THE INFLUENCE OF MANUAL THINNING UPON THE PRODUCTIVITY OF SOME APPLE TREE VARIETIES IN THE CONDITIONS OF BANAT'S PLAIN AREA

INFLUENȚA RĂRIRII MANUALE ASUPRA PRODUCTIVITĂȚII UNOR SOIURI DE MĂR ÎN CONDIȚIILE DE ŞES ALE BANATULUI

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Abstract. *Fruit thinning is the most efficient method of controlling the fruits qualities being done in different development stages of fruits and by different means. Manual thinning is normally done after the physiological fall of fruits in order to improve the physical and chemical features of fruits. It is recommended to leave only one fruit in the fruit group, so that there will be a distance of 12 to 20 cm between the fruits and to have enough space of nutrition. This operation has to be done very carefully and there are always removed injured and damaged fruits, leaving the healthy ones on the branches. In this article there is presented the impact of manual thinning of three apple varieties cultivated in conditions of Timisoara: Generos, Florina and Jonathan, upon the fruits' weight and production. The thinning was done in June, after the physiological fall of apples, leaving only one apple in the group. Out of the collected data we can say that the manual fruit thinning definitely has an impact upon fruits' qualities (weight), but it does not influence too much the fruit production.*

Key words: apple, fruit thinning, fruits' qualities, fruit production.

Rezumat. *Rărirea fructelor este cea mai eficientă metodă de controlare a calității fructelor, fiind realizată în diferite stadii de dezvoltare a fructelor prin diferite procedee. Rărirea manuală se realizează în mod normal după căderea fiziologică a fructelor cu scopul de a îmbunătății proprietățile fizice şi chimice ale acestora. Se recomandă lăsarea unui singur fruct în inflorescență, astfel încât să rămână o distanță de 12 până la 20 cm între fructe şi acestea să aibă spațiu de nutriție suficient. Această operațiune trebuie realizată cu mare atenție şi se înlătură întotdeauna fructele vătămate sau atacate de boli şi dăunători, lăsându-se pe ramuri doar fructele sănătoase. În lucrarea de față am prezentat influența răririi manuale a trei soiuri de măr cultivate în condițiile Timişoarei: Generos, Florina şi Jonathan, asupra greutății fructelor şi a producției. Rărirea s-a realizat în luna iunie, după căderea fiziologică a merelor, lăsând doar un măr în inflorescență. După datele colectate putem afirma faptul că rărirea manuală a fructelor are influență asupra calității fructelor (greutatea), însă nu influențează prea mult producția de fructe.*

Cuvinte cheie: măr, rărirea fructelor, calitate fructe, producție

INTRODUCTION

The fruit thinning is an important method of controlling and improving fruits' physical and chemical qualities, being done by different means. The manual thinning of apples is done normally in June, after the physiological fall of fruits, eliminating the damaged and injured fruits and leaving one healthy fruit in the group.

Luckwill (1978) did the correlation between the seasonal changes of gibberellins quantities extracted from seeds and the effect of flowering intensity decrease in the fallowing year of thinning.

Zatyko (1970) concluded that in some years the harvesting moment of winter apple varieties has a significant impact upon flowering and fruiting of next year, being in favor of the fruit trees that were thinned (cited by Gonda I. 2003).

MATERIAL AND METHOD

The experiment was made in the Didactic Plantation of the Fruit Tree Culture Department in our University, in the specific ecological and pedological conditions of the area, during the years 2006-2008.

The biological material consisted in 3 apple tree varieties: Generos, Florina and Jonathan cultivated under identical technologies.

The varieties are in the didactic plot cultivated with apple tree varieties, established in 1997, and they are grafted on M106, planted at the distances of 4x2 m and they have a free palmed crown.

The research purpose consisted in observing the impact of apples manual thinning of different intensities upon the productivity of fruits.

The experimental variants were:

- V1 – 50% thinned fruits
- V2 – 25% thinned fruits
- V3 – 30% thinned fruits
- V4 – 40% thinned fruits
- V5 – not thinned (witness)

The collected data was statistically calculated and interpreted, using the variance analyses method.

RESULTS AND DISCUSSIONS

In this article we will present the results obtained concerning two studied parameters: fruits' weight and the medium production of fruits. At the same time, we will present the average values of the three studied years 2006-2008.

In 2007, the number of apples left on the trees was lower than in the other years, especially for Jonathan variety to which the alternance phenomenon was obvious. In the rest of the years, we can notice that in 2006 the number of fruits left on the trees for Generos and Florina varieties was lower than in 2008, while for Jonathan variety there were more apples in 2006 than in 2008 (table 1).

Table 1

Number of apples left on the trees

Variety	Variant	Year		
		2006	2007	2008
GENEROS	V_1 –50% thinned	93,75	85,50	118,00
	V_2 –25% thinned	140,60	122,60	175,00
	V_3 –30% thinned	131,25	103,00	165,00
	V_4 –40% thinned	112,50	92,00	142,00
	V_5 – not thinned	187,50	143,00	195,00
FLORINA	V_1 –50% thinned	98,00	76,00	102,00
	V_2 –25% thinned	126,00	96,50	163,00
	V_3 –30% thinned	116,00	88,50	136,00
	V_4 –40% thinned	108,50	81,00	118,00
	V_5 – not thinned	138,80	104,00	197,00
JONATHAN	V_1 –50% thinned	128,00	50,00	83,00
	V_2 –25% thinned	201,50	71,00	115,00
	V_3 –30% thinned	172,00	62,00	98,00
	V_4 –40% thinned	145,00	56,00	90,50
	V_5 – not thinned	233,50	75,00	125,00

The average weight of Generos apples in the period 2006-2008 had a value of 120 g for the control variant (V5 not thinned), as for the other variants it can be seen that variant 1 (50% thinned apples) registered a very significant positive difference to the witness (173,5 g – average weight) and variant 4 (40% thinned apples) registered a distinct significant positive difference to the witness (157,3 g – average weight). The average weight of apples in variant 3 was also higher than the witness (142,20 g), but it didn't register any difference to the witness, while variant 2 had the average weight value similar to the witness (122,27 g) (table 2).

Table 2

Average weight (g) of Generos apples 2006-2008

Variant	Medium value	Relative value	Difference to the witness	Significance
V_1 –50% thinned	173,50	144,58	53,50	XXX
V_2 –25% thinned	122,27	101,88	2,27	-
V_3 –30% thinned	142,20	118,50	22,20	-
V_4 –40% thinned	157,30	131,08	37,30	XX
V_5 – not thinned	120,00	100	0	wt

DL 5% = 24,17 DL 1% = 35,16 DL 0,1% = 52,74

During the period of 2006-2008 the average weight of Florina apples registered values higher than the witness that was not thinned. Variant 1, where 50% of apples, were thinned had the biggest apples, which had an average weight of 151,20 g and a very significant positive difference to the witness V1 (92,53 g). Variant 4 (40% thinned) had a value of 128,73 g and variant 3 (30% thinned) of

111,53 g, both of the variants having a very significant positive difference to the witness. In the variant where the thinning was done only in percentage of 25 (V2) the average weight of the three studied years was also higher than the witness (106,80 g), but it had only a distinct significant positive difference to the control (table 3).

Table 3

Average weight (g) of Florina apples 2006-2008

Varianta	Valoarea medie	Valoarea relativă	Diferența față de martor	Semnificația
V_1 –50% thinned	151,20	163,40	58,67	XXX
V_2 –25% thinned	106,80	115,41	14,27	XX
V_3 –30% thinned	111,53	123,77	22,00	XXX
V_4 –40% thinned	128,73	139,12	36,20	XXX
V_5 – not thinned	92,53	100	0	wt

DL 5% = 9,23 DL 1% = 13,43 DL 0,1% = 20,15

For Jonathan apples the average weight in the period 2006-2008 had a value of 112,88 g (V5 the witness not thinned). Variant 1 (50% thinned apples) and variant 4 (40% thinned apples) registered a very significant positive difference to the witness (V1-158 g; V4-146,5 g average weight), while variant 3 (30% thinned apples) had significant positive difference to the witness (132,53 g). Thought the average weight of variant 2 was higher than the witness, it did not register any difference to it (table 4).

Table 4

Average weight (g) of Jonathan apples 2006-2008

Variant	Medium value	Relative value	Difference to the witness	Significance
V_1 –50% thinned	158,00	139,97	45,12	XXX
V_2 –25% thinned	120,97	107,16	8,09	-
V_3 –30% thinned	132,53	117,41	19,66	X
V_4 –40% thinned	146,50	129,78	33,62	XXX
V_5 – not thinned	112,88	100	0	wt

DL 5% = 14,27 DL 1% = 20,76 DL 0,1% = 31,14

Concerning the production of Generos variety, we can see in table 4 that variants 1 (50% thinned apples) and 2 (25% thinned apples), even though they had larger fruits than the witness, had a lower production than the witness registering a significant negative difference to the witness (V1 – 17,17 kg/tree; V2 – 17,65 kg/tree). The other variants had no difference to the witness (table 5).

Table 5

Average production (kg/tree) of Generos apple tree variety 2006-2008

Variant	Medium value	Relative value	Difference to the witness	Significance
V_1 –50% thinned	17,17	82,77	- 3,57	0
V_2 –25% thinned	17,65	85,11	- 3,09	0
V_3 –30% thinned	18,91	91,19	- 1,83	-
V_4 –40% thinned	18,14	87,44	- 2,60	-
V_5 – not thinned	20,74	100	0	wt

DL 5% = 3,07 DL 1% = 4,47 DL 0,1% = 6,71

Florina variety had an average production in the studied period 2006-2008 of 13,45 kg/tree in the not thinned variant (V5). The production of the other variants where thinning was done is close the one of the witness so there were no differences to it. Anyway, the highest average production was obtained for variant 1 (50% thinned apples) of 13,89 kg/tree, followed by variant 2 (13,60 kg/tree). Variants 3 and 4 had the lowest value for the average production, which is 13,18 kg/tree and 13,16 kg/tree (table 6).

Table 6

Average production (kg/tree) of Florina apple tree variety 2006-2008

Varianta	Valoarea medie	Valoarea relativă	Diferența față de martor	Semnificația
V_1 –50% thinned	13,89	103,27	0,44	-
V_2 –25% thinned	13,60	101,11	0,15	-
V_3 –30% thinned	13,18	97,99	- 0,27	-
V_4 –40% thinned	13,16	97,81	- 0,29	-
V_5 – not thinned	13,45	100	0	wt

DL 5% = 1,71 DL 1% = 2,50 DL 0,1% = 3,75

The average production of Jonathan variety in the period 2006-2008 registered the highest value in the control variant (V5 not thinned – 16,15 kg/tree) and it was fallowed by variant 2 (25% thinned apples – 15,39 kg/tree). The lowest production was obtained in variant 1 (50% thinned apples – 13,60 kg/tree). The other two variants (V3 and V4) had productions of over 14 kg/tree. Anyway, no variant registered any difference to the witness (table 7).

Table 7

Average production (kg/tree) of Jonathan apple tree variety 2006-2008

Variant	Medium value	Relative value	Difference to the witness	Significance
V_1 –50% thinned	13,60	84,21	- 2,55	-
V_2 –25% thinned	15,39	95,25	- 0,77	-
V_3 –30% thinned	14,54	89,99	- 1,62	-
V_4 –40% thinned	14,20	87,88	- 1,96	-
V_5 – not thinned	16,15	100	0	wt

DL 5% = 3,49 DL 1% = 5,08 DL 0,1% = 7,63

CONCLUSIONS

Out of the presented data we can clearly see that the thinning of fruits does not influence too much the production, but it has a big impact upon the fruits physical qualities, that is the weight.

Even if in the control variant (V5 – not thinned) the number of apples left on the trees was higher they had a smaller weight, but the production was also higher. On the trees where there were left fewer apples they were larger, more attractive for the consumer, but the production was smaller than the one of the witness.

Only in the case of Generos apple tree variety we could notice that on the variants where the thinning was more severe and the apples had higher weights, the production registered negative significations to the witness.

Jonathan variety had an alternant production, which was larger in 2006 and 2008 than in 2007, while Florina variety had similar productions in each year.

The largest weight of apples was observed for all three varieties in case of variants 5 and 4 (V5 – 50% thinned apples; V4 – 40% thinned apples) that registered very significant positive differences to the witness.

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