

THE EVALUATION OF FERTILIZATION SCHEMES OPTIMISATION AT TWO ROW BARLEY CROP IN ORDER TO INCREASE THE HARVEST PROCESSING VALUE

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Abstract

As the cultivation of barley as a raw material for brewing beer is on an upward trend in Romania, to identifying an optimal fertilization scheme that enhances the quality of the grains is still a real challenge for producers and processors alike. In this context, the researches focused on the behavior of the Salamandre two row barley genotype in terms of grain yield achieved per unit area and the technical value of the harvest, against the background of the practice of differentiated fertilization schemes. The results of the research highlighted the positive impact of the administration of foliar fertilizers based on macro and microelements, in the phenophases considered critical for the supply of nutrients to plants. The highest values of the physical and chemical indicators that define the quality of grains in barley for brewing were obtained under the conditions of application of three foliar treatments with Poly Feed GG fertilizer applied in well-defined vegetation phases, against the background of administration at the time of establishment of the crop of 200 kg/ha of Complex fertilizers 20-20-0+13% Sulphur.

Key words: two row barley, foliar fertilization, grain yield.

INTRODUCTION

The management of different variables influences productivity, grain protein content and other quality parameters that have a direct impact on the quality of malt extracted from barley and barley grains for beer (Villiers et al., 1988).

The agronomic practices for increasing the quality of malt are quite different from those recommended by the technology of growing barley and barley for beer. Among them, the time and methods of sowing, the tillage system, irrigation, recommended nitrogen doses and the stage of nitrogen application greatly affect the productivity and quality of malt. Nitrogen is the main constituent of amino acids, which are precursors of proteins. Increasing nitrogen intake for a crop result in an increase in the protein content in the grains (Briggs, 1978; Briggs, 1998). Sandhu (2006), reported that the grain yield of beer barley increased significantly with the application of a nitrogen dose of 78 kg/ha, as a result of plant height growth, efficient twinning, leaf area index value, dry matter accumulation (DMA), grain count/ear, mass of 1000 grains and nitrogen uptake, compared to applying lower doses of nitrogen.

Patel et al. (2004), reported an increase in grain production as a result of the application of nitrogen doses between 60-100 kg/ha. However, the increase in grain yield as a result of increasing the nitrogen dose administered to the barley crop to 100 kg/ha was insignificant compared to the 80 kg N/ha administration variant.

Gonzalez et al. (1992), in Toledo, Spain, observed that by increasing the nitrogen dose from 0 kg N/ha to 160 kg N/ha, biological production and grain production increased, as well as the Harvest Index.

It is possible that the application of a full dose of N in the early stages of plant growth may not be able to meet the nutritional needs of the barley crop for beer until maturity as the application of nitrogen in later stages can increase the protein content of the grains, thus decreasing the quality of the extracted malt (Malhi & Nyborg, 1992). Roy & Singh (2006), reported that applying three doses of N at different times resulted in the highest protein and starch content of grains compared to applying nitrogen in a single dose. Ruiter & Brooking (1994), showed that quality parameters could be improved by applying N post-anthesis without excessive accumulation of

N in grains, demonstrating that pre-anthesis nitrogen management ensured near-optimal barley crop growth for beer. Singh et al. (1974), reported that applying the full dose of N at the time of sowing keeps the nitrogen content and all other malt quality parameters within a desirable limit.

As a result, the present research aimed to test the influence of different foliar fertilization schemes on the behavior of the Salamandre barley variety and to identify the most optimal scheme so as to enhance the productive capacity of the variety under study, and the grains to meet the requirements imposed by the standards in force regarding the physical and chemical parameters that render the technological value of the grains intended for the beer industry.

MATERIALS AND METHODS

In order to determine the influence of differentiated foliar fertilization schemes on the productivity and technological value of barley grains intended for brewing in 2023 in Grădiște, Giurgiu County, an experiment was designed in which the behavior of the Salamandre variety, grown at a sowing density of 350 germinable grains/m², was followed. Against the background of the basic fertilization of the soil in autumn by administering in autumn with the sowing of 200 kg/ha Complex 20-20-0+13% Sulphur.

During the vegetation period, in order to ensure the necessary nutrients for barley plants, foliar fertilizations were administered in the vegetation phases considered critical for the barley crop, namely: in the stem elongation phase, in the sprouting phase and in the grain formation and filling phase.

In order to establish the impact of the administration of foliar fertilizers on the orzoaica crop for beer, a bifactorial experiment was designed in subdivided plots, with three replications, the experimental factors tested in the research being the following:

Factor A - foliar fertilizers administered, with 3 graduations:

- a1 - fertilized with MKP (0-52-34), 2% concentration;
- a2 - fertilized with Poly Feed GG (9-10-38+3% MgO), 2% concentration;
- a3 - fertilized with Multi K Mg (11-0-40+4% MgO), 2% concentration;

Factor B – the number of foliar treatments administered to the crop, with 3 graduations:

- B1 - 1 foliar treatment (for straw elongation)
- b2 - 2 foliar treatments (straw elongation and bellows phase)
- b3 - 3 foliar treatments (for straw elongation, bellows and berry formation)

By combining the experimental factors tested in the research, 9 variants resulted, according to Table 1.

Table 1. Experimental variants tested in the two-row barley experiment

Experimental Variants		Factor B		
		b1	b2	b3
Factor A	a1	a1b1	a1b2	a1b3
	a2	a2b1	a2b2	a2b3
	a3	a3b1	a3b2	a3b3

The observations and determinations made during the research were aimed at both the evaluation of the grain yield of the Salamander variety, and the evaluation of the physical and chemical quality indicators required by the beer industry (physical purity of the grains, moisture of the grains, uniformity of the grains, germination capacity of the grains, protein and starch content of the grains).

The results obtained from the research were analyzed by the analysis of variance method for bifactorial experiments placed in subdivided plots, with three replicates.

RESULTS AND DISCUSSIONS

Against the background of practicing the foliar fertilization schemes tested in the research, the barley variety Salamandre achieved average grain yields of over 7000 kg/ha, regardless of the foliar fertilizer administered or the time of their administration, highlighting its productive capacity (Table 2).

The grain yield achieved in the 9 experimental variants was between 7317 kg/ha (V1), the lowest yield obtained under the conditions of applying during the vegetation period of the crop a single treatment in the stem elongation phase with the foliar fertilizer MKP (0-52-34) and 7870 kg/ha, in the experimental variant in which 3 foliar treatments were administered with Poly Feed GG (9-10-38+3% MgO), to elongation of the stem, to sprouting and to the formation and filling of grains (V6).

Table 2. Influence of foliar fertilization scheme on grains yield to Salamandre two row barley variety

Experimental variant	Physical yield (kg/ha)	Difference (kg/ha)	Significance degrees	Relative yield (%)	Difference (%)
V1 - 1 foliar fertilization with MKP (0-52-34)	7317	-308	ooo	95.96	-4.04
V2 - 2 foliar fertilizations with MKP (0-52-34)	7420	-205	ooo	97.31	-2.69
V3 - 3 foliar fertilizations with MKP (0-52-34)	7726	101	xxx	101.32	1.32
V4 - 1 foliar fertilization with Poly Feed GG (9-10-38+3% MgO)	7582	-43	o	99.44	-0.56
V5 - foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	7663	38	x	100.49	0.49
V6 - 3 foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	7870	245	xxx	103.21	3.00
V7 - 1 foliar fertilization with Multi K Mg (11-0-40+4% MgO)	7595	-30	o	99.60	-0.40
V8 - 2 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	7636	11	-	100.14	0.14
V9 - 3 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	7816	191	xxx	102.50	2.5
Experimental Average (Control)	7625	Control	Control	100.00	Control
DL _{5%} = 23.775; DL _{1%} = 77.611; DL _{0.1%} = 91.921					

Compared to the average of the experimental variants taken as a control, there were statistically very significantly negative (ooo) differences in the variants in which 2 foliar fertilizations with MKP were applied, significantly negative (o) in the variants in which a single foliar fertilization was administered in the elongation phase of the stem with Poly Feed GG or Multi K Mg (11-0-40+4% MgO), insignificant (-) as a result of the administration of two foliar fertilizations with Multi K Mg and very significantly positive (xxx), with production increases between 11

kg/ha and 191 kg/ha in the variants that benefited from three foliar treatments, regardless of the fertilizer used for this purpose. Following the determination of the physical purity of the barley grains harvested from the 9 experimental variants, it was observed that the values of this grain quality indicator exceeded in all tested variants the minimum value of 93% provided for this parameter by the national standard for brewing, with values between 96% and 98% being recorded, regardless of the fertilization scheme practiced (Table 3).

Table 3. Influence of foliar fertilization scheme on grains physical purity to Salamandre two row barley variety

Experimental Variant	Physical purity (%)	Difference (%)	Significance degrees
V1 - 1 foliar fertilization with MKP (0-52-34)	97	-0.11	-
V2 - 2 foliar fertilizations with MKP (0-52-34)	98	0.89	x
V3 - 3 foliar fertilizations with MKP (0-52-34)	98	0.89	x
V4 - 1 foliar fertilization with Poly Feed GG (9-10-38+3% MgO)	96	-1.11	o
V5 - foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	97	-0.11	-
V6 - 3 foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	98	0.89	x
V7 - 1 foliar fertilization with Multi K Mg (11-0-40+4% MgO)	96	-1.11	o
V8 - 2 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	97	-0.11	-
V9 - 3 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	97	-0.11	-
Experimental Average (Control)	97.11	Control	Control
DL _{5%} = 0.874; DL _{1%} = 1.446; DL _{0.1%} = 2.706			

The differences from the experimental control were quite small, ranging from 0.11 to 0.89 percentage points, with statistical assurance ranging from significantly negative (o) for variants V4 and V7, insignificant (-) for variants V1, V5, V8 and V9, to significantly positive (x) for variants V2, V3 and V6.

The determinations made after the seminal rest of the grains showed a moisture content that varied between 11.3% and 12.5% (Table 4), in all the 9 experimental variants tested in the research, this qualitative parameter of the grains

being below the minimum limit of 14% required by the beer industry.

It is observed that the highest values of berry moisture were determined in the case of the experimental variants in which two foliar treatments were administered (in the elongation phase of the spike and in the phase of berry formation and filling) with Poly Feed GG and Multi K Mg, with very significantly positive differences (xxx) compared to the average of the experimental variants (Control).

Table 4. Influence of foliar fertilization scheme on grains moisture content to Salamandre two row barley variety

Experimental Variant	Moisture content (%)	Difference (%)	Significance degrees
V1 - 1 foliar fertilization with MKP (0-52-34)	11.3	-0.76	ooo
V2 - 2 foliar fertilizations with MKP (0-52-34)	11.7	-0.36	ooo
V3 - 3 foliar fertilizations with MKP (0-52-34)	11.9	-0.16	o
V4 - 1 foliar fertilization with Poly Feed GG (9-10-38+3% MgO)	11.9	-0.16	o
V5 - foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	12.3	0.24	xxx
V6 - 3 foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	12.4	0.34	xxx
V7 - 1 foliar fertilization with Multi K Mg (11-0-40+4% MgO)	12.3	0.24	xxx
V8 - 2 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	12.3	0.24	xxx
V9 - 3 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	12.5	0.44	xxx
Experimental Average (Control)	12.06	Control	Control
DL _{5%} = 0.091; DL _{1%} = 0.127; DL _{0.1%} = 0.180			

Following the determinations regarding the weight of the grains, it is noted that the Salamandre barley variety reacted very well to the administration of foliar fertilizers during the vegetation period, from the 9 experimental variants tested during the research, grains with a weight that exceeded the minimum values imposed by the national standard for the beer industry were harvested, respectively 65 kg/hl for the volumetric weight and 45 g for the mass of 1000 grains.

Thus, the mass values of 1000 grains varied between 46.7 g and 50.6 g, the highest values of this grain quality indicator being obtained in the

experimental variants in which 3 foliar fertilizations with MKP (50.6 g) and Poly Feed GG (50.3 g) were applied, respectively the V3 and V6 variants (Table 5).

The foliar fertilizers tested recorded very statistically significant positive (xxx) differences from the average experience under the administration of two or three foliar treatments with MKP, Poly Feed GG and Multi K Mg (V2, V3, V5, V6 and V9), and from significantly negative (o) to very significantly negative (ooo) by administering a single foliar fertilization in the elongation phase of the stems (V1, V4, V7 and V8).

Table 5. Influence of foliar fertilization scheme on grains weight to Salamandre two row barley variety

Experimental Variant	Weight of 1000 grains (g)	Diff. (g)	Signif. degrees	Volumetric weight (kg/hl)	Diff. (kg/hl)	Signif. degrees
V1 - 1 foliar fertilization with MKP (0-52-34)	48.3	-0.5	ooo	66.2	-0.4	o
V2 - 2 foliar fertilizations with MKP (0-52-34)	49.9	1.1	xxx	66.8	0.2	o
V3 - 3 foliar fertilizations with MKP (0-52-34)	50.6	1.8	xxx	67.9	1.3	xxx
V4 - 1 foliar fertilization with Poly Feed GG (9-10-38+3% MgO)	47.4	-1.4	o	66.1	-0.5	o
V5 - foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	49.6	0.8	xxx	66.4	-0.2	o
V6 - 3 foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	50.3	1.5	xxx	67.2	0.6	xx
V7 - 1 foliar fertilization with Multi K Mg (11-0-40+4% MgO)	46.7	-2.2	oo	65.8	-0.8	oo
V8 - 2 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	47.3	-1.5	o	66.1	-0.5	o
V9 - 3 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	49.1	0.3	xxx	66.9	0.3	x
Experimental Average (Control)	48.8	Control	Control	66.6	Control	Control
DL _{5%} = 0.119; DL _{1%} = 0.167; DL _{0.1%} = 0.235				DL _{5%} = 0.12; DL _{1%} = 0.58; DL _{0.1%} = 0.86		

The volumetric weight values of the grains harvested from the 9 experimental variants were between 65.8 kg/hl and 67.9 kg/hl (Table 5), with very significantly positive (xxx) differences compared to the average of the experimental variants (control), against the background of the administration of three foliar

fertilizations with MKP (V3), distinctly significantly positive (xx) by applying three treatments with Poly Feed GG (V6) and significantly positive (x) following the administration of the same number of foliar treatments with Multi K Mg (V9).

Table 6. Influence of foliar fertilization scheme on grains uniformity to Salamandre two row barley variety

Experimental Variant	Class I 2.8 mm (%)	Diff. (%)	Signif. degrees	Class II 2.5 mm (%)	Diff. (%)	Signif. degrees
V1 - 1 foliar fertilization with MKP (0-52-34)	89	-4.22	ooo	11	4.23	xxx
V2 - 2 foliar fertilizations with MKP (0-52-34)	91	-2.22	oo	9	2.23	x
V3 - 3 foliar fertilizations with MKP (0-52-34)	93	-0.22	-	7	0.23	-
V4 - 1 foliar fertilization with Poly Feed GG (9-10-38+3% MgO)	93	-0.22	-	7	0.23	-
V5 - foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	95	1.78	xx	5	-1.77	o
V6 - 3 foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	97	3.78	xxx	3	-3.77	ooo
V7 - 1 foliar fertilization with Multi K Mg (11-0-40+4% MgO)	91	-2.22	oo	9	2.23	x
V8 - 2 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	94	0.78	-	6	-0.77	-
V9 - 3 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	96	2.78	xxx	4	-2.77	oo
Experimental Average (Control)	93.22	Control	Control	6.77	Control	Control
	DL _{5%} = 1.187; DL _{1%} = 1.666; DL _{0.1%} = 2.352			DL _{5%} = 1.678; DL _{1%} = 2.356; DL _{0.1%} = 3.326		

Against the background of practicing the fertilization schemes tested in the experience with barley for beer, the Salamandre variety has achieved grains with a high degree of uniformity, in all 9 experimental variants the grains resulting from the harvest of the crop falling into the first quality class in terms of grain uniformity, in accordance with both the national standard (minimum 80% grains with a diameter greater than 2.5 mm), and with the European standard (minimum 85% grains with a diameter greater than 2.5 mm) for barley intended for brewing.

The largest and most uniform grains were harvested in the experimental variants in which 2 treatments were administered during the vegetation period of the crops with Poly Feed GG (V5 and V6) and Multi K Mg (V8 and V9), the degree of uniformity of the grains exceeding 94% in these experimental variants (Table 6), with distinctly significantly positive (xx) and very significantly positive (xxx) differences

compared to the average of the experimental variants (control).

By applying the foliar fertilizer MKP, the differences from the average experience were very significantly negative (oo) as a result of the administration of a single foliar treatment, distinctly significantly negative (oo), by applying two foliar fertilizations and insignificant (-) by applying three foliar treatments (Table 6).

The germination capacity of the grains did not register significant differences between the 9 experimental variants taken in the study, the values of this barley grain quality parameter required by the beer industry varying between 95% and 98%, the grains harvested from the 9 experimental variants exceeding, after 72 hours from the moment of their placement on the germination layer, the minimum germination capacity scale of 92% provided by the standard for this destination (Table 7).

Table 7. Influence of foliar fertilization scheme on grains germination capacity to Salamandre two row barley variety

Experimental Variant	Germination capacity (%)	Difference (%)	Significance degrees
V1 - 1 foliar fertilization with MKP (0-52-34)	95	-2.0	oo
V2 - 2 foliar fertilizations with MKP (0-52-34)	96	-1.0	o
V3 - 3 foliar fertilizations with MKP (0-52-34)	98	1.0	x
V4 - 1 foliar fertilization with Poly Feed GG (9-10-38+3% MgO)	97	0.0	-
V5 - foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	98	1.0	x
V6 - 3 foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	98	1.0	x
V7 - 1 foliar fertilization with Multi K Mg (11-0-40+4% MgO)	96	-1.0	o
V8 - 2 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	97	0.0	-
V9 - 3 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	98	1.0	x
Experimental Average (Control)	97	Control	Control
	DL _{5%} = 0.874; DL _{1%} = 1.446; DL _{0.1%} = 2.706		

Compared to the average experience (control), in the case of this physiological parameter of

barley grain quality, statistically assured differences were recorded from distinctly

significant negative (oo) by applying a single foliar treatment with MKP (V1), to significantly positive (x), as a result of the application of two

or three foliar fertilizations, regardless of the fertilizer used for this purpose (V3, V5, V6 and V9).

Table 8. Influence of foliar fertilization scheme on grains protein content to Salamandre two row barley variety

Experimental variant	Protein content (%)	Difference (%)	Significance degrees
V1 - 1 foliar fertilization with MKP (0-52-34)	9.6	-0.53	ooo
V2 - 2 foliar fertilizations with MKP (0-52-34)	9.6	-0.53	ooo
V3 - 3 foliar fertilizations with MKP (0-52-34)	9.8	-0.33	oo
V4 - 1 foliar fertilization with Poly Feed GG (9-10-38+3% MgO)	9.8	-0.33	oo
V5 - foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	9.8	-0.33	oo
V6 - 3 foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	10.1	-0.03	-
V7 - 1 foliar fertilization with Multi K Mg (11-0-40+4% MgO)	10.6	0.47	xxx
V8 - 2 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	10.8	0.67	xxx
V9 - 3 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	11.1	0.97	xxx
Experimental Average (Control)	10.13	Control	Control
DL _{5%} = 0.162; DL _{1%} = 0.237; DL _{0.1%} = 0.364			

Analyzing the results obtained from the determination of the protein content of the grains, results that are centralized in Table 8, it is observed that, against the background of the practice of differentiated foliar fertilization schemes, the Salamandre variety performed very well in terms of this quality parameter, with values between 9.6% and 11.1% protein content of the grains harvested from the 9 experimental variants falling within the limits of 9.5-11.5% provided by the standard for Intended for brewing. Making a comparative analysis between the experimental variants tested during the research, the variants that were administered foliar fertilization with MKP and Poly Feed GG stand out in terms of grain protein content, the grain proteins having values ranging between 9.6% and 9.8%, regardless of the number of foliar fertilizations applied or the time of their treatment.

With a starch content between 61% and 62.9% (Table 9), the Salamandre variety exceeded the

minimum scale of 60% provided by the national standard for barley for the beer industry, the fertilization schemes practiced in the research having a direct and significant influence on this quality indicator. By administering the foliar fertilizer Multi K Mg, the starch content values recorded the highest values, exceeding 61.8%, regardless of the number of foliar treatments applied during the vegetation period of the barley crop.

The differences from the average of the experimental variants were statistically ensured from very significant negative (ooo) by administering a single foliar treatment in the elongation phase of the stem with MKP, to very significantly positive (xxx) following the administration of three foliar treatments (in the stem elongation phase, in the sprouting phase and in the bean formation phase) with Poly Feed GG and Multi K Mg).

Table 9. Influence of foliar fertilization scheme on grains starch content to Salamandre two row barley variety

Experimental variant	Starch content (%)	Difference (%)	Significance degrees
V1 - 1 foliar fertilization with MKP (0-52-34)	61.0	-0.97	ooo
V2 - 2 foliar fertilizations with MKP (0-52-34)	61.4	-0.57	oo
V3 - 3 foliar fertilizations with MKP (0-52-34)	61.8	-0.17	o
V4 - 1 foliar fertilization with Poly Feed GG (9-10-38+3% MgO)	61.7	-0.27	oo
V5 - foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	61.9	-0.07	-
V6 - 3 foliar fertilizations with Poly Feed GG (9-10-38+3% MgO)	62.9	0.93	xxx
V7 - 1 foliar fertilization with Multi K Mg (11-0-40+4% MgO)	61.8	-0.17	o
V8 - 2 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	62.4	0.43	xx
V9 - 3 foliar fertilizations with Multi K Mg (11-0-40+4% MgO)	62.9	0.93	xxx
Experimental Average (Control)	61.97	Control	Control
DL _{5%} = 0.135; DL _{1%} = 0.221; DL _{0.1%} = 0.582			

CONCLUSIONS

The results obtained for the Salamandre barley variety grown in 2024 under differentiated fertilization conditions, highlighted the following:

The highest grain production (7870 kg/ha) was obtained in an experimental version in which three foliar treatments with Poly Feed GG (9-10-38+3% MgO) were administered, respectively, in the stem elongation phase, in the sprouting phase and in the berry formation phase.

Regardless of the foliar fertilizer administered and the number of treatments carried out during the vegetation period of the barley crop, the Salamandre variety obtained physical purity values above the minimum limit of 93% provided by the national standard for barley grains intended for brewing.

In terms of the moisture content of the grains after their seminal rest, values below the maximum limit of 14% required by the brewing destination were obtained, regardless of the fertilization scheme practiced during the vegetation period of the barley crop.

The Salamandre barley variety reacted very well to the administration of foliar fertilizers during the crop's vegetation period, exceeding the minimum values of 65 kg/hl for volumetric weight and 45 g for the mass of 1000 grains provided by the national standard for the beer industry, the highest values of these parameters being obtained as a result of the administration of three foliar treatments with MKP and Poly Feed GG.

At the Salamandre barley variety, grains with a high degree of uniformity were obtained, classified in the first quality class, both according to the national standard and according to the European standard for barley, as a raw material in the chain - Brewing.

With a germination capacity between 95% and 98%, the barley grains harvested from the 9 experimental variants exceeded the minimum scale of 92% provided by the national standard for the beer industry, regardless of the fertilization scheme practiced during the crop's vegetation period.

Salamandre variety performed very well in terms of grains protein content, falling within the limits of 9.5-11.5% provided by the standard for Intended for brewing, with values between

9.6% and 11.1% protein the variants that were administered foliar fertilization with MKP and Poly Feed GG stand out in terms of this parameter, the grain proteins having values ranging between 9.6% and 9.8% regardless of the fertilization scheme practiced.

For the Salamandre barley variety, against the background of the practice of differentiated schemes, values of the starch content of the grains were recorded that exceeded 60%, a scale provided by the national standard for barley intended for the beer industry.

Among the fertilization schemes tested during the research, the optimal fertilization scheme proved to be the one in which three foliar treatments were administered, in the vegetation phases considered critical for nutrients, with the Poly Feed GG fertilizer, the Salamandre variety achieving clearly superior grain productions and with high technological value, in accordance with the requirements provided in the quality standards for the beer industry.

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