RESEARCH CONCERNING SOME QUALITATIVE ELEMENTS OF WINTER BARLEY FOR BEER INDUSTRY

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***Abstract**: For the production of beer, especially for the production of varieties of beer for various brands, quality of raw material obtained from barley is very important. In the category of quality traits of barley are: dry matter (%), starch content (%), protein (%), fat (%) extract(%), ash (%), germination faculty (%). The research on this paper aims to find best technological elements to obtain higher quality of malt barley. Fertilizer application and selection of suitable varieties are two of the most important links in order to obtain best quality. This study is par of the author's doctoral research and is in progress to public sustaining of the doctoral thesis. In order to obtain concluding results were organized experiences of bi-factorial type. Experimental facts, were placed in the field after the method of over lapping strips During vegetation, were carried out three foliar fertilization, using products PlantfertU, MicrofertU and TerraSorb. Were tested four varieties of winter barle: Laura, Trasko, Plaissant and Clarine. Laboratory tests were made at the brewery Distillery Sudrigiu European Food and Scandic, which has a laboratory equipped with modern equipment with which they could obtain very precise values of some parameters of the chemical elements that make complex traits of winter barley and spring barley designed to achieve a high quality beer. The highest value of dry matter content was unregistered on Laura variety, on basic fertilization with $N_{48}P_{48}K_{48}$ – 88.32%. From the fertilizants poit of view best result in starch content were obtained usig PlantfertU while from the poit of view of varieties best results were obtained on Trasko and Plaisant varieties. From the analysis of results obtain on winter barley we find that the differences between varieties are significant on two varieties, Laura and Trasko, the protein content excedees 8%, while on the rest of varieties the protein content is lower*

Key words*: *winter barley, quality elements foliar fertilization, varieties

INTRODUCTION

Beer is the world's most widely consumed and probably oldest of alcoholic beverages; it is the third most popular drink overall, after water and tea. It is produced by the brewing and fermentation of starches, mainly derived from cereal grains—most commonly malted barley, The starch content of grain is an important quality factor of barley for beer. Higher is the content of starch (carbohydrates), better is the quality of beer resulting from barley.

Barley is a highly adaptable cereal grain that is produced in climates ranging from subArctic to sub-tropical. It is a cereal grain derived from the annual grass *Hordeum vulgare* and has many uses. It serves as a major animal fodder, as a base malt for beer and certain distilled beverages, and as a component of various health foods.

Like wheat and rye, barley contains gluten that makes it an unsuitable grain for consumption by those with celiac disease.

Barley is grown on a large scale in Russia, Australia, Germany, Turkey, and North America.

The leading exporters of barley are the European Union, Australia, and Canada. Because of its use in malt beverages, barley is grown in many areas of the world as much for cultural as economic reasons.

Europe has long been a producer of malt barley. European subsidies encouraging

production has resulted in the European Union competing with Canada as the largest malt barley exporter. A growing percentage of the world trade is in the form of malt.

In a 2007 ranking of cereal crops in the world, barley was fourth both in terms of quantity produced (136 million tons) and in area of cultivation (566,000 km²).

In the case of barley for malt, finding a formula and the optimal period of application of fertilizers is very important, knowing that failure to protein and starch contents is leading to deteriorating quality and transition on the feed, where the purchase price in the market is lower than for the beer industry.

Proper fertilization, it is very important not only for production quality but also to maintain and improve the productive potential of soil.

For the production of beer, especially for the production of varieties of beer for various brands, quality of raw material obtained from barley is very important.

In the category of quality traits of barley are: dry matter (%), starch content (%), protein (%), fat (%) extract (%), ash (%), germination faculty (%).

In barley starch content is in a negative correlation with the content of protein substances. The starch content it is very influenced by the variety and especially by the technology applied (especially fertilization) that determines its level in grain.

MATERIAL AND METHODS

Experience has been placed in the experimental fields of the Discipline of plant growing at the Banat's University of Agricultural Sciences and Veterinary Medicine Timisoara. The experimental field was located on a chernozem soil type, bill, groundwater, wet (low gleyed), weak decarbonated on loesoide deposits, clay, dust-clay / loam-clay.

In order to obtain concluding results were organized experiences of bi-factorial type. Experimental facts, were placed in the field after the method of over lapping strips

The area sown to each variant was 140 m^2, harvested area was 30 m^2 (1.5 x 20 m) on each repetition, or 120 m^2 (4.5m x 20m) on each variant.

Sunflower was the preemergent plant.

Basic plowing was performed at 22 to 25 cm deep. Preparing the soil for sowing was done with the disc harrow, perpendicularly to the direction of sowing.

Were applied 16-16-16 fertilizer complex assortment at a calculated dose of 300 kg per hectare gross substance, ie 144 kg.

Sowing was done with SUP-29 sowing machine at a line spacing of 12.5 cm and a sowing depth of 4 cm ensuring a density of 500 bg/m^2.

The seed was treated before sowing with WITAWAX using a dose of 3 kg/t.

Control of weeds during the vegetation was achieved by using herbicide COUNTRIESSUPER SL dose of 1 l/ha for winter barley.

Foliar disease control was performed using PROTECT 50WP fungicide.

During vegetation, were carried out three foliar fertilization, using products PlantfertU, MicrofertU and TerraSorb.

Harvesting was done at maturity, when grain moisture was around 14%. The results were interpreted by variance analysis method for production and change the string method for biometric measurements. Laboratory tests were made at the brewery Distillery Sudrigiu European Food and Scandic, which has a laboratory equipped with modern equipment with which they could obtain very precise values of some parameters of the chemical elements that make complex traits of winter barley and spring barley designed to achieve a high quality beer.

Apron foliar fertilizer used in the formation of experimental variants were:

a_1 - $N_{48}P_{48}K_{48}$ – applied to seedbed preparation

a_2 - $N_{48}P_{48}K_{48}$ + (PlantfertU)

a_3 - $N_{48}P_{48}K_{48}B_{0,0048}$ +(MicrofertU)
a_4 - $N_{48}P_{48}K_{48}$ + (TerraSorb)
Were tested four varieties of winter barley: Laura, Trasko, Plaissant and Clarine.

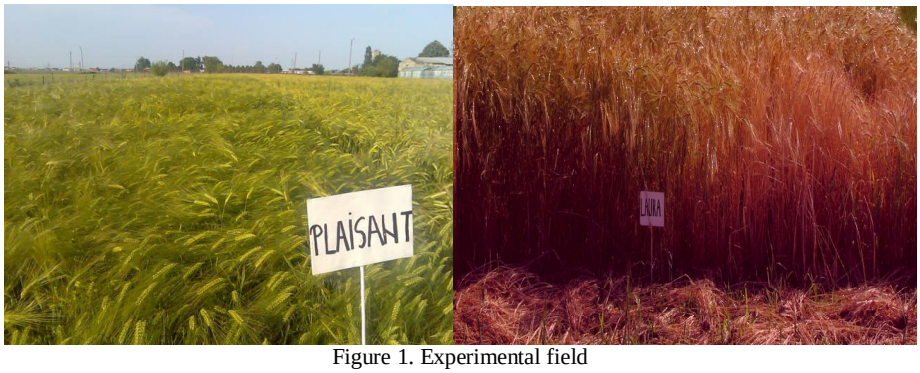
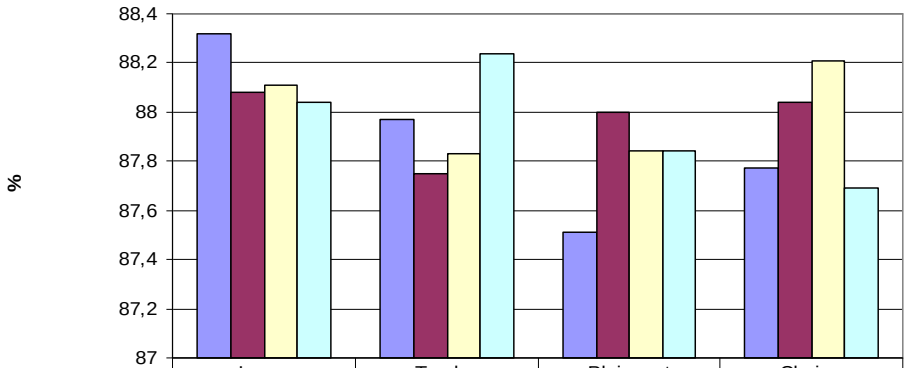


Figure 1. Experimental field

RESULTS AND DISCUSSIONS

In figure 2 is presented the analysis of dry matter quality element under the influence of varieties and foliar fertilizes, fertilization with $N_{48}P_{48}K_{48}$ – 88.32%.



	Laura	Trasko	Plaissant	Clarine
N48P48K48	88,32	87,97	87,51	87,77
PlantfertU	88,08	87,75	88	88,04
MicrofertU	88,11	87,83	87,84	88,21
TerraSorb	88,04	88,24	87,84	87,69

Figure 2. Influence of foliar fertilization and varieties on dry matter percent (synthesis 2006-2008)

On Laura variety, foliar fertilizes tend to reduce the dry matter content. Best results were obtained on basic fertilization with $N_{48}P_{48}K_{48}$ – 88.32%. Trasko variety, respond best on basic fertilization with $N_{48}P_{48}K_{48}$ to

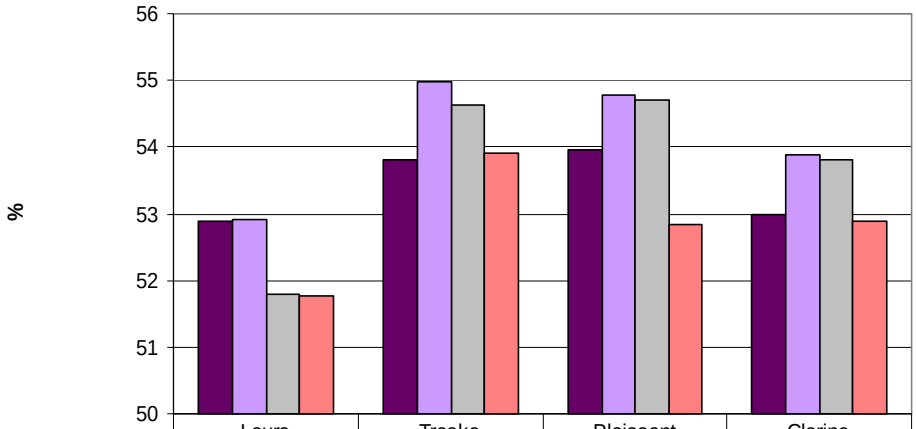
At Plaissant variety in the conditions from Timisoara foliar fertilization tend to increase the dry matter content, highest percent being registred on PlantfertU fertilization.

(88,00).

In case of Clarine variety, the foliar products PlantfertU -88.04% and Microfert U - 88.21%, lead to the increase of dry matter content.

The highest value of dry matter content was unregistered on Laura variety, on basic fertilization with $N_{48}P_{48}K_{48}$ – 88.32%.

Analyzing the results of the starch is found that it is influenced more of foliar fertilizer and less of sorts. (figure 3)



	Laura	Trasko	Plaissant	Clarine
N48P48K48	52,89	53,8	53,96	52,99
PlantfertU	52,92	54,99	54,78	53,89
MicrofertU	51,79	54,62	54,71	53,8
TerraSorb	51,78	53,91	52,84	52,88

Figure 3. Influence of foliar fertilization and varieties on starch content (synthesis 2006-2008)

Differences between the versions on the starch content is more obviously reporting of the dry matter. In the varieties of winter barley, the starch content is as follows:

On Laura variety, starch content on grain ranges from 51.79% in the variant fertilized with MicrofertU and TerraSorb , to 52,89% were we apply in vegetation PlantfertU. In case of barley variety Trasko, foliar application: PlantfertU, TerraSorb and MicrofertU, increases in grain the starch content. In the case of winter barley variety for beer Plaissant, the starch content on is higher (54.78%) on PlantfertU agro. TerraSorb decrease starch content (52,84%) compared to the percentage of starch content carried on the control agro $N_{48}P_{48}K_{48}$.

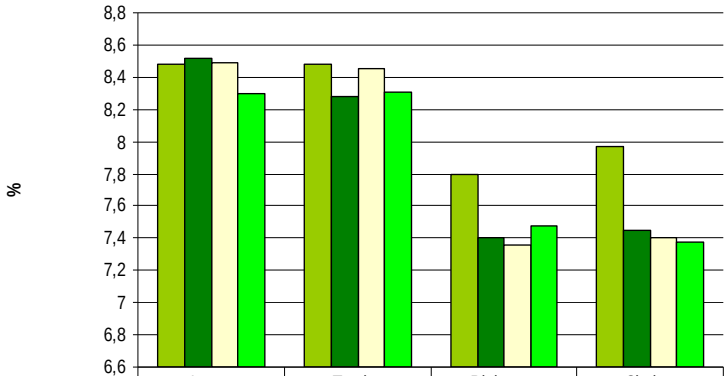
Clarine variety registred lower results compared to the rest of varieties.

From the fertilizants poit of view best result in starch content were obtained usig PlantfertU while from the poit of view of varieties best results were obtained on Trasko and Plaisant varieties.

The values of protein content are extremely important in beer quality. We represented them in figure 4.

From the analysis of results obtain on winter barley we find that the differences between varieties are significant on two varieties, Laura and Trasko, the protein content excedees 8%, while on the rest of varieties the protein content is lower

The highest value of protein content was obtained on PlantfertU fertilization at Laura variety.



	Laura	Trasko	Plaissant	Clarine
N48P48K48	8,48	8,48	7,8	7,97
PlantfertU	8,52	8,28	7,4	7,45
MicrofertU	8,49	8,45	7,36	7,4
TerraSorb	8,3	8,31	7,48	7,38

Figure 4: Influence of foliar fertilization and varieties on protein content (synthesis 2006-2008)

CONCLUSIONS

From the point of view of qualitative attributes of studied barley varieties we can conclude that an major and determinate fact in obtaining best results in the process of obtaining high quality beer.

The best variety for beer industry is considered Plaissant variety because its high starch content and lower content of protein.

In case of studied varieties all of them are proper for beer industry because of their equilibrated quality elements.

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