ISSUES CONCERNING THE IMPACT OF FOLIAR FERTILIZATION ON THE PRODUCTION OF BARLEY IN TIMISOARA

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Abstract: *The development of brewing industry in Romania draws to the development of agricultural industries that provide the raw material used in the process of obtaining this drink. One of the raw materials of great importance in this industry is barley. Starting from these considerations, the paper proposes a study of the evolution of production values recorded in some barley varieties under the influence of foliar fertilization products. This study is par of the author's doctoral research and is in progress to public sustaining of the doctoral thesis. The research method that we used involved the placement of experiences in the field and the development of physical and chemical laboratory analysis. Production values were obtained by statistical calculation. The biological material used is composed of several varieties of winter and spring barley. Bellow basic fertilization, foliar treatments were applied using the following products: PlantfertU, MicrofertU and TerraSorb. Have been studied both forms of spring and winter barley. Different physiological needs of both forms of barley have required the separate study of the effect of foliar fertilizer on them. In case of spring barley using the product PlantfertU we achieve the sustainable production of 2842 kg/ha for the Hanca variety and 2722 kg/ha for the Penellope variety. On winter barley best results are obtained using the product TerraSorb on Plaissant variety (5490 kg/ha). Summing up the results we can say that the best results were obtained using the foliar products foliar PlantfertU and TerraSorb, the difference being considerate statistically very significant compared with the results obtained using the product MicrofertU. Research related to the use of foliar fertilizers in barley cultivation have a high degree of novelty, the products that we used being relatively newly introduced and used in Romanian agriculture. This fact gives a touch of originality on present work. The results have great significance in that they come in support of the barley growers who want to use new technological links in order to obtain high yields.*

Key words**:** *barley, foliar fertilization, varieties, yields*

INTRODUCTION

Barley is one of the oldest cultivated plants, with evidence that it has been known since the Stone Age. It is used in human food, as animal feed, malt beer industry, adextrin, starch, alcohol, etc. (BORLAN Z., 1980).

As a crop, barley is a widely adaptable. It is currently popular in temperate areas where it is grown as a spring, summer crop and tropical areas where it is sown as a winter crop. Its germination time is anywhere from 1 to 3 days. Barley likes to grow under cool conditions but is not particularly winter hardy.

Barley and winter barley crop meets very favorable conditions in the following areas in our country: Western Plain, Southern Plains and South-eastern Romanian, Dobrogea. Favorable conditions are close to very favorable area and in the Transylvania Plain.

Winter barley for beer, must be located on fertile soils (SALONTAI A. et el., 1996).

There is not the same advantage of sowing winter barley early as there is winter wheat. Winter barley is more prone to frost damage on forward crops in the spring and the most common period for drilling is from the end of September to the end of October.

When drilling early (before the fourth week of September) it is best to select a later

maturing variety that will be less affected by frost. This cannot always be guaranteed as late frosts in May can still cause problems.

All malt production requires a lower level of nitrogen than feed production. Some malting contracts specify the grain nitrogen required. Nitrogen rates will depend on soil type and fertility levels but all applications should be completed by the end of March.

Plant growth regulators not only help in the prevention of lodging, but are important in the promotion of root development and spring growth. On average, maximum yield potential is achieved when head counts are in the range of 850 - 950 per square meter (BRISSON S. et el,, 1990).

Barley production has become more intense and complex in recent years. Crop managers must understand barley development and be able to recognize growth stages because of the increased use of growth stage sensitive production inputs such as chemical fertilizers, pesticides, and growth regulators.

In the current economic situation for the Romanian farmers, barley malt can be a solution to increase their income, taking into account the offer to purchase in the market for barley grown for malting quality.

Taking a look on the barley cultivated area in Romania (table.1), we observe that over the years the surface suffer variations.

In 2002 the area cultivated with barley is 578.8 thousand hectars but is decreasing until 2009 when the barley area reach at 517,5 thousand hectars. In 2010 the area cultivated with barley was of 509,2 thousand hectars.

Taking acount of average production, we can observe that the limits were between 1461 kg/ha in the year 2007 and 3312 kg/ha in the year 2004. In 2010 average production was 2542 kg/ha.

Total production in 2010 was of 1294,5 thousant tones (ZAMFIRESCU N. et. el, 1965).

Table 1

Data on cultivated area and production dynamics obtained from barley in Roumania (BORLAN Z., HERA C., 1980)

Specification	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Surface (Th. ha)	578,8	329,6	424,5	484,6	331,6	363,8	394,0	517,5	509,2
Average production (Kg/ha)	2005	1641	3312	2227	2331	1461	3069	2284	2542
Total production (Th. to)	1160,4	540,8	1406,0	1079,1	772,9	531,4	1209,4	1182,1	1294,5

There are European Union countries such as France, Germany, Belgium, which obtained average yields ranging between 5,000 and 6,000 kg/ha while yields obtained from us are between 2000 and 4000 kg/ha.

In order to reach high production is needed to use varieties with high yield capacity, winter resistance and high quality attributes for beer industry.

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. 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) and four varieties of spring barley (Aspen, Adonis, Penellope, Hanca).

Figure 1. Hanka variety on SDE Timisoara

Production values were obtained by statistical calculation.acording to specialist authors in the fild of data interpretation. Yield calculation and interpretation af results was done by variance analysis method. For the two types of barley yiel calculation and interpretetion was done separately because of different physiological needs of each one of types.

RESULTS AND DISCUSSIONS

Average yields obtained in the pedoclimatic condition from Timisoara, on winter barley are presented in figure 2 and table 2.

Foliar fertilization leads to the increase of production (figure 2).

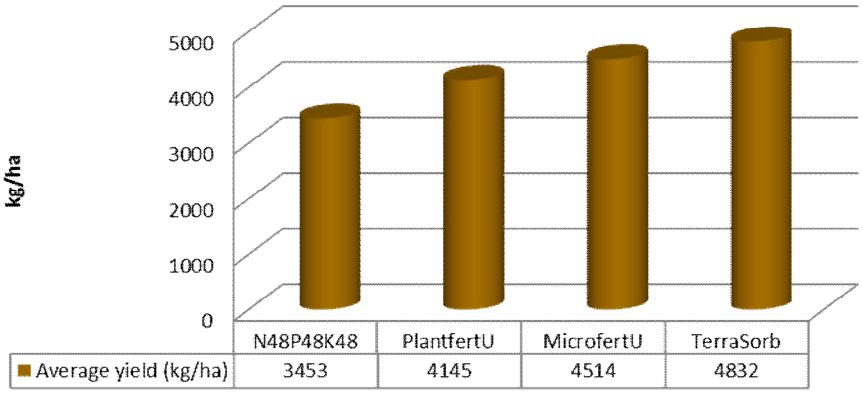

Figure 2. Influence of foliar fertilization on winter barley in Timisoara

Basic fertilization with $N_{48}P_{48}K_{48}$ leads to an average yield of 3453 kg/ha on control plot. By using PlantfertU we obtain 4145 kg/ha, whit 20 percent higher than control, the increase of 692 kg/ha compared to control being significant.

Table 2

Production of spring barley obtained in Timişoara

Foliar fertilizants	Varieties				Averages of foliar fertilizes			
	Laura	Trasko	Plaissant	Clarine	Average yield kg/ha	%	Dif. ± kg/ha	Significance
$N_{48}P_{48}K_{48}$	3531	3561	3462	3259	3453	100	Mt.	
PlantfertU	3833	3579	5083	4083	4145	120	692	*
MicrofertU	4065	4294	4873	4824	4514	131	1061	***
TerraSorb	4639	4809	5490	4389	4832	140	1379	***

Dl 5% =520kg/ha; Dl 1% =693 kg/ha; Dl 0,1% =910 kg/ha.

Averages of varieties

Average yield kg/ha	4017	4061	4727	4139
	100	101	117	103
Dif ± kg/ha	Mt.	44	710	122
Significance			***	

Dl 5% =260 kg/ha; Dl 1% =346 kg/ha; Dl 0,1% =455 kg/ha.

The Foliar product MicrofertU, leads to a production of 4514 kg/ha, the increase being considered statistically very significant (1061 kg/ha). By using as foliar fertilizing TerraSorb, average production reach to 4832 kg/ha, realizing an yield increase of 1379 kg/ha, statistically very significant (table 2).

Regarding to the varieties, the highest yield achieved on barley variety Plaissant - 4727 kg/ha, with an increase of 710 kg/ha compared to the yield obtained on Laura variety.

Generally average yields realized on the influence of foliar fertilization are higher that the yield obtained under the variety influence.

In figure 3 and table 3 are revealed the yield result obtained on spring barley varieties under the foliar fertililization in pedoclimatic condition of Timisoara.

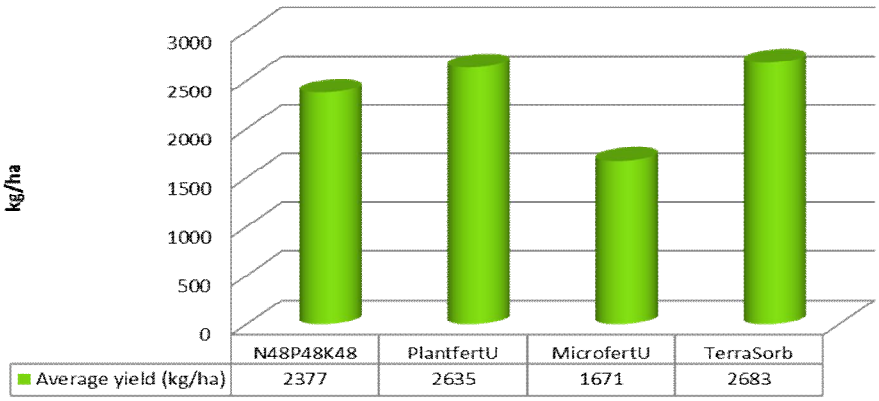

Figure 3. Influence of foliar fertilization on spring barley in Timisoara

Analising the results we found that foliar fertilization lead to the increase of yieled when are used the foliar products PlantfertU and TerraSorb. Production increase in these cases are 11% and 13% comparing to control ($N_{48}P_{48}K_{48}$).

Table 3

Production of spring barley obtained in Timişoara

Foliar fertilizants	Varieties				Averages of foliar fertilizants			
	Aspen	Adonis	Penellope	Hanca	Average yield kg/ha	%	Dif. ± kg/ha	Semniff.
$N_{48}P_{48}K_{48}$	2166	2481	2194	2666	2377	100	Mt.	
PlantfertU	2333	2638	2722	2842	2635	111	258	
MicrofertU	1639	2573	2472	2620	1671	70	-706	0
TerraSorb	2509	2647	2787	2796	2683	113	306	

Dl 5% =555; Dl 1% =740; Dl 0,1% =972.

Averages of varieties

Prod. kg/ha	2162	2585	2544	2731
Prod. relativă	100	119	117	126
Dif ± kg/ha	Mt.	423	382	569
Semnif.		**	**	***

Dl 5% =277; Dl 1% =370; Dl 0,1% =486.

In case of using foliar product MicrofertU, yields are reduced with 30% comparing to the control. The yield difference in these case is of 706 kg/ha, statistically significant.

Comparing the influence of foliar fertilization (figure 1) on the two types of barley (winter and spring) we observe that in both cases best results are obtained by using TerraSorb product. Winter barley has higher yielding capacity comparing to spring barley but requires higher cost in implementing cultivation technology.

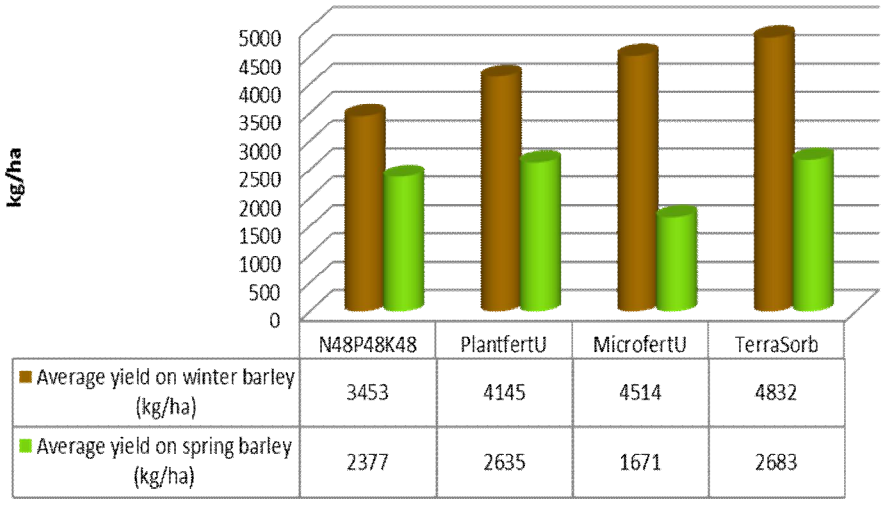

Figure 4: Influence of foliar fertilization on winter and spring barley

CONCLUSIONS

Preceding the experiences we organized, we can conclude that the impact of foliar fertilization on brewing industry barley is significant., for which ,we consider necessary the using of foliar fertilizes as a link to quantitative and qualitative yields on this culture.

Foliar fertilizers are ideal for fertilizing with nitrogen, phosphorus, potassium and micronutrients, because of the balance between the high concentration of microelements and the fact that they are easily assimilated by plants.

Based on these facts, obtaining good yields of barley per hectare, with very high quality and low cost prices is the desire of each farmer. This goal can be achieved if, in addition to known technological links, we use the proper fertilization, knowing that the costs of fertilized production, takes a large share.

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