

THE BEHAVIOR OF SOME LOCAL WHEAT VARIETIES IN THE ECOPEDOLOGICAL CONDITIONS OF THE ROMANATI PLAIN

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ABSTRACT

For two years (2018-2019), under the condition of the cambic chernozem argillic-illuvial soil, from S.C. ETCO – MAR S.R.L Cilieni there had been grown the next varieties of wheat: GLOSA -romanian variety and RUBISKO, AVENUE, ANAPURNA-french varieties. Regarding to the production obtained, the Glosa variety has recorded the average value of 6100 kg/ ha, and the Avenue and Rubisko varieties has obtained an average production of 8500-8800 kg/ ha. Wheat grain protein content largely depends on : the wheat variety, cultivation technology (irrigated, unwatered, fertilization) and the pedoclimatic conditions.

A high protein content is associated with a good bakery quality. Among the technological factors, the fertilization influences the wheat protein the most. It is recommended the cultivation of the wheat varieties with a high production capacity, with good resistance to the main climate risk factors in Romania, with good drop resistance and high union capacity, with high ecological plasticity, from different maturity classes, with good tolerance to major foliar diseases, with superior quality indices.

INTRODUCTION

Oltenia area is often affected by drought and scorching heat, which influences the development of plants and the productive capacity of cultivated species (Bonea Dorina, 2016). In order to obtain larger and constant production when a wheat variety is chosen, account must be taken of the climatic and soil conditions in the growing area (Constantinescu Emilia et al., 2009). The phenomenon of escape and avoidance of drought plays an important role in adapting to specific environmental conditions. Precocity is another important characteristic of the wheat varieties, allowing for a better correlation between critical phase of plants development and periods with more favourable climatic conditions, which reduces the risk of losses caused by drought and scorching heat (Păunescu Gabriela, 1999).

These french varieties high production is justified by the fact that they belong to the Premium group, very

productive, receptive to the administration of fertilizer doses. (fertilization -in autumn with complexes 18-46-0, 150 kg/ ha;) with urea 200 kg/ha (1-3 March) and 150 kg/ha ammonium nitrate (19-20 April), superior in terms of qualitative properties.

The biological potential is very high reaching 11,000 kg /ha (Constantinescu Emilia, Olaru L. A., 2017). Experimenting with different wheat varieties in comparative crops under the specific climatic conditions in Oltenia showed significant differences in genotypes behavior. There were variations between different chemical indices and leaf biochemistry such as: enzyme activity, content in carbohydrates, amino acids and foliar pigments (Babeanu Cristina and collaborators, 2008, 2010).

MATERIAL AND METHOD

The research aims to study the comparative of some varieties of autumn

wheat, in a conventional cultivation system, under the conditions of the chernozem argillic-illuvial soil, from S.C. ETCO - MAR S.R.L - Cileni, on an area of 200 had been cultivated with wheat, for a better knowledge of them, in order to recommend to grow in the area, the varieties that can express their maximum, productive and qualitative potential. For two years (2018 - 2019) , within S.C. ETCO - MAR SRL - CILENI - OLT the wheat varieties had been grown: GLOSA - romanian variety and RUBISKO, AVENUE, ANAPURNA - french varieties.

Comments and determinations:

In the field there were determined and noted in the wheat:

- number of risen plants /m² – average of two counters, with metric frame with side of 0,5 m, at plant harvesting, calculated at m².
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- size – the average of a bunch of plants placed on the line, from the surface of the soil to the tip of the, without arist.
- production – sample 1 ha, at harvest humidity 14 %.

In the laboratory of the reception base, the quality of production was determined:

- grain moisture (%) - spectrophotometric method with NIR analyser;
- protein content (%) - spectrophotometric method with NIR analyzer model INFRAMATIC 9200;
- Zeleny sedimentation index (ml) - spectrophotometric

method with NIR analyzer model INFRAMATIC 9200;

- wet gluten content (%) - spectrophotometric method with NIR analyzer model INFRAMATIC 9200;
- drop index (seconds) - the system for determining alpha amylase activity, PERTEN model FALLING NUMBER 1310;
- MMB (relative mass of 1000 grains) (g); - by weighing 1000 grains at the KERN digital electronic balance;
- MH (hectolytic mass) (kg/hl); - with the apparatus for determining the hectolitre weight.

An average sample of about 2 kg was used in the composition of the sample for analysis.

RESULTS AND DISCUSSIONS

Results concerning morfologic characters of the cultivated wheat varieties

The following results will be presented on: number of plants risen /sqm, number of wheatear /sqm, waistline, mass of 1000 grains, hectolytic mass, grain/spic weight, production, protein content, gluten content, on average for 2 years (2018 and 2019), on typical argillic-illuvial cernosyoma, from Cileni.

The number of plants risen/sqm had an average value of between 341 plants/sqm of the Avenue variety and 425 plants/sqm in the Glosa variety (table 1, figure 1).

The number of wheatears /sqm oscillated between 480 spice/sqm in the Glosa variety and 710 wheatears /sqm in

the Rubisko variety. The Rubisko variety has been detached, due to the very high union power in the spring and the very good adaptation to the hard time conditions, for the autumn crops of the 2018-2019 agricultural year. Also, through an ability to form the wheatear, significantly superior, the productive potential is very high.

In terms of plant size, the average value is between 59.5 cm and 75 cm. In conditions with lower rainfall (2018), stress has acted in vegetation

phenophase, from the elongation of the stem to the growth of the wheatear. The smallest size was recorded by the Anapurna variety, being a genetic characteristic of the variety, having a small to medium waist, and the highest value of 75 cm was recorded by the Glosa variety, a high-sized variety. In cultivation technology, a growth regulator – Medax Top (0.6 l/ha) was applied to this variety at the beginning of the straw elongation – between the first and second internode.

Table 1

Morphological characteristics of the cultivated wheat varieties.

Nr crt.	Variety	No.pl./m ²		Average	No. wheatears /m ²		Average	Size (cm)		Average
		2018	2019		2018	2019		2018	2019	
V ₁	Glosa	450	400	425,0	500	460	480,0	76	74	75,0
V ₂	Rubisko	360	330	345,0	720	700	710,0	62	60	61,0
V ₃	Avenue	362	320	341,0	710	690	700,0	63	62	62,5
V ₄	Anapurna	410	400	405,0	700	695	697,5	60	59	59,5

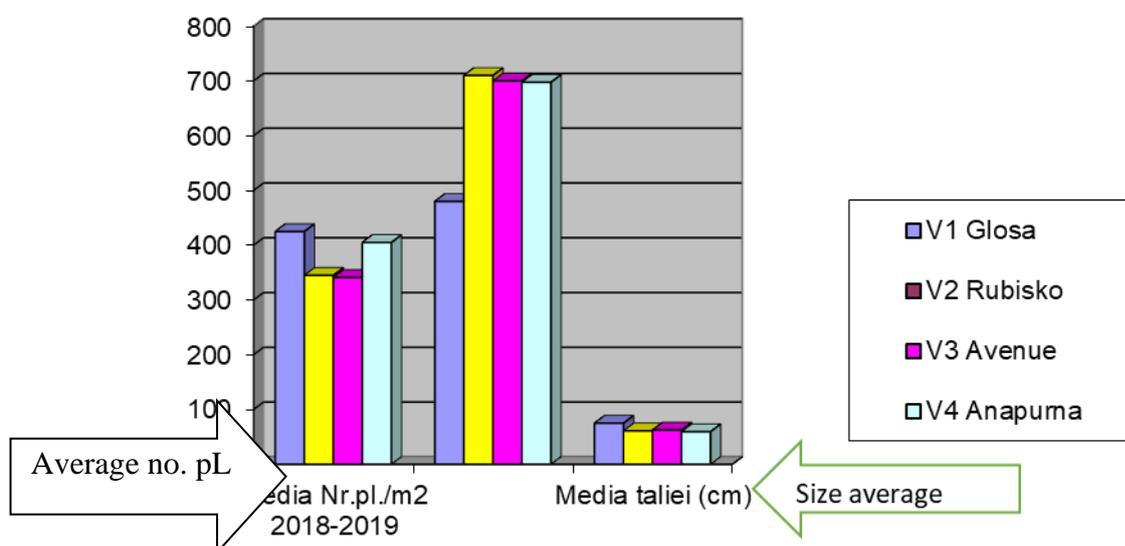


Figure 1. Morphological characteristics of the cultivated wheat varieties.

Resultuls concerning the mmb and hectolytic mass, in the cultivated wheat varieties

In terms of the mass of 1000 grains (MMB), the Glosa variety recorded the highest value – 44.5 g, and the lowest

- the Avenue variety 39.5 g. The climatic conditions differentiated in the two years, in particular the agricultural year 2018-2019, have led to the emergence of morphological characteristics atypical of the varieties studied. The hectolytic mass

ranged from 75.5 kg/hl in the Avenue variety to 77.5 kg/hl in the Glosa variety.

All three varieties of foreign genetics showed inadequate values of

these physiological indicators (table 2, figure 2).

Table 2

Mass of 1000 grains and hectolitre mass off cuoltivated wheat varieties

Nr crt	Variety	MMB (g)		Average	MH (kg/hl)		Average
		2018	2019		2018	2019	
Years		2018	2019		2018	2019	
V ₁	Glosa	43	46	44,5	77	78	77,5
V ₂	Rubisko	42	43	42,5	77	76	76,5
V ₃	Avenue	40	39	39,5	76	75	75,5
V ₄	Anapurna	41	40	40,5	77	75	76,0

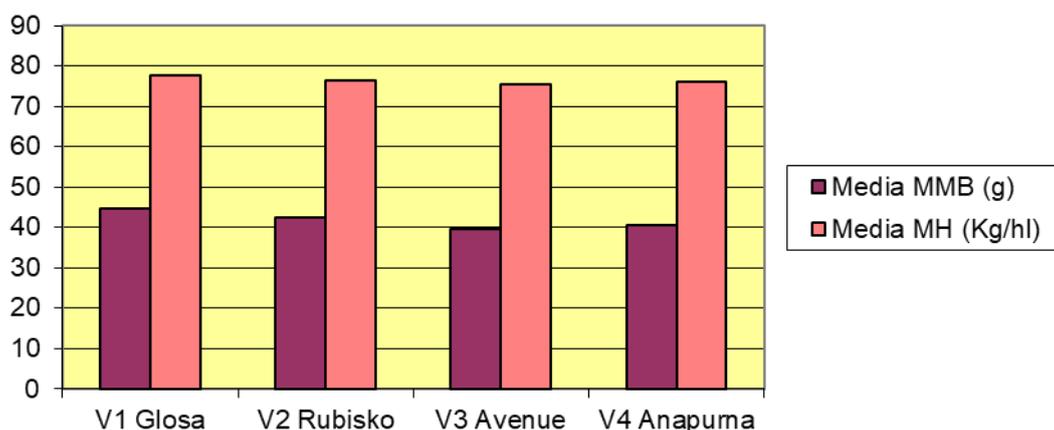


Figure 2. Mass of 1000 grains and hectolitre mass off cuoltivated wheat varieties

RESULTS CONCERNING THE NUMBER OF GRAINS/ WHEATEAR AND THE WHEIGHT OF GRAINS/ WHEATEAR, TO CULTIVATED WHEAT VARIETIES

In terms of the number of grains/ wheatear, the me values were between 36 in the Rubisko variety and 39 in the Glosa variety. Regarding the weight of

the grains / wheatear, the third element of productivity studied, the Avenue variety recorded the lowest value of 1.00 g/spic, and the Glosa variety had the highest value of 1.37 g/spic, which indicates that fertilization with increased doses of nitrogen in drought conditions does not influence this character, regardless of variety (table 3, figure 3).

Table 3

Grains/ wheatear Number and weight of grains/ wheatear in wheat species

No crt	Variety	Grains No/ Wheatear		Average	Grains/ wheatear Wheight (g)		Average
		2018	2019		2018	2019	
V ₁	Glosa	38	40	39,0	1,86	1,88	1,37
V ₂	Rubisko	35	37	36,0	0,97	1,21	1,09
V ₃	Avenue	38	38	38.0	0,96	1,04	1,00
V ₄	Anapurna	36	37	36,5	1,00	1,12	1,06

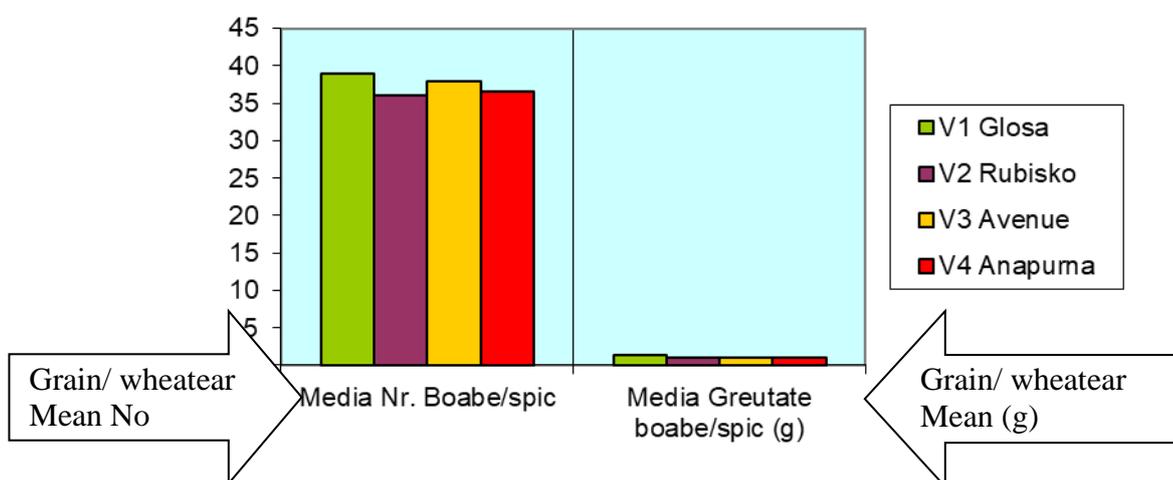


Figure 3. Grains/ wheatear Number and weight of grains/ wheatear in wheat species

RESULTS CONCERNING PRODUCTION AND QUALITY REQUIREMENTS IN CULTIVATED WHEAT VARIETIES

Regarding the production obtained, the Glosa variety recorded the average value of 6100 kg/ha, while the Avenue and Rubisko varieties achieved an average production of 8500-8800 kg/ha. The high production of these French varieties is justified by the fact that they belong to the Premium group, very productive, very tolerant to drought and with high ecological plasticity, with good resistance to wintering, fall, diseases and high union capacity, receptive to the administration of fertilizer doses, superior in terms of qualitative

attributes. The biological potential is very high reaching 11,000 kg /ha. Considering, the very high rainfall fell in June, when the plants reached physiological maturity, in both years of research, it was observed that foreign varieties very quickly lose the quality of bakery, due to the rains that "wash" the gluten and decrease their hectolytic mass, which does not happen to the Glosa variety. Avenue, being extra-early, was the most affected during the research period.

In terms of protein content, a wheat has very good quality when the values of this indicator are more than 13 %, good quality at values between 12-13 %, satisfactory quality at values between 10-12 % and unsatisfactory quality at values below 10 %. Low-protein flour is

suitable to produce snacks and cakes. High-protein flour is recommended for rough-to-the-look products such as bread. Bakers use the results of the protein content to predict water absorption and dough development time during

processing and production, as a normally high content requires more water and a longer mixing time, so that the dough can achieve optimal consistency (table 4, figure 4a, 4b).

Table 4

Production, protein content and fall index in cultivated wheat varieties

Nr crt	Variety	Production (kg/ha)		Average	Protein content (%)		Average	Fall Index (s)		Average
		2018	2019		2018	2019		2018	2019	
V ₁	Glosa	5900	6300	6100	12,5	13,0	12,70	250	262	256,0
V ₂	Rubisko	8500	9100	8800	12,5	12,0	12,25	180	175	177,5
V ₃	Avenue	8800	8200	8500	12,0	11,0	11,50	210	200	205,0
V ₄	Anapurna	8300	8150	8225	12,2	11,8	12,00	250	260	255,0

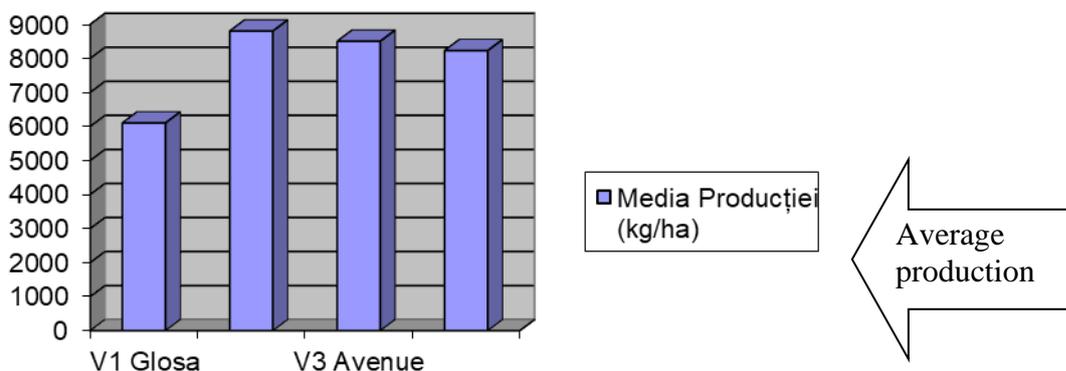


Figure 4 a. Production of the cultivated wheat varieties

The most important method in the rapid appreciation of wheat quality appears to be the sedimentation test. After research it was found that the sedimentation test is in close correlation with the volume of bread, the pharynographic note, the gluten index and the raw protein content and less close between them and the Pelsenke

index and the extensographic note. Both the Zeleny sedimentation index and the gluten index correctly express the bakery quality of the wheat. These indices associated with the pharynographic note and the volume of bread are the basic elements in assessing the quality of wheat for the bakery.

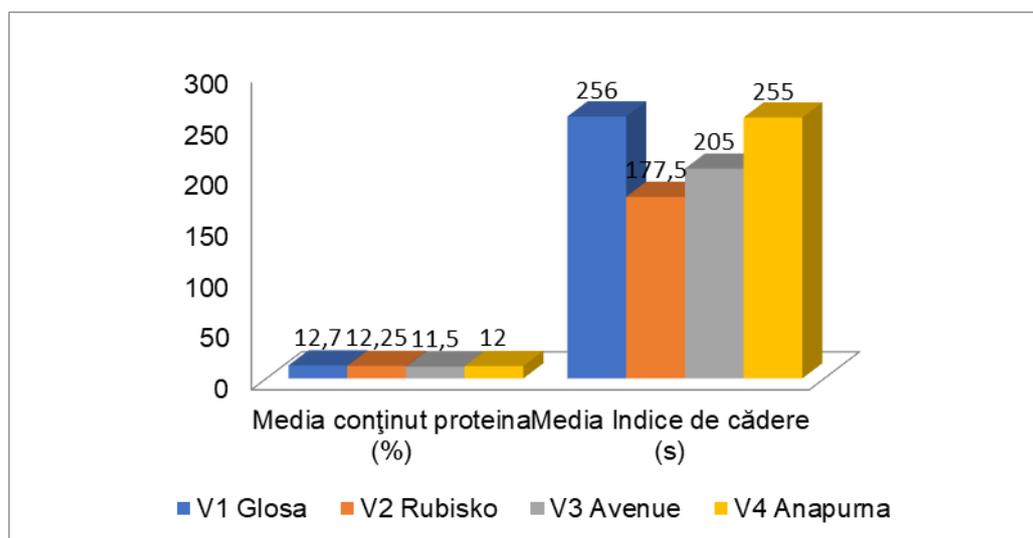


Figure 4 b. Protein content and fall index in cultivated wheat varieties

A flour considered to be good must have a sediment above 60 ml.

The higher the value of the sediment, the better the gluten content, although the flour is good (table 5, figure

5). Values can range from 20 or less for low-protein wheat with low gluten to 70 or more, in high-protein wheat with strong gluten.

Table 5

Sendimentation index and wet gluten in studied wheat

Nr crt.	Variety	Zeleny sendimentation index (ml)		Average	Gluten wet (%)		Average
		2018	2019		2018	2019	
V ₁	Glosa	84	86	85,0	24	26	25,0
V ₂	Rubisko	86	84	85	25	24	24,5
V ₃	Avenue	86	84	85	25	24	24,5
V ₄	Anapurna	86	82	84	25	23	24,0

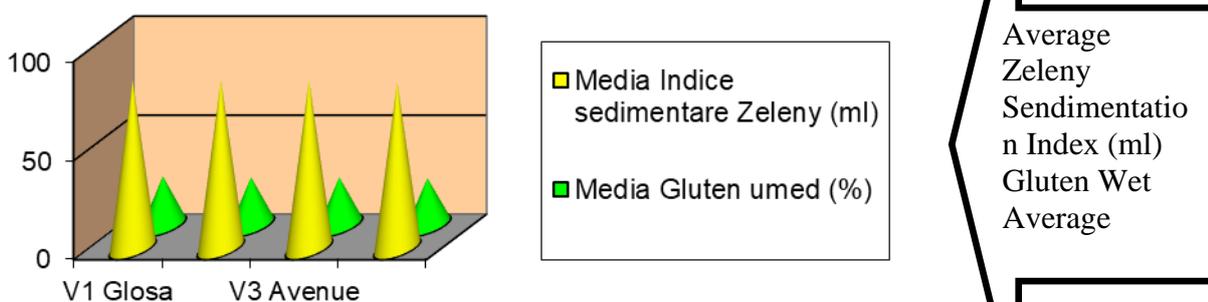


Figure 5. Zeleny sedimentation index, wet gluten, in cultivated wheat varieties

The wet gluten content was initially considered to be the most eloquent qualitative parameter of wheat flour (STAS 90-88). In general, a high content in gluten is an indication that the flour in question has good bakery properties. A good quality gluten should be well crowded, quite durable and elastic. In order to flour to be used in bakery, wet gluten must be greater than 26 %. If this value is not reached, wheat flour should be improved with the addition of vital **gluten**. Gluten is responsible for the elasticity and extensibility of flour. The wet gluten content reflects the protein content and is a specific flour requirement requested by end-users of the food industry. A flour is rated to have very good quality, with a wet gluten content above 26 %, good quality at 24-26 % wet gluten, satisfactory quality at 22-24 % wet gluten and unsatisfactory quality, at wet gluten content values below 22 %.

FOLIAR FERTILIZERS INFLUENCE TO THE GLOSA AND AVENUE WHEAT VARIETIES

In the case of these wheat varieties, the initial cultivation technology was respected, and on an area of 10 ha foliar fertilizers were also used, the products of Lebosol, with the following experienced variants: 2 treatments applied in autumn and 2 treatments in April, in the phase of intense growth of the antes (tables 6 and 7, figure 6, 7, 8, 9).

The values of the quality indices are close to those they have recorded – these varieties, when the classical fertilization was applied. From the point of view of production there is a difference of 640 kg/ha in the Glosa variety and 150 kg/ha in the Avenue variety. Given the basic fertilization and foliar fertilizations that we have introduced into the technological scheme, these additional foliar fertilizations did not have the expected effect, the production increase being small, the only benefit being costing in increasing by one point the hectolytic mass, with a focus on correcting metabolic disorders and especially physiological processes.

Table 6

Influence of foliar fertilizants in the GLOSA wheat variety

Crt. No.	Variant	STAS Production (kg/ha)	MMB (g)	MH (kg/hl)
V ₁	Unfertilized foliar	5900	43	77
V ₂	Tr. I –Potassium 3 l/ha + Bor 0, 5 l/ha Tr. II. –Mixed cereal 1,5 l/ha	6 400	46	77
V ₃	Tr. I. –Mixed cereal 1,5 l/ha (autumn) Tr. II –Mixed cereal 1,5 l/ha (spring)	6540	47	78

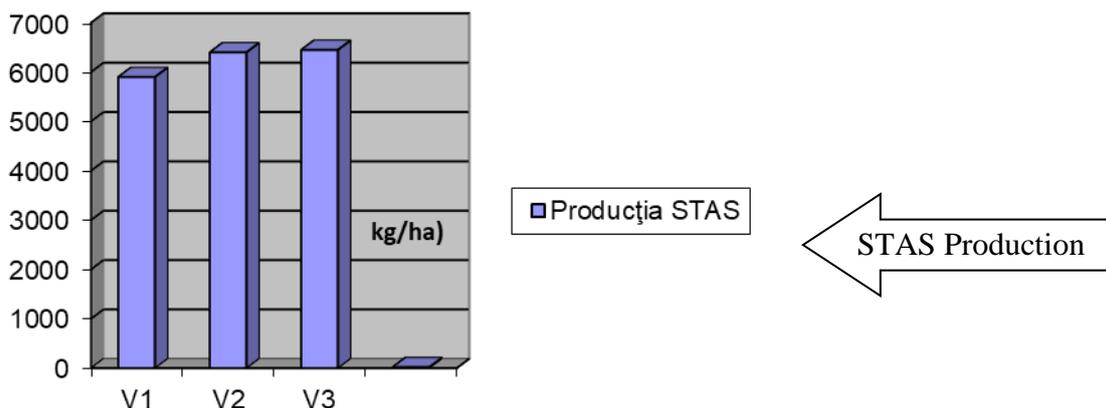


Figure 6. Influence of foliar fertilizants in the GLOSA wheat variety

Table 7

Influence of foliar fertilizants in the AVENUE wheat variety

Nr. crt.	Variant	STAS Production (kg/ha)	MMB (g)	MH (kg/hl)
V ₁	Unfertilized foliar	8800	40	76
V ₂	Seed treatment with TOTALCARE-2,0 l/t Autumn Treatment with TRIMAX 1 l/ha Spring I Treatment with Mixed cereals -2,0 l/ha Spring II Treatment with Mixed cereals – 1,5 l/ha	8900	40	76
V ₃	Seed treatment with TOTALCARE-3,0 l/t Autumn Treatment with Manganese nitrate -2,0 l/ha 1 l/ha Spring I Treatment with TOTALCARE-2,0 l/ha Spring II Treatment with 1,5 l/ha Quadroes	8915	40	76
V ₄	Seed treatment with TOTALCARE-5,0 l/t Spring I Treatment with NUTRIPLANT 36-5,0 l/ha + 1 l/ha bor Spring II Treatment with NUTRIPLANT 36-5,0 l/ha	8950	41	77

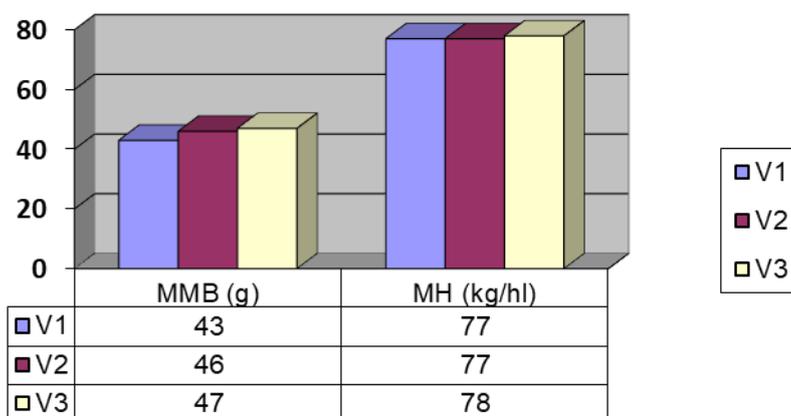


Figure 7. Influence of foliar fertilizants on MMB and MH, in the GLOSA wheat variety

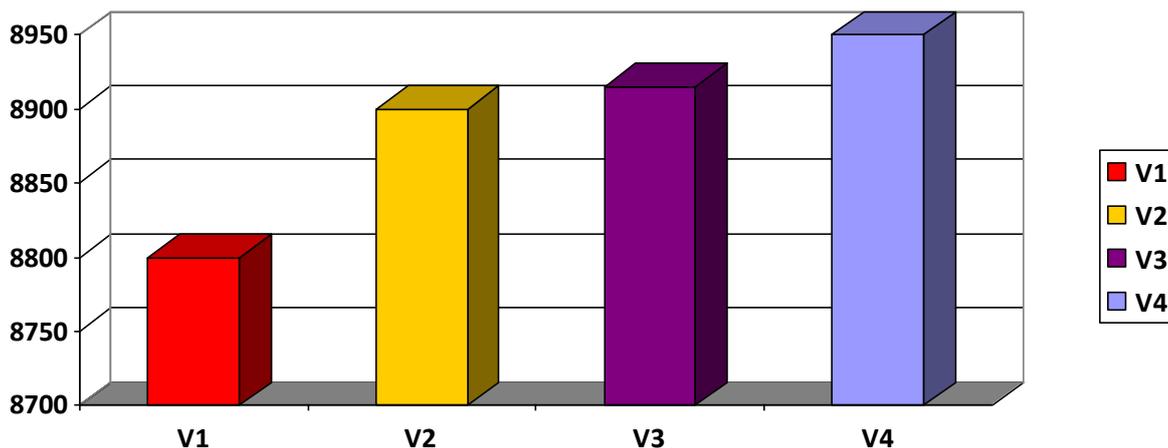


Figure 8. Influence of foliar fertilizers on production in AVENUE wheat variety

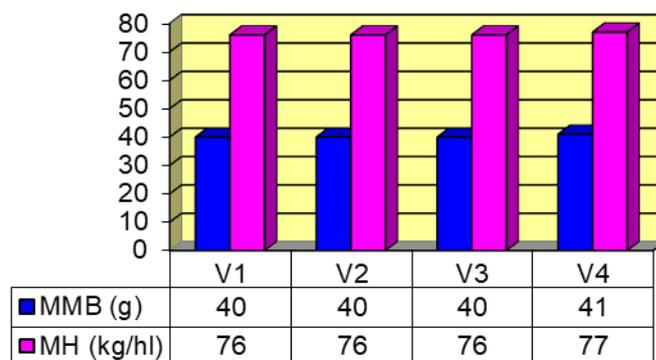


Figure 9. Influence of foliar fertilizers on MMB and MH on the AVENUE wheat variety

CONCLUSIONS

1. Drought has a greater influence on the size compared to the mass of 1000 grains.
2. The number of leaves, strong union and the scattered crown are also competitive features.
3. The differences in wheat precocity are mainly determined by the requirements for vernalization and photoperiod.
4. The precocity and duration of the grain filling period are characters, which determine the weight of the grain, the mass of 1000 grains being significantly higher, in plants with the date of the earlier anthesis.
5. A valuable variety must be characterized by good phenotypic stability, regardless of the environmental factors acting.
6. Wet gluten content and fall index are favorably influenced by the application of nitrogen fertilizers.
7. For organic growing areas in Romania, semi-early or late wheat varieties are recommended to successfully cope with the arid climate.
8. Romanian wheat sheep Glosa, with high ecological plasticity, high production capacity and good quality attributes is recommended to be cultivated in the future, on large areas in Romania.
9. Foreign varieties lose very quickly the quality of the bakery, due to the rains that “wash” the gluten and decrease their hectolytic mass, which does not happen to the Glosa variety.
10. Wheat cultivation technology is not very demanding. Good land processing must be carried out

before sowing and proper fertilization when preparing the germination bed.

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