MANAGEMENT OF THE WHEAT BLENDING, IN ORDER TO IMPROVE THE TECHNOLOGICAL PROPERTIES OF THE FLOURS OBTAINED IN THE MILLING PROCESS OF THE ROMANIAN WHEAT VARIETIES

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Abstract

Following the demand of the bakery industry to diversify the range of foods, it can be said that improving the quality parameters of flours has become a necessity from both the supplier and the beneficiary. This research is based on the demonstration that the knowledge of quality indicators as well as alveographic properties are necessary in calculating the mixing percentages of two or more batches of wheat with different quality properties. The individual grinding of three different wheat batches, from three suppliers with different geographical locations (Agroind Oradea, Ameropa Olari and Merpano Săcălaz), was performed. The adequate correlations between main physico-chemical parameters of the wheat grain and the alveographic parameters of the flour obtained lead to the technological properties suitable for bakery or pastry products, fully fulfilling the satisfaction of consumer requirements.

Key words**:** *wheat blending, quality management, quality indicators*

INTRODUCTION

The quality characteristics of wheat differ from one supplier to another and are directly influenced by a number of intrinsic and extrinsic factors, such as: climatic conditions, wheat treatment, wheat conditioning, storage and storage conditions [6].

The variation of wheat quality represents a real problem in obtaining flours, therefore it is absolutely necessary to determine the quality of the physical and chemical properties of wheat batches in order to orient the flour obtained to the appropriate bakery and pastry products and establishing the need for breeders both in terms of quantity and quality [5]. The rheological analysis of the dough provides valuable information about the behavior of the flour in different phases of the processes of obtaining bakery and pastry products [7]. Between the main physico-chemical parameters of the wheat (such as organoleptic properties, moisture, hectoliter mass, falling number, wet gluten content) and the alveographic parameters of the flour obtained, there are a large number of correlations that ultimately influence the rheological properties of the dough [8][9].

The batches thus constituted are divided according to the technological properties, in three groups [1]:

- batches that can be ground on their own, but can be used in the mix for improvement batches with poorer qualities;
- batches which can be ground on their own but which cannot be used for mixing, the qualitative indicators of the lot ensuring only the standardized minimum values of final products;
- batches that cannot be ground alone, due to poor technological qualities, but only mixed with high quality batches.

Following blending of two or more batches, with different quality indicators, participating in a well-determined proportion, wheat mixtures are sent to grinding, in order to obtain the quality of the flour required by the beneficiary [3].

Good quality management of wheat batches and wheat grain mixtures leads to high yields in terms of flour production, to the optimization of raw material acquisition costs

and to the maintenance of a constant quality of the obtained products [2][11].

MATERIALS AND METHODS

The research was conducted on the Romanian varieties of wheat (Triticum aestivum, ssp. vulgare) Agroind Oradea (Sample 1), Ameropa Olari (Sample 2) and Merpano Săcălaz (Sample 3), harvested in 2020.
The main indicators that are taken into account when making the grinding mixtures, namely: moisture, wet gluten, drop rate, mechanical work and hydration capacity. All these factors converge to obtain grinding batches from which a flour with desired baking properties will be obtained [10].
The three wheat grain samples were previously analyzed using the NIR FOSS INFRATEC 1241 Grain Analyzer for a quick determination of the main indices (protein content, moisture, wet gluten, mechanical work, hectoliter mass) after which each sample was analyzed separately to determine mechanical work by the alveographic method (SR EN ISO 27971/2009), the falling number index by the Hagberg method (SR EN ISO 3093/2007) and wet gluten by the manual method (SR EN ISO 21415-1/2007). The rheological analysis performed with the help of the Chopin alveograph (Alveolink NG) determined the technological qualitative properties of the flours obtained by the individual grinding of three different wheat batches, coming from three Romanian suppliers from different geographical locations.
Following the elaboration of the Grading Form, it is found that there are 3 grades of different qualities.
After qualitative analyses of the 3 samples, wheat mixtures were made in different percentages (using the method of inverse proportions) from the wheat samples of different qualities, which were analyzed to determine the optimal mixture for obtaining a 650 (0.65 % ashes) type flour which is most often used to obtain bread [4]. In order to obtain the desired final product, wheat flour laboratory analyzes were performed according to the standards depicted above.

RESULTS AND DISCUSSIONS

Determining the quality indicators (Fig. 1) is important because after finding them, the unloading and storage of wheat raw material takes place according to the quality and at the same time the price of wheat is established.
Following the analyzes, the different quality of the 3 batches of wheat was highlighted. Based on the mixtures made, 3 types of flour were obtained that can have different industrial directions.

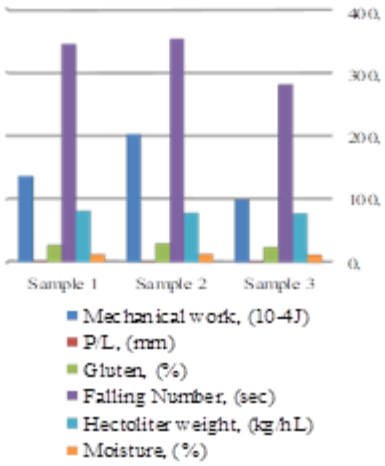

Fig. 1. Results obtained from analyzes performed on wheat- raw material
Source: Own analysis.

From sample 1 of flour (wheat mixture 1) a medium quality flour was obtained which is suitable for use in the bakery industry (Figure 2).
From sample 2 of flour (wheat mixture 2) a high-quality flour was obtained which is suitable for use as flour for specialties that need much greater stability, stronger gluten and high elasticity (Figure 2).
Sample 3 of flour (wheat mixture 3) yielded a lower quality flour which can also be used in the pasta industry, biscuits or any product which does not require very strong gluten, high volume or high elasticity (Figure 2).
The baking test subtly highlighted the differences between the three wheat mixtures, observing small differences in the elasticity of the dough (Photo 1), the volume and porosity of the final product (Photo 2).

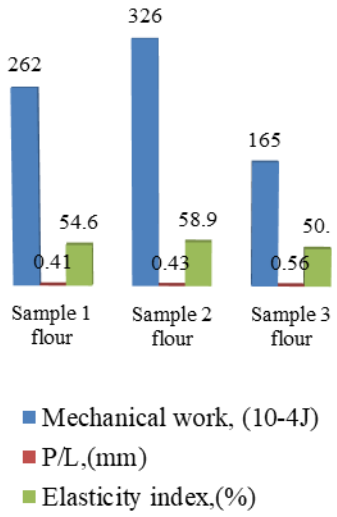

Fig. 2 Qualitative indicators of flour obtained from mixtures of wheat
Source: own analysis.

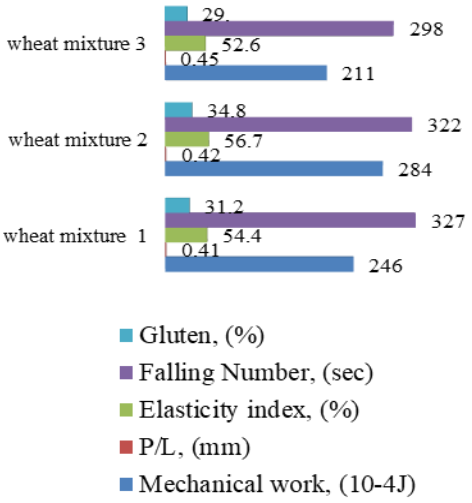

Fig.3. Results obtained from the analyzes performed on the mixtures of the wheat
Source: own analysis.

After analysis of the wheat as raw material, the technical specification of the product was consulted and it was found that it falls within the permissible limits for unloading/storage.

Photo 1. Fermented dough samples obtained from the three grinding mixtures of wheat, from left to right:
-55 minutes fermented dough from wheat mixture 1;
-65 minutes fermented dough from wheat mixture 2;
-50 minutes fermented dough from wheat mixture 3.
Source: own analysis.

Photo 2. Baking test products obtained from the three grinding mixtures of wheat, from left to right: bread from wheat mixture 1, bread from wheat mixture 2, bread from wheat mixture 3
Source: own baking test.

At the end of the analysis of the 3 types of flour obtained, the technical specification of the product was consulted and it was found that wheat mixture 1, which has an average quality, is perfectly suitable for the bakery industry.

CONCLUSIONS

The biological properties of wheat play an important role in its acquisition process.
Grading of raw material wheat is an essential tool in determining the purchase price.
Preliminary analyzes on wheat, performed in the laboratory, give clear and precise information about its quality and facilitate the storage / subdivision process.
Determining the moisture of the raw material is one of the key factors that determine how it is stored.
The quantity and quality of wet gluten give clear information about the properties that the intermediate product will later have, namely the dough.
The hydration capacity is directly influenced by the degree of crushing and the quantity and quality of gluten in the flour, it gives clear information about the stability of the intermediate product, the dough, in the production process.
Determining the mechanical work helps the milling unit to classify both the flour and give

it a purpose and the wheat so that it can be stored according to quality.

The baking test is the key element that shows exactly the behavior of the flour during the technological process.

The storage of wheat in batches according to the quality of each one, leads to the optimization of the working time, of the available storage space and to the facilitation of obtaining the grinding loads.

The importance of wheat blending consists in the fact that following a constant quality of it results a product of a uniform quality and this positively influences the customers' perception on the manufactured product;

The analysis of the wheat mixtures clearly highlighted the importance of the grinding loads in terms of the desire to obtain a flour of a certain target quality for the customer's product.

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