

THE NUTRITION AREA AND FERTILISATION EFFECT ON THE PRODUCTION OF ACHENES ON SOME OF THE SUNFLOWER HYBRIDS

EFFECTUL FERTILIZĂRII ȘI SPAȚIULUI DE NUTRIȚIE ASUPRA PRODUCȚIEI DE ACHENE LA CÂȚIVA HIBRIZI DE FLOAREA-SOARELUI

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Abstract. In a trifactorial experiment such as fertilisation x plant density x sunflower hybrids, the achenes production was taken under observation during the 2009-2010 agricultural year, on a cambic chernozem, in sunflower friendly ecological conditions. The maximum plant height was that of 175,3 cm on the $N_{120}P_{60}K_{120}$ fertilisation, 174,6 cm for the density of 70000 plants/hectare and 171,8 cm for the PR63A90 hybrid. Taking into consideration the studied factors in the analysis of achenes production, the following were found : the $N_{96}P_{48}K_{96}$ fertilisation has determined the highest production of 3762,43 kg/hectare; the density of 70000 plants/hectares led to the highest production of 3745,8 kg/hectare; the PR64A83 hybrid achieved the maximum production of 3609 kg/hectare.

Key words: hybrids, fertilisation, sunflower, production

Rezumat. Într-o experiență trifactorială de tipul fertilizare x desimea plantelor x hibrizi de floarea-soarelui s-a urmărit producția de achene în anul agricol 2009-2010, pe un sol cernoziom cambic, în condiții ecologice favorabile florii-soarelui. Înălțimea plantelor maximă, de 175,3 cm s-a realizat la aceeași doză de fertilizare ($N_{120}P_{60}K_{120}$) la desimea de 70000 pl/ha (174,6 cm) și la hibridul PR63A90 (171,8 cm). Analizând producția de achene pe factorii cercetați s-au constatat următoarele: fertilizarea cu $N_{96}P_{48}K_{96}$ a determinat cea mai mare producție, de 3762,43 kg/ha; la desimea de 70000 pl/ha s-a obținut producția maximă de 3745,8 kg/ha; hibridul PR64A83 a realizat producția maximă de 3609 kg/ha.

Cuvinte cheie: hibrizi, fertilizare, floarea – soarelui, producție

INTRODUCTION

Fertilization is an important component in the technology of plant, representing the completion of the soil deficit in plant mineral elements necessary for it to develop properly. In terms of fertilization, we may argue that the sunflower has a low reactivity to the effect of fertilizers taking into account the achieved production growth.

Some of the many studies on sunflower culture refer to the influence of nitrogen fertilizers and the configuration and activity of the photosynthetic

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device. Thus, Gimenez C., (1994), Mundstock C.M., (1994), Trapani N., (1996) conducted a research to clarify the mystery of the plant response to nitrogen fertilizers.

Plamer S.J., (1996) states that after the tests, the expansion and architecture of plants can be controlled with certain doses of nitrogen, resulting in the fact that nitrogen has a tremendous influence on the length and width of leaves of sunflower.

In what concerns the nitrogen effect on the production of achenes in sunflower Ibrahim M.E. and the collaborators (2007), following investigations have found that sunflower efficiently use nitrogen fertilizers applied to the plant seed, registering increases in the production.

Axinte M. and the collaborators (2007) present the fact that the productivity of sunflower achenes is influenced simultaneously by the plants density on surface area.

This paper aims at quantifying the effect of fertilizers and sowing densities on the production of sunflower achenes and also on vegetative growth.

MATERIALS AND METHODS

During 2010 spring, on a cambic chernozem soil type within Ezăreni farm at the University of Agricultural Sciences and Veterinary Medicine - Iasi, a trifactorial experience was established by the method of subdivided parcels.

The three investigated factors were:

Factor A – fertilization – five graduations:

a1 – $N_0P_0K_0$

a2 – $N_{32}P_{24}K_{48}$

a3 – $N_{64}P_{36}K_{72}$

a4 – $N_{96}P_{48}K_{96}$

a5 – $N_{120}P_{60}K_{120}$

Factor B - Plant density - three graduations:

b1 - 40,000 pl / ha

b2 - 55,000 pl / ha

b3 - 70,000 pl / ha

Factor C - Hybrid sunflower - four graduations:

c1 - Favorite

c2 - Performer

c3 - PR63A90

c4 - PR64A83

The seedbed preparation consisted of the basic work of the soil, the plowing being done at a depth of 30 cm; in spring two crossings were made with the combinator, at which time compound fertilizers of type 0:12: 24 and half the dose of ammonium nitrate under the experimental protocol have been applied, the second half being applied at the first mechanical weeding.

To achieve the specified densities, the combined SPC 8 type drills, equipped with three types of distribution disks and respecting all the technological norms was used.

RESULTS AND DISCUSSIONS

During the agricultural year 2009-2010, at AGROEXPERT - Miroslava meteorological station the rainfall values that were ranked above the annual average were recorded. Average rainfall recorded at Miroslava meteorological station in the crop year 2009-2010 compared to the annual average. In terms of temperature, the crop year 2009-2010 was a year with higher temperatures than the annual average, hot temperatures being also recorded during some months of summer.

The number of leaves per plant was determined during the full bloom, showing a variation according to density, degree of fertility and of course to the used hybrid (table 1).

Table 1

The influence of the investigated factors on the number of leaves and plant height in 2012

Specification	No. of leaves			Plant height		
	No. leaves on plant	% Compared to the stander-by	The difference	Cm	% Compared to the stander-by	The difference
Influence of fertilization						
N ₀ P ₀ K ₀	15,60	100,00	Mt.	171,3	100,00	Mt.
N ₃₂ P ₂₄ K ₄₈	16,59	106,34	0,98	172,8	100,8	1,5
N ₆₄ P ₃₆ K ₇₂	16,71	107,11	1,1	173,4	101,2	2,1
N ₉₆ P ₄₈ K ₉₆	17,40	111,47	1,79	174,3	101,7	3,0
N ₁₂₀ P ₆₀ K ₁₂₀	18,26	116,97	2,65	175,3	102,3	4,0
Influence of plant density						
40000 pl/ha	16,73	100,00	Mt.	172,5	100,0	Mt.
55000 pl/ha	17,32	103,52	0,59	173,3	100,4	0,8
70000 pl/ha	16,70	99,82	-0,03	174,6	101,2	2,1
Influence of hybrids						
Favorite	16,79	100,00	Mt.	174,4	100,0	Mt.
Performer	17,78	105,89	0,99	176,0	100,9	1,6
PR63A90	16,50	98,27	-0,29	171,8	98,5	-2,6
PR64A83	16,58	98,74	-0,21	171,4	98,2	-3,0

Fertilization showed an important role in increasing the vegetative mass; after modifying the doses of fertilizers, a directly proportional growth was observed, but while increasing the seeding density, an increase in plant height was also observed, the density of 70,000 pl / ha showing an increase in height of 1.2% compared with the stander-by.

Moreover, the genetic material influences the number of leaves per plant and its height. After analyzing the data on the number of leaves per plant it could be seen that the Performer hybrid achieved the highest increase in the number of leaves per plant, with a difference from the stander-by of 5.89% reaching a height of 176 cm, with 1.6 cm more than the stander-by.

In case of the sunflower achenes production, the influences of factors were separately pursued as well as the interaction between them. Fertilization has always played an important role in all crops, but sunflower requires a richer fertilization, being a huge consumer of nutrients. In Table 2 we present the influence of fertilization on the production of sunflower achenes.

Table 2

Influence of fertilization on production of achenes in 2010

Fertilization	Product kg / ha	Percent compared to the stander-by%	Difference (kg / ha)	Significance	kg of Achenes to 1 kg of fertilizer
N ₀ P ₀ K ₀	2588,25	100,00	Mt.	-	
N ₃₂ P ₂₄ K ₄₈	3166,50	122,34	578,25	xx	5,56
N ₆₄ P ₃₆ K ₇₂	3568,89	137,88	980,64	xxx	5,70
N ₉₆ P ₄₈ K ₉₆	3762,43	145,36	1174,18	xxx	4,89
N ₁₂₀ P ₆₀ K ₁₂₀	3716,60	143,59	1128,35	xxx	3,76
DL 5%	308,2 kg/ha				
DL 1%	409,3 kg/ha				
DL 0,1%	532,8 kg/ha				

The best results of fertilization occurred in case of N₉₆ P₄₈ K₉₆ dose, an increase of 45.36% compared to the stander-by (1174.18 kg/ha) being registered, the difference compared to the stander-by being very significant. Once the dose was increased by applying a variant of fertilization of N₁₂₀ P₆₀ K₁₂₀, the production decreased up to 45.83 kg/ha (in percentage of 1.77%) compared with its predecessor.

The plant density per unit area influenced the production as shown in table 3.

Table 3

The effect of density on production in 2010

Density pl / ha	Production kg / ha	Percent compared to the stander-by %	Difference (kg / ha)	Significance
40,000	2938.39	100	Mt.	-
55,000	3397.42	115.62	459.03	xx
70,000	3745.80	127.47	807.41	xxx
DL 5%	157,3 kg/ha			
DL 1%	361,2 kg/ha			
DL 0,1%	2,529 kg/ha			

With reference to our results summarized in the table above, we notice that the most beneficial effect on production has a density of 70,000 pl/ha, this being recorded during the experiments, the best production compared to the stander-by with an addition of 27, 47% from the stander-by version, the difference being very significant. At the density of 55,000 pl/ha, the difference from the stander-by was significantly distinct.

The production is also influenced by the genetic heritage of the hybrid used in the crop, the data being presented in Table 4.

Table 4

Hybrid effect on production in 2010

Hybrids	Production kg / ha	Percent compared to the stander-by%	Difference (kg / ha)	Significance
Favorite	3049.80	100	Mt.	-
Performer	3261.73	106.94	211.93	x
PR63A90	3521.58	115.46	471.78	xxx
PR64A83	3609.04	118.33	559.24	xxx
DL 5%	153,7 kg/ha			
DL 1%	244,5 kg/ha			
DL 0,1%	361,5 kg/ha			

Note that the Performer hybrid production grew by 211.93 kg / ha compared to the stander by. The PR64A83 hybrid registered a notable difference from the stander-by, of 559.24 kg / ha, exceeding with 18.33% production of the Favorite hybrid taken as the stander-by.

CONCLUSIONS

1. During fertilization with N₉₆ P₄₈ K₉₆, 3762.43 kg/ha have been obtained, with 45.36% more than in N₀ P₀ K₀ stander-by version (2588.25 kg/ha);
2. The density of 70,000 pl / ha resulted in the highest yield of achenes of 3716.60 kg / ha with 27.47% higher than the stander-by density, 40000 pl/ha;
3. The most productive hybrid was PR64A83, with a production of 3,609.04 kg/ha, with 18.33% higher than the Favorite hybrid stander-by.

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