

THE QUALITY OF WHEAT FLOUR AT SOME COMPANIES IN DOLJ

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ABSTRACT

In this paper we studied the quality of wheat flour from various companies in Dolj County. In order to study the quality of the flour, we analyzed the following indicators: wet gluten content, falling number, sedimentation test, gluten deformation index, gluten index, farinograph test, allveograph test, which are currently used in the panification industry.

Analyzing these indices we can conclude that the soil is the main factor that influences the quality of flour.

INTRODUCTION

The nutritional value of agricultural products can be appreciated, on the one hand, by the content and quality of nutritional principles and, on the other hand, depending on some physical characteristics such as color, hectoliter weight, etc., elements that are especially commercial. The biosynthesis of the substances on which the quality of the crops is influenced by the mineral nutrition conditions of the plants. Proper supply of plants with nitrogen is an essential condition for the biosynthesis of proteins that in wheat can range between 9 and 25% and which grows to the detriment of starch (Amberger 1975, Toma 2009).

In the present the increase of the nutritional quality of wheat is a goal in breeding and selection programs. Wheat has a nutritional value of particular importance and a special place in crops used as source of food to the most of the world population (Matei et al., 2013).

By administering fertilizers, the metabolism can be directed in the desired direction and the accumulation of proteins, starches, fats and other substances with an important biological

role in the wheat harvest can be favored (Dodocioiu et al, 2009).

In terms of quality, the bakery properties must not be omitted in the case of wheat. Nitrogen fertilizers in doses up to 200 kg/ha increase the gluten content, which has the positive effect of increasing the volume of bread.

The use of chemical fertilizers and especially those with nitrogen largely conditions both protein metabolism and carbohydrates and especially some baking indices Hera, 1980, Rusu, 2007.

In order to establish the influence that different doses of fertilizers have on the quality of flour, a series of studies were performed on the quality of wheat flour from two companies in Dolj County.

MATERIAL AND METHOD

The nutritional value and quality of wheat baking depends on: endosperm starch, embryo fats, pericarp minerals and skin vitamins.

Considering the definition of wheat quality given, main physical properties, protein-related properties, rheological properties and enzymatic properties, we sought to highlight the quality of wheat flour from the two companies in Dolj County:

-wet gluten content (%),

-Falling number,
 -sedimentation test (Zeleny, ml),
 -gluten deformation index (mm),
 -glutenic index (mm),
 -farinograph test: development time (minutes), stability (minutes),
 -alveographic test: w- the energy absorbed by the dough when stretched (joules), the P/L ratio which shows to what extent the dough is more extensible or more resistant.

RESULTS AND DISCUSSIONS

In the following are presented the results obtained after the analysis of the wheat flour sample from the first variant. As we have shown, 4 average samples of wheat flour harvested from different plots

In the first variant was used flour obtained from wheat that received the following doses of fertilizers: nitrogen fertilizers applied alone N_{100} and N_{150} and P_{40} , P_{80} .

For the second variant, a wheat flour was used which was treated with the following fertilizer doses: K_{40} , K_{80} , $N_{100}P_{40}$, $N_{100}P_{80}$.

were used which were fertilized differently with simple doses of nitrogen and phosphorus: N_{100} and N_{150} and P_{40} , P_{80} .

The results of the main baking indicators analyzed for the first variant are presented in table 1.

Table 1.

The results of the main indicators of baking wheat flour from variant 1.

Fertilizer dose	Wet gluten %	Falling number (sec)	Zeleny test (ml)	Gluten deformation index (mm)	Glutenic index %	Farinograph test		Alveograph test	
						Development time (min)	Stability (min)	W joules	P/L
Unfertilized	20.5	116	16	22.3	18.1	1.3	0.7	77	0.3
N_{100}	22.6	141	27	18.9	26.2	2.4	2.6	131	0.4
N_{150}	23.54	164	33	17.6	30.5	3.2	3.6	144	0.5
P_{40}	21.5	128	22	22	23.4	1.6	0.8	89	0.4
P_{80}	22.3	144	27	19.1	24.9	2.7	2.6	134	0.4

The increase of the falling number, from 116 seconds to the unfertilized variant at 141 and 164 seconds makes the flour pass from the unsuitable category to the satisfactory one for baking.

Applying phosphorus fertilizers in doses of P₄₀, P₈₀ also lead to an increase of the falling number at 128 and 144 seconds, wheat flour becoming satisfactory for baking.

Wet gluten also increased following the use of different doses of fertilizers from 20.5% to the unfertilized variant at 22.6-23.54% following the application of N₁₀₀ and N₁₅₀ doses and only up to 21.5-22.3% when using doses of phosphorus P₄₀, P₈₀ (Dodocioiu et al., 2015).

Both doses of nitrogen and phosphorus fertilizers increase the quality of the flour according to this indicator, raising it from unsatisfactory to satisfactory.

The Zeleny sedimentation test was favorably modified by the doses of nitrogen used, the flour passing from the unsatisfactory category to a corresponding category, close to the good class.

The doses of phosphorus P₄₀ and P₈₀ changed the quality of the flour less from this point of view compared to those with nitrogen, the flour passing into the satisfactory middle category.

The gluten deformation index was favorably modified by the doses of nitrogen

fertilizers, decreasing from 22.3 mm to 17.6 and 18.9 mm, the flour falling into the satisfactory category.

The application of the phosphorus doses P₄₀ and P₈₀ kept this indicator at the same level and led to its slight decrease, the flour passing from the unsatisfactory category to the satisfactory category.

The gluten index was modified more favorably by the doses of nitrogen fertilizers, making the flour pass to the satisfactory category and to a lesser extent by phosphorus fertilizers.

Farinograph test. The use of nitrogen doses N₁₀₀ and N₁₅₀ resulted in both the increase of the development time value and its stability, the flour can be classified in the middle category, and the phosphorus doses positively influenced this indicator, passing the flour in the middle category.

The alveographic test is favorably influenced by the nitrogen doses used, the flour passing from the low category to the category of flour with baking potential. Phosphorus doses also favorably influenced this indicator.

The results of the main baking indicators analyzed for the second variant are presented in table 2.

Table 2.

The results of the main indicators of baking wheat flour from variant 2.

Fertilizer dose	Wet gluten %	Falling number (sec)	Zeleny test (ml)	Gluten deformation index (mm)	Glutenic index %	Farinograph test		Alveograph test	
						Development time (min)	Stability (min)	W joules	P/L
Unfertilized	19.58	114	17	23.8	17.2	1.4	0.8	62	0.3
K ₄₀	80.17	124	22	22.7	21.5	1.5	0.8	71	0.3
K ₈₀	21.05	133	23	19.6	23.6	2.2	2.0	111	0.3
N ₁₀₀ P ₄₀	23.5	152	44	17.6	36.5	2.6	1.9	141	0.4
N ₁₀₀ P ₈₀	24.8	124	61	15.0	42.8	3.5	3.2	155	0.4

Potassium doses were less favorable for increasing the wet gluten content, the increase being insignificant and the flour remaining in the unsatisfactory category.

The interaction of nitrogen - phosphorus $N_{100}P_{40}$, $N_{100}P_{80}$ best influenced the wet gluten content, the flour going from unsatisfactory quality to good quality.

The use of K_{40} , K_{80} doses had the effect of increasing the falling number from 114 seconds to 124 - 133 seconds, the flour going from unsatisfactory to satisfactory.

The use of nitrogen together with phosphorus greatly increased the falling number from 114 seconds to 152 seconds, respectively 224 seconds, the flour being included into the satisfactory category for baking.

The Zeleny sedimentation test is favorably modified by the doses of potassium, flour obtained being included in the corresponding flour category, while the N-P interaction increases even more indicator, the flour being include in the middle category.

The deformation index of gluten is reduced to a lesser extent by potassium fertilizers, the flour remaining in the unsatisfactory category, but being substantially reduced to 15.0 - 17.6 mm from the doses of nitrogen with phosphorus, the flour passing to the satisfactory category.

The use of potassium fertilizers results in obtaining a gluten index between 21.5 - 23%, the flour remaining in the unsatisfactory category.

The nitrogen-phosphorus interaction also had a beneficial effect from this point of view, making the flour pass from the satisfactory category to the good category (Mocanu et al, 2012)

The farinograph test was less influenced by K inputs, the flour remaining in the low category, while the doses of nitrogen and phosphorus had a very favorable influence, the flour moving to the medium category.

The alveographic test is less influenced by the doses of potassium, but

is very well influenced by the doses of nitrogen and phosphorus, the flour being included in the category of flour with baking potential.

CONCLUSIONS

Following the analyzes performed on the samples of flour from wheat fertilized differently, we can conclude the following:

- nitrogen and phosphorus fertilizers applied alone had favorable effects on the positive change in wheat flour bakery indicators.

- potassium fertilizers applied alone do not favorably change all baking properties.

- the application of nitrogen fertilizers together with phosphorus fertilizers have the strongest influence on the change of quality indicators even at low doses of $N_{100}P_{40}$.

- of the two variants, the best quality of wheat flour was recorded in the samples of the second variant.

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