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# CONTENT

<b>GURBANOV ELSHAD, IBRAHIMOV SHAHIN</b> VEGETATION CLASSIFICATION OF OIL-CONTAMINATED SOILS IN AZERBAIJAN.....	3
<b>IBADULLAYEVA SAYYARA, SHIRALIYEVA GULNARA, MOVSUMOVA NURI</b> PROSPECTS OF USE OF USEFUL SPECIES OF THE FAMILY ROSACEAE JUSS. FOUND IN FOREST AND SHRUB VEGETATION OF AZERBAIJAN .....	9
<b>YUSIF ABIYEV, MAGSUD GURBANOV, FARID SEYFULLAYEV</b> INTERCONNECTIONS OF CLIMATE, VEGETATION INDEX, AND TREE GROWTH: INSIGHTS INTO SAMUR-YALAMA NATIONAL PARK, AZERBAIJAN.....	18
<b>AYDIN ASKEROV, HUMIRA HUSEYNOVA, VAZEH BAKHSHIYEV</b> VEGETATION MAPPING IN THE TERRITORY OF THE REPUBLIC OF AZERBAIJAN IS AN ACTUAL PROBLEM .....	33
<b>ABBASOV MEHRAJ, BABAYEVA SEVDA, RUSTAMOV KHANBALA, RASULOVA LAMAN, AHIMOVA OFELYA, MAMMADOVA AFAT, IZZATULLAYEVA VUSALA, HAJIYEV ELCHIN, ALIYEV RAMİZ, AKPAROV ZEYNAL</b> EXPLORING GENETIC DIVERSITY IN AZERBAIJANI BARLEY COLLECTION THROUGH AMPLICON SEQUENCING .....	38
<b>ALIYEVA SANAM, SULEYMANOV TAHIR, ALIYEV HUSEYN</b> INVESTIGATION OF THE PHENOLIC COMPOUNDS CONTENT OF THE RAW MATERIAL OF MELISSA OFFICINALIS L. ....	45
<b>AHMADOV ISMAT, HASANOVA FARIDE</b> CHLOROPHYLL DEGRADATION IN LEAVES OF NANOPARTICLES EXPOSED COTTON SEEDLINGS UNDER DARK CONDITION .....	50
<b>NABIYEVA FATMAKHANUM, IBRAGIMOV ALIYAR</b> BIOMORPHOLOGICAL, BIOECOLOGICAL, USEFUL CHARACTERISTICS, EFFECTIVE AND SUSTAINABLE USE OF TAXA OF THE SUBFAMILY CAESALPINIOIDEAE IN THE FLORA OF AZERBAIJAN .....	59
<b>GASANOVA GATIBA, ABDULLAYEV ABDIN, POLADOVA GULSHAN</b> STUDYING THE QUALITY INDICATORS OF COMPETITIVE VARIETY TESTING SAMPLES FROM THE TERTER REGION.....	67
<b>MAMMADOV ZIYADDIN, ALIYEVA NAILA, SHAHBAZI NIGAR</b> EFFECT OF COMBINED SALT STRESS OF ALKALINE TYPE ON BIOLOGICAL INDICATORS, ANTIOXIDANT AND PROOXIDANT ENZYME SYSTEMS OF SOYBEAN SPROUTS .....	72

## STUDYING THE QUALITY INDICATORS OF COMPETITIVE VARIETY TESTING SAMPLES FROM THE TERTER REGION

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**Abstract.** *Today, the most urgent problem for breeders is the creation of high-quality wheat varieties. Recently, the grain quality of soft wheat, especially the quality of gluten, has become low, despite its high content. It is known that, in the formation of grain quality, the contribution of the genotype is undeniable, from this point of view, the study of samples of competitive variety testing makes it possible to establish the direction of selection. The role of various traits in realizing the potential of a variety is different in a particular agro-ecological region, therefore, the purpose of this study was to study the dependence of grain quality on the genotype and growing conditions. The object was 99 samples, the studies were carried out in 2021-2022. Grain quality was assessed in the laboratory "Grain Quality", according to the following indicators: the mass fraction of crude gluten, the quality of gluten, i.e., GDİ (gluten deformation index), sedimentation and protein content. The study of the quality of grain obtained from the control nursery of variety testing for the selection of soft wheat grown in the same conditions of irrigated soil of the Terter RES (regional experimental station) showed that the year of the study of the growing season significantly affects the formation of the quality of soft wheat grain. In this study, the protein content indicator turned out to be the most dependent on weather conditions. Along with this, the features of the genotype also have an impact on the formation of the quality of the crop. Consequently, climatic conditions have a significant influence, but at the same time, the properties of the genotype are undeniable.*

**Keywords:** *soft wheat, gluten, vitreous, protein, correlation*

### INTRODUCTION

Global climate change and its impact on the environment is one of the modern science main problems. Each crop is characterized by a strict, definite relationship between the yield and grain quality. Temperature, humidity, nutrients for yield and weather are the main things for most crops.

Increasing the productivity of varieties is not the only way to increase yields under production conditions. Here, the resistance of varieties to biotic and abiotic stresses, as well as the genetically determined ability to express themselves, plays a priority role [Koptik et al., 1996].

In modern conditions, the decrease in

productivity can be combined into the following groups: soil and climatic conditions; soil fertility; moisture availability and the sum of active temperatures [Labutina, 2003]. In order to obtain high-yielding varieties of soft wheat with high quality, in addition to their adaptive nature, special attention should be paid to their donor qualities [Gasanova et al., 2019].

The grain quality of soft wheat, especially the quality of gluten, has become low despite its high content. In the formation of grain quality, the contribution of the genotype is undeniable. The role of various traits in realizing the potential of a variety is different in a particular agro ecological climate [Gasanova, 2014]. The yield of wheat depends on the varietal characteristics



and weather conditions [Kadykov et al., 2012].

The contribution of weather conditions in the formation of the crop reaches 25-55%, mineral fertilizers 33-56%, and varieties from 1 to 15%. The content of protein and gluten, except for the weather, is mainly determined by the use of fertilizers, in particular nitrogen, from 14.7 to 46.0% [Zavalin et al., 2011].

The adaptability of varieties is characterized by a set of parameters of their ecological plasticity and stability. Scientists consider ecological plasticity as the ability to stably form in a wide area and with a sufficient variety of weather and agro technical conditions a high (relative to other varieties or hybrids) yield of genetically determined quality. Variety stability is defined as the degree of deviation of the response to environmental changes from the average for the group of studied genotypes, as the stability of the manifestation of a trait under different conditions, and as the ability of genotypes to maintain a certain phenotype under different conditions using regulatory mechanisms [Popolzukhina et al., 2019].

The quality of wheat is a combination of grain properties that determine its suitability to satisfy certain needs in accordance with its intended purpose, and it is the basis of the quality of those food products that we all consume: flour, bread, bakery, confectionery and culinary flour products [Meleshkina, 2011].

Grain quality is divided into three groups: 1-grain quality, 2-flour-grinding properties 3-quality of the final product. The external environment significantly affects the quality of wheat grain, but the variety has a certain role in the formation of yield and grain quality.

Variety is one of the factors in the production of wheat grain. Not all varieties realize their productivity potential in the same way under the same growing conditions.

The content of protein and gluten in the grain is adversely affected by weather conditions. Drought and high temperatures are among such indicators [Petrov, 1996]. If dry weather sets in, the grain quickly passes from milky ripeness to full ripeness, but the amount of plastic substances remains the same as at the beginning of milky ripeness. To improve the

efficiency of breeding work, for two years in the KSI (competitive variety testing) of soft wheat, the quality indicators of these samples were studied. Moreover, the experiments were carried out under irrigation conditions in the Tartar RES of the Grope Husbandry. We tried to find out the role of the genotype and environmental factors in determining the variability of quality indicators, as well as to determine the adaptive and productive capabilities of genotypes in the process of interaction with the environment. It is known that in addition to the characteristics of the genotype, the manifestations of grain quality are greatly influenced by the conditions of the year and the environment.

The purpose of this study was to study the dependence of grain quality on the genotype and growing conditions.

#### **MATERIAL AND METHODS.**

The object for the study was 99 samples grown in the CSI (competitive variety testing) of the Terter RES in 2021 and 2022, there were 47 and 52 samples, respectively.

Terter RES is located in the northwestern part of lowland Karabakh, the soil of this part is mainly dark chestnut, light chestnut and meadow-steppe type. The climate here is temperate continental, annual precipitation is 300-400 mm [Gasanova, 2014]. For two years - during the study period, the annual air temperature did not actually change. It averaged over the year a maximum of 38.30 C., a minimum of -9.40 C.

The assessment of grain quality carried out in the laboratory "Grain Quality", Institute Grope Husbandry. Grain quality was assessed by the following indicators: the mass fraction of raw gluten in the grain (determined by manual method). Gluten quality - according to deformation on the IDK-1 device. Sedimentation was carried out according to the modified method of Pumpyansky in 2% acetic acid. The nitrogen content was determined using an Auto Distillation Unit using a modified Keldal micro method. The protein content was determined using the coefficient  $N \times 5.7$ . Statistical processing of the research results was carried out according to the methodological guidance of B.A. Dospek-hova [Gasanova et al., 2016].

## RESULTS

When studying samples in competitive variety testing, forms with satisfactory grain quality were identified. As is well known, varieties and hybrids suitable for competitive variety testing are examined in order to establish the quality of the crop (for example, the content of protein, fat, sugar, etc.).

When studying the data from 2021, it turned out that the average weight of 1000 grains was 41.3 g, in total, the indicators of the samples ranged from 38.8 - 51.6 g. According to their parameters, the grains are mostly large, but there were and small grains. Despite the fact that the conditions of the experiment varied over the years, the weight of 1000 grains remained relatively stable. The vitreousness of the grain averaged 81.2%, but there is a large variability in this feature (ranging from 51.3 to 100.0%).

As is known from the literature, the vitreousness of the grain characterizes the consistency of the endosperm structure, the relative position of its tissues. Glassy grain of wheat, usually contains more protein than mealy. When producing grain from wheat, it is desirable to have a vitreous grain that gives the products a better presentation [Sultanova et al., 2022]. Despite this, one hundred percent (100%) glassiness for soft wheat is not the desired result, since it will make bread more elastic. The vitreousness of the grain is formed depending on the genotype and growing conditions. In general, most of the competitive variety testing samples were highly vitreous.

The average gluten content in the same year was 28.4%, but in general the results ranged from 24.6% to 33.4%, that is, there is a rather high difference and it must be taken into account that grain containing low gluten cannot give bread a satisfactory quality.

Differences in gluten, under the same conditions, gives the breeder the opportunity to make a rejection precisely on this basis. Since the quality and quantity of gluten are important in obtaining a high-quality product - bread. However, if these varieties are high-yielding, this complicates the selection process. Usually, yield and quality are negatively correlated, but more often, breeders prefer high-yielding

varieties.

It should be noted that, the first year of the study after sowing, irrigation was carried out late. The winter months were dry, the spring periods turned out to be cold, and in May, relatively high temperatures led to the formation of grain with low quality indicators.

The IDK indicator (2021), that is, the quality of gluten, averaged 98.3 i.i. (instrument indicator) which corresponds to the third class of wheat. Unfortunately, often the gluten quality (GQ) in our Republic does not meet the requirements of class 1. This is due to changes in climatic conditions. In recent years, in our country, in fact, summer comes abruptly, the temperature rises suddenly, and this creates a stressful state for plants. It is known that if dry weather occurs during the period of grain filling, then the assimilation processes slow down or stop altogether. In this case, the grain gains more protein, but with low quality. The grain filling period is shortened, and the plants cannot realize the quality potential of modern varieties. [Galushko et al., 2018]. As pointed out in his work [Shevelukha, 1916], bright sunlight and lack of water in the soil also have a depressing effect.

In the second year of the study (2022), the weather was relatively hot and dry. The average weight of 1000 grains was 39.7 grams, which is slightly, but still lower than in the previous year (41.3 g). Note that the mass index of 1000 grains for the samples varied from 32.0 g to 43.8 g.

As scientists note, in order to increase the efficiency of breeding for yield and select the best variety, it is necessary to study the mass index of 1000 grains, taking into account changes in all elements of the crop structure. It is important to know that environmental factors have a decisive influence on the formation of grain size under specific cultivation conditions [Rybas et.al 2015].

The average vitreous index for 2022 was 94.8%. The variation was noted in the range from 88.7 to 100%, which demonstrates the difference between the samples in this trait. Analysis of data on indicators of average results of gluten content (35.5%), IDK (108.6 i.i.), sedimentation (36.8 ml) and protein (14.4%) revealed the influence of year conditions on these

indicators. However, it should be noted that the high accumulation of gluten in the grain does not guarantee the receipt of high-quality finished products. A more important criterion is the gluten deformation index (GDI).

Meteorological conditions affect the accumulation of protein and gluten in the grain, this is due to inhibition or physiological process in the early stages of grain formation. On the other hand, in a continuous breeding process, it is

difficult to evaluate the quality of new material and create new varieties. The production of high quality grain of soft wheat is an important task. [Zobnina & Potapova, 2018].

With an average gluten content of 35.5%, the variation was 43.8-28.8%, according to IDK 96.8 - 111.0 i.i., according to sedimentation 60.0 - 18.0 ml, and according to protein 17.2-10, 9% (Table 1).

**Table 1**

**Dependence of grain quality of CVT samples on agroecological conditions of cultivation.**

CVT Samples 2021-2022 Year	Weight 1000 grains, gr.	Vitreous, %	Gluten content, %	GDI (instrument indicator) i.i.	Sedimentation, ml.	Protein, %
47	41.3	81.2	28.4	98.3	28.4	11.8
52	39.7	94.1	35.5	108.6	36.7	14.4
distinction	3,9	-12,9	-7,1	-10,3	-8,3	-2,6
R pirson	0,90	0,99	0,83	1,0	0,86	-0,73

As can be seen from the table, the conditions of the year significantly affect the grain quality indicators. In terms of weight 1000, the difference was positive (3.9 g), in other parameters, the difference was negative. The difference in gluten content (-7.1%) and sedimentation index (-8.3, ml) is a significant difference, but statistical processing revealed a close correlation between the two-year data of these indicators ( $R_{\text{pirson}} = 0,83$  and  $R_{\text{pirson}} = 0,86$  respectively). The difference over the years of the GDI indicator was -10.3 i.i., while the correlation was 1.0 ( $R_{\text{pirson}} = 1.0$ ). One of the important signs is the accumulation of protein, in this study the difference over the years was -2,6%, but the correlation was negative  $R_{\text{pirson}} = -0,73$ . The vitreous index had a difference over the years of almost -13% (-1269%), but the correlation was closer to unity ( $R_{\text{pirson}} = 0.99$ ).

The study of the grain quality obtained from

the control nursery of variety testing for the selection of soft wheat grown in the same irrigated soil conditions of the Terter RES showed that the growing season year of the study significantly affects the formation soft wheat grain quality, but along with this, the features of the genotype also have their influence on the formation of the crop quality, this can be seen in the example of statistical processing. It is believed that for reliable information and the creation of better forms, it is necessary to expand the system of evaluation of breeding material.

#### CONCLUSIONS

Based on the above data, we can say that the formation of the soft wheat grain quality is significantly influenced by climatic conditions, and the properties of the genotype cannot be denied, since some indicators are most dependent on weather conditions.

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