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ASSESSMENT OF CORRELATION OF QUALITY FACTORS OF WINTER WHEAT*

The purpose. To assess correlation of the most important quality factors of winter wheat. **Methods.** Laboratory, statistical analysis. **Results.** The correlation and character of dependence of quality factors of winter wheat are shown: mass corpuscle of gluten and grain unit on protein content in grain. **Conclusions.** Strong positive correlation dependence of parameters of gluten on protein content in grain of wheat, coefficient of correlation, and also direct correlation between grain unit of wheat and protein content in grain r=0,96 is determined.

Key words: winter wheat, gluten, protein content, grain unit, correlation of indexes.

Often, the priority character in the analytical analysis of the experimental data obtained is to optimize the factors of the technology of winter wheat cultivation in order to produce high quality products. According to DSTU 3768: 2010, depending on the quality indicators of wheat, soft wheat is divided into six classes (classes 1, 2, 3 groups A, classes 4, 5 - group B and class 6). Classes A are ranked according to the content of protein in the grain, the mass fraction of gluten, the nature of the grain, the quality of the gluten and other parameters related to the parameters of the contents of the garbage and grain additives [10]. It is known that qualitative indices of wheat are determined both genotypically and phenotypically [13, 14]. In particular, the amount of gluten is inherited due to a lesser extent, since this indicator strongly depends on the conditions of cultivation [5, 6]. Consequently, quality can be controlled largely as factors of technology, and to some extent, factors of vegetation. E. Vavilov stressed that all the doctrine of agrotechnics in essence does not deal with hereditary variability in both the quantity and quality of harvest [1]. AN Pavlov believes that in appropriate conditions of control in grain of wheat, it is possible to increase protein

up to 16% without changing yields [8]. Some researchers came to the conclusion of the inverse correlation between protein content and yield [12]. Details of the quality of wheat and the interrelationship between the characteristics of grain quality are highlighted by AP Orlyuk [7]. He gives data on the correlation between grain quality parameters of wheat breeding lines and yields, in particular, the protein content, and the mass fraction of gluten is weak but significantly correlated with the grain yield of wheat. The purpose of the research is to assess the interrelationships between the most important quality indicators of winter wheat. Research methodology. The research was conducted in the conditions of production of SFG "Volodymyr" of Tyvriv district of Vinnytsia region. During 2013-2015, the soils are dark gray, medium-grained. Investigating factors: predecessors - black pairs, perennial bean grasses (clover rayon); Seed time - the second decade of September, the first decade of October; varieties - Bila Tserkva half-carcass, Tsarivna. The content of protein in winter wheat was determined by the Kjeldahl method (GOST 10846 - 91 Grain and products of its processing), the content of gluten was determined by the method of washing the sample in running water (DSTU ISO 21415-1: 2009 Wheat and wheat flour. 1. Determination of raw gluten by hand), the nature of grain in accordance with DSTU 4234: 2003 Grain Cultures).

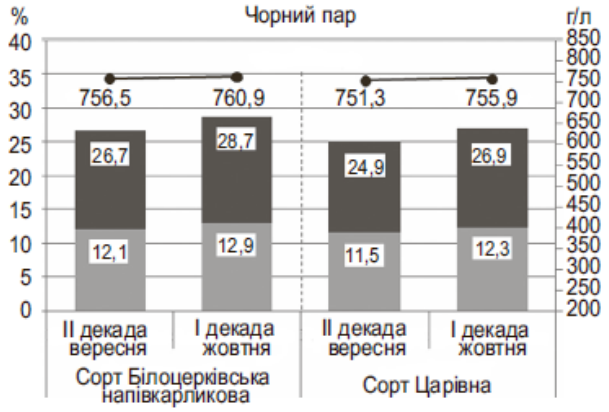

Рис. 1. Залежність показників якості зерна пшениці озимої від впливу строків сівби та сортів після попередника чорний пар (середнє за 2013–2015 рр.): ■— уміст клейковини; ■ — уміст білка; ● — натура зерна

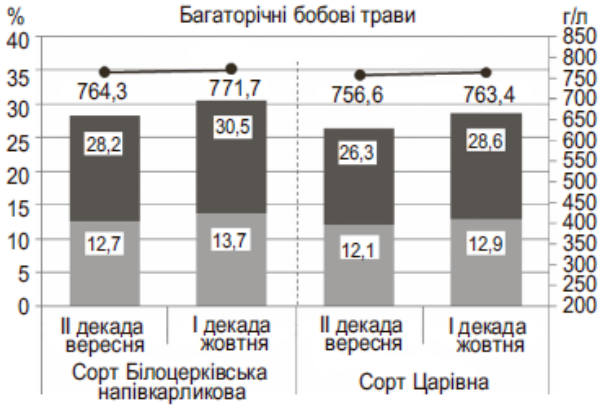

Рис. 2. Залежність показників якості зерна пшениці від впливу строків сівби та сортів по попереднику багаторічні бобові трави (середнє за 2013–2015 рр.): ■ —уміст клейковини; ■ — уміст білка; ● — натура зерна

The mathematical processing of the results of the research was carried out using the method of correlation analysis using the program Statistica. Research results. A

weak correlation between the content of protein and grain yield was found. After analyzing the yield of wheat of the Bila Tserkva half-carcass variety and the content of protein in the grain with a single elimination, the predecessor, the dependence was revealed: the lower level of protein corresponds to a higher level of grain yield. In 2013, the predecessor of the clover was a ray - grain yield was at 3.8 t / ha, protein - 13.2%; black pairs - grain yield 5.24 t / ha, protein content - 12.5%; in 2014, respectively, the precursors indicated above - the grain yield is 4.54 t / ha - the protein content - 13.7%. Provided the forerunner black pairs - grain yield 5.56 t / ha, protein content in grain - 12.8%; in 2015 the grain yield is 4.87 t / ha, the protein is 14.3%, the grain yield after the black steam is 5.8 t / ha, the protein content is less than 13.4%. In the same way as the Tsarivna variety, the crop grown on experimental sites after the predecessor black pairs is characterized by a significantly higher grain yield compared to the predecessor of the cranberry raven. But the lower grain yield on the predecessor of the clover is racy, corresponding to more annual protein content. For example, in 2013, the grain yield of 4.90 t / ha was 11.7%, the black pairs were the forerunner, after many years of bean grasses, the yield of grain at 3.44 t / ha corresponds to a protein content of 12.2%. In 2014, the grain yield of the class of the Tsarivna after the predecessor black pairs was at 5.23 t / ha with a protein content of 12.3%.

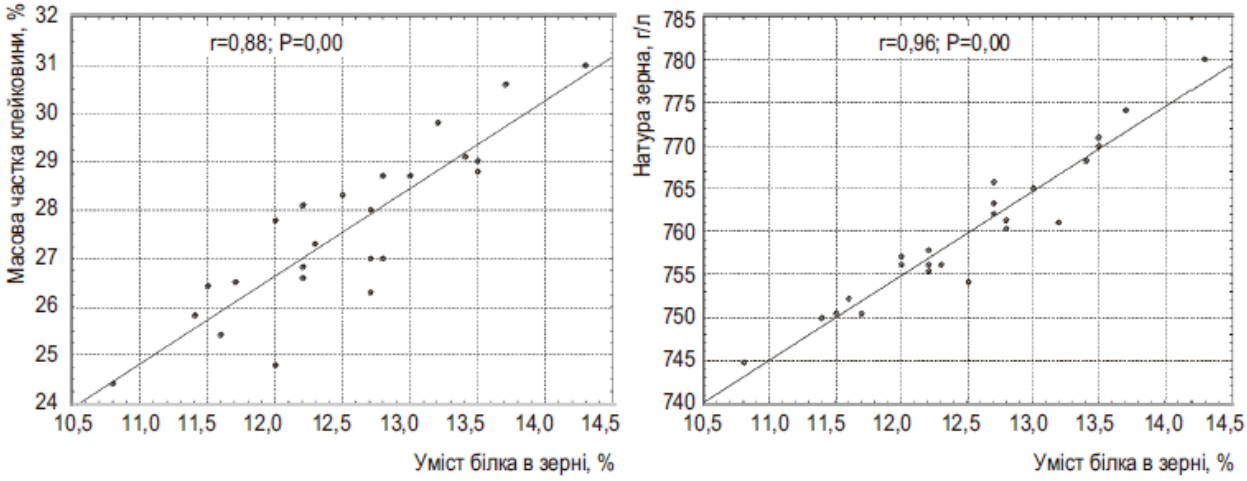

Рис. 3. Залежність клейковини та натури зерна від вмісту білка в зерні пшениці озимої

Growing wheat grain after a predecessor, perennial legumes - yielded 4.24 t / ha, with a protein content of 13.0% in grain. Such a pattern was in 2015 - the grain yield of 5.34 t / ha provided black pairs, but the protein was 12.8%, a significantly lower yield

of 4.32 t / ha after the predecessor of the clover was two-fold, but the protein content of the grain was significantly higher - 13.5%. In these studies, the correlation dependence of the content of protein in the grain and the mass fraction of gluten, where r = 0.68 - 0.88, was established. There is evidence that the correlation between the content of protein and gluten can be very strong and approach the unit r = 0.83 - 0.97 [2]. The analysis of the experimental data on wheat growing after black steam showed (Fig. 1) that in the Bila Tserkva half-carcass variety, seeding in the first decade of October contributed to a larger accumulation of protein in grain and a larger proportion of gluten, for sowing during the second decade of September - the protein content in grain it was less 12.1% and less was gluten - 26.7%. Similar patterns are observed in the variety of Tsarivna. The content of protein in grain was 11.5% for the first seeding period, while the content of gluten mass content was 24.9%. In wheat grown after the clover, the biochemical and technological indicators of grain quality are also characterized by interconnection - higher content of protein corresponds to a higher content of gluten. Under such regularities, grain is usually characterized by the best kind. The mass fraction of protein in the grains of the variety is 12.1%, it corresponds to a mass fraction of gluten 26.3%, followed by a mass fraction of 12.7% protein corresponds to 28.2% gluten, for the protein parameter 12.9%, the gluten parameter was 28, 6% (Fig. 2).

Рис. 4. Кореляційна плеяда системи зв'язків показників якості зерна пшениці озимої (К — клейковина; Б — вміст білка; Нз — натура зерна)

These data provide the basis for asserting that larger quantities of grain correspond to higher levels of protein content in the grain and a higher proportion of gluten. The smallest amount of grain corresponds to the lowest content of protein and gluten. From the reference to the logistic pattern of the correlation of the data obtained experimentally, a correlation analysis was carried out. The interconnection of the

mass fraction of gluten as a dependent variable from the protein content of wheat grain is established. Such a pattern has the nature of linear dependence, as shown by rice. 3. The correlation coefficient r = 0.88. Accordingly, the mass fraction of gluten is determined, the content of protein in wheat grain is 77%. A relationship was also established between grain parameters and protein content in grain, where the correlation coefficient r = 0.96. The proportion of protein in grains and gluten is similarly characterized by many researchers [3, 4, 9, 11]. The analysis provides the basis for establishing the relationship of quality indicators based on the maximum correlation path algorithm, which shows that the protein is the main component on which the nature of the grain depends, as well as the parameter of the gluten parameters (Fig. 4). The performed statistical calculations give grounds to assert that according to the protein in the grain it is possible to judge the quality of wheat in general.

Conclusions

A direct correlation dependence of the mass fraction of gluten from the content of protein in wheat grain r = 0.88 was established. A strong correlation between wheat grain parameters and the content of protein in grain is also proved, the correlation coefficient r = 0.96. The maximum quality indices of wheat grain in the Bila Tserkva half-carcass variety were determined, provided that the sowing date was increased in the 2nd stage of sowing by the parameters of the content of protein 13.7% and gluten 30.3% after the predecessor of the clover 2-slope and parameters 12.9 and 28.7% respectively, after the precursor the black pairs that correspond to class 1 of class A according to the requirements of DSTU 3768 - 2010.

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