

## RESEARCHES CONCERNING THE YIELD CAPACITY OF THREE HYBRIDS OF SUNFLOWER (*Helianthus annuus*) IN CONDITIONS OF TIMIȘOARA

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**Abstract.** Farming future must be not only sustainable but also performing, this is accomplished through proper application of any specific technological links sunflower crop. In this link, fertilizers of any kind must take a priority role in maintaining and enhancing soil fertility to increase agricultural production. This paper aims to highlight issues concerning the importance of sunflower hybrids Clearfield type (resistant to herbicides of Group imidazolinonelor) in Romania, the role of foliar fertilizers and plant growth and development of sunflower with further implications on the quantity and quality of production optimum doses of fertilizers with nitrogen, phosphorus and potassium soil and climate conditions of Timisoara. Market presence in Romania of Limagrain for 10 years and significant results obtained by testing the potential of hybrid sunflower production behavior under extreme conditions of water stress and, together with technology you have available, argues scientific importance of these hybrids that provide farmers the best solution for placing them in culture. The study were taken three sunflower hybrids with resistance to herbicides such as imidazoline create firm Limagrain: Rimisol (approved for cultivation in Romania in 2004), and F 30008, LHA 6654. The research topic chosen, hybrids mentioned are tested against four agrofonduri:  $N_0P_0K_0$ ,  $N_{60}P_{60}K_{60}$ ,  $N_{90}P_{60}K_{60}$  and  $N_{60}P_{60}K_{60}$  + foliar fertilizer (Fertitel). Experience bifactorial type was placed in the experimental field USAMVBT. Introduction of hybrid-type culture has economic importance for agriculture Clearfield whereas monocotyledonous and dicotyledonous weed control using herbicides containing the active substance imidazolinele are eliminated 1-2 mechanical papers, which are currently very expensive. Even if a single year, the results are valuable for agricultural practice and underlines the effectiveness of foliar fertilization on the production of chemical and achenes. The results of this study are part of a doctoral program, with as theme: "Development of cultivation technology of sunflower hybrids to increase seed production and oil" under the leadership of the distinguished university professor Valeriu Tabără.

**Key words:** sunflower, hybrids, chemical fertilizers and foliar

### INTRODUCTION

Sunflower, being one of the most important oily plants, constituted a research target for numerous researchers, from abroad and from Romania. Like any other culture plant, the spectacular progresses in the last years achieved by the firm Limagrain from Romania impose the thoroughly study and the placement of these studies in different climatic and especially microclimatic areas, with the goal to obtain the highest possible quantitative and qualitative yields.

In the paper there are exposed the research results concerning the improvement of the cultivation technology of some sunflower hybrids with herbicide resistance like imidazolines, in order to increase the achene production. In this context, the present research has been developed within pedoclimatic conditions of Timișoara in the agricultural year 2006/2007.

By the approached thematic, the sunflower hybrids are tested in comparison with four agro-backgrounds:  $N_0P_0K_0$ ,  $N_{60}P_{60}K_{60}$ ,  $N_{90}P_{60}K_{60}$  and  $N_{60}P_{60}K_{60}$  + foliar fertilizer - Fertitel.

Even they are only for a year, the obtained results scientific argue that the new hybrids created by the firm Limagrain will be extended into culture in the next years both in Romania and at European level.

#### **MATERIAL AND METHODS**

The bifactorial experience has been placed within the experimental field of U.S.A.M.V.B.T., on a cambic chernozem, wet-phreatic (low gleyed), low decarbonated, on loess deposits, loam clay-dusty/loam-clay, which presents values of the chemical characteristics indicating a soil with medium fertility potential.

The experimental variants had been distributed following the method of the randomized blocks in three replicates. The fertilization has been made using complex fertilizers 15:15:15, applied at the germinal bed preparation for the agro-backgrounds  $N_{60}P_{60}K_{60}$ ,  $N_{90}P_{60}K_{60}$  and  $N_{60}P_{60}K_{60}$  + foliar fertilizer (Fertitel). For the agro-background  $N_{90}P_{60}K_{60}$ , the nitrogen completion up to 90 kg/ha active substance on ha was made by applying 50 kg/ha active substance of ammonium nitrate before the first weeding.

There were taken in the study three sunflower hybrids resistant to herbicides like imidazoline, created by the firm Limagrain: Rimisol (approved to be cultivated in Romania in the year of 2004), F 30008 and LHA 6654. By the chosen research subject, the upper mentioned hybrids were tested in comparison with four agro-backgrounds:  $N_0P_0K_0$ ,  $N_{60}P_{60}K_{60}$ ,  $N_{90}P_{60}K_{60}$  and  $N_{60}P_{60}K_{60}$  + foliar fertilizer (Fertitel).

In order to characterize the climatic conditions there were used the data from the Meteorological Station of Timișoara.

In conclusion, under climatic aspect, there were found optimal conditions to obtain significant experimental results for the studied hybrids, which serve to elaboration of convincing scientific results regarding the cultivation technology of this type of hybrids.

#### **RESULTS AND DISCUSSIONS**

For sunflower there was established that exists a close correlation between precipitations amounts from the period of September-April, precipitations that were accumulated into the soil as water reserve (Victor Ștefan, 1997).

In order to characterize the climatic conditions there were used the data from the Meteorological Station of Timișoara.

The agricultural year 2006/2007 was a very special year from climatically viewpoint.

In the figure 1 there are presented the monthly mean temperatures and precipitations recorded in the analyzed period. It can be observed that the monthly mean temperatures registered during the period between springing and appearance of the inflorescence assured the optimal temperature necessary for a rapid and uniform germination and springing of sunflower plants. During the growth and development period, the sunflower plants benefit by extremely favorable temperatures. As well, the temperatures from July and August which correspond to flowering and seed formation stages are favorable for a well development of these phases and favor the pollination of quality achenes under the aspect of their size and filling.

In correlated with precipitations, it was found that in 2007 sunflower had an optimal level of humidity required by the each phase of the vegetation period.

In the table 1 there are presented the mean yields of the three hybrids of sunflower obtained under different agro-backgrounds as fertilization ratio with N, P, K and with foliar fertilizer Fertitel.

The figure 2 highlights that the humidity deficit registered during certain periods, associated with high temperatures in June – July, not affected the yield of the studied sunflower hybrids.

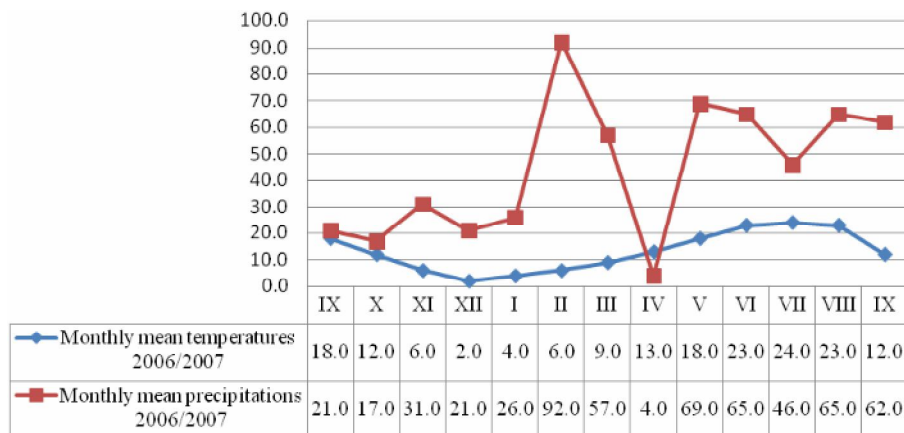


Figure 1 Monthly mean temperatures and precipitations recorded at the Meteorological Station of Timișoara during the agricultural year 2006 / 2007

Table 1  
The achieved yield of three sunflower hybrids under influence of fertilization at S.D.E Timișoara in the experimental year 2007

Factor B (The hybrid)	Factor A – The agro-background				Means of the factor B			
	Unfertilized	N60K60P60	N90P60K60	N60P60K60 + Foliar fertilizer	Mean yield (kg/ha)	Relative yield (%)	Difference ± related to control (MT)	Significatio n
Rimisol	2532	2668	2836	2884	2730	100	-	
F 30008	3370	3695	3556	3605	3557	130	827	***
LHA 6654	3334	3528	3545	3575	3496	128	766	***
Means of the factor A					DL 5% = 220 kg/ha DL 1% = 294 kg/ha DL 0,1% = 386 kg/ha			
Mean yield (kg/ha)	3079	3297	3313	3355				
Relative yield (%)	100	107	107	109				
Difference ± related to control (MT)	-	218	234	276				
Sign ification	-	**	***	***				

DL 5% = 127 kg/ha    DL 1% = 170 kg/ha    DL 0,1% = 223 kg/ha

Analysis of the achieved yields of all three hybrids, correlated to the climatic conditions, emphasize that hybrid F 30008 realizes a mean yield by 3557 kg/ha with a production increase by 827 kg/ha comparing to the control hybrid Rimisol, statistically assured as being very significant. As well, the hybrid LHA 6654 realized a mean production by 3496 kg/ha with a production increase by 766 kg/ha comparing to the control, statistically assured as being very significant.

Gh. Bîlteanu, making researches to establish the critical periods of the mineral nutrition of sunflower, finds that, during the period of the initial growth, the insufficiency of nitrogen, phosphorous and potassium lead to a pronounced decrease of seed crop.

In the figure 3 it can be observed that, under the influence of fertilization, the sunflower yields increase in all three studied hybrids.

Thus, comparing to the control unfertilized agro-background  $N_0P_0K_0$ , the yield in the agro-background equally fertilized with amounts of 60 kg/ha nitrogen, phosphorous and

potassium increases with 218 kg/ha, being statistically assured as distinct significant. As well, in the agro-background  $N_{60}P_{60}K_{60}$  + foliar fertilizer Fertitel, the achieved mean production was by 3355 kg/ha, with a production increase by 276 kg/ha comparing to the control agro-background  $N_0P_0K_0$ , statistically assured as being very significant.

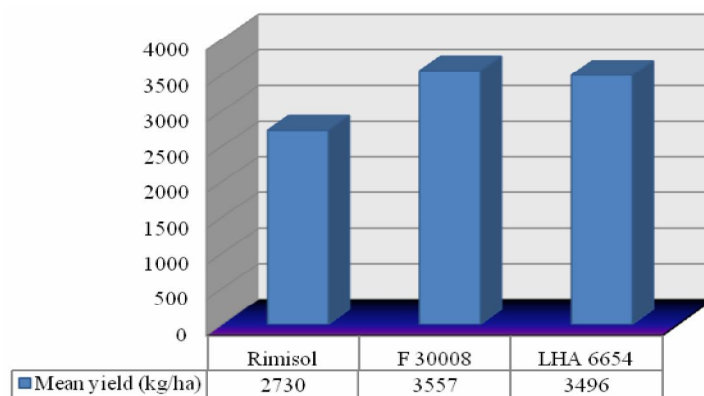


Figure 2 Mean productions achieved by the three sunflower hybrids in conditions of Timișoara in 2007

The foliar fertilization with Fertitel significantly influences the achene production, so that in the agro-background  $N_{60}P_{60}K_{60}$  + foliar fertilizer Fertitel there was realized a production by 3355 kg/ha against 3297 kg/ha in the agro-background  $N_{60}P_{60}K_{60}$ , with a production increase by 58 kg/ha.

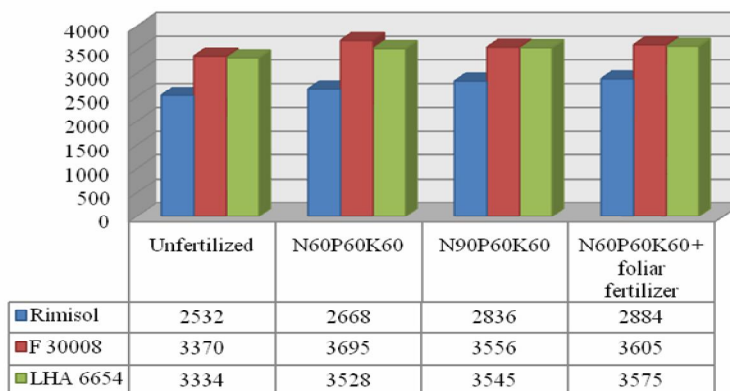


Figure 3 The influence of the agro-background on achene production in the studied sunflower hybrids within the pedoclimatic conditions of Timișoara

### CONCLUSIONS

The results obtained in the experimental year 2007 allow the establishment of the following conclusions:

1. The three studied hybrids present a very high yield capacity;

2. The existing climatic conditions of the experimental year 2006/2007 did not affect the yield capacity of the studied hybrids;

3. The chemical and foliar fertilizations strongly influence both the plant production and the productivity elements;

4. The equilibrate fertilization with NPK maintains the leaf surface enough large in the phase of flowering – achene formation, so that the achene formation process not be disturbed;

5. The potential of the cultivated hybrids is over 3500 kg/ha which assures an economic efficiency extremely good for sunflower.

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