



FLOUR QUALITY ANALYSIS AND ITS RELATIONSHIP WITH GRAIN YIELD FOR THREE WHEAT VARIETIES

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Abstract: The experiment was carried out in MCXA Timiryazevskaya in Moscow for the spring season of 2016-2017 to study the relationship between the yield and its components and the specific content of the flour for three types of wheat (Maskovskaya-39, Nur, T.Timopheevii × Zarya). The Laboratory study was the Content of proteins, Wet and dry Gluten, and Ash percentage in the flour. There were significant differences between the cultivars of the studied traits.

Key words: Dry gluten, Wet gluten, Grain yield, Protein, Ash.

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1. Introduction

Wheat crop (*Triticum aestivum* L.) is main food crop for humans in the most of countries in the world. The issue of providing food is a sensitive and important things that researchers keen to investment secured through the experiences of scientists in the production or devise new genetic structures appropriate to the conditions of soil and climate in any environment from Iraq environments [Al-Juthery *et al.* (2020)].

Wheat seeds consist mainly of starch (up to 70%) and proteins (12-15%). Starch is generated from carbohydrates, which is activated to provide energy during seed germination [Al-Juthery *et al.* (2018)]. The protein in wheat seeds can be divided into albumins, globulins, gliadins, and glutenins. Albumins and globulins are important enzymes that take part in plant growth [Wiesner *et al.* (1980)]. Gliadins and glutenins are the major storage proteins in wheat endosperm, which confer extensibility and viscoelasticity of dough and affect the processing quality of wheat [Payne (1987)].

The high weight grains contain high rates of endosperm compared with low-grain weigh can be inferred them to extract flour. The size of sedimentation is influenced by the quantity and quality of protein and gluten, volume of sedimentation is used as an indicator of the quality of gluten and thus the performance of the flour in the baking process [Al-Azawi *et al.* (2019)]. Wheat varieties is heterogeneity of grain and flour quality.

Many research institutions and international companies develop new hybrids or genotypes characterized by quantitative properties and good quality specifications. There is also a search ongoing about how genotypes and environment interacts with each other for growth, productivity, and quality [AL-Taey and Burhan (2021), Al-Taweel and Al-Hamdani (2022)].

The different genotypes in the traits number of grains in the spike may be due to the difference in the length of the spike, the variation in the exploitation of growth factors, especially during the flowering stage to form the largest number of fertile florets and then

the grain, and the difference in the high temperatures tolerance of that may lead to weaken the vitality of pollen and dried stamens which negatively affects the rate of pollination and fertilization and nodes [Al-Taweal (2009)].

2. Materials and Methods

The experiment was carried out at field experimental station of Russian State Agrarian University, Moscow Timiryazev Agricultural Academy in 2016-2017 to determine the correlation between the yield and its components and the quality content of the flour for three varieties of wheat (*Maskovskaya-39*, *Nur*, *T. Timopheevii* × *Zarya*), using the design of RCBD with three replicates. The area of the experimental unit was 3 m² containing 5 lines with a distance between the lines of 15 m. The seeds of superphosphate were planted on 2/05/2016, Add superphosphate (45% P₂O₅ fertilizer) when preparing soil for planted at a rate (100g), Nitrogen fertilizer was added at a rate of (300 kg.h⁻¹) in urea (46% N).

2.1 Studied Characters

1. The number of spike/m².
2. Number of grains per spike. The average number of grains at 25 spike per experimental unit [Briggs and Aytensu (1980)].
3. Weight of 1000 grains/g. The weight of 1000 grains, which was weighed by a sensitive balance and each unit is tested and at moisture 12%.
4. Crude protein content in the flour (%). Calculation of protein ratio according to the following equation:
Protein Content = Content of total Nitrogen in flour × 7.5 (by humidity ratio 14%).
5. Wet and dry gluten content. Wet gluten was estimated with a device (INDEX GLUTEN GLUTOMATIC). Dry gluten was calculated by placing the wet clot in an oven at 100°C for 24 hours.
6. Ash content in flour %, Use the method given in AOAC (1975). Weighing 4 grams of flour, burning and incineration in the oven temperature (550°C) until the stability of weight.

2.2 Statistical analysis

After collecting the data for the studied

characteristics, it was analyzed statistically according to the method of analysis of variance for the design of the split panels. The lowest significant difference (L.S.D) was tested for the comparison between the arithmetic means of the coefficients at a 5% probability level [Steel and Tome (1980)].

3. Results and Discussion

3.1 Grain yield Components

Number of spikes/m²: The cultivars showed a high significant difference in this characteristic and the superiority of the variety (*T.timopheevii* × *Zarya*) with the highest number of spikes. It reached (420.6) Spikes, while the (*Maskovskaya-39*) variety was the lowest in the number of spikes per square meter, reaching (338.8) spikes. Perhaps this is due to varieties differ in their ability to produce shells that are affected by their genotype, and we explain the variation of the varieties in the number of spikes per unit area to their difference in the production of representative materials that support the shells in order to turn into fertile shells bearing spikes.

Number of grain/spike: The effect of the varieties was clear on the characteristic of the number grains/spike, as the (*Maskovskaya-39*) variety gave the highest average of (58.8), while the variety (*T.timopheevii* × *Zarya*) gave the lowest average of (53.9) grains per spike.

Weight 1000 grains(g): The results in the Fig.1, show that there are significant effects of the varieties on the average of this characteristic, in which the varieties differed, as the (*Maskovskaya-39*) variety gave the highest average weight of 1000 grains and reached 39.4 g, and its superiority may be due to the decrease in the number of spikes per square meter.

3.2 Grain yield (tons.h)

The final yield of grains is determined by an unlimited number of different combinations of the yield components or the interaction that occurs between these components. And that the yield of the grains is mainly determined by the agricultural operations related to the capacity of the source to supply nutrients from the side and the capacity downstream of the seed (sink) to store these nutrients on the other hand. It appears from the Fig. 1, that the varieties differ in the rates of this characteristic, as the variety (*Maskovskaya-39*) outperformed the highest rate of the trait, reaching 6.8 tons.h, while the lowest average for the grain yield was

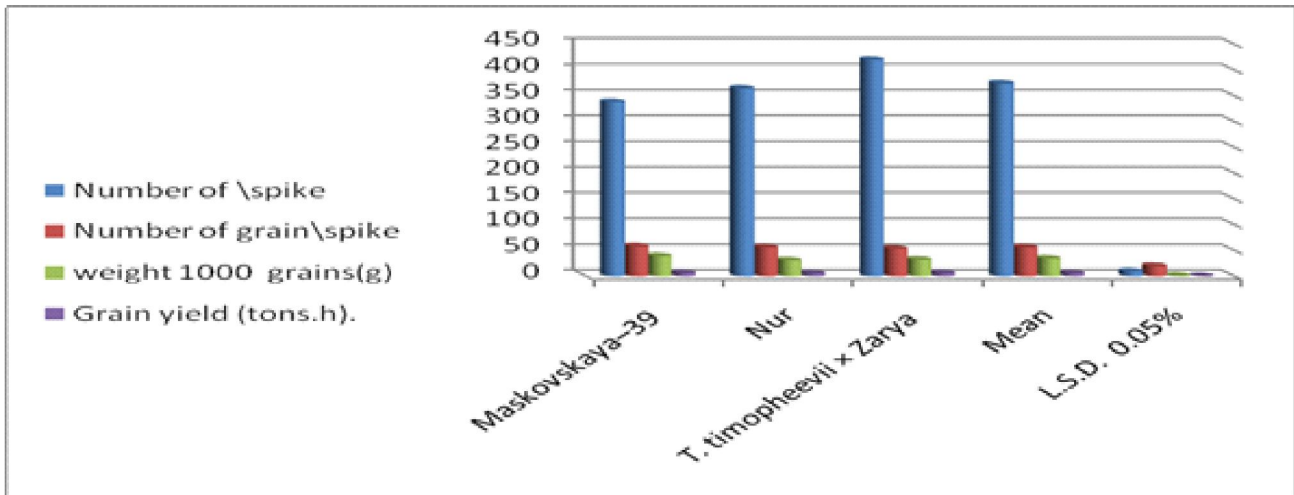


Fig.1: Estimation of Grain yield Components (Number of spikes/m², Number of grain/spike, Weight 1000 grains/g, Grain yield/tons.h) for three varieties (Maskovskaya-39, Nur, T.Timopheevii x Zarya) 2016-2017

(5.6 tons.h) for the variety (Nur).

The explanation for this discrepancy between the varieties is in their ability to branching out the basal, the production of fertile branches, the number grains/spike and the weight of (1000) grains (g), which is explained in Fig. 1.

3.3 The qualities characteristics of flour

The percentage of protein: It becomes clear from Fig. 2 that there are no statistically significant differences between the studied varieties in the average percentage of protein in flour. Temirbekova *et al.* (2019) showed that the percentage of protein was high, ranged between 11.2.4 and 16.5 %.

The percentage of wet and dry Gluten: The Fig. 2 shows the high significant differences in the two characteristics of wet and dry gluten, as the variety (*T.timopheevii x Zarya*) excelled in these two characteristics, and the reason for this difference may be due to the variation in the protein content of these varieties. Many varieties showed elevated outcomes in terms of gluten quality indices and other economically important features [Al-Azawi *et al.* (2019)].

Ash percentage: The percentage of ash in the flour is a measure of the percentage of minerals in it, and it is also a measure of the degree of milling efficiency. If the percentage is high, it means high extraction efficiency extraction. The proportion of ash

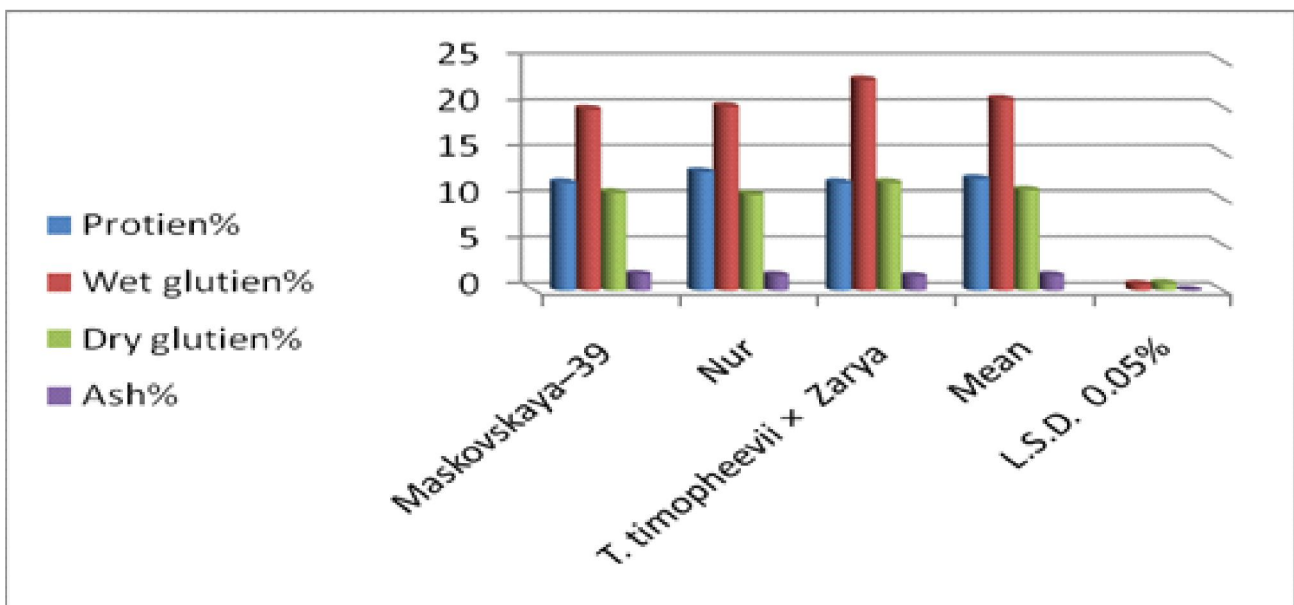


Fig. 2: The qualities characteristics of flour in wheat for three varieties (Maskovskaya-39, Nur, T. Timopheevii x Zarya) 2016-2017

has a direct relationship with the proportion of protein, and this percentage varies according to the varieties and the environmental conditions of production. It is noted from Fig. 2 that the varieties vary according to the ash content of their flour. The (*Maskovskaya-39*) variety excels in this characteristic, and the reason for this may be attributed to the difference in their ability to absorb the constituents of ash, such as magnesium, calcium, and iron.

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