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STUDY OF PRODUCTION ELEMENTS AND QUALITY INDICATORS OF DURUM WHEAT GENE POOL

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Abstract. This research was carried out for the experimental plots Grains and Legumes during 2021-2022. The height of the different durum wheat gene pool samples, the length of the spike, the number of grains in 1 spike, the mass of grains in 1 spike, and the mass of 1000 grains were studied. The height of plants from the investigated durum wheat samples varied between 79.0-106.0. *Erythromycin* was the tallest sample of wheat varieties (106.0 cm) and *Aegyptiacum* (79.0 cm) was the shortest. The mass of 1000 grains of the investigated durum wheat gene pool samples was 45.3-58.2 g.

Keywords: *durum wheat, production elements, species diversity.*

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1. Introduction

Food products are the basis of the economic security of wheat crops. As in the whole world, in Azerbaijan, many programs have been prepared, and decisions have been made to produce plant products, especially wheat crops, to provide people with basic food and animal feed. Therefore, it is urgent and essential to carry out selection works in the direction of modern and highly stable productivity accompanied by global climate variability (Aliyev *et al*., 2012; Boggini *et al*., 1995). Around the world, durum wheat is cultivated on 17 million ha with a production of 36 million tons (Musayev *et al*., 2008). durum wheat grain is the main food source and its quality determines the culinary quality of the final product, which is mainly pasta (Moragues *et al*., 2006; Xynias *et al*., 2020), but also bread and pizza products (Ruisi *et al*., 2021; Rustamov, 2016). According to rapid population growth and global climate changes, the demand for cereals, mainly wheat, is expected to increase by 60% by 2050 (Rustamov, 2010). It was determined that the diversity of the quality indicators of durum wheat varieties depends more on the soil and climate conditions of the region than on seed reproduction, cultivation technology, and agrotechnical care (Ray *et al*., 2013). Knowledge of the genetic variability present in durum wheat soils is essential for effective selection grain yield and its constituents (Hasanova *et al*., 2012). Fertility, being a complex trait, results from the sequential formation of the main bar elements in ontogeny. Productivity from a single area, response to specific agrotechnical measures, resistance to disease, pests, dormancy, and other adverse environmental factors have been the main conditions in all periods. Morphogenesis, continuity, the number and sizes of bar elements, and the length of individual stages of ontogenesis affect the formation of potential productivity (Alzuwaid et al., 2012).

2. Materials and methods

Local durum kinds of wheat were studied in the "Grains and Legumes" field laboratory of Azerbaijan State Agrarian University (ASAU). Samples were sown by hand in 2 replicates on an area of 20 m^2 in the first and second ten days of November. According to the growth stages of the plants, after sowing and during the growing season, the experimental area was irrigated; with sowing and feeding, fertilizers were given. Phenological observations, assessment of disease resistance at the beginning of earing and wax maturity, analysis of sample seams after harvesting and final evaluations, and grain quality indicators were conducted based on relevant methodical instructions. Sample seams were analyzed. Mass performances were observed in the third decade of November and the first decade of December. The agrotechnical maintenance works recommended for the region were carried out in the experimental field. Plant height and productivity indicators were performed based on the "Methodology of field experiments on research works in the cereal grain plant selection field." The researched area consists of washed brown (chestnut) soil cover. In the experimental year, climate indicators not typical for the region affected the initiation of phenological phases, plant height, and structural elements, and productivity changed in one direction or another. Low temperature and high humidity conditions created conditions for the epiphytotic of rust (predominantly yellow) diseases. The background of high infection significantly reduced biological and agronomic productivity by negatively affecting the structural elements of productivity and grain yield. As a result, although differentiation was observed in the samples for disease resistance, the assessment for yield elements and total yield was not accurate.

3. Results and discussion

The winter and summer temperatures of the research years and the amount of precipitation were generally consistent with the average perennial of the region. However, in the first ten days of June 2021, the air temperature rose to 39-40°C, resulting in low productivity.

Table 1. Classification of durum wheat samples - species diversity composition, Ganja 2021

Species diversity	N	Characteristic signs
Valenciae	1	Awns, spikelet scales white,harly, awns and grain white
Fastuosum	1	Awns, spikelet scales white, hairy, awns white, grain red
Melanopus	1	Awns , spikelet scales white, hairy, awns white , grain white
Erythromelan	1	Awns, spike scales red, hairless, awns black, grain white
Affine	1	Awns, spikelet scales white, hairless, awns white, grain red
Leucurum	1	Awns, spikelet scales white, hairless, awns white, grain white
Aegyptiacum	1	Awns, spike scales red, hairy, awns red, grain red
Libicum	1	Awns, spike scale black, hairy, awns black, grain red
Murciense	1	Awns, spike scales red, hairless ,awns and grain red
Subaustrale	1	Awnless, spike scales red, hairy, - , grain white .

Phenological observations have shown that the end of April and the beginning of May can be considered the optimal spike period for wheat samples. Depending on the meteorological conditions, although the spiking period in the studied samples differed sharply (April 23-May 17), most of them spiked in the first decade of May. In late sprouting samples, especially in semi-deaf forms, the grain needed to be filled and had a floury consistency. No correlation was found between the spike period and plant classification and height. Short, medium and tall genotypes belong to *Aegyptiacum*, *Affine* and *Erythromelan*. Compactum was found among early and late sprouting forms.

Although the shape of the grain in the studied samples is primarily long (7-12 cm), round grains were also found in the genotypes of short samples. In most of the samples, the grain was oblong and oblong. Since the grain filling period is extended in the quick-sprouting variety samples, they made up most of the samples selected for their productivity. Durum wheat samples also differed in resistance to fungal diseases. Although a partial susceptibility to powdery mildew was observed in the samples, most were highly resistant. As we mentioned above, the cold and humid spring season and the onset of severe heat from the end of May had one or another effect on the morphological and agronomic characteristics of durum wheat genotypes.

Table 2. Durum wheat samples on structural indicators

The name of the numbers	Height of plants (cm)	Spike date	Length of the spike (cm)	The number of grains in the spike, number	The mass of the grain in the spike, g	1000-grain weight (g)
Valenciae	104,0	19.IV	6,1	44,0	2,8	57,3
Fastuosum	94,0	26. IV	5,7	36,5	2,0	52,6
Melanopus	83,0	28. IV	6,0	42,7	2,6	49,6
Erythromelan	106,0	27. IV	4,8	30,0	1,6	55,5
Affine	98,0	25. IV	4,9	28	1,3	58,1
Leucurum	99,0	21. IV	5,6	34	2,3	54,6
Aegyptiacum	79,0	08. V	6,6	28	1,6	46,1
Libicum	86,0	10. V	5,5	54,0	3,5	45,3
Murciense	80,2	21. IV	6,5	29	2,5	54,7
Subaustrale	97,0	18. IV	5,8	37	2,7	58,2

The quality, accuracy and result of research conducted in the direction of selection are based on the correct assessment of the structural elements of the studied samples. The main feature of the structural elements forming the product of each sample is the summation of that sample's physiological activity during the vegetation period. From this point of view, during the research, the height of different durum wheat gene pool samples, the length of the spike, the number of grains in 1 spike, the mass of grains in 1 spike, and the mass of 1000 grains were studied. During the vegetation period, agrotechnical maintenance, field research, and observations on plants and structural elements of the crop were carried out per the existing methodology (Samaan *et al*., 2006). As can be seen from Table 2, the taping phase was observed at the end of March-early April, and the peaking phase was observed at the end of April-early May. The height of plants from the investigated durum wheat samples varied between (79.0-106.0). *Erythromycin* 106.0 cm was the tallest sample of wheat varieties, and *Aegyptiacum* (79.0 cm) *Murciense* (80.2 cm) was the shortest. The mass of 1000 grains of the investigated durum wheat gene pool samples was 45.3-58.2 g. Structural elements of productivity in the studied wheat samples were very different. (Table 2).

4. Conclusion

As a result of research conducted on samples, positive samples were selected according to high productivity and quality indicators. The samples selected for their complex morpho-biological and agronomic characteristics were sown again to be studied in the next selection stage.In durum wheat samples, the flowering period is accelerated, the productivity and grain quality of the samples are high. In conditions of high air temperature and drought, ultra-fast and fast-growing samples gain advantage, while in late-ripening samples, the ripening period is shortened, the period of grain filling is shortened the quantity and quality of products decreases.

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