RESEARCH CONCERNING THE IMPACT OF CHEMICAL AND FOLIAR FERTILISATION ON THE NUMBER OF ACHENES ON CALATIDIUM IN THREE SUNFLOWER CULTIVARS IN THE CONDITIONS OF TIMIŞOARA

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Abstract. *Sunflower represents one of the most important crops in Romania from the point of view of the area cultivated, ranging 3rd after maize and wheat. In this paper we point out the impact of different systems of fertilisation on sunflower productivity elements. The analysis of results in the three sunflower hybrids under study point out the fact that the number of achenes formed on the calatidium is an important element of sunflower productivity. We have studied three sunflower hybrids resistant to herbicides of the imidazone type from the Limagrain Company: Rimisol (approved for cultivation in Romania since 2004), F 30008, and Hidalgo. These sunflower hybrids have been tested on four agri-funds: $N_0P_0K_0$, $N_{60}P_{60}K_{60}$, $N_{90}P_{60}K_{60}$, and $N_{60}P_{60}K_{60}$ + foliar fertiliser (Fertitel). The bifactorial experiment was set on the experimental field of the Banat University of Agricultural Science and Veterinary Medicine in Timisoara. Introducing into cultivation this type of sunflower hybrids resistant to herbicides containing imidazolines is of particular importance for Romania's agriculture. Though our results speak for just one year, they are particularly valuable for the agricultural practices and point out the efficacy of chemical and foliar fertilisers. The theme of this research aimed at better knowing sunflower hybrids developed by the Limagrain Company and at expanding their cultivation both in Romania and in Europe. Sunflower hybrids resistant to some post-emergent herbicides of the imidazoline or sulphuran-ureic type contribute, besides the increase of production per ha, to the efficacy of the sunflower crop on farms. By using this type of sunflower hybrids we eliminate 1-2 mechanical works whose efficacy is low in the context of sunflower weeding by creeping thistle (Cirsium arvense) and cockleburs (Xhantium sp.).*

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

INTRODUCTION

The agriculture of the future should be not only sustainable, but also performing; this can be done by properly applying all technological steps specific to the cultivation of sunflower. In this context, fertilisers of all types should rank first to maintain and increase soil fertility and, therefore, agricultural production.

The introduction into cultivation of the sunflower hybrids of the Clearfield type is of economic importance for agriculture since by controlling both mono- and dicot weeds using herbicides based on imidazolines allows us to avoid 1-2 mechanical works that are very costly nowadays.

Though our results speak for just one year, they are particularly valuable for the agricultural practices and point out the efficacy of chemical and foliar fertilisers on productivity elements.

The presence on the market of the Company Limagrain for 10 years now, the significant results obtained through the testing of sunflower hybrids concerning the production potential and the cultivation technology support the claim that introducing these sunflower

hybrids into cultivation is the best solution for the farmers.

MATERIAL AND METHODS

The experiment of the bifactorial type was set on the experimental field, on a cambic chernozem, moist phreatic of the Didactic Station of the Banat University of Agricultural Science and Veterinary Medicine in Timişoara.

The variants were set after the randomised block method with three replications.

We have studied three sunflower hybrids resistant to herbicides of the imidazoline type developed by the Limagrain Company: Rimisol (approved for cultivation in Romania since 2004), F 30008, and Hidalgo. These sunflower hybrids have been tested on four agri-funds: a_1 – $N_0P_0K_0$, a_2 – $N_{60}P_{60}K_{60}$, a_3 – $N_{90}P_{60}K_{60}$, and a_4 – $N_{60}P_{60}K_{60}$ + foliar fertiliser (Fertitel).

Fertilisation was done by using complex fertilisers of the type 15:15:15 applied on preparation of the germination bed for the agri-funds a_1, a_2, and a_3. For the agri-fund a_3, completion of nitrogen up to the level of 90 kg of active substance per ha was done by applying 50 kg of ammonia nitrate per ha before the first weeding.

During vegetation of sunflower plants, i.e. during the flower bud and blooming periods we applied the foliar fertiliser Fertitel on the agri-fund corresponding to the variant a_4.

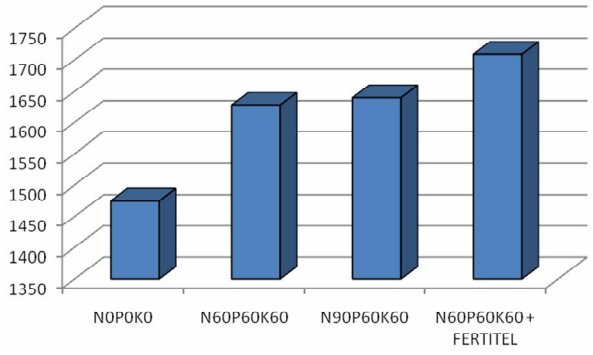
From the point of view of the climate, there were optimal conditions for conclusive experimental results in the studied sunflower hybrids that support the development of some conclusive scientific results concerning the cultivation technology of these sunflower hybrids.

RESULTS AND DISCUSSIONS

The number of achenes per calatidium is an important element of productivity.

In the case of the sunflower hybrid Rimisol, fertilisation stimulates the formation of a large number of achenes per calatidium.

Figure 1 shows the mean number of achenes per calatidium in the sunflower hybrid Rimisol.



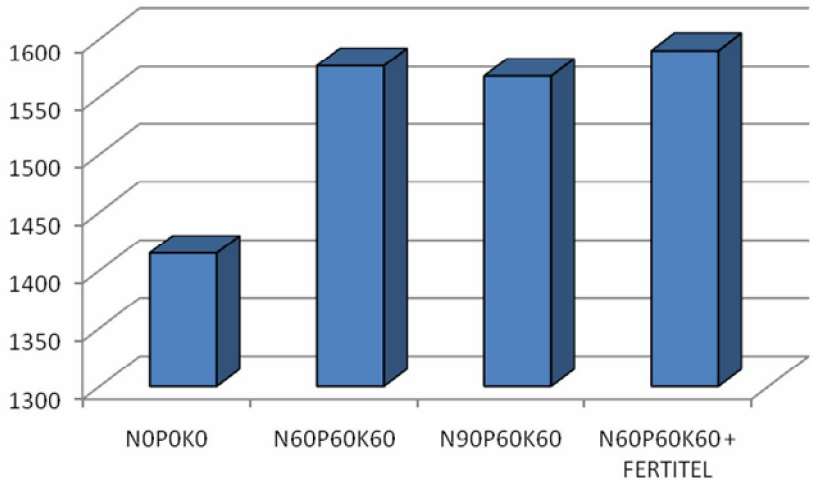
X	1475	1628	1640	1709
S2	1405	1149	1967	1412
S	37	34	44	38
S_X	1.23	1.13	1.47	1.27
S%	2.51	2.09	2.68	2.22

Figure 1. The average number of achenes on the hybrid RIMISOL calatidiu agro influence in Timisoara in 2009

Analysing data shows that a rate of 90 kg of nitrogen per ha applied on an agri-fund of 60 kg of phosphorus per ha and 60 kg of potassium per ha results in a number of 1.640 achenes per calatidium. To note that through foliar fertilisation the mean number of achenes is 1.709, i.e. 234 achenes per calatidium more than the on the agri-fund $N_0P_0K_0$.

Analysis of the values of the variation coefficients shows that the number of achenes per calatidium is highly stable in the studied sunflower hybrids which confirms that these sunflower hybrids are also more adaptable to micro-area conditions (Didactic Station in Timişoara).

As shown in Figure 2, as a result of data processing, we can see that, on the agri-fund fertilised with N_{60} P_{60} K_{60}, the sunflower hybrid F 30008 yielded the largest number of achenes per calatidium, i.e. 1,577, compared to only 1,415 achenes per calatidium on the non-fertilised agri-fund $N_0P_0K_0$.



X	1415	1577	1568	1590
S2	482	1574	1264	1120
S	22	40	36	33
S_X	0.73	1.33	1.20	1.10
S%	1.55	2.54	2.30	2.08

Figure 2. The average number of achenes per calatidiu in hybrid F 30008 under the influence of agro in Timisoara in 2009

Increasing the rate of nitrogen on the agri-fund to 90 kg/ha on a constant agri-fund of 60kg of phosphorus and 60 kg of potassium did not prove efficient, resulting in only 1.568 achenes per calatidium, with a difference of 9 achenes per calatidium on the agri-fund of $N_{60}P_{60}K_{60}$.

In the sunflower hybrid F 30008, in the climate conditions of the year 2009 in Timişoara, we can see that foliar fertilisation has a significant impact: the number of achenes per calatidium in the variant fertilised with a foliar fertiliser was 1.590 compared to 1.415 achenes per calatidium in the control variant.

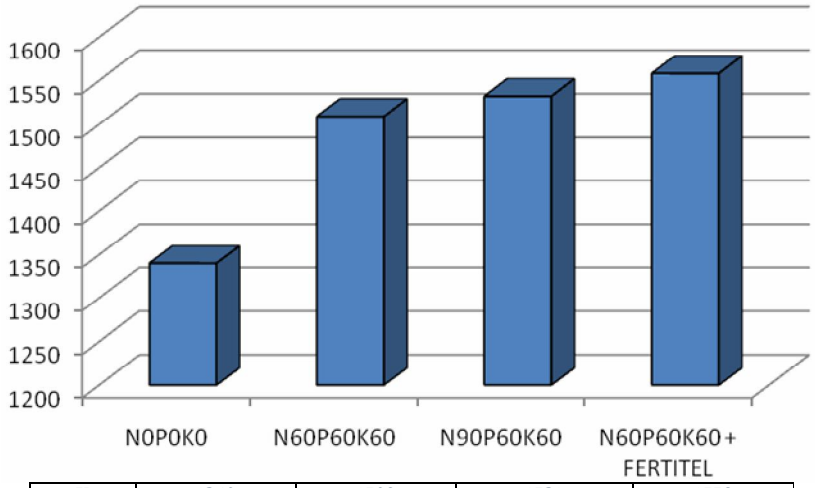
In the sunflower hybrid F 30008, there are low values of the variability coefficient which shows a higher degree of stability in the three sunflower hybrids we have studied.

In the sunflower hybrid Hidalgo, the number of achenes per calatidium is impacted by

fertilisation.

A balanced fertilisation with NPK, the sunflower hybrid Hidalgo results in a number of 1,509 achenes per calatidium compared to only 1,340 achenes per calatidium on the control agri-fund (Figure 3).

The agri-fund fertilised with $N_{60}P_{60}K_{60}$ + foliar fertiliser, the sunflower hybrid Hidalgo yields a number of 1.558 achenes per calatidium, i.e. with 49 achenes more than the number of achenes per calatidium on the agri-fund of $N_{60}P_{60}K_{60}$.



X	1340	1509	1532	1558
S2	742	410	729	989
S	27	20	27	31
S_X	0.90	0.67	0.90	1.03
S%	2.01	1.33	1.76	1.99

Figure 3. The average number of achenes on the hybrid HIDALGO calatidiu agro influence in Timisoara in 2009

CONCLUSIONS

On the ground of the results obtained in the experimental year 2009, we can draw the following conclusions:

1. The studied sunflower hybrids yield a very high number of achenes per calatidium in the climate conditions of the year 2009;
2. Fertility elements and fertility conditions vary depending on the meteorological features of the agricultural year;
3. Chemical and foliar fertilisation have a strong impact on the development and on the number of achenes per calatidium in the three studied sunflower hybrids;
4. Analysis of the variation coefficient shows that the number of achenes per calatidium is highly stable in the studied sunflower hybrids which confirms that they have a higher degree of adaptability in the conditions of the micro-area of the Didactic Station in Timişoara;

5. Balanced fertilisation with NPK keeps the foliar area enough large during the blooming and achene development phases preventing the hindering of achene development.

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