VARIABILITY OF QUANTITATIVE TRAITS OF WINTER WHEAT DEPENDING ON THE VARIETY

Bahan Alla

Candidate of Agricultural Sciences

Associate Professor

at the Department of Selection, Seed Science and Genetics

Yurchenko Svitlana

Candidate of Agricultural Sciences

Associate Professor

at the Department of Selection, Seed Science and Genetics

Pysarenko Oleksii

Master of the 2nd year of study

Poltava State Agrarian Academy

Abstract: Variability of quantitative traits of winter wheat varieties has been established. The effect of the variety on the yield level and quality indicators of soft winter wheat grain has been investigated. The best winter wheat varieties for introduction into production in the conditions of the central forest-steppe of Ukraine have been identified according to the investigated traits.

Keywords: winter wheat, variety, quantitative traits, yield, grain quality indicators.

Modern agricultural production, domestic and foreign market place high demands on the traits and properties of new winter wheat varieties. They must be characterized by high stability and productivity, complex resistance to unfavourable environmental factors, diseases and pests, response to high agrophones, adaptability to the industrial mechanized cultivation technologies and high quality of commodity products [1. 2]. Among these requirements, in addition to the yield, a special place is occupied by the grain quality. The quality of grain determines the nutritional and commercial value of

new winter wheat varieties as well as their competitiveness. The quality of crop production depends to a large extent on the soil and climatic conditions, the characteristics of the variety, the cultivation technology, transportation, storage, etc. Therefore, the evaluation of its quality is not limited to one indicator, but take into account the combination of requirements [3. 4].

Quantitative traits characterize the most important indicators of the cultivated plants, in particular, size and quality of the yield. But, they have not been genetically studied yet, although information from this area is widely represented in the studies of many scientists. These traits are characterized by considerable variability and dependence on the environmental factors [5].

Therefore, investigations on the variability of yield and quality of winter wheat depending on the varietal properties remain relevant.

The object of the research was to determine the variability of winter wheat quantitative traits depending on the variety. The subject of the research was winter wheat varieties Sahaidak, Orzhytsa, Samurai, Epokha odeska, Lisova pisnia, productivity, grain quality indicators. Variety Sahaidak was accepted as standard.

The sowing of the studied winter wheat varieties was carried out in the conditions of Poltava region (Forest-Steppe zone of Ukraine) during the period of 2016-2018. The forecrop was peas. Harvesting during the period of 2017-2019 was carried out by the method of direct combining. Yield analysis and grain quality indicators were determined by generally-accepted methods.

Mathematical analysis of the research results was performed by the dispersion and variational analyzes according to the methods of B.A Dospehov [6].

Yield is considered to be the main indicator of economic and biological value in the study of almost all cultivated plants, including winter wheat.

On the whole, this trait was higher in 2018, which had more favorable weather conditions, and lower in 2019. Thus, the studied indicator varied as follows: in 2017 – 4.26-5.44 t/ha, in 2018 – 4.88-6.43 t/ha, in 2019 – 3.72-4.68 t/ha.

According to the average values of productivity, it is possible to distinguish winter wheat varieties Samurai and Orzhytsa (5.52 and 5.27 t/ha, respectively), which are valuable for obtaining high and stable yields (Table 1).

Table 1

Quantitative traits of winter wheat (average, 2017-2019)

Indicator	Variety				
	Sahaidak (st)	Epokha odeska	Lisova pisnia	Samurai	Orzhytsia
Yield, t/ha	4.89	4.29	4.56	5.52	5.27
Grain-unit, g/l	793.0	742.0	757.0	776.7	799.3
Weight of 1000 grains, g	42.0	39.0	40.2	46.7	43.5
Glassiness, %	71.0	80.3	84.0	61.0	67.3
Protein content, %	13.4	14.3	13.7	11.9	12,7
Gluten content, %	30.4	33.2	32.0	26.9	28.4
Gluten quality, units	74.0	86.0	90.7	83.7	78.7
Falling number, s	359.0	315.3	277.3	294.0	379.7

Important indicators of the quality of winter wheat grain are: grain-unit, weight of 1000 grains, glassiness, protein content, gluten content and quality, falling number. According to the variational analysis, indicators of grain quality of winter wheat varieties had a small coefficient of variation (V = 3.5-9.2%) during the period of 2017-2019. The average degree of traits variation (V = 13.5-14.2%) was observed only in glassiness and falling number.

During the research years, the indicator of grain-unit of winter wheat varieties accordingly was: in 2017 – 739-798 g/l; it was the largest at a level of 760-817 g/l in 2018; it was the lowest at a level of 727-783 g/l in 2019. According to the investigated trait, the winter wheat variety Orzhytsia (799.3 g/l) has been distinguished, and variety Epokha odeska was characterized by the lowest value – 742.0 g/l.

Weight of 1000 grains in the studied varieties varied similarly: in 2017– 38.7-46.9 g; in 2018 – 40.5-47.8 g; in 2019 – 37.8-45.3 g. Winter wheat variety Samurai (46.7 g) was characterized by large and evened grain, and variety Epokha odeska provided the smallest weight of 1000 grains – 39.0 g.

Tha trait of glassiness of winter wheat varieties during the research years was the lowest at the level of 55-79% in 2017, it was 60-84% in 2018 and it was the largest (68-89%) in 2019. Winter wheat variety Lisova pisnia showed the highest indicator of grain glassiness (84.0%), and variety Samurai showed the lowest indicator (61.0%).

The protein content in winter wheat grain varied over the years as follows: in 2017 – 11.3-13.9%; in 2018 – 11.9-14.3%; in 2019 – 12.4-14.8%. Wheat variety Epokha odeska has been distinguished according to this trait (14.3%), and variety Samurai was characterized by the lowest protein content – 11.9%

Gluten content is closely correlated with protein content. Therefore, a similar situation was observed. Thus, gluten content was 25.6-31.7% in 2017; 26.7-33.2% was in 2018; 28.4-34.8% was in 2019. Winter wheat variety Epokha odeska was characterized by the highest content of gluten (33.2%), and variety Samurai showed the lowest indicator of this trait (26.9%).

The quality of gluten during the research years varied in the range: in 2017 – 78-98 units; in 2018 – 74-90 units; in 2019 – 70-84 units. The variety standard was characterized by the best quality of gluten (74.0 units), and variety Lisova pisnia was characterized by the worst quality of gluten (90.7 units).

The indicator of falling number of winter wheat varieties was accordingly: in 2017 – 265-356 seconds; in 2018 – 278-378 seconds; in 2019–289-405 seconds. Winter wheat variety Orzhytsia showed the highest indicator of falling number (379.7 seconds), and variety Lisova pisnia was characterized by the lowest value of this indicator – 277.3 seconds.

Thus, winter wheat varieties Samurai and Orzhytsia had the highest productive potential of grain production. According to the quality indicators of winter wheat grain, the following varieties have been distinguished: Orzhytsa – by the nature of the

grain and falling number; Samurai – by weight of 1000 grains; standard Sahaidak – by gluten quality; Lisova pisnia – by glassiness; Epokha odeska – by the content of protein and gluten.

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