THE EFFECT OF PLANT FERTILISATION AND DENSITY ON SOME OF THE PHYSICAL PROPERTIES OF ACHENES ON A FEW SUNFLOWER (*HELIANTHUS ANNUUS L.)* HYBRIDS

EFECTUL FERTILIZĂRII ŞI DESIMII PLANTELOR ASUPRA UNOR ÎNSUŞIRI FIZICE ALE ACHENELOR LA CÂȚIVA HIBRIZI DE FLOAREA-SOARELUI (*HELIANTHUS ANNUUS L.)*

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***Abstract**. Considering a cambic chernozem, in the ecological conditions of the agricultural year2009-2010, at the Ezăreni – Iaşi farm, two physical sunflower parameters of quality were taken under observation, under the influence of fertilisation, plant density and cultivated hybrids. The value of 60,07g was the highest for the interaction of two factors, the $N_{32}P_{24}K_{48}$ fertilisation and the 40,000 pl/ha density. The highest mass per storage volume was: 41,84 kg/hectolitre for the $N_{120}P_{60}K_{120}$ fertilisation, 40,5 kg/ hectolitre for the 40000 plants/hectare density, 41,2 kg/ hectolitre for the Performer hybrid. The interaction between $N_{120}P_{60}K_{120}$ x 40000 pl/ha x Performer resulted into the highest mass per storage volume of 42 kg/hectolitre.*
Key words: hybrids, fertilisation, Thousand Grain Weight, sunflower

***Rezumat.** În condițiile ecologice ale anului agricol 2009-2010, pe un cernoziom cambic, de la ferma Ezăreni – Iaşi s-au urmărit doi indicatori fizici de calitate la floarea-soarelui, sub influența fertilizării, desimii plantelor şi hibrizilor cultivați. Masa a 1000 de boabe (MMB) a fost de 60,07 g, cea mai mare, la interacțiunea a doi factori, fertilizarea cu $N_{32}P_{24}K_4$, şi desimea de 40000 pl/ha. Masa hectolitrică cea mai mare a fost: la fertilizarea cu $N_{120}P_{60}K_{120}$, de 41,84 kg/hl; la desimea de 40000 pl/ha, cu 40,5 kg/hl; la hibridul Performer, cu 41,2 kg/hl. Interacțiunea $N_{120}P_{60}K_{120}$ x 40000 pl/ha x Performer a realizat cea mai mare masă hectolitrică, de 42 kg/hl.*
Cuvinte cheie: hibrizi, fertilizare, floarea – soarelui, masa a 1000 de boabe

INTRODUCTION

Research regarding the effect of fertiliser doses over the productivity of the fitosystem of sunflower and of the quality parameters was done both in the country and abroad. Hakoomat A. and the collaborators (2005) that have kept a check on the influence of applying azoth doses on the production of achenes and sunflower oil concluded that azoth plays a very important role in the formation of physical parameters of quality for sunflower.

Vrânceanu A. (2000), in the paper called „Hybrid Sunflower ”discusses the effect of fertilizers on sunflower, claiming that phosphorus fertilizers can be

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applied individually, substantially increasing production in comparison to the fertiliserz based on azoth, without contributing to diminishing the content of oil from the seeds.

Research done in Romania and abroad on the productivity of sunflower fitosystem has also had in view the effect of the genetic material and of nutrition space, factors which have a very important role, influencing the value of production. Olewe V.I.O. (2005) present the fact that the density of plants on the surface unit influences production and productivity elements.

MATERIALS AND METHODS

During 2010 spring, on a cambic chernozem soil type within Ezăreni-Iasi farm a trifactorial experience was established by the method of subdivided parcels in four repetitions.

The three factors investigated were:

Factor - 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 - density seeding with 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 (Romanian) c2 - Performer (Romanian)

c3 - PR63A90 (Pioneer) c4 - PR64A83 (Pioneer)

Corn was used as a pre-plant, which allowed an autumn plowing performed under optimal conditions, releasing the land earlier, at a depth of 25-30 cm.

RESULTS AND DISCUSSION

The 2009-2010 crop year presented good conditions reported in the annual average precipitation recorded at Miroslava meteorological station, the values being above the average. The amount of the annual rainfall exceeded the annual average over 39.4 mm. During the growing season of sunflower, the rainfall was lower with 9.4mm than the annual average.

Moreover, the agricultural year 2009-2010 proved to be a year with temperatures higher than the annual average, from time to time, during the summer months, heat periods being also recorded. The yearly average temperature of 9.6^{o}C was exceeded by 1.5 C, which shows a global warming trend. During the sunflower growing, temperatures exceeded the annual average by 2.36^{o}C.

During the performed laboratory tests to determine the specific hectoliter mass, it was observed that the highest value of this timer occurred in N_{120} P_{60} K_{120} fertilization with 41.84 kg / hl (tab. 1); at the density of 40.000 pl / ha a value of 40.5 kg / h of the hectoliter mass was recorded (tab. 2); the Performer hybrid recorded 41.2 kg / hl, the largest mass per storage volume (tab. 3).

Mass per storage volume increased with the increasing of the fertilizer dose, reaching a maximum of 41.84 kg/hl, with 2.31 kg/hl in addition to the stander-by, in case of fertilization variant $N_{120}P_{60}K_{120}$.

Table 1

Influence of fertilization on the hectoliter mass in 2010

Fertilization	MH (Kg / hl)	% percent compared to the stander-by	Difference (kg / hl)	Significance
$N_0P_0K_0$	39, 53	100, 0	Mt.	-
$N_{32}P_{24}K_{48}$	39, 98	101.1	0,45	Xxx
$N_{64}P_{36}K_{72}$	40, 40	102.2	0,87	Xxx
$N_{96}P_{48}K_{96}$	40, 62	102.7	1,09	Xxx
$N_{120}P_{60}K_{120}$	41, 84	105.8	2,31	Xxx
DL 5%	0,1 kg / hl			
DL 1%	0,15 kg / hl			
DL 0,1%	0,2 kg / hl			

Table 2

The density influence on the hectoliter mass in 2010

Density pl / ha	MH (Kg / hl)	% percent compared to the stander-by	Difference (kg / hl)	Significance
40,000	40,5	100	Mt.	
55,000	40,2	99,2	-0,3	ooo
70,000	40,0	98,7	-0,5	ooo
DL 5%	0.10 kg/hl			
DL 1%	0.15 kg/hl			
DL 0, 1%	0.20 kg/hl			

Statistically, the mass per storage volume recorded differences in the density of minus 55 to 70 000 plants / ha.

Table 3

The hybrid influence on hectoliter mass in 2010

Hybrids	MH (Kg / hl)	% percent compared to the stander-by	Difference kg / hl compared to the stander-by	Significance
Favorite	39, 9	100, 0	Mt.	
Performer	41, 2	103.2	1,3	xxx
PR63A90	38, 9	97.4	-1,0	ooo
PR64A83	41, 1	103, 0	1 to 2	xxx
DL 5%	0,10 kg / hl			
DL 1%	0,15 kg / hl			
DL 0,1%	0,20 kg / hl			

Among the sunflower hybrids there were some differences in terms of mass per storage volume. The largest mass per storage volume was recorded in Performer hybrid, with 41.2 kg / hl, followed by PR64A83, with 41.1 kg / hl and the lowest hybrid PR63A90 with 38.9 kg / hl.

The interaction of several factors may have different reactions of the mass of 1000 grains, thus the evolution of the mass of 1000 grains was followed after the interaction between fertilization and density. (tab. 4).

Regarding the effects that the density x fertilizer interaction has on the mass of 1000 grains, significant variations of the MMB are being observed, both based on the used variants of fertilization and the density of plants / ha.

Table 4

The effect of the fertilization interaction x densities on the MMB in 2010

Fertilization	Densities pl / ha	MMB (g)	% percent compared to the stander-by	Difference (g)	Significance
$N_0P_0K_0$	40,000	56,97	100, 00	Mt.	-
	55,000	57,65	101, 19	0,68	
	70,000	57,12	100, 26	0,15	
$N_{32}P_{24}K_{48}$	40,000	60,07	105, 44	3,10	xxx
	55,000	58,67	102, 98	1,70	xxx
	70,000	57,70	101, 28	0,73	
$N_{64}P_{36}K_{72}$	40,000	59,75	104, 87	1,04	x
	55,000	59,17	103, 86	2,19	xxx
	70,000	58,47	102, 63	1,50	xxx
$N_{96}P_{48}K_{96}$	40,000	59,07	103, 68	2,35	xxx
	55,000	58,45	102, 60	2,10	xxx
	70,000	58,42	102, 54	1,45	xx
$N_{120}P_{60}K_{120}$	40,000	59,75	104, 87	2,78	xxx
	55,000	58,02	101, 84	1,05	x
	70,000	56,90	99, 87	-0, 07	
DL 5%	0.8 g				
DL 1%	1.1 g				
DL 0,1%	1.5 g				

Thus, in case of fertilization variant $N_{32}P_{24}K_{48}$ x 40000 pl/ha the highest 1000 grain weight of 60.07 g was obtained.

CONCLUSIONS

1. Physical analyzes on sunflower achenes showed an increase of a thousand grain weight and a hectoliter mass from the stander-by version; the fertilization with $N_{32}P_{24}K_{48}$ at the density of 40,000 pl/ha caused the greatest mass of 1,000 grains of 60,07 g;

2. Mass per storage volume was positively influenced by fertilization and hybrid density, the greatest mass per storage volume occurred in $N_{120}P_{60}K_{120}$ fertilization with 41.84 kg/ha; at the density of 40,000 pl/ha 40.5 kg/ha were registered; the Performer hybrid recorded 41.2 kg/hl, the largest mass per storage volume.

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