FRUIT SIZE IMPROVEMENT OF 'ÚJFEHÉRTÓI FÜRTÖS' SOUR CHERRY CULTIVAR BY THINNING

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ABSTRACT

Yield efficiency per unit of trunk cross-sectional area (TCSA), of 20% bud and blossom thinned trees significantly increased compared with untreated control. While the yield decreased with increasing the severity of thinning. Significant decreases were found between the yield efficiency per unit of TCSA, tree volume and surface area for the hand thinned treatment by 50% and 80% of bud and flowers in compare with untreated control treatment. Fruit weight and diameter increase linearly with increasing the severity of thinning. Fruits from trees thinned at 80% bud had significantly higher soluble solids compared to those thinned at 20% and 50% of buds and flowers, and in compare with unthinned control trees. However, fruits from 80% bud thinned trees had significantly higher soluble solids than control and 50% bud and flower thinning.

INTRODUCTION

'Újfehértói fürtös' sour cherry cultivar is the most extended cultivar in Hungary. According to Nyéki et.al [8], 'Újfehértói fürtös' is a sour cherry cultivar that produces small fruit with low self-fertility (5%) and the fruit set by open pollination is about 24.5%. High crop load reduced fruit size and quality. Crop load management by chemical or manual removal of blossoms or fruit has been shown to improve fruit quality in peach [2], wine grapes [10], apple [3], plum [11], and oranges [5]. Advantage of early thinning is that fruits ripen sooner [4]. However, thinning too early, i.e. blossom thinning reduces both fruit set and yield [12]. Generally, flower thinning is more effective in producing better quality of fruits compared to late fruit thinning [12].

Standard orchard management practices with highly productive rootstocks tend to result in high yields of small fruit [1,7,8].

Generally there are few available litterateurs that quantify the relationship between crop load, advantages of fruit thinning, fruit quantity and quality of sour cherry cultivars. The objective of this research was to investigate how sour cherry fruit size, fruit growth dynamic on tree, total yield, and fruit quality are affected by blossom and flower hand-thinning treatments.

MATERIALS AND METHODS

10 years-old of 'Újfehértói fürtös' sour cherry cultivar on *Prunus mahaleb* were selected. Non-thinned control and hand thinned by removing swollen fruit buds and opened flowers by 20, 50 and 80% throughout the whole of 12 similar tree canopies were studied. Weekly 100 randomly sampled fruit were evaluated for diameter of fruit growth dynamic on the trees and weekly 30 fruits per treatment were collected and immediately transported to the lab for mass

fruit growth dynamic, length (mm), flesh and seed weight (g), and dry matter percentage were recorded. At commercial maturity, (2008.07.02.) fruits from each tree were harvested and weighed. Fruit quality, total harvested yield per tree was recorded at commercially harvest time, from each tree.

Data were statistically analyzed, as completely randomized design with 2 replicates (whole canopy of 3 tree) per treatment; Analysis of variance and Duncan's multiple range tests (α = 0.05) were done using MSTATC program.

RESULTS AND DISCUSSION

The yield of 20% bud and 20% blossom thinned trees significantly increased compared with untreated control and other treatments (Table 1) while significant decreases were found between the yield efficiency per unit of TCSA, tree volume and surface area for untreated control treatment and the hand thinned treatment by 50% and 80 % of bud and flowers. Fruits from all treatments of thinned trees were significantly heavier than control. The fruits from 80% thinned trees were 31% heavier in compare to unthinned control. There was no significant difference ($P > 0.05$) in mean fruit weight and diameter between fruits from trees thinned at bud and flower stages. The mean fruit size from 20% bud and blossom-thinned treatment trees was similar to that of 50% flower and significantly bigger than no-thinned control in exception of fruit from trees treated by 20% which was similar to control.

Table 1. The amount of fruits per cross-sectional area, tree volume and surface area.

Treatments (% removed)	Yield efficiency g/surface area m2	Yield efficiency g/ Tree volume (m)3	Yield efficiency g/ cm2 TCSA	Mean fruit weight	Mean fruit diameter	Mean of soluble solids (Brix)
20% Bud	1800	779	22a	4.44	19.28	17.94
50% Bud	877	331	9.3 c	4.99	19.75	17.28
80%- Bud	508	224	8.5 d	5.40	20.15	18.58
20% flower	1967	968	23.9 a	4.96	19.4	17.78
50% flower	662	220	8.6 d	5.22	20.27	17.28
80% flower	749	363	7.9 c	5.56	20.35	17.98
Control	1168	462	13.8 b	4.23	19.35	16.82

Sour cherry fruit growth on the basis of fruit diameter is divided into three stages. A slow-growth stage till 4th and 5th weeks after fruit set (stage I) followed by a rapid increase between 5th and 6th weeks (stage II), and then by an accelerated growth period (stage III). Figure 1. and Figure 2. shows that growth speed of all treatments are the on stage 1 but on stage 2 the growth rate of thinned treatment was faster than unthinned control, also in the 3rd stage the 80% thinned bud and flower has the highest growth rate. It seems that when a cherry tree's blossoms are thinned, less fruit is left on the tree so that the tree can devote more nutrients to develop each cherry into that the larger fruits

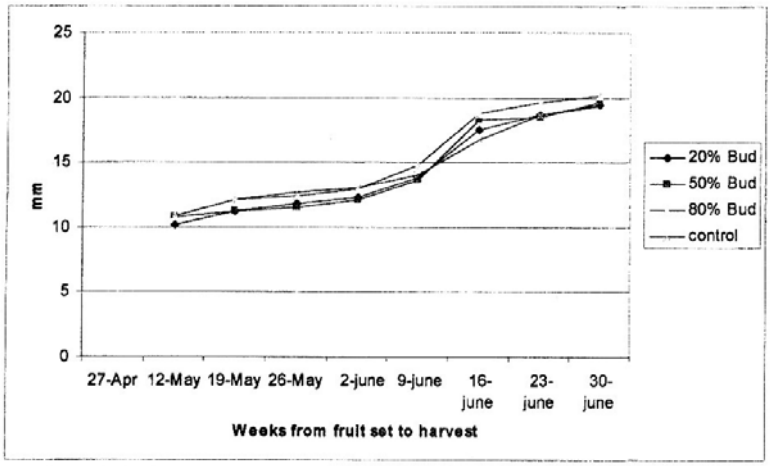

Figure 1. Dynamic of fruit growth on the trees which was tinned at dormant bud stage.

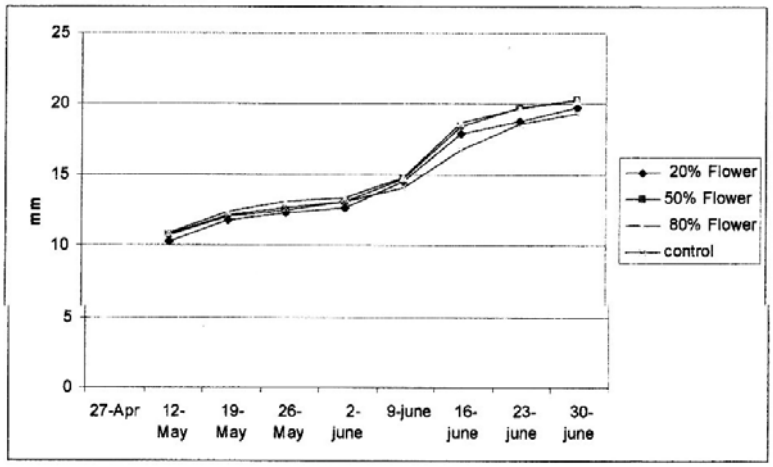

Figure 2. Dynamic of fruit growth on the trees which was tinned at open flower stage.

Soluble solids

Fruits from trees thinned at 80% bud had significantly higher soluble solids compared to those thinned at 20% and 50% of buds and flowers, and in compare with unthinned control trees. However, fruits from 80% bud thinned trees had significantly higher soluble solids than control and 50% bud and flower thinning , but a higher concentration of soluble solids was not specific to kind of thinning (bud or flower) (Table 1).

Fruit firmness

The effect of bud and blossom thinning on flesh firmness was not consistent. In both methods did not affect flesh firmness. The 80% thinning of both bud and flower thinning had less flesh firmness (Figure 3). These results confirm the result obtained by [9] which showed high crop load reduced fruit quality and delayed maturity.

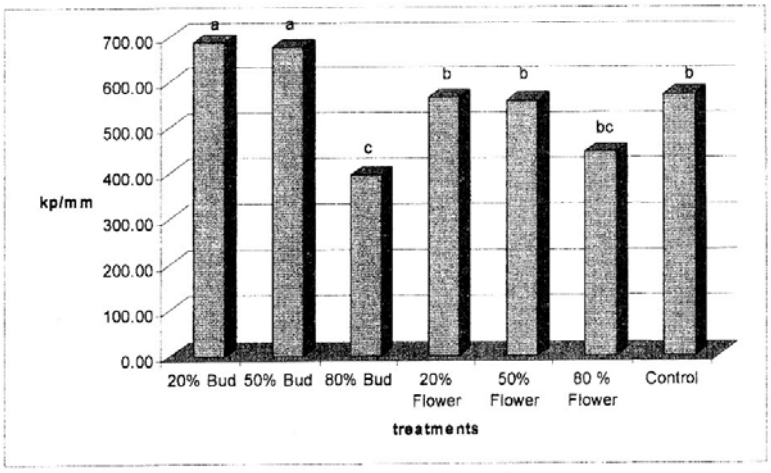

Figure 3. Effects of severity of buds and flowers thinning on the mean of flesh firmness of treated sour cherry fruits.

CONCLUSION

All the treatments registered an increase in weight as well as volume over the controls. The increase in fruit size of treated fruit over controls was due to the reduction in the total crop. The reduction in fruit set and yield is a disadvantage if the increase in fruit size does not translate into increased market value. There are some new large fruit cultivars same as 'Piramis' and 'Érdi bőtermő' which are good for fresh consumption. 'Újfehértói fürtös' is suitable fruit for fresh consumption, but in some years the fruit size is not so desirable and fruit thinning can be profitable. The optimum percent of thinning was 20% of bud or flower thinning. There were no significant differences between dormant buds and flowers thinning. It is recommended to thin at bud stage, because it is easier.

However, in the basis of literature earlier tinning (bud) is more effective in producing better quality of fruits compared to later (flower) thinning, but our results don't shows significant differences between bud and flower thinning. Hand thinning of whole canopy of sour cherry trees is not recommended because hand thinning is expensive as well as impracticable due to non-availability of labours.

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