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STUDY OF THE CORRELATION BETWEEN PRODUCTION AND SOME OF ITS QUALITY COMPONENTS IN SEVERAL *T. AESTIVUM* WHEAT LINES

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ABSTRACT

In this study, the data of the yield kv/ha and some qualitative indicators of grain, in some Tr.aestivum wheat lines, created by the research group Agroarfa (Albania) and Koal Seeds (Kosovo) are provided. As a test, a well-known Italian bisanzio variate was used which also has good quality indicators of production. The features that were researched, along with the kv/ha yield were respectively the total protein content, 14% moisture starch, gluten, hardness, and zeleny test. The trials were developed in four places in Toshkëz (Albania), Istog (Kosovo), Grosseto (Italy) and Voghera (Italy). While the quality indicators were revelated in apsov sementti's laboratory (Voghera Italy). The experimental settings represent four different environments. Some of the new lines feature high yields in all four experimentation places. From the analysis of the indicators, it turns out that their contents represent not pronounced variation between the lines. Specifically, protein content varies from 12.80% in the Bisanzio variation to 10.50% in AF19_64 line. Two of the new lines, namely AF19_25 and AF19_26 lines, have protein content at the witness level. While the starch content in the grain of the lines varies from 57.67% in the AF19_65 line to 60.98 AF1934. In terms of gluten percentage 14% humidity, this indicator varies from 27.32% in the Bisanzio variance to 34.9 in AF19_36 line. In addition to their contents, the correlations of these indicators to the kv/ha productivity were studied. For this, the correlation coefficients were calculated, where it is seen that the kv/ha yield has negative correlation with the percentage of proteins with correlation coefficient- 0.664. The weak negative correlation presents gluten and starch etc. (8).

Keywords: correlation coefficient, gluten starch, hardness NIR, line, protein.

INTRODUCTION

Wheat is not only one of the oldest cultivated plants in the world, but has always been one of the most important products for many countries. Bread and baked wheat products in Albania and Kosovo cover an important part of our daily calorie intake and contribute significantly to a balanced diet. The main use of wheat is flour to make bread and many food products such as pastries, cookies, cakes, etc. Industrially, it is used in the preparation of starchy, gluten,

and distilled alcohol. Wheat brans are rich in protein and used as valuable feed for livestock. From this perspective, the increase in yield and production of this plant is one of the continuous problems that can be achieved through two routes: First, genetic improvement for the creation of more productive varieties and improved cultivation techniques. But the second route certainly has problems that are linked to increased costs (for equipment, fertilizers, pesticides for phytosanitary treatments), but also provoke environmental pollution, especially from nitrogen fertilizers and phytosanitary treatments.

Thus, the first route remains the most convenient in terms of which many institutions and scientific forces have been engaged to put in the service of the producers' varieties of all and more productive. But production is one side of the problem solution on the other, equally important is the quality of production. The concept of the quality of a food product is a complex concept, which takes different characteristics depending on the view of the different actors in its supply chain. The essential requirement to achieve good quality wheat can be the presence of different kinds of grain quality parameters at an optimal level. The quality of grains is determined mainly by genetic basis, but can also be influenced by soil, climatic conditions and the management of cultivation practices (7). Quality is related to the content of grain. In Albania and Kosovo wheat bread is one of the main components of the calorie diet and contribute significantly to a balanced diet. The first quality requires that the containment of the grain elements be in sufficient quantity and of good quality (11) Raw materials based on wheat beans, such as starchy and wheat protein, are essential for modern food production. For grain are important the composition of the grain as the primary product of the wheat culture that relates to its quality these are proteins, starch, gluten, etc. (2,6). Wheat proteins are the main determinants of wheat flour consisting of gluten and non-gluten fractions, of which the quality of the final product of wheat depends primarily on gluten protein. The gluten in the protein mainly provides the elasticity and stretch of the dough, which is unique to wheat, leading to various end products. Starch is a complex carbohydrate composed of many glucose units joined by chemical bonds. From a nutritional point of view, starch is also a very important substance for humans, as it constitutes the dominant part of complex carbohydrates consumed in a balanced diet (12). It is found in large quantities in potatoes, rice and generally in cereals and their derivatives.

The Hardness Index is related to its texture. The main determinants of wheat quality are the texture of the endosperm (the hardness of the grains), the protein content and the strength of gluten. The texture of endosperma in wheat is the single most important and determining quality characteristic, as it facilitates grain classification and affects the quality of grinding, roasting and end-use (8).Zeleny test is the sedimentation index (Zeleny test) This is an international standard, described as a method, known as the Zeleny sedimentation test, for evaluating one of the factors that determine the quality of wheat, as a means to predict the baking strength of flour that can be made of it. This measures the sedimentation volume of a flour suspension in diluted lactic acid. Sediment obtained in this way is related to the bloating of glutenins, which are closely related to the quality of flour for bread production (20). The quality of the production is related to the natural ingredients of wheat, while also keeping in fixed reports the components that improve the quality in the process of their reprocessing (18). The quality of the production is related to the natural ingredients of wheat, while also keeping in the ratios assigned to the components that improve the quality in process of their reproduction (18).

The successful implementation of new, sustainable alternative nutrition concepts are finding application and nutrition in general, for sustainability and food quality in particular. As a result, the food industry can already contribute to implementing the requirements of future nutrition concepts and contribute to making food healthier and sustainable, by moving towards a healthy diet that protects people, animals and the environment. But what is most important is that wheat in Albania and Kosovo finds suitable conditions to obtain high and lasting yields thanks to the adaptability that characterizes this important plant.

MATERIALS AND METHODS

As a result of the genetic enhanced work, 15 new wheat lines were created. These were tested in four places: Toshkëz (Albania), Istog (Kosovo), Voghera (Italy and Grosseto (Italy)) where as a witness was placed a well-known Italian bisanzio variate with good bread quality. In Table 1, the lines and parent components are set from them.

Table 1. Lines and sources from which they were created.

Lines	Sources	Lines	Sources
AF19_05	Altezza x Ardelor L05	AF19_34	W12 x LVS L.34
AF19_06	Altezza x Ardelor L06	AF19_36	W12 x LVS L.36
AF19_08	Altezza x Tiepolo L.06	AF19_53	W12 x LVS L.53
AF19_21	W12 x LVS L.021	AF19_62	AgroArfa 3082
AF19_23	T 775 x T 237 L.023	AF19_64	PR22R58 x Altamira L64
AF19_25	T 775 x T 237 L.025	AF19_65	Bisanzio x L.65
AF19_26	DM106x (Exotic x Palesio) L.26	AF19_67	Altezza x Africa L.67
AF19_29	Marcopolo x Nogal L.29	Bisanzio	

For these lines, the kv/ha yield was determined and analyses were done for 5 indicators of the total protein, glutenit14% humidity, hardness, zeleny test, and starch content in the grain. The tests were done in the laboratory of APSOV Sementi Italy. This in order: First, assess the composition of the lines created in terms of protein, gluten percentage, etc. To see in these lines the links between the yield kv/ha with the grain indicators which relate to the quality of production. To this end, their correlation coefficient were also merged.The trials were set up in four iterations where the distribution was done under the randomised block scheme. In addition, many important aerated indicators were also revisited. This is to see the variation between them because some of these synthesized lines have the same parental compons.

RESULTS AND DISCUSSION

As seen in Table 2. (columns 2, 3, 4, and 5) is given the data of kv/ha yield of lines in four countries: Grosseto (Italy), Voghera (Italy), Istog (Kosovo and Toshkëz (Albania). While in columns 6.7 8 9 10 are given the studied indicators. The percentage of proteins in the studied lines varies from 12.80% in bisanzio to 10.50% in the AF19_67 line created by the crossing of varieties PR22R58 x Altamira.

The lines that have under 11% protein are not perfect for bread, but for biscuits. (11,14). It is worth noting that AF19_26 and AF19_25 lineages have a higher percentage of protein respectively 12.01 and 12.50% from which good quality bread can be obtained. Looking at the complex data of the lines obtained for this indicator, we mark that they are not distinguished for wide genetic variation in terms of protein percentage. We know that some of them are characterized by high production capacity.

Table 2. Kv/ha test yield data of several lines (created on soft wheat in Toshkaz Albania).

Lines name	(kv/ha) Grosseto	(Kv/ha) Istog	(Kv/ha) Lushnje	(Kv/ha) Voghera	% protein	% Gluten 14% humidity.	Hardnes NIR	Zelen	% Starch
AF19_05	45.4	71.90	91.90	67.2	10.80	28.84	61.14	37.42	59.95
AF19_06	39.8	74.10	97.60	68.2	11.70	32.57	68.32	50.81	59.07
AF19_08	41.3	79.70	86.50	68.4	11.40	30.14	55.92	40.74	59.33
AF19_21	39.7	83.00	95.60	70.4	10.87	32.63	71.34	50.51	58.88
AF19_23	40.8	62.70	70.10	57.9	11.30	30.52	38.18	34.48	61.01
AF19_25	36.3	66.40	67.20	56.4	12.00	33.85	66.76	52.71	59.05
AF19_26	36.5	63.00	80.50	58.3	12.49	32.58	61.27	51.06	58.58
AF19_29	45.5	67.50	80.10	63.8	11.50	27.84	66.66	37.35	58.85
AF19_34	45.2	81.90	96.90	72.3	10.90	30.36	50.99	36.62	60.98
AF19_36	44.1	74.70	95.50	64.1	11.00	34. 9	66.77	53.36	58.03
AF19_53	45.6	70.50	79.70	63.3	11.50	32.44	53.83	46.78	59.21
AF19_62	46.6	69.50	88.60	68.1	10.40	27.73	54.84	34.11	59.97

AF19_64	50.1	70.10	104.90	78.2	10.50	28.79	53.29	36.28	59.15
AF19_65	46.1	79.30	80.90	66.6	11.50	34.31	71.17	53.59	57.67
AF19_67	41.9	67.60	94.10	66.5	10.50	27.36	56.44	34.05	60.23
Bisanzio	43.1	67.60	82.30	61.4	12.80	27.32	72.84	36.02	58.52
L.S.D. 5%						2.44	6.64	5.84	0.65
L.S.D. 1%						3.35	9.13	8.02	0.90
C.V. %						3.82	5.07	6.50	0.52

Regarding the percentage of gluten at 14% moisture, it is seen that this indicator varies from 27.32% in the Bisanzio variety to 34.9 in the AF19_36 line. Therefore, a more noticeable variation is seen than this in the percentage of proteins. Even in this case, referring to the L.S.D. 1%, the variation for this indicator is also narrow. The starch content in the grain of the created lines varies from 57.67% in the AF19_65 line to 60.98 in the AF19_34 line with a difference of 3.31%, so a not large difference. This shows that the genetic base of the lines we use in the improvement process is not distinguished by wide variation. However, the genetic base of soft wheat is wide and complex, which carries potential for the continuous improvement of this plant. But it remains a task for the collection to be continuously enriched. The main determinants of wheat quality are endosperm texture (kernel hardness), protein content and gluten strength. Endosperm texture in wheat is the single most important and defining quality characteristic, as it facilitates grain grading and affects the quality of milling, baking and end use. The different techniques used to measure grain hardness are classified into different groups according to milling, pressing and abrasion. The most commonly used methods for measuring texture are PSI, NIR hardness (8.). The hardness of the studied lines ranges from 38.1 in line AF19_23, to 72.4 in the Bisanzio variety. Therefore, a wider variation is observed than the other indicators (8).

Table 3. Correlation coefficients between some grain quality indicators and yield kv/ha of some new wheat lines (*Triticum aestivum*).

Indicators	Yield kv/ha (Voghera)	% protein	% Gluten 14% moisture.	Hardnes NIR	Zeleny	Starch
Yield kv/ha	1					
% protein	-0.664	1				
%Gluten14% moisture	-0.226	0.224	1			
Hardnes	-0.063	0.401	0.271	1		
Zeleny	-0.258	0.353	0.925	0.569	1	
Starch	0.117	-0.440	-0.477	-0.798	-0.696	1

From this table it turns out that for the studied lines, the yield kv/ha correlated negatively with the percentage of proteins. The correlation coefficient is -0.664, a good negative correlation. It is seen that increased production is accompanied as a rule by the decrease in protein content. This is also seen in the study (7). For other indicators, it is a negative but weak link. Thus, the yield link with the gluten percentage is -0.226, while with Hardnes it is - 0. 063.While with the starch content is positive but not sensitive. The percentage of proteins is positively related to the hardness index with positive correlation coefficence 0.401, but is negatively related to the starch content with correlation coefficence -0.440.

CONCLUSİONS

In improving work with wheat, the selection for yield should be accompanied by quality indicators. It must be said that grain quality is important as it determines the end use of new grain lines and contributes to maximizing profitability across the grain value chain. This adds value to the rest of the improvement activities, as it is a key set of characteristics for the trading and commercialization of grain. Grain quality should be an integral part of the improvement process and considered within the variety development process. The genetic basis is narrowed which is reflected even in the established lines which have relatively low percentages of the indicators studied. Yield correlates not positively with protein percentage. But the fact that there are high-yielding lines such as AF19_06 that there are also significant percentages of protein content.

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