THE INFLUENCE OF MINERAL AND ORGANIC FERTILIZATION UPON THE APPLE TREE YIELD IN INTENSIVE SYSTEM CULTURE IN TIMISOARA

INFLUENȚA FERTILIZĂRII MINERALE ŞI ORGANICE ASUPRA PRODUCȚIEI DE MĂR ÎN SISTEM INTENSIV LA TIMIŞOARA

Olimpia Alina IORDĂNESCU, Casiana MIHUȚ, Aurelia BLIDARIU

Agricultural and Veterinary University of the Banat, Timişoara, Romania
Corresponding author: Casiana Mihuț, e-mail:mihut.casiana@personal.ro

Abstract: *The research made in the fruit trees plantation of Didactic Station in Timisoara cultivated in intensive system observed the growing of apple tree yield after mineral and organic fertilization during three years (2003, 2004, and 2005). The experience was made on the Generos de Voineşti variety grafted on M26 and planted at 2 m distance on the row and 4 m distance between the rows. M26 rootstock, used mainly in super-intensive system, gives to the tree high productions and good quality fruits.*

Rezumat: *Cercetările efectuate în plantația de măr de la Staţiunea Didactică Timişoara în sistem intensiv au urmărit creşterea producţiilor de măr în urma aplicării de îngrăşăminte minerale şi organice în cei trei ani de cercetare, respectiv anii 2003, 2004 şi 2005. Soiul luat în studiu a fost Generos de Voineşti, altoit pe portaltoiul de vigoare mijlocie M_{26} şi plantat la distanța de 2 m pe rând şi 4 m între rânduri. Portaltoiul M_{26} utilizat în special în sistemul superintensiv, este un portaltoi ce imprimă productivitate şi fructe de bună calitate.*

Key words**:** soil, productions, apple culture, intensive system
Cuvinte cheie**:** *sol, producții, cultura mărului, sistem intensiv*

INTRODUCTION

Mineral and organic fertilizers help to increase the fruit yield per hectare according to the applied doses, type of fertilizer (mineral or organic).

Organic fertilizers, which is manure is recommended to be given to the apple trees once at 3 years, late autumn, after stopping of vegetation in a doses of 30-40t/ha. That is why we have given a dose of 20 t/ha manure to the apple trees in the first year of research, in autumn 2003.

MATERIAL AND METHOD

The production was determined theoretically considering the number of fruits on the tree multiplied to the medium weight of fruits. During the next years, the production increased and the determination was made in the same way because the determination by weighting when we harvest has many errors because of the losses and circumvents each year.

The experience is polyfactorial of type 2 x 6, having the following factors:

Factor A – culture system: *a_1 – intensive system (4x2);*
a_2 – super intensive system (4x1).

Factor B – doses of the mineral and organic fertilizers

Factor B has six variants and four repetitions:

b_0 – not fertilized witness (Mt)
b_1 – $N_{70}P_{30}K_0$

b_2 – $N_{100}P_{50}K_{20}$
b_3– $N_{150}P_{100}K_{50}$
b_4 – manure (20t/ha)
b_5 – $N_{50}P_{30}K_{10}$ + manure

RESULTS AND DISCUSSIONS

Giving organic and mineral fertilizers had a great impact upon the increasing of production for each variant. The fertilization level was important for this increasing, being different for each variant and for each culture system.

In intensive system the fruit yield per hectare are presented in tables and figures 1, 2, 3, and 4.

Table 1.

The apple fruit production (t/ha) face to the witness, in the intensive system

Years	Variant	Production (t/ha)	%	Difference production (t/ha)	Signification difference
2003	b_0 - $N_0P_0K_0$	12,500	100		
	b_1 - $N_{70}P_{30}K_0$	12,900	103,20	0,400	-
	b_2 - $N_{100}P_{50}K_{20}$	13,590	108,72	1,090	-
	b_3 - $N_{150}P_{100}K_{50}$	13,850	110,80	1,350	-
	b_4 - g.g.	14,078	112,63	1,578	*
	b_5 - g.g.+$N_{50}P_{30}K_{10}$	14,251	114,01	1,751	**
2004	b_0 - $N_0P_0K_0$	11,700	100		
	b_1 - $N_{70}P_{30}K_0$	12,059	103,07	0,359	-
	b_2 - $N_{100}P_{50}K_{20}$	12,180	104,11	0,480	-
	b_3 - $N_{150}P_{100}K_{50}$	12,370	105,73	0,670	-
	b_4 - g.g.	12,250	104,70	0,550	-
	b_5 - g.g.+$N_{50}P_{30}K_{10}$	12,404	106,02	0,704	-
2005	b_0 - $N_0P_0K_0$	11,821	100		
	b_1 - $N_{70}P_{30}K_0$	12,139	102,69	0,318	-
	b_2 - $N_{100}P_{50}K_{20}$	12,940	109,47	1,119	-
	b_3 - $N_{150}P_{100}K_{50}$	13,042	110,33	1,221	*
	b_4 - g.g.	13,073	110,59	1,252	*
	b_5 - g.g.+$N_{50}P_{30}K_{10}$	13,099	110,81	1,278	*

DL 5% = 1.200 **DL 1% = 1.710** **DL 0.1% = 2.501**

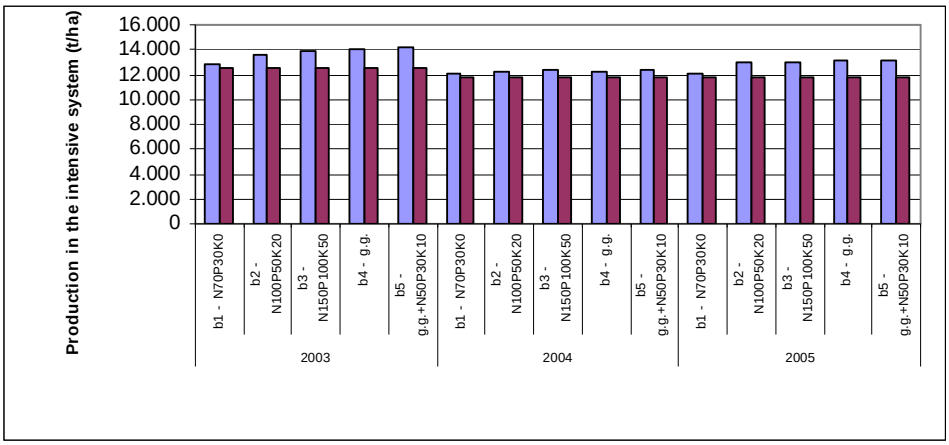

Fig. 1. The apple fruit production (t/ha) face to the witness, in the intensive system

In 2003 the highest yields were obtained in variant b5, which is 14.25 t/ha, having a difference of 1.751 t/ha bigger than the witness, the productions obtained in variant b5 being distinct significant positive than the witness. Higher productions were obtained in variant b4, which had 14.078 t/ha with a difference of 1.578 t/ha bigger than the witness, which had a production of 12.500 t/ha. Variant b4 had a production significant positive towards the witness and this thing happened because of the climatic conditions of the year 2003 and because of the manure given in autumn 2002, variants b4 and b5 being fertilized with organic fertilizers (b4) and organic and mineral fertilizers in higher doses.

In 2004, higher productions were obtained in variant b5 of 12.404 t/ha with a difference of 0.704 t/ha and in variant b3 of 12.370 t/ha with a difference of 0.670 t/ha bigger than the witness variant, which had a production of 11.700 t/ha.

In 2005, the highest productions were obtained for variants b5, b4 and b3, and the lowest in variant b1. In variant b5 the production was of 13.099 t/ha with a difference of 1.278 t/ha bigger than b0, variant b4 had a production of 13.073 t/ha with a difference of 1.252 t/ha and variant b3 had a production of 13.042 t/ha with a difference of 1.221 t/ha than the witness variant, which had a production of 11.821 t/ha. All the three variants have a significant positive difference to the witness.

The highest productions were obtained in 2003, than in 2005 and than in 2004 in all the variants.

The medium productions obtained in apple tree in tones per hectare, on the three years of research (2003, 2004, and 2005) are presented in table and figure 2.

In table and figure 2, we can observe that the medium productions obtained during the years 2003-2005 were higher in 2003, then in 2005 comparative to those in 2004. Comparing the productions of the years 2003 and 2004 were observed the following: 12.1607 t/ha in 2004 and 13.528 t/ha in 2003, the difference being of -1.3675 t/ha, which means that the year 2004 had values significant negative than the year 2003. this happened because of the bad climatic conditions in 2004 and because of the fruiting alternation.

Table 2.

The medium productions obtained to the apple (t/ha) in period 2003-2005, in the intensive system

Years	Medium production		%	Difference	Signification
2004 – 2003	12,1607	13,5282	89,89	-1,3675	0
2005 – 2003	12,6857	13,5282	93,77	-0,8424	-
2005-2004	12,6857	12,1607	104,32	0,5251	-

DL 5% = 1.328 DL 1% = 2.198 DL 0.1% = 4.113

In table 3 there was made a comparison of the productions obtained in apple tree according to the experimented variants.

Comparing variants b1 and b5, the productions obtained were significant positive for variant b5 than b1. Between the other variants there were no differences concerning their productions.

The medium productions obtained in apple tree during the three years of research (table and figure 4) were higher in 2003, which is 25.4663 t/ha, than 2004 which had a medium production per hectare of 17.4724 t/ha. The year 2004 had a difference of -7.9939 t/ha than the year 2003, being a significant negative difference.

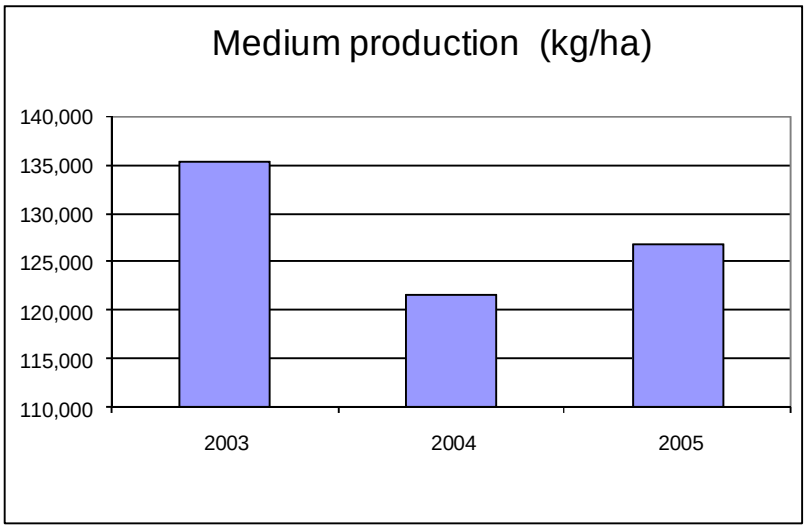

Fig. 2. The medium productions obtained to the apple (t/ha) in period 2003-2005, in the intensive system

Table 3.

The apple fruit production compare to variant in the intensive system

Variants		Medium production (t/ha)	%	Difference production	Signification
b_0 - $N_0P_0K_0$		12,007	100	-	-
b_1 - $N_{70}P_{30}K_0$		12,366	102,99	0,359	-
b_2 - $N_{100}P_{50}K_{20}$	b_0 -$N_0P_0K_0$	12,904	107,47	0,897	*
b_3 - $N_{150}P_{100}K_{50}$		13,087	109,00	1,080	*
b_4 - g.g.		13,134	109,38	1,127	**
b_5-g.g.+$N_{50}P_{30}K_{10}$		13,251	110,36	1,244	**
b_1 - $N_{70}P_{30}K_0$		12,366	100	-	-
b_2 - $N_{100}P_{50}K_{20}$	b_1-$N_{70}P_{30}K_0$	12,904	104,35	0,537	-
b_3 - $N_{150}P_{100}K_{50}$		13,087	105,83	0,721	-
b_4 - g.g.		13,134	106,21	0,768	-
b_5-g.g.+$N_{50}P_{30}K_{10}$		13,251	107,16	0,885	*
b_2- $N_{100}P_{50}K_{20}$	b_2- $N_{100}P_{50}K_{20}$	12,904	100	-	-
b_3 - $N_{150}P_{100}K_{50}$		13,087	101,42	0,184	-
b_4 - g.g.		13,134	101,78	0,230	-
b_5-g.g.+$N_{50}P_{30}K_{10}$		13,251	102,70	0,348	-
b_3 -$N_{150}P_{100}K_{50}$	b_3 -$N_{150}P_{100}K_{50}$	13,087	100	-	-
b_4 - g.g.		13,134	100,36	0,047	-
b_5-g.g.+$N_{50}P_{30}K_{10}$		13,251	101,26	0,164	-
b_4 - g.g.	b_4 - g.g.	13,134	100	-	-
b_5-g.g.+$N_{50}P_{30}K_{10}$		13,251	100,90	0,118	-

DL 5% = 0.807 DL 1% = 1.088 DL 0.1% = 1.444

Out of the data in the table above we can see an increase of the productions in variants b5 and b4, being distinct significant positive than the witness variant, variants b2 and b3 being only significant positive than b0.

Table 4.

The medium productions obtained to the apple (t/ha), in period 2003-2005, in the super intensive system

Years	Medium production		%	Difference	Signification
2004 – 2003	17,4724	25,4663	68,61	-7,9939	000
2005 – 2003	22,2241	25,4663	87,27	-3,2422	00
2005-2004	22,2241	17,4724	127,20	4,7517	***

DL 5% = 1.251 DL 1% = 2.070 DL 0.1% = 3.87

The medium productions obtained in 2003 had a difference of 3.2422 t/ha than those obtained in 2005, the year 2005 being distinct significant negative than the year 2003.

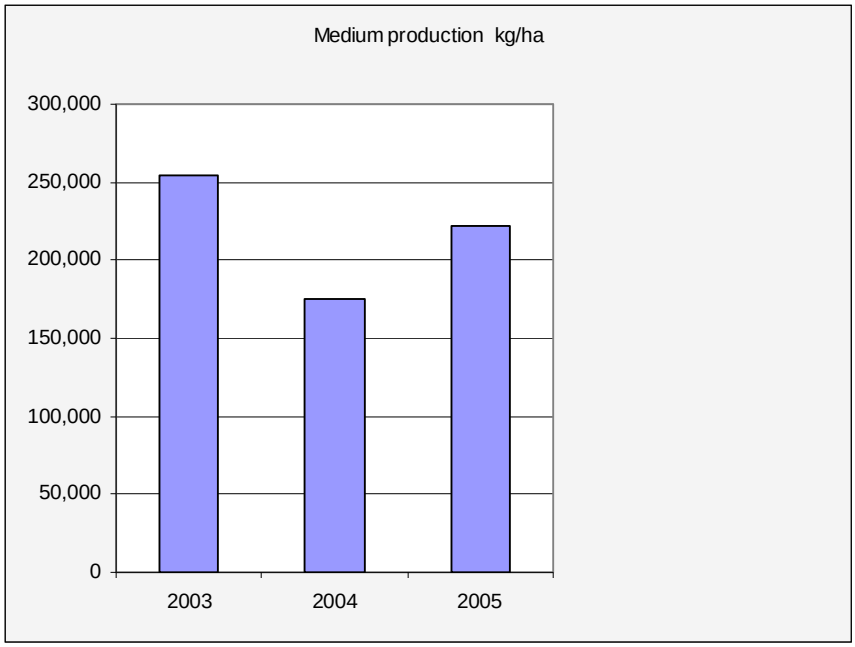

Fig. 4. The medium productions obtained to the apple (kg/ha), in period 2003-2005, in the super intensive system

The medium productions obtained in 2004 were of 17.4724 t/ha than those obtained in 2005, which were of 22.2241 t/ha, the year 2005 having a positive difference of production of 4.7517 t/ha than the year 2004, the productions of the year 2005 being very significant positive than those in the year 2004.

CONCLUSIONS

After the research made on the cambic, batigleic, ortocalcic chernozem in the apple tree plantation of Didactic Station Timisoara during the years 2003-2005 we observed the following:

1. The fruit yield oscillated between 12.059 t/ha in 2004 in variant b1 and 14.251 t/ha in 2003 variant b5, than 11.821-12.500 t/ha that were obtained in the witness variant.

2. The medium yield/hectare in intensive system were of 12.1607 t/ha in 2004; 13.5282 t/ha in 2003 and 12.6857 t/ha in 2005, the year 2004 being significant negative than the year 2003.

3. The highest productions were obtained for variants b5 and b3 and the lowest productions were obtained for variant b1.

4. Higher productions were obtained in 2003, than 2005 and 2004.

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